Belle River Wind Project
Bird and Bat Environmental Effects Monitoring Plan

Prepared for:
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Aquatic, Terrestrial and Wetland Biologists

Belle River Wind Project
Bird and Bat Environmental Effects Monitoring Plan

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1.0 Purpose of the Environmental Effects Monitoring Plan

An environmental effects monitoring plan (EEMP) must be prepared to address negative environmental effects that may result from engaging in a renewable energy project. The EEMP must set out:

- Performance objectives in respect of the negative environmental effects,
- Mitigation measures to assist in achieving the performance objectives, and
- A program for monitoring negative environmental effects for the duration of the time that the project is engaged in, including a contingency plan to be implemented if any mitigation measures fail.

Furthermore, all Class 3 and 4 wind facilities must prepare an EEMP in respect of birds and bats in accordance with the following publications of the Ministry of Natural Resources and Forestry (MNRF):

- Bats and Bat Habitats: Guidelines for Wind Power Projects (OMNR 2011a)
- Birds and Bird Habitats: Guidelines for Wind Power Projects (OMNR 2011b)

This post-construction monitoring plan is one component of the EEMP submitted to the Ministry of the Environment and Climate Change (MOECC) as part of the Renewable Energy Approval (REA) Application for the project. This document has been prepared in accordance with O. Reg. 359/09, MNRF's Bats and Bat Habitats: Guidelines for Wind Power Projects (July 2011) and MNRF's Birds and Bird Habitats: Guidelines for Wind Power Projects (December 2011).

2.0 Project Overview

Natural Resource Solutions Inc. (NRSI) was retained in April 2014 by AECOM, on behalf of SP Belle River Wind LP, by its general partner, SP Belle River Wind GP Inc. (Belle River Wind), to conduct a Natural Heritage Assessment (NHA) in accordance with the Renewable Energy Approval (REA) Regulation, Ontario Regulation (O.Reg.) 359/09. This assessment includes a records review, site investigation, evaluation of significance, and impact assessment of any potentially significant natural features or wildlife habitats at the proposed Belle River Wind Project.

The Belle River Wind Project ('the Project') is being proposed by Belle River Wind, a joint venture limited partnership owned by affiliates of Pattern Renewable Holdings Canada ULC (Pattern Development) and Samsung Renewable Energy Inc. (Samsung Renewable Energy). Belle River Wind is proposing to develop a wind project in the Town of Lakeshore in the County of Essex, Ontario. The Project will be located south of the community of Belle River, and is generally bounded by County Road 42 to the north, Lakeshore Road 111 to the west, Highway 401 and South Middle Road to the south, and Comber Sideroad to the east. The Project will be located primarily on privately owned land with some components (e.g., electrical collector lines) being placed along public right-of-ways, none of which are proposed on provincial Crown land. The installation of up to 44 operational wind turbines is proposed for this wind energy generating facility, totaling 100 megawatts (MW).

The Belle River Wind Project will consist of the following permanent infrastructure:

- Wind turbines
- Access roads
- Collector lines (underground and overhead cabling are both being considered)
- Collector substation
- Transmission line
- Point of interconnection (POI)
- Operations and maintenance (O&M) building
- Meteorological and microwave towers

The Belle River Wind Project will consist of the following temporary infrastructure:

- Laydown areas
- Crane pads
- Construction staging area
- Construction disturbance areas

As identified in O.Reg. 359/09, the proposed layout of these project components is collectively referred to as the 'project location'. For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the 'project area'. See Map 1 for an illustration of the project area and natural features.

In accordance with the REA Regulation, NRSI has developed a monitoring program, which is outlined in this report, to assess the potential environmental impacts in respect of birds and bats that may result from engaging in the Belle River Wind Project. This monitoring program has been developed as a follow-up to the Belle River Wind Project Natural Heritage Assessment: Environmental Impact Study (NH EIS) (NRSI 2015).

3.0 Post-Construction Monitoring for Significant Wildlife Habitats

The Belle River Wind Project NHA (NRSI 2015) received confirmation by the MNRF's Regional Operations Division on May 29, 2015 (refer to Appendix I). As part of this confirmation, many wildlife habitats have been treated as significant with a commitment for additional pre-construction surveys to be undertaken during the appropriate season prior to any construction activities. In addition to these significant wildlife habitats which require monitoring, the REA Regulation requires that bird and bat post-construction mortality monitoring be conducted at all Class 4 wind facilities. Table 1 below provides a summary of potential negative impacts to bird and bat habitats as per the Belle River Wind Project NHA (NRSI 2015), with the exception of post-construction mortality monitoring, which is detailed separately in Section 4.0 of this report.

Table 1. Summary of Wildlife Habitats Treated as Significant for the Belle River Wind Project

Habitat Type	Feature ID	Potential Operational Impacts
Bat Maternity Colony	BMA-001	• Habitat disturbance and/or avoidance behavior. • Direct mortalities through collisions with operational turbines.
Raptor Wintering Area	RWA-001 RWA-002	• Habitat disturbance and/or avoidance behavior. • Direct mortalities through collisions with operational turbines.
Marsh Bird Breeding Habitat	MBB-001 MBB-002	• Habitat disturbance and/or avoidance behavior. • Direct mortalities through collisions with operational turbines.
Open Country Bird Breeding Habitat	OCB-001	• Habitat disturbance and/or avoidance behavior. • Direct mortalities through collisions with operational turbines.
Bird Species of Conservation Concern:		
Eastern Wood-Pewee Habitat	EWP-002 (SCC-P) EWP-003 (SCC-N) EWP-004 (SCC-S) EWP-006 (SCC-A) EWP-007 (SCC-H) EWP-008 (SCC-K)	• Habitat disturbance and/or avoidance behavior. • Direct mortalities through collisions with operational turbines.
Wood Thrush Habitat	WTH-001 (SCC-N) WTH-002 (SCC-A)	

The location of wildlife habitat treated as significant is mapped on Map 2. The potential negative environmental effects, performance objectives, mitigation strategy,

environmental effects monitoring plan, and contingency measures are described in Table 2. The environmental effects monitoring plan for each wildlife habitat treated as significant includes the post-construction survey methods, monitoring locations, frequency and duration of sample collection, technical and statistical value of the data, and reporting commitments.

Table 2. Summary of the Environmental Effects Monitoring Plan for Wildlife Habitats Treated as Significant for the Belle River Wind Project

Feature ID	Distance to Project Location with Operational Impact	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Bird and Bat Environmental Effects Monitoring Plan					Contingency Measure
					Monitoring Methods	Monitoring Locations	Frequency and Duration of Sample Collection ¥	Technical and Statistical Value of Data	Reporting Requirements¥	
BMA-001** Bat Maternity Colony	0-30m Wind Turbine	Avoidance of habitat during operation phase. Direct mortality during operation phase.	Protect bat maternity colony habitat.	Impacts are expected to be minimal, and temporary, in nature, and no specific mitigation measures have been determined necessary Schedule regular (non-critical) maintenance activities to occur outside of the critical roosting period (June), unless specifically required in accordance with manufacturer specifications. Develop post-construction monitoring plan in accordance with MNRF's Bats and Bat Habitats (OMNR 2011a) guidance.*	Monitoring sites will be selected using the criteria outlined in the Bats and Bat Habitats guidelines (OMNR 2011a). A total of 10 suitable cavity trees will be selected within the candidate bat maternity colony habitat since it is less than 10ha in size. Following the Bats and Bat Habitat guidelines (OMNR 2011a), exit surveys will be conducted during the month of June. Observers will choose a viewing station with a clear aspect of cavity opening or crevice. Cavity opening or crevice should be monitored from 30 minutes before dusk until 60 minutes after dusk for evidence of bats exiting. An acoustic bat detector paired with a digital recorder will be used in conjunction with visual surveys to determine species. Each candidate tree will only be monitored once. Night-vision or infrared video equipment may be substituted for observers. Equipment specifications will be provided to the MNRF for confirmation prior to use. Once an evening's monitoring is completed (60 minutes after sunset), the cameras will be collected by the staff members conducting visual surveys in the same candidate significant habitat and the visual recordings for each video recorder will be reviewed for evidence of significant bat roosting activity.	The location of the candidate bat maternity colony habitat can be seen on Map 2. Monitoring locations within this habitat will be determined prior to pre-construction surveys and will be repeated at the same locations during post-construction surveys.	Pre-construction Survey (baseline): 1. Jun 2015 3 years of Post-construction Surveys: 1. Jun 2018 2. Jun 2019 3. Jun 2020	Determine the potential disturbance impact of operational turbines on nearby significant bat maternity roost.	Annual reports or memos summarizing results will be submitted to the MOECC and MNRF following the anticipated schedule below: Pre-construction Survey (baseline): 1. Sept 2015 Post-construction Survey: 1. Feb 2019 2. Feb 2020 3. Feb 2021	If a permanent disturbance has been noted within this wildlife habitat, the MNRF will be contacted to determine whether additional mitigation measures will be needed. If high bat mortality is observed at T19, discuss appropriate mitigation measures with the MNRF.
RWA-001** RWA-002** Raptor Wintering Area	0-30m Wind Turbine and/or Cabling	Noise disturbance/ avoidance behavior. Direct mortalities through collisions with operational turbines.	Protect raptor wintering area habitat. Limit disturbance to raptors overwintering within the project area.	Use underground cabling or single-wooded overhead poles, wherever possible. Minimize use of turbine lighting while maintaining Transport Canada requirements. Schedule regular (non-critical) maintenance activities to occur outside of the peak raptor wintering period (January - February), wherever possible, unless specifically required in accordance with manufacturer specifications. Develop post-construction monitoring plan in accordance with MNRF's Birds and Bird Habitats (OMNR 2011b) guidance.*	NRSI will conduct winter raptor surveys approximately every 7 days, on 4 visits in January 2016 and 4 visits in February 2016. These surveys will be conducted at the 2 candidate raptor wintering areas. Surveys will be carried out during daylight hours, between 9am and 4pm, when raptors are expected to be most visible at potential perching locations. Surveys will be carried out using binoculars and/or a spotting scope. All individuals will be recorded along with information on species, behaviour, movement and time observed. Optimal weather conditions for these surveys are clear, sunny days with little to no precipitation. Surveys will be postponed and re-scheduled if poor weather conditions are encountered, specifically if high winds or heavy precipitation are noted. Where site access is granted, standardized area searches will be conducted following a prescribed route along the woodland edge, searching for perching raptors or other raptor activity indicative of winter foraging areas. Where site access is unavailable, 30 minute visual behavioural point counts will be conducted, along the roadside, which will identify perching/foraging raptors along the woodland/field edge. At the end of January 2016, NRSI will review the results to	The locations of each of the candidate raptor wintering areas can be seen on Map 2. Monitoring locations within these habitats will be determined prior to pre-construction surveys and will be repeated at the same locations during post-construction surveys.	Pre-construction Survey (baseline): 1. Jan-Feb 2016 1 year of Post-construction Surveys: 1. Jan-Feb 2018 If surveys indicate that there is an avoidance effect, an additional 2 years of post-construction monitoring will occur. The need to conduct an additional 2 years of monitoring will be determined in consultation with MNRF.	Determine the potential disturbance impact of wind turbines and overhead cabling on significant raptor wintering areas.	Annual reports or memos summarizing results will be submitted to the MOECC and MNRF following the anticipated schedule below: Pre-construction Survey (baseline): 1. March 2016 Post-construction Survey: 1. Feb 2019	MNRF will be consulted to determine contingency measures. If high avian mortality is observed, appropriate mitigation measures will be discussed with the MNRF.

Feature ID	Distance to Project Location with Operational Impact	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Bird and Bat Environmental Effects Monitoring Plan					Contingency Measure
					Monitoring Methods	Monitoring Locations	Frequency and Duration of Sample Collection ¥	Technical and Statistical Value of Data	Reporting Requirements ¥	
					determine if surveys should continue for the remaining 4 week survey period in February. In the event that none of the 6 indicator species are observed during any of the first 4 visits, NRSI will conclude that these habitats are not significant raptor wintering areas and will discontinue surveys at these locations for the remainder of the monitoring program. In this instance, an email notification to the MNRF will be provided to deliver initial results and confirm the approach to discontinue studies.					
MBB-001** MBB-002** Marsh Bird Breeding Habitat	0-30m Wind Turbine	Noise disturbance/ avoidance behaviour. Direct mortalities through collisions with operational turbines.	Minimize impacts to marsh bird breeding habitat. Minimize marsh bird mortalities from collisions with operational turbines.	Schedule regular (non-critical) maintenance activities to occur outside of the peak marsh bird breeding season (April-June), wherever possible. If regular (non-critical) maintenance must occur during this peak breeding season (April-June), have a biologist confirm birds will not be impacted. Develop post-construction monitoring plan in accordance with MNRF's Birds and Bird Habitats (OMNR 2011b) guidance.*	Surveys will be conducted as per the methods outlined in the NHA (NRSI 2015) and will consist of 15 minute point counts within each candidate significant habitat during the breeding season, and will occur once in each of April, May, and June, no less than 10 days apart. Each survey will be conducted in the evening, occurring no earlier than 4 hours before sunset and ending before dark, when marsh birds are actively nesting in wetland habitats. Each survey will be conducted under near optimal weather conditions, on clear, warm (at least 16°C), evenings, with no precipitation and little or no wind. Point counts will be conducted within the habitat where site access has been granted, or from the property adjacent to the habitat, where site access has not been granted. Each point count will last for 15 minutes, and will be sub-divided into three 5 minute components: a 5 minute passive (silent) observation period, a 5 minute call playback period, and a second 5 minute passive observation period. If candidate significant habitat (shallow water with emergent aquatic vegetation) is determined to be not present on the first site visit of the pre-construction survey, no specific studies will be conducted and the habitat(s) will be confirmed not significant.	The locations of each of the candidate marsh bird breeding habitats can be seen on Map 2. Monitoring locations at these habitats will be determined prior to pre-construction surveys and will be repeated at the same locations during post-construction surveys.	Pre-construction Survey (baseline): 1. Apr-Jun 2015 3 years Post-construction Surveys: 1. Apr-Jun 2018 2. Apr-Jun 2019 3. Apr-Jun2020	Determine the potential disturbance impact of operational turbines on marsh bird breeding habitat.	Annual reports or memos summarizing results will be submitted to the MOECC and MNRF following the anticipated schedule below: Pre-construction Survey (baseline): 1. Sept 2015 Post-construction Survey: 1. Feb 2019 2. Feb 2020 3. Feb 2021	If a permanent disturbance has been noted within this wildlife habitat, consult the MNRF to determine whether additional mitigation measures will be needed. If high avian mortality is observed, discuss appropriate mitigation measures with the MNRF.
OCB-001** Open Country Bird Breeding Habitat	0-30m Wind Turbine	Avoidance of habitat during operation phase Direct mortality through collisions with operational turbines.	Minimize disturbances to breeding success of open country bird species. Minimize open country bird mortalities from collisions with operational turbines.	Schedule regular (non-critical) maintenance activities located within 30m of open country bird breeding habitats to occur outside of the peak breeding bird season (May 1st-July 31st), if possible. If regular maintenance must occur during the breeding bird period (May 1st – July 31st), have a biologist confirm no nests will be impacted by maintenance activities. Develop post-construction monitoring plan in accordance OMNR's Birds	Open country breeding bird point count surveys will be conducted on 3 visits at the one candidate open country bird breeding habitat in June and early July, each no less than 10 days apart, following the Birds and Bird Habitat guidelines (OMNR 2011b). Surveys will be carried out between dawn (half hour before sunrise) and 3 hours after sunrise, during a time period when males are singing and defending territory. The observer will walk along a standardized transect, stopping at each point count to undertake 10 minutes of observations and listening. Optimal weather conditions for these surveys are clear, calm, sunny days with little to no precipitation. During each visit, the highest observed breeding evidence will be recorded for each species. Since there is no direct overlap proposed between the 1 candidate habitat and the project location, indicating a greatly reduced potential for significant or permanent impacts, breeding bird surveys will be conducted through point count locations, each separated by at least 250m to avoid counting the same species multiple times. Point counts will be	The location of the candidate open country bird breeding habitat can be seen on Map 2. Monitoring locations within this habitat will be determined prior to pre-construction surveys and will be repeated at the same locations during post-construction	Pre-construction Survey (baseline): 1. Jun-Jul 2015 3 years Post-construction Surveys: 1. Jun-Jul 2018 2. Jun-Jul 2019 3. Jun-Jul 2020	Determine the potential disturbance impact of operational turbines on open country bird breeding habitat.	Annual reports or memos summarizing results will be submitted to the MOECC and MNRF following the anticipated schedule below: Pre-construction Survey (baseline): 1. Sept 2015 Post-construction Survey: 1. Feb 2019 2. Feb 2020 3. Feb 2021	If a permanent disturbance has been noted within this wildlife habitat, contact the MNRF to determine whether additional mitigation measures will be needed. If high avian mortality is observed, discuss appropriate mitigation measures with the MNRF.

Feature ID	Distance to Project Location with Operational Impact	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Bird and Bat Environmental Effects Monitoring Plan					Contingency Measure
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				and Bird Habitats (OMNR 2011b) guidance*.	strategically placed within the habitat to ensure that surveys will be repeatable during post-construction monitoring, if required. If candidate significant habitat (meadow habitat) is determined to be not present during the first site visit of the pre-construction survey, no specific studies will be conducted and the habitat(s) will be confirmed not significant.	surveys.				
Bird Species of Conservation Concern: EWP-002 (SCC-P) ** EWP-003 (SCC-N) ** EWP-004 (SCC-S) ** EWP-006 (SCC-A) ** EWP-007 (SCC-H) ** EWP-008 (SCC-K) ** Eastern Wood-Pewee Habitat WTH-001 (SCC-N) ** WTH-002 (SCC-A) ** Wood Thrush Habitat	0-30m Wind Turbine	Noise disturbance/ avoidance behavior. Direct mortalities through collisions with operational turbines.	Minimize noise disturbance/avoidance behavior of bird species of conservation concern. Minimize the mortality of bird species of conservation concern from collisions with operational turbines.	Schedule regular (non-critical) maintenance activities located within 30m of significant bird species of conservation concern habitat to occur outside of the peak breeding bird season (May 1st – July 31st), whenever possible. If regular maintenance must occur during the breeding bird period (May 1st – July 31st), have a biologist confirm birds will not be impacted by maintenance activities. Develop post-construction monitoring plan in accordance OMNR's Birds and Bird Habitats (OMNR 2011b) guidance*.	Surveys will consist of 10-minute point count surveys within each of the candidate habitats for bird species of conservation concern in June and early July 2015. Each point count station will be surveyed 3 times during early, mid and late season (spring and early summer) no less than 10 days apart. The number of point counts required depends on the size and habitat diversity at each site. Where more than one point count will be conducted within each candidate habitat, a standardized transect will also be conducted between point count sites. Surveys will be conducted between dawn (one half hour before sunrise) and 3 hours after sunrise. These surveys will occur during a time period when males are busy singing and defending territories. Days with high wind speeds and rain will be avoided. During each visit, the highest observed breeding evidence will be recorded for each species.	The locations of each of the candidate habitats for bird species of conservation concern can be seen on Map 2. Monitoring locations within these habitats will be determined prior to pre-construction surveys and will be repeated at the same locations during post-construction surveys.	Pre-construction Survey (baseline): 1. Jun-Jul 2015 3 years Post-construction Surveys: 1. Jun-Jul 2018 2. Jun-Jul 2019 3. Jun-Jul 2020	Determine the potential disturbance impact of wind turbines on significant habitat for bird species of conservation concern.	Annual reports or memos summarizing results will be submitted to the MOECC and MNRF following the anticipated schedule below: Pre-construction Survey (baseline): 1. Sept 2015 Post-construction Survey: 1. Feb 2019 2. Feb 2020 3. Feb 2021	If considerable, and consistent, disturbance impacts are noted, discuss appropriate mitigation measures directly with the MNRF. If high avian mortality is observed, discuss appropriate mitigation measures with the MNRF.

** The detailed Post-construction Monitoring Plan for bird and bat mortality is provided in Section 4.0 of this report.*
*** Only if these habitats are determined to be significant through pre-construction surveys.*
¥ Actual post-construction monitoring (and reporting) timelines are subject to change if there are modifications to the construction schedule; however, post-construction surveys will occur during the correct seasonality and during the first year following the completion of construction activities.

3.1 Contingency Measures

Where mitigation measures are found to be ineffective, the contingency measure identified in Table 2 will be implemented immediately.

4.0 Post-Construction Monitoring for Bat and Bird Mortality

Post-construction mortality surveys are required for all Class 3 and 4 wind power projects. This Post-Construction Monitoring Plan is one component of the EEMP of the REA application for the Project, and has been prepared in accordance with MNRF's Bats and Bat Habitats: Guidelines for Wind Power Projects (July 2011) and MNRF's Birds and Bird Habitats: Guidelines for Wind Power Projects (December 2011).

4.1 Mortality Thresholds

A threshold approach, consistent with MNRF guidelines, will be used to identify and mitigate significant bat and bird mortality resulting from the operation of wind turbines.

4.1.1 Bats

Bat mortality is considered to be significant when a threshold of annual bat mortality (averaged across the site) exceeds:

- 10 bats/turbine/year

This threshold has been determined based on bat mortality reported at wind power projects in Ontario and through a comparison with other jurisdictions across North America.

4.1.2 Birds

Bird mortality is considered to be significant when a threshold of annual bird mortality exceeds:

- 14 birds/year at individual turbines or turbine groups,
- 0.2 raptors/turbine/year (all raptors) across a wind power project, or
- 0.1 raptors/turbine/year (provincially tracked raptors) across a wind power project.

Provincially tracked raptors are defined as raptors of provincial conservation concern by MNRF's Natural Heritage Information Centre (NHIC), and include those considered as a species of Special Concern in Ontario or with a provincial status of S1-S3, indicating sensitive populations within Ontario.

4.2 Post-Construction Monitoring Methods

Post-construction bat and bird mortality surveys estimate bird and bat mortality from wind turbines and may identify species and specific periods of high mortality. This knowledge can be used to evaluate the success of mitigation measures, establish protocols for operational mitigation, and inform adaptive management.

Bat and bird mortality surveys identify the number of bats or birds killed per turbine over a known period of time (expressed as bats/turbine/year or birds/turbine/year). This value represents an estimate of bat and bird mortality adjusted for carcass removal rates, searcher efficiency, and percent area searched. Standard methods for mortality surveys are identified below.

For bats and birds, a monitoring year is considered to be from May 1 – October 31, and continues until November 30 specifically for raptor monitoring. Bat and non-raptor bird mortality data collected during the weekly raptor survey period in November will not be included in detailed bat and bird mortality estimates.

Post-construction monitoring is required for 3 years at all Class 3 and 4 wind power projects. Post-construction monitoring will consist of:

- Regular bat/bird mortality surveys around specific wind turbines,
- Monitoring of bat/bird carcass removal rate by scavengers (or other means),
- Monitoring of bat/bird searcher efficiency (i.e. number of bat/bird fatalities present that are actually detected by surveyors),
- Avoidance-disturbance effects monitoring (where the project is located within 120m of bird/bat significant wildlife habitat),
- For birds, 2 subsequent years of scoped mortality and cause and effects monitoring at individual turbines (and unmonitored turbines in near proximity) following any given year where an annual post-construction mortality report identifies significant bird or raptor mortality, and
- For bird/bats, an additional 3 years of effectiveness monitoring where mitigation is applied.

All searchers will have updated rabies pre-exposure vaccinations, or will follow an alternative safety protocol for minimizing risks associated with potential incidental contact with animals which may have been exposed to the rabies virus.

4.2.1 Effort and Timing for Bird and Bat Mortality Monitoring

Minimum requirements for post-construction monitoring of bats include:

- Post-construction monitoring (including mortality surveys, carcass removal and searcher efficiency trials) will be conducted during the core season when bats are active, and in coordination with bird mortality monitoring (May 1 - October 31) for the first 3 years of wind turbine operation.
- Mortality surveys will be conducted at each monitored turbine twice per week (3 and 4 day intervals) from May 1 – October 31; surveys for raptor mortality will be continued once per week from November 1 – November 30.
- Bat and bird mortality surveys will occur at a sub-sample of at least 30% of installed turbines. Turbines will be selected to cover representative areas throughout the project location.
- For birds, all turbines within the project location will be monitored once a month during the May 1 - October 31 survey period for evidence of raptor mortalities.
- Where significant annual bird mortality is identified, subsequent scoped mortality and cause effects monitoring will be conducted for 2 years at individual turbines (and unmonitored turbines in near proximity).
- Should significant bat or bird mortality be observed, and operational mitigation implemented, post-construction monitoring will be conducted for an additional 3 years from the implementation of operational mitigation to evaluate the effectiveness of the mitigation.
- The results of weekly November surveys and monthly surveys at turbines not part of the regularly searched sub-sample (if applicable) will not be included in any annual mortality estimates.

The total number of turbines required for monitoring will meet the minimum requirement of 30% of the installed turbines, and therefore the final number selected will be based on number of installed turbines. The turbines will be selected to cover representative areas throughout the project location, with a map of final selections provided to MNRF prior to the onset of the monitoring program. A total of 50 proposed turbine locations have been permitted for the Belle River Wind Project, although up to 44 wind turbines are proposed to be installed for the Project. The subset of turbines chosen for monitoring cannot be selected until the specific number and location of turbines are finalized, following the construction phase of the Project. In accordance with provincial guidelines, the turbine selection will be completed in a defensible manner and will consider factors such as geographic representation, proximity to natural features, significant wildlife habitats, etc. Post-construction monitoring will begin on May 1st after the wind power project is fully operational. The commercial operation date of the Belle River Wind Project is expected during summer 2017; therefore, it is anticipated that post-construction monitoring will begin May 1, 2018.

If full project commissioning is delayed, post-construction monitoring of a partially completed project will not be delayed for longer than 1 year. If the project is constructed

in phases, monitoring for each phase will coincide with the commencement of operation of that phase. When available, post-construction monitoring data may be useful in considering potential effects on bats and bat habitat in adjacent phases.

4.2.2 Carcass Searches

Carcass removal by scavengers is highly variable among sites (varying by vegetation cover, terrain and season) and must be considered when estimating total bat and bird mortality. Carcass searches will consider the following:

- The sub-sample of wind turbines that are monitored will include a representative sample of habitat types and significant wildlife habitat present at the site, and will cover the spatial distribution of the wind turbines. Wind turbines will be selected through a scientifically defensible system (e.g. stratification).
- The time required to search each turbine will vary depending on the surrounding habitat (e.g. open field vs. forest, etc.) and individual searchers, but searchers will search for a consistent search time for all surveyed turbines (e.g. 20 minutes per turbine).
- Each surveyed turbine will have a search area that has a 50m radius.
- Within this 50m radius, the search area will be examined using transects 5-6m apart, allowing for a visual search of approximately 3m on each side. The search area may be rectangular, square or circular depending on turbine locations and arrangements and surrounding terrain.
- The search area of each turbine will be mapped into visibility classes according to the following table. Where the majority of the search area would not be searchable due to vegetation cover or other impediments (e.g. Visibility Class 4), these turbines may be purposefully avoided during the selection of the sub-sample of monitored turbines.

%Vegetation Cover	Vegetation Height	Visibility Class
≥90% bare ground	≤15cm tall	Class 1 (Easy)
≥25% bare ground	≤15cm tall	Class 2 (Moderate)
≤25% bare ground	≤25% > 30cm tall	Class 3 (Difficult)
Little or no bare ground	≥25% > 30cm tall	Class 4 (Very Difficult)

- Where possible, ground cover around turbines will be maintained at a low level in order to facilitate more accurate bat and bird mortality surveys.
- Mortality surveys that incorporate the use of trained dogs (i.e., dog handler teams to locate mortalities) to improve searcher efficiency may be considered, particularly in difficult terrain.
- All carcasses found will be photographed and recorded/labeled with species (if possible), sex (if possible), date, time, location (UTM coordinates), carcass condition, searcher, any apparent/external injuries, ground cover, and distance and direction to nearest turbine.
- Weather conditions including wind speed and precipitation will be included as part of the data collection.
- The estimated number of days since death, and condition of each carcass collected will be recorded in one of the following categories:

    - Fresh
    - Early decomposition
    - Moderate decomposition
    - Advanced decomposition
    - Complete decomposition
    - Scavenged
- Bird carcasses found during mortality monitoring will be collected and stored in a freezer and used in carcass removal or searcher efficiency trials, assuming they are in reasonable condition.
- Carcasses of the following species found during bat mortality searches will be stored in a freezer and used in carcass removal or searcher efficiency trials, assuming they are in reasonable condition:
    - *Lasionycteris noctivagans* (silver-haired bat)
    - *Lasiurus cinereus* (hoary bat)
    - *Lasiurus borealis* (eastern red bat)
- Because of white-nose syndrome contamination risks, the following species will not be used in carcass removal or searcher efficiency trials (carcasses of these species may be sent to the Canadian Cooperative Wildlife Health Centre for analysis of white-nose syndrome):
    - *Myotis septentrionalis* (northern myotis)
    - *Myotis lucifugus* (little brown myotis)
    - *Myotis leibii* (eastern small-footed myotis)
    - *Perimyotis subflavus* (tricolored bat)
    - *Eptesicus fuscus* (big brown bat)

4.2.3 Carcass Removal Trials

The level of carcass scavenging must be determined through carcass removal trials. In these trials, carcasses are placed around the wind turbines and monitored until they disappear. The average carcass removal time is a factor in determining the estimated bat or bird mortality. As carcass removal rates vary considerably from one site to another and seasonally, removal trials will be conducted at every wind power project for every year of monitoring.

Below are some important considerations for conducting carcass removal rate trials:

- Carcass removal trials will be conducted at least once a season, including spring (May/June), summer (July/August), and fall (September/October) during the same period as the mortality surveys. Trials will be conducted more frequently (i.e. once per month) if vegetation changes occur during the season (e.g. crops grow, harvest, etc.).
- A minimum of 10 carcasses will be used for each trial. A maximum of 5 trial carcasses will be placed at any one time to avoid flooding the area with carcasses.
- Carcasses will be monitored every 3-4 days in conjunction with regular carcass searches.

- Carcass removal trials will be conducted in a variety of weather conditions. Weather conditions will be recorded.
- Carcasses will be distributed across the range of different substrates/habitats and visibility classes of turbines being searched.
- To the extent possible, carcass removal trials will be conducted at turbines that are not part of the carcass search sub-sample.
- Carcasses will be placed before dusk using gloves and boots to avoid imparting human smell that might bias trial results (e.g. attract scavengers, etc).
- Trials will continue until all carcasses are removed or have completely decomposed, for a minimum of 2 weeks (14 days).
- To avoid confusion with turbine related fatalities, trial carcasses will be discretely marked (e.g., clipping of ear, wing, fur; hole punching ear; etc.) with a unique identification so they can be identified as trial carcasses.
- Carcasses used will be as fresh as possible, since frozen or decomposed carcasses are less attractive to scavengers. If frozen carcasses are used, they will be thawed prior to beginning carcass removal trials.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise another third of the trial carcasses. Trials using other small brown mammal or bird carcasses (e.g., mice, brown chicks) may also be used when bird and bat carcasses are not available.
- Scavenging rates may change over time as scavengers become aware of and develop search images for new sources of food beneath turbines.
- Scavenging will be determined on a project-specific basis and rates will not be assumed to be similar between sites or used in calculations for other projects.

4.2.4 Searcher Efficiency Trials

Searcher efficiency is another important factor in creating an estimate of total bat and bird mortality. Searcher efficiency trials require a known number of discretely marked carcasses to be placed around a wind turbine. Searchers examine the wind turbine area, and the number of carcasses that they find is compared to the number of carcasses placed. Searcher efficiency will vary considerably for each searcher and from one site to another (varying by vegetation cover, terrain and season), and will be conducted as part of post-construction monitoring at every wind power project for every year of monitoring.

Below are some important considerations for conducting searcher efficiency trials:

- Searcher efficiency trials will be conducted at least once a season (following the same general seasonal periods as identified in Section 4.2.3) during the same period as the mortality surveys. Trials will be conducted once per month if vegetation changes occur during the season (e.g., crops grow, harvest, etc.).
- A ‘tester’ will control the trials and return to collect marked trial carcasses at the completion of the trials to determine the number of carcasses remaining and if any carcasses were scavenged or removed during the trial.

- Searcher efficiency trials are to be conducted for each individual searcher or team involved in searching for carcasses (including teams using dogs). The searcher will not be notified when they are participating in an efficiency trial to avoid potential search biases.
- A minimum of 10 carcasses per searcher per season (following the same general seasonal periods as identified in Section 4.2.3) in all applicable visibility classes (see table in Section 4.2.2) are to be used. The average per searcher across all visibility classes will be used for calculations.
- Trial carcasses will be spread out over the trial period (month or season) and conducted with the mortality surveys. A maximum of 5 trial carcasses will be placed at any one time (no more than 2 at any single turbine) to avoid bias and flooding the area with carcasses. *This approach deviates slightly from provincial guidelines which states a maximum of 3 carcasses will be placed at one time. However, for large projects where numerous turbines are being searched, the potential for carcass 'flooding' or searcher bias are of little concern.*
- Trial carcasses are placed for one search day only and then removed and recorded by the 'tester'.
- Trial carcasses will be randomly placed within the search area and location recorded so that they can be retrieved if they are not found during the trial.
- Trial carcasses will be discreetly marked (e.g., clipping of ear, wing, leg, fur; hole-punching ear; etc.) with a unique identification so that they can be identified as a trial carcass by the tester.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise another third of the trial carcasses. Trials using other small brown mammal or bird carcasses (e.g., mice, brown chicks) may also be used when bird and bat carcasses are not available.
- If frozen carcasses are used, they will be thawed prior to beginning searcher efficiency trials.
- All observers, even those with trained dogs, will overlook some carcasses. This percentage will vary depending on the observer, the habitat and the area being searched, etc.

4.2.5 Proportion Area Searched

Based on current Ontario post-construction data, most bats and birds appear to fall within 50m of a wind turbine base. This area therefore represents the maximum recommended search area. Since it may not always be possible to search the entire 50m radius because of the presence of thick or tall vegetation, steep slopes, active cultivation, etc. the actual area searched during the mortality surveys will be calculated at each turbine, using a GPS. A map of the actual search area for each turbine searched, and a description of areas deemed to be unsearchable (e.g. vegetation height, type, slope, etc.), will be provided in the mortality report.

4.2.6 Calculations

Scavenger Correction Factor

The following formula will be used to calculate the overall scavenger correction (S_c) factors based on the proportion of carcasses remaining after each search interval are pooled:

$$S_c = \frac{n_{visit1} + n_{visit2} + n_{visit3}}{n_{visit0} + n_{visit1} + n_{visit2}}$$

Where,

S_c	is the proportion of carcasses not removed by scavengers over the search period
n_{visit0}	is the total number of carcasses placed
n_{visit1} - n_{visit3}…	are the numbers of carcasses on visits 1 through 3

Searcher Efficiency

Searcher efficiency (S_e) will be calculated for each searcher as follows:

$$S_e = \frac{\text{number of test carcasses found}}{\text{Number of test carcasses placed – number of carcasses scavenged}}$$

The number of turbines that each individual searches will vary, so it will be necessary to calculate a weighted average that reflects the proportion of turbines each searcher searched. The weighted average or overall searcher efficiency will be calculated as follows:

$$S_{eo} = S_{e1}(n_1/T) + S_{e2}(n_2/T) + S_{e3}(n_3/T)\ldots$$

Where,

S_{eo}	is the overall searcher efficiency
S_{e1} and $_2$ and $_3$…	are individual searcher efficiency ratings
N_1 and $_2$ and $_3$…	are number of turbines searched by each searcher
T	is the total number of turbines searched by all searchers

Proportion Area Searched

Proportion area searched (P_s) is calculated as follows:

$$P_s = \frac{\text{actual area searched}}{\pi r^2}$$

Where r = 50m

Corrected Mortality Estimates

The minimum estimated bat mortality (C) is calculated as follows:

$$C = c / (S_{e0} \times S_c \times P_s)$$

Where,

C is the corrected number of bat fatalities
c is the number of carcasses found
S_{e0} is the weighted proportion of carcasses expected to be found by searchers (overall searcher efficiency)
S_c is the proportion of carcasses not removed by scavengers over the search period
P_s is the proportion of the area searched

4.2.7 Other Considerations

- The above calculations will be presented in corrected number of bats/turbine per year and birds/turbine per year. In this context, the year is from May 1 to October 31 for all bats and birds (non-raptors). The year continues until November 30 specifically for raptor monitoring, but any bat or non-raptor bird mortality data collected in November will be treated as incidental observations in the annual report and will not be included in bat and bird (non-raptor) estimated mortality calculations for the year.
- Should additional bird or bat mortality be reported through supplemental monitoring (e.g., associated with significant wildlife habitat) and using the same standard protocols, these mortalities should be included in the calculation of mortality rates. In this case, a monitoring year will be defined as all reporting periods in a calendar year.
- Bird carcasses may be discovered incidental to formal searches. These carcasses will be processed (i.e., collected and recorded, etc.) and fatality data will be included with the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately.
- Tissue samples from bat and bird carcasses may be used in a number of DNA analyses to provide insight into population size and structure, as well as the geographic origin of migrants. The local MNRF office may be contacted prior to disposing bat and bird carcasses, to determine if this type of research is occurring in the area.

4.3 Post-Construction Mitigation

4.3.1 Bats

Operational mitigation is required if post-construction monitoring shows that a wind power project is causing significant bat mortality. Bat mortality is considered significant when mortality levels at a project location exceed 10 bats/turbine/year.

Operational mitigation refers to adjustments made to the operation of wind turbines to help mitigate potential negative environmental effects on bats (i.e., significant bat mortality). Operational mitigation for bat mortality consists of changing the wind turbine cut-in speed to 5.5 m/s (measured at hub height), or feathering of wind turbine blades when wind speeds are below 5.5 m/s.

The majority of bat mortalities from wind turbine operations occur during fall migration. Across North America, it is estimated that 90% of bat fatalities occur from mid-July through September. Where a post-construction monitoring annual report indicates the annual bat mortality threshold of 10 bats/turbine/year has been exceeded, operational monitoring will be implemented across the wind power project (i.e. at all turbines) from sunset to sunrise, from July 15 to September 30. This mitigation will continue for the duration of the Project. Should site-specific monitoring indicate a shifted peak mortality period, operational mitigation may be shifted to match the peak mortality, with mitigation maintained for a minimum 10 weeks. Any shift in the operational mitigation period to match peak mortality should be determined in coordination with and confirmed by MNRF.

Where post-construction mitigation is applied, an additional 3 years of mitigation effectiveness monitoring is required. Monitoring the effectiveness of any post-construction mitigation techniques will help to evaluate the success of this mitigation.

4.3.2 Birds

Post-construction mitigation or additional scoped monitoring will be required at individual turbines or groups of turbines where post-construction monitoring identifies significant annual bird mortality, disturbance effects associated with bird significant wildlife habitat, or significant bird mortality events.

For turbines located outside 120m of bird significant wildlife habitat, 2 years of subsequent scoped mortality and cause and effects monitoring is required where a significant annual mortality threshold has been exceeded. Following scoped monitoring, post-construction monitoring (e.g., operational mitigation) and effectiveness monitoring may be required at individual turbines where a mortality effect has been identified or significant annual mortality persists.

For turbines located within 120m of bird significant wildlife habitat, immediate post-construction mitigation (including operational mitigation), as identified in the EIS, and 3 years of effectiveness monitoring will be required where monitoring identifies significant annual bird mortality or disturbance effects associated with bird significant wildlife habitat.

Operational mitigation techniques may include periodic shut-down of select turbines and/or blade feathering at specific times of the year when mortality risks to the affected bird species is particularly high (e.g., migration). Emerging and new technologies will be considered that may reduce bird fatalities.

4.4 Contingency Plans

A contingency plan addresses immediate actions necessary in case of a significant bat or bird mortality event, or if mitigation actions fail. A contingency plan allows additional mitigation measures to be implemented in the event that unanticipated negative environmental effects are observed during a single mortality monitoring survey.

4.4.1 Bats

Should cut-in speed mitigation be implemented and the bat mortality threshold continue to be exceeded, additional mitigation and scoped monitoring requirements will be determined in consultation with MNRF.

4.4.2 Birds

A significant bird mortality event is defined to have occurred when bird mortality during a single mortality monitoring survey (as observed in the field on a single day) exceeds:

- 10 or more birds at any one turbine; or
- 33 or more birds (including raptors) at multiple turbines

NOTE: These numbers are actual carcasses found (not corrected numbers)

The MNRF will be notified within 48 hours of observation, or no later than 2 business days, if one of the thresholds above is exceeded during a single mortality monitoring survey. MNRF will be consulted to determine appropriate contingency plans should a significant bird mortality event occur or if mitigation actions fail.

5.0 Species at Risk

The Species at Risk in Ontario List (O.Reg 230/08) will be consulted to determine species listed as Endangered and Threatened in Ontario. Mortality or injury of an Endangered or Threatened species will be reported to the MNRF within 24 hours (or next business day) of a confirmed identification of a Species at Risk. Due to the possibility of encountering decomposed or scavenged carcasses, a confirmed identification may sometimes take several days from the date of first observation/collection.

6.0 Reporting Requirements

Reporting requirements for significant wildlife habitats are summarized in Table 2. All mortality data collected during post-construction monitoring will be submitted in accordance with MNRF data standards and templates. Post-construction reports will be prepared and submitted as per Table 3 below.

Table 3. Schedule for Post-construction Monitoring Reports Detailing Results of the Environmental Effects Monitoring Plan

Monitoring Year*	Report Submission Date
Year 1: May 1 – Nov 30, 2018	February 2019
Year 2: May 1 – Nov 30, 2019	February 2020
Year 3: May 1 – Nov 30, 2020	February 2021

*If additional years of monitoring are required, the additional report submissions will follow a similar schedule as listed above.

All bat and bird monitoring data and associated reports will be submitted to the MOECC and MNRF, consistent with MNRF's procedures and protocols, and satisfy the data standards and requirements of the Wind Energy Bird and Bat Monitoring Database (see Appendix II for data template). Bat survey data submitted will be entered by the MNRF into the database, analyzed, reported and used to address knowledge gaps and create public data summaries. Standardized templates available online through the Wind Energy Bird and Bat Monitoring Database found at http://www.bsc-eoc.org/birdmon/wind/wind_templates.jsp will be used to record and report all field data. Other similar data sheets may be used, providing they allow for the collection and submission of the same data as the templates identified above. All data sheet templates are provided in Appendix II.

Reports will also include maps of areas searched for each surveyed turbine and raw data for all carcass searches, searcher efficiency trials and carcass removal trials will be submitted as part of the annual report.

A summary of when information about a particular mortality event or threshold is reported to MNRF is included in Table 4.

Table 4. Timeline for Reporting Mortality to the Ministry of Natural Resources and Forestry

Mortality Threshold	How mortality is calculated	Reporting Timeline for Results
10 bats/turbine/year	Based on calculation described in Section 4.2.6 and applying the following formula $C = c / (S_{ewhe0} \times S_c \times P_s)$	Results to be submitted annually to MNRF (within 3 months of completion of mortality surveys) as outlined in Table 3.
14 birds/turbine/year	Based on annual calculation described in Section 4.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MNRF as outlined in Table 3.
10 birds/turbine	Single event as observed in the field during monitoring	Mortality event to be reported to MNRF within 48hrs (or next business day) of detection.
33 birds (including raptors) at any multiple turbines	Single event as observed in the field during monitoring	Mortality event to be reported to MNRF within 48hrs (or next business day) of detection.
0.2 raptors/turbine/year (all raptors) across a wind power project	Based on annual calculation described in Section 4.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MNRF (within 3 months of completion of mortality surveys) as outlined in Table 3.
0.1 raptors/turbine/year (provincially tracked raptors) across a wind power project	Based on annual calculation described in Section 4.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MNRF (within 3 months of completion of mortality surveys) as outlined in Table 3.
Endangered and Threatened Species	Single event as observed in the field during monitoring	Mortality event to be reported to MNRF within 24hrs (or next business day) of a confirmed identification.

7.0 References

Natural Resource Solutions Inc. (NRSI). 2015. Belle River Wind Project: Natural Heritage Assessment. May 2015.

Ontario Ministry of Natural Resources (OMNR). 2011a. Bats and Bat Habitats: Guidelines for Wind Power Projects. First Edition. Queen's Printer for Ontario, Canada. July 2011.

Ontario Ministry of Natural Resources (OMNR). 2011b. Birds and Bird Habitats: Guidelines for Wind Power Projects. First Edition. Queen's Printer for Ontario, Canada. December 2011.

Map 1
Project Area and Natural Features

Map 1

Belle River Wind Project

Project Area and Natural Features

Legend

- Project Area (120m Buffer)
- Construction Disturbance Area
- Proposed Turbine
- Proposed MET Tower
- Proposed Collection Line
- Proposed Collection ROW
- Proposed Transmission Line
- Proposed Access Road
- Potential POI Parcel
- Proposed Substation/Laydown/O&M
- Potential Laydown Area
- Existing Transmission Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Open Water
- Wooded Area
- Provincially Significant Wetland (PSW)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 1490
Date: May 25, 2015

NAD83 - UTM Zone 17
Size: 11x17"
1:68,000

0 1 2 3 4 kms

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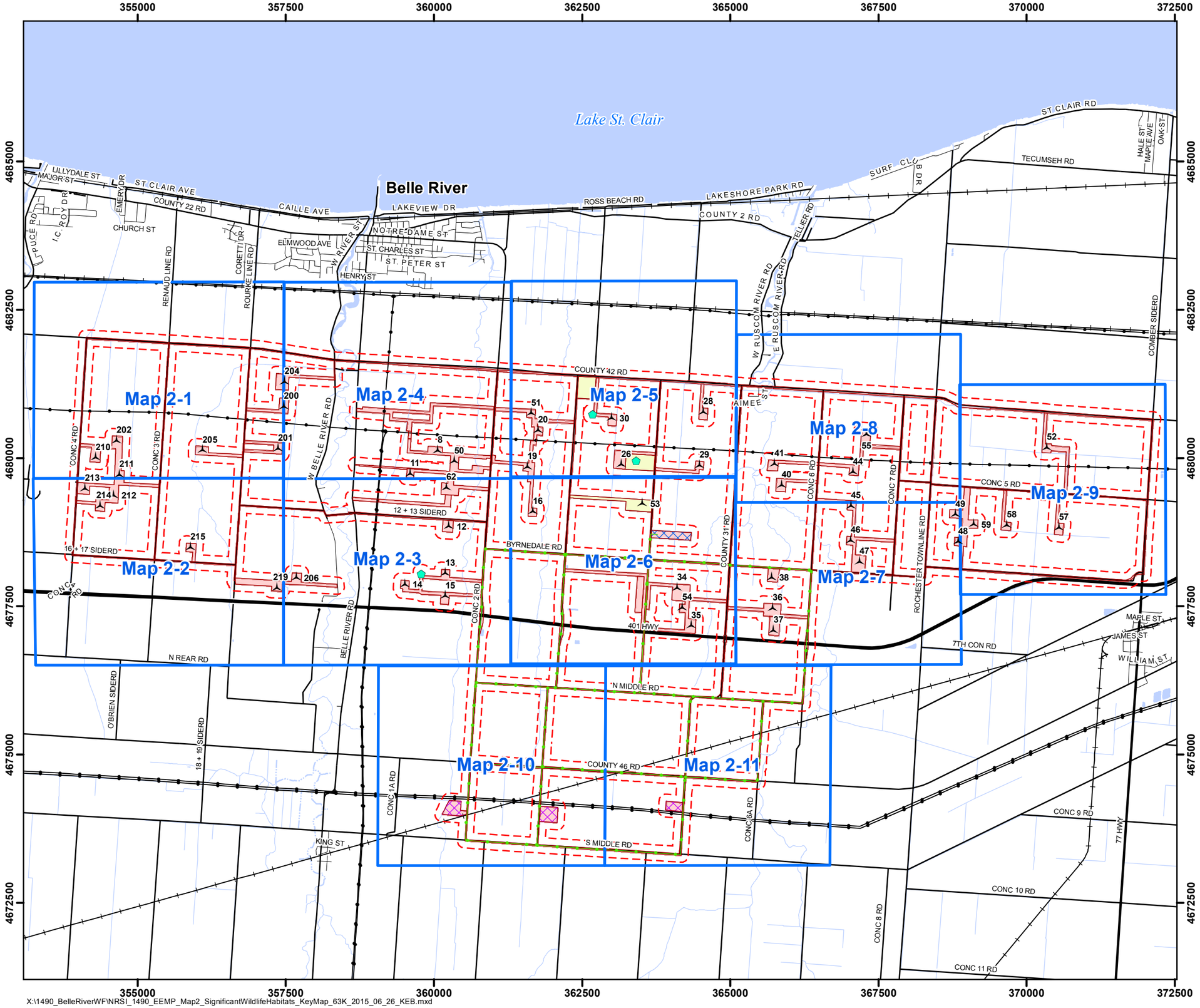
Maps 2-1 to 2-11
Significant Wildlife Habitats

Map 2

Belle River Wind Project

Significant Wildlife Habitats Key Map



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Legend

- Map Extents
- Project Area (120m Buffer)
- Construction Disturbance Area
- Proposed Turbine
- Proposed MET Tower
- Proposed Transmission Line
- Potential POI Parcel
- Proposed Substation/Laydown/O&M
- Potential Laydown Area
- Existing Trasmission Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Open Water

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Project: 1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:63,000**

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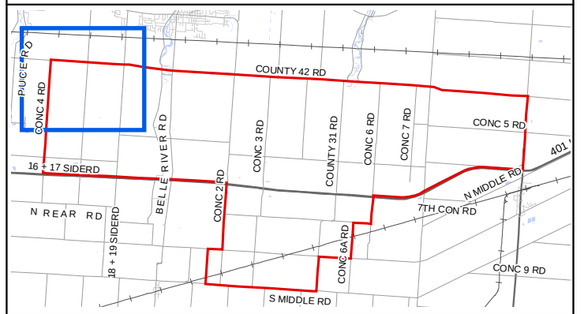
Map 2-1

Belle River Wind Project

Significant Wildlife Habitats



Legend

- Project Area (120m Buffer)
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- Proposed Collection ROW
- Proposed Transmission Line
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- Intermittent Watercourse
- Open Water
- Bat Maternity Colonies (BMA)
- Raptor Wintering Area (RWA)
- Open Country Bird Breeding Habitat (OCB)
- Marsh Bird Breeding Habitat (MBB)
- Species of Conservation Concern Habitat (SCC)
  - (1) Eastern Wood-Pewee Habitat
  - (2) Wood Thrush Habitat

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Project: P1490
Date: June 26, 2015

NAD83 - UTM Zone 17
Size: 11x17"
1:15,000

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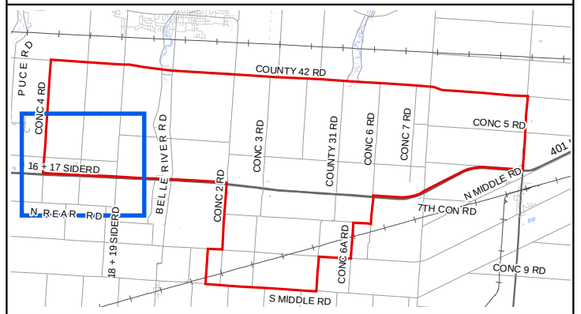
Map 2-2

Belle River Wind Project

Significant Wildlife Habitats



Legend

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  - (2) Wood Thrush Habitat

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Project: P1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:15,000**

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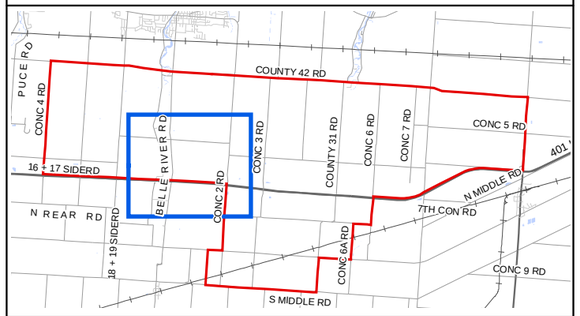
Map 2-3

Belle River Wind Project

Significant Wildlife Habitats



Legend

- Project Area (120m Buffer)
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Project: P1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:15,000**

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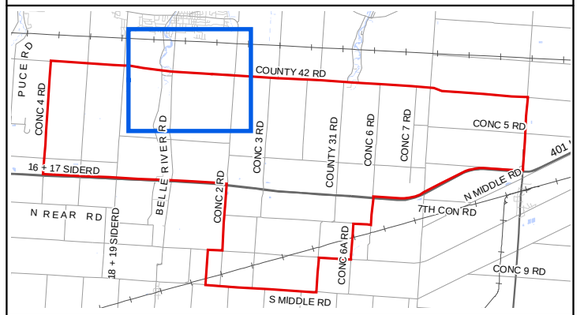
Map 2-4

Belle River Wind Project

Significant Wildlife Habitats



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(1) Eastern Wood-Pewee Habitat

(2) Wood Thrush Habitat

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490
Date: June 26, 2015

NAD83 - UTM Zone 17
Size: 11x17"
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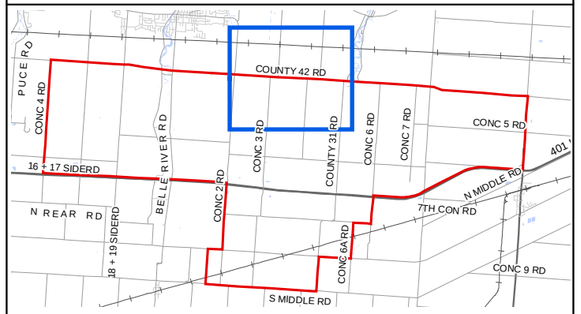
Map 2-5

Belle River Wind Project

Significant Wildlife Habitats



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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490
Date: June 26, 2015

NAD83 - UTM Zone 17
Size: 11x17"
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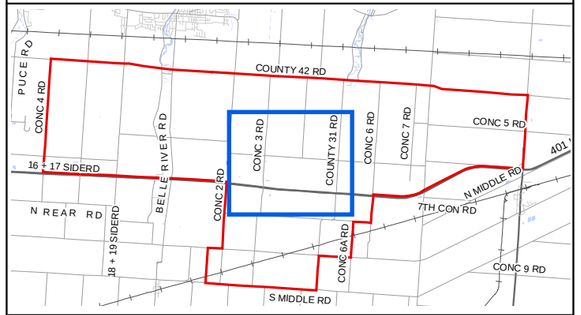
Map 2-6

Belle River Wind Project

Significant Wildlife Habitats



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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:15,000**

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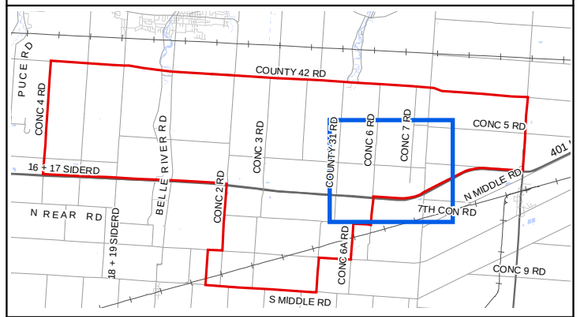
Map 2-7

Belle River Wind Project

Significant Wildlife Habitats



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- Open Water
- Bat Maternity Colonies (BMA)
- Raptor Wintering Area (RWA)
- Open Country Bird Breeding Habitat (OCB)
- Marsh Bird Breeding Habitat (MBB)
- Species of Conservation Concern Habitat (SCC)
  - (1) Eastern Wood-Pewee Habitat
  - (2) Wood Thrush Habitat

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490
Date: June 26, 2015

NAD83 - UTM Zone 17
Size: 11x17"
1:15,000

0 200 400 600 800 Meters

N

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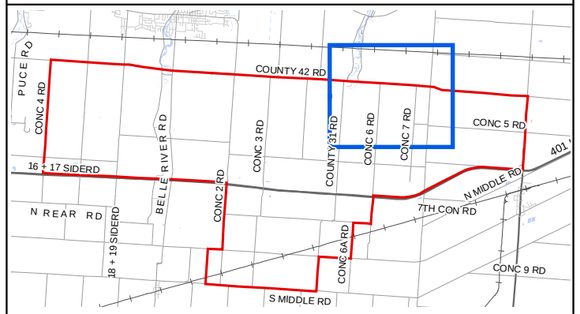
Map 2-8

Belle River Wind Project

Significant Wildlife Habitats



Legend

- Project Area (120m Buffer)
- Construction Disturbance Area
- Proposed Turbine
- Proposed MET Tower
- Proposed Collection Line
- Proposed Collection ROW
- Proposed Transmission Line
- Proposed Access Road
- Potential POI Parcel
- Proposed Substation/Laydown/O&M
- Potential Laydown Area
- Existing Trasmission Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Open Water
- Bat Maternity Colonies (BMA)
- Raptor Wintering Area (RWA)
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(1) Eastern Wood-Pewee Habitat

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1:15,000

0 200 400 600 800 Meters

N

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368500 369000 369500 370000 370500 371000 371500 372000 372500

4681000 4680500 4680000 4679500 4679000 4678500 4678000

COUNTY 42 RD

ROCHESTER TOWNLINE RD

COMBER SIDERD

CONC 5 RD

CONC 6 RD

401 HWY

N MIDDLE RD

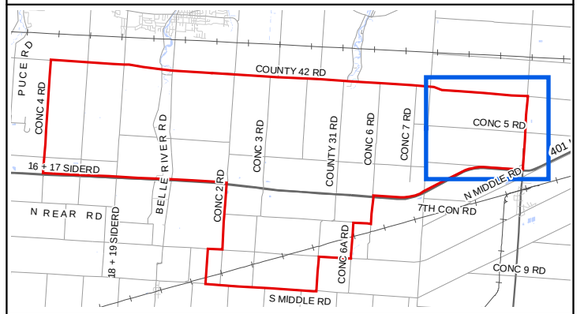
52 49 59 58 57 48

X:\1490_BelleRiverWF\NRSI_1490_EEMP_Map2-1to2-11_SignificantWildlifeHabitat_2015_06_26_KEB.mxd

Map 2-9

Belle River Wind Project

Significant Wildlife Habitats



Legend

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:15,000**

0 200 400 600 800 Meters

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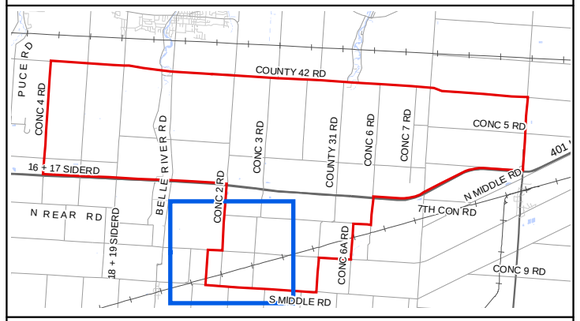
Map 2-10

Belle River Wind Project

Significant Wildlife Habitats



Legend

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(1) Eastern Wood-Pewee Habitat

(2) Wood Thrush Habitat

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490
Date: June 26, 2015

NAD83 - UTM Zone 17
Size: 11x17"
1:15,000

0 200 400 600 800 Meters

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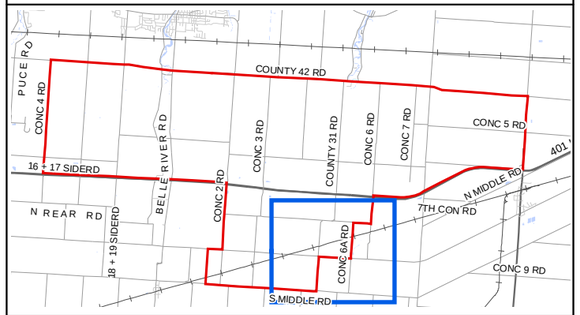
Map 2-11

Belle River Wind Project

Significant Wildlife Habitats



Legend

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- Proposed Collection Line
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- Species of Conservation Concern Habitat (SCC)

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: P1490 Date: June 26, 2015	NAD83 - UTM Zone 17 Size: 11x17" **1:15,000**

0 200 400 600 800 Meters

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Appendix I
Belle River Wind Project NHA Letter of Confirmation

Ministry of Natural Resources and Forestry

Regional Resources Section
Southern Region
Regional Operations Division
300 Water Street
Peterborough, ON K9J 3C7
Tel: 705-755-1328
Fax: 705-755-3233

Ministère des Richesses naturelles et des Forêts

Ressources régionales article
Région du Sud
Division des opérations régionales
300, rue Water
Peterborough (ON) K9J 3C7
Tél: 705-755-1328
Téléc: 705-755-3233

Ontario

May 29, 2015

Mr. Colin Edwards, Director,
Mr. Lee Jeong Tack, Director
SP Belle River Wind LP by its general partner,
SP Belle River Wind GP Inc.
2050 Derry Road West
Mississauga, ON L5N 0B9

RE: NHA Confirmation for the Belle River Wind Project

Dear Mr. Edwards, Mr. Lee Jeong Tack:

In accordance with the Ministry of the Environment's (MOE's) Renewable Energy Approvals (REA) Regulation (O.Reg.359/09), the Ministry of Natural Resources and Forestry (MNRF) has reviewed the Records Review, Site Investigation, Evaluation of Significance and Environmental Impact Study dated May 25, 2015 for Belle River Wind Project in Lakeshore Township, Essex County, submitted by Natural Resource Solutions Inc on May 26, 2015.

In accordance with Section 28(2) and 38(2)(b) of the REA regulation, MNRF provides the following confirmations following review of the natural heritage assessment:

1. The MNRF confirms that the determination of the existence of natural features and the boundaries of natural features was made using applicable evaluation criteria or procedures established or accepted by MNRF.

2. The MNRF confirms that the site investigation and records review were conducted using applicable evaluation criteria or procedures established or accepted by MNRF, if no natural features were identified.

3. The MNRF confirms that the evaluation of the significance or provincial significance of the natural features was conducted using applicable evaluation criteria or procedures established or accepted by MNRF.

4. The MNRF confirms that the project location is not in a provincial park or conservation reserve.

5. The MNRF confirms that the environmental impact study report has been prepared in accordance with procedures established by the MNRF.

In accordance with Section 28(3)(c) and 38(2)(c), MNRF also offers the following comments in respect of the project.

Pre-construction Monitoring

In accordance with Appendix D of MNRF's NHA Guide, a commitment has been made to complete pre-construction assessment(s) of habitat use for the candidate significant wildlife habitats listed in Table 1 (enclosed).

MNRF has reviewed and confirmed the assessment methods and the range of mitigative options. Pending completion of the assessments and determination of significance, the appropriate mitigation is expected to be implemented, as committed to in the environmental impact study.

Post-Construction Monitoring

In addition to the NHA, Environmental Effects Monitoring Plans (EEMP) that address post-construction mortality monitoring and mitigation for birds and bats must be prepared and implemented. Environmental Effects Monitoring Plans for birds and bats must be prepared in accordance with MNRF Guidelines and should be reviewed by MNRF in advance of submitting a REA application to MOE in order to minimize potential delays in determining if the application is complete. Comments provided by the MNRF with respect to the EEMP must be submitted as part of the application for a REA.

A commitment has been made in the Environmental Impact Study and will be included in the Environmental Effects Monitoring Plan, part of the Design and Operations Report, to conduct post-construction monitoring should the pre-construction monitoring (as outlined above) deem the wildlife habitat to be significant. For the Belle River Wind Project, this includes surveys outlined in Table 2 (enclosed).

A commitment has been made in the Environmental Impact Study and will be included in the Environmental Effects Monitoring Plan, part of the Design and Operations Report, to conduct post-construction monitoring. For the Belle River Wind Project, this includes;

1. Mortality Monitoring-Birds and Bats – entire project, 30%turbines, as described in EIS
2. Climbing Prairy Rose, CPR-002 (SCC-T)
3. Shumard Oak Habitat, SHU-001 (SCC-C), SHU-002 (SCC-P)
4. Upright Carrion Flower Habitat,UCF-004 (SCC-T)
5. Shellbark Hickory Habitat SHH-001 (SCC-P), SHH-002 (SCC-H), SHH-003 (SCC-K), SHH-004 (SCC-B), SHH-005 (SCC-G)
6. Pignut Hickory Habitat PGH-001 (SCC-L)

This confirmation letter is valid for the project as proposed in the natural heritage assessment and environmental impact study, including those sections describing the Environmental Effects Monitoring Plan and Construction Plan Report. Should any changes be made to the proposed project that would alter the NHA, MNRF may need to undertake additional review of the NHA.

Where specific commitments have been made by the applicant in the NHA/EIS with respect to project design, construction, rehabilitation, operation, mitigation, or monitoring, MNRF expects that

these commitments will be considered in MOE's Renewable Energy Approval decision and, if approved, be implemented by the applicant.

In accordance with S.12 (1) of the Renewable Energy Approvals Regulation, this letter must be included as part of your application submitted to the MOE for a Renewable Energy Approval.

Please be aware that your project may be subject to additional legislative approvals as outlined in the Ministry of Natural Resources' *Approvals and Permitting Requirements Document*. These approvals are required prior to the construction of your renewable energy facility.

If you wish to discuss any part of this confirmation or additional comments provided, please contact Joanna Gaweda, Regional Planner, Southern Region, MNRF at 705-755-1365.

Sincerely,

K. Milian.

Kazia Milian
Land Use Planning Supervisor, Southern Region, MNRF

cc Jim Beal, Renewal Energy Coordinator, Southern Region, MNRF
Mohsen Keyvani, Environmental Assessment and Approvals Branch, MOE

Enclosure

Table 1. Pre-construction monitoring commitments

Wildlife Habitat Type	Location/Feature(s)
Raptor Wintering Area	RWA-001 RWA-002
Bat Maternity Colony	BMA-001
Amphibian Breeding Habitat (Woodland)	AWO-002 AWO-003 AWO-004 AWO-006 AWO-007 AWO-008 AWO-009 AWO-011 AWO-012 AWO-013
Marsh Bird Breeding Habitat	MBB-001 MBB-002
Open Country Bird Breeding Habitat	OCB-001
Eastern Wood-Pewee *(Contopus virens)*	EWP-002 EWP-003 EWP-004 EWP-006 EWP-007 EWP-008
Wood Thrush *(Hylocichla mustelina)*	WTH-001 WTH-002
Prairie Milkweed *(Asclepias sullivantii)*	PMI-001 PMI-002
Pawpaw *(Asimina triloba)*	PAW-001 PAW-002 PAW-003 PAW-004 PAW-005 PAW-006
Muskingum Sedge *(Carex muskingumensis)*	MSE-002 MSE-003 MSE-004 MSE-005 MSE-006 MSE-007
Schweinitz's Flatsedge *(Cyperus schweinitzii)*	SFL-001
Deer-tongue Panicgrass *(Dichanthelium clandestinum)*	DTP-001
White-haired Panicgrass *(Dichanthelium praecocius)*	WHP-001
Burning Bush *(Euonymus*	BBU-001 BBU-002

Wildlife Habitat Type	Location/Feature(s)
atropurpureus)	BBU-003 BBU-004 BBU-005 BBU-006 BBU-007
Many-fruit Primrose-willow *(Ludwigia polycarpa)*	MPW-001 MPW-002 MPW-003 MPW-004
Winged Loosestrife *(Lythrum alatum)*	WLO-001 WLO-002 WLO-003 WLO-004
Biennial Gaura *(Oenothera gaura)*	BGA-001
Climbing Prairie Rose *(Rosa setigera)*	CPR-001
Upright Carrion Flower *(Smilax ecirrata)*	UCF-001 UCF-002 UCF-003 UCF-005
Illinois Carrion Flower *(Smilax illinoensis)*	ICF-001 ICF-002 ICF-003 ICF-004
Giant Ironweed *(Vernonia gigantea)*	GIW-001 GIW-002
Lizard's Tail (*Saururus cernuus*)	LTA-001 LTA-002 LTA-003 LTA-004 LTA-005 LTA-006 LTA-007 LTA-008 LTA-009
Missouri Ironweed (*Vernonia missurica*)	MIW-002 MIW-004 MIW-005 MIW-006 MIW-007 MIW-008
Dion Skipper *(Euphyes dion)*	DIS-001 DIS-002 DIS-003 DIS-004
Duke's Skipper *(Euphyes dukesi)*	DUS-001 DUS-002 DUS-003 DUS-004
Giant Swallowtail *(Papilio cresphontes)*	GSW-001 GSW-002
Common Sootywing *(Pholisora catullus)*	CSO-001
Hickory Hairstreak *(Satyrium caryaevorus)*	HHA-002 HHA-003 HHA-004 HHA-006

Wildlife Habitat Type	Location/Feature(s)
	HHA-007 HHA-009 HHA-010
Hayhurst's Scallopwing *(Staphylus hayhurstii)*	HSC-001
Southern Cloudywing *(Thorybes bathyllus)*	SCL-001

Table 2. Post-Construction Monitoring Commitments

Raptor Wintering Area Surveys	RWA-001 RWA-002
Bat Maternity Colony Surveys	BMA-001
Amphibian Breeding Habitat (Woodland) Surveys	AWO-002 AWO-003 AWO-004 AWO-006 AWO-007 AWO-008 AWO-009 AWO-011 AWO-012 AWO-013
Marsh Bird Breeding Habitat Surveys	MBB-001 MBB-002
Open Country Bird Breeding Habitat	OCB-001
Bird Species of Conservation Concern Surveys: • Eastern Wood-Pewee Habitat • Wood Thrush Habitat	EWP-002 (SCC-P) EWP-003 (SCC-N) EWP-004 (SCC-S) EWP-006 (SCC-A) EWP-007 (SCC-H) EWP-008 (SCC-K) WTH-001 (SCC-N) WTH-002 (SCC-A)
Plant Species of Conservation Concern Surveys: • Pawpaw Habitat • Muskingum Sedge Habitat • Burning Bush Habitat • Illinois Carrion Flower Habitat • Lizard's Tail Habitat • Prairie Milkweed Habitat • Schweinitz's Flatsedge Habitat • Deer-tongue Panicgrass Habitat • White-haired Panicgrass Habitat • Many-fruit Primrose-willow Habitat • Winged Loosestrife Habitat • Biennial Gaura Habitat • Giant Ironweed Habitat • Shumard Oak Habitat • Climbing Prairie Rose Habitat • Upright Carrion Flower Habitat • Shellbark Hickory Habitat • Missouri Ironweed Habitat	PAW-001 (SCC-N) PAW-002 (SCC-I) PAW-003 (SCC-K) PAW-004 (SCC-L) PAW-005 (SCC-B) PAW-006 (SCC-E) MSE-002 (SCC-N) MSE-003 (SCC-I) MSE-004 (SCC-K) MSE-005 (SCC-L) MSE-006 (SCC-B) MSE-007 (SCC-E) BBU-001 (SCC-N) BBU-002 (SCC-I) BBU-003 (SCC-G) BBU-004 (SCC-K) BBU-005 (SCC-L) BBU-006 (SCC-B) BBU-007 (SCC-E) ICF-001 (SCC-G) ICF-002 (SCC-B)

• Pignut Hickory Habitat	ICF-003 (SCC-E) ICF-004 (SCC-K) LTA-001 (SCC-P) LTA-002 (SCC-N) LTA-003 (SCC-I) LTA-004 (SCC-H) LTA-005 (SCC-K) LTA-006 (SCC-L) LTA-007 (SCC-A) LTA-008 (SCC-E) LTA-009 (SCC-D) PMI-001 (SCC-G) PMI-002 (SCC-T) SFL-001 (SCC-M) DTP-001 (SCC-B) WHP-001 (SCC-M) MPW-001 (SCC-P) MPW-002 (SCC-F) MPW-003 (SCC-C) MPW-004 (SCC-D) WLO-001 (SCC-P) WLO-002 (SCC-H) WLO-003 (SCC-C) WLO-004 (SCC-D) BGA-001 (SCC-M) GIW-001 (SCC-P) GIW-002 (SCC-M) CPR-001 (SCC-M) UCF-001 (SCC-G) UCF-002 (SCC-B) UCF-003 (SCC-E) UCF-005 (SCC-K) MIW-002 (SCC-P) MIW-004 (SCC-F) MIW-005 (SCC-K) MIW-006 (SCC-A) MIW-007 (SCC-E) MIW-008 (SCC-D)
Butterfly Species of Conservation Concern Surveys: • Hickory Hairstreak Habitat • Giant Swallowtail Habitat • Dion Skipper Habitat • Duke's Skipper Habitat • Common Sootywing Habitat • Hayhurst's Scallopwing Habitat • Southern Cloudywing Habitat	HHA-002 (SCC-P) HHA-003 (SCC-N) HHA-004 (SCC-S) HHA-006 (SCC-H) HHA-007 (SCC-K) HHA-009 (SCC-E) HHA-010 (SCC-D) GSW-001 (SCC-G) GSW-002 (SCC-M) DIS-001 (SCC-H) DIS-002 (SCC-K) DIS-003 (SCC-C) DIS-004 (SCC-D) DUS-001 (SCC-H) DUS-002 (SCC-K) DUS-003 (SCC-C) DUS-004 (SCC-D) CSO-001 (SCC-M) HSC-001 (SCC-M) SCL-001 (SCC-M)

Appendix II
Post-Construction Mortality Monitoring Data Sheet Templates

Overview of templates for Natural Heritage Assessment Reports and Post-construction Mortality Monitoring Reports

Report the data from these forms onto the provided Excel templates. Each form correspond to at least one Excel sheet. Refer to the instructions in the Excel templates and at the top of each form.

Post-construction Field Forms

1. Site Description Form (Carcass searches)
2. Site Description and Carcass Distribution Form (Carcass searches)
3. Bird/Bat Carcass Searches Form
4. Searcher Efficiency Trials Form
5. Searcher Efficiency Trials Summary Form
6. Carcass Removal Trials Form
7. Carcass Removal Trials Summary Form

Wind Energy Bird and Bat Monitoring Database (post-construction)

1. Site Description Form (Carcass Searches)

Complete one Site Description Form for each turbine search (i.e. Each turbine sampled, once per season). Every turbine should have a unique turbine number, also referenced in other field sheets. Report each Site Description Form as a record in the data template (site_descr_carcass).

Project name : _____

Province : _____ **Turbine number :** _____

Date completed (dd/mm/yyyy) : _____/_____/ 20____

UTM coordinates of the turbine :

Zone: _____ **Easting:** _____ **Northing :** _____

Slope : _____° **Orientation of slope :** _____ (e.g., SSW)

Required survey area : _____ m^2 (e.g. 7,854 m^2 for 50 m radius)

Transect separation : _____ m

Habitat description :

Distance from the turbine to the following features:

Distance to nearest wood : _____ m

Distance to nearest shoreline : _____ m

Distance to nearest wetland : _____ m

Distance to nearest Significant Wildlife Habitat : _____ m

Type of Significant Wildlife Habitat (eg. hibernacula): _____

Turbine details :

Power : _____ Megawatts

Turbine height (from ground to top of nacelle) : _____ m

Turbine blade diameter : _____ m

Wind Energy Bird and Bat Monitoring Database (post-construction)

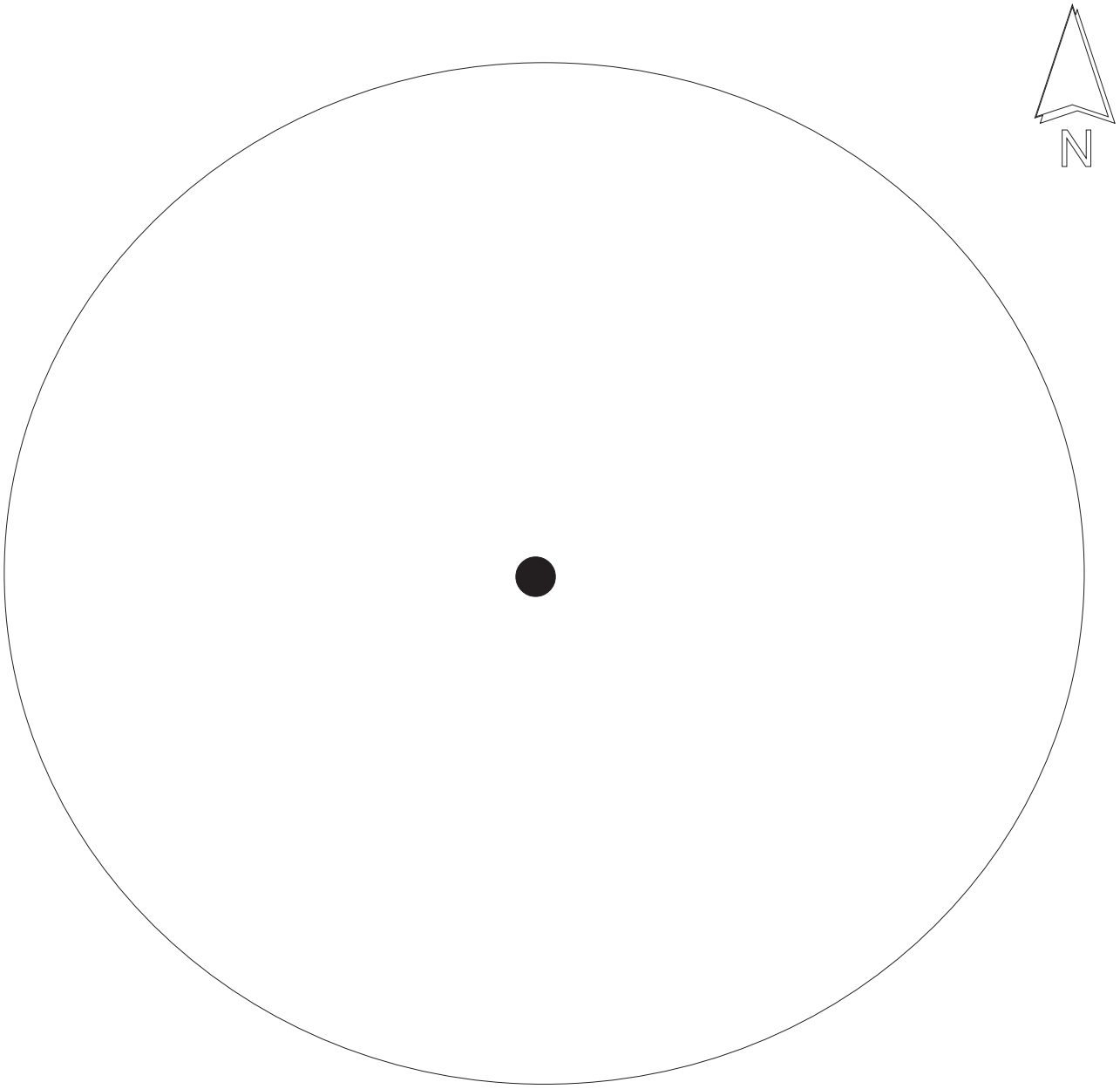
2. Site Description and Carcass Distribution Form (Carcass Searches)

Map the search plot, indicating visibility classes, substrate, carcass locations and area searched
This form should provided for information with the reports, and does not contain information that needs to be transfered to the Excel data templates.

Project name: _____

Site number : _____

Year : _____



Wind Energy Bird and Bat Monitoring Database (post-construction)

3. Bird/Bat Carcass Searches Form

Complete one Bird/Bat Carcass Search Form for every visit to a turbine (i.e. one per day of survey at each turbine). Note that once per season, a Site Description Form must also be completed for each turbine surveyed.

Report the following fields in BOTH the carcass_search_header and the carcass_search_data table templates (once per visit in header, and repeated for each carcass found in data):

Project name : _____ Turbine number : _____

Date of search (dd/mm/yyyy): _____/_____/ 20_____ Start time : ____:____

Report the following fields ONLY in the carcass_search_header table (one record per visit).

End time : ____:____ OR Duration : _____ min Number of searchers : _____

Searcher(s) name : _____

Number of days since last search : _____

Actual area searched : _____ m^2 Dog used (Y/N) : _____

Search method (square or circular) : _____ Transect separation : _____ m

Temperature: _____ °C Wind speed : _____ km/h Wind dir. : _____ Precipitation : _____

Cloud cover : _____% Significant weather (before the visit) : _____

Comments :

species	sex	UTM position (NAD83)		position from turbine		condition (refer to coding sheet)	injuries (refer to coding sheet)	time (hrs) since death	substrate	visibil. (1-4)
		easting	northing	dist. (m)	direct.					

Wind Energy Bird and Bat Monitoring Database
(post-construction)

4. Searcher Efficiency Trials Form

One Searcher Efficiency Trials Form should be filled for every searcher or searcher team (e.g. Searcher and dog), once a year. The results should also be summarized for each season using the Searcher Efficiency Trials Summary Form.

Project name: ______________________ **Year:** ________ **Searcher(s) name:** _____________________ **Dog used** (Y/N) ______

date placed dd/mm	time hh:mm	species	condition (fresh/ frozen)	UTM position (NAD83)		position from turbine		marking	weather	scaveng. (Y/N)	found (Y/N)	substrate	visibil. (1-4)
				easting	northing	dist. (m)	direction						

Wind Energy Bird and Bat Monitoring Database (post-construction)

5. Searcher Efficiency Trials Summary Form

Project name: _____ **Year :** _____

Spring (May-June)

Searcher	Number of carcasses placed	Number scavenged	Number found	Proportion found	Proportion turbines searched	**Weighted searcher efficiency Se**
Spring Total					100%	

Summer (July-August)

Searcher	Number of carcasses placed	Number scavenged	Number found	Proportion found	Proportion turbines searched	**Weighted searcher efficiency Se**
Summer Total					100%	

Fall (September-October)

Searcher	Number of carcasses placed	Number scavenged	Number found	Proportion found	Proportion turbines searched	**Weighted searcher efficiency Se**
Fall Total					100%	

Wind Energy Bird and Bat Monitoring Database (post-construction)

6. Carcass Removal Trials Form

One Carcass Removal Trials Form should be filled per season and per project. The results should be summarized in the Carcass Removal Trials Summary Form.

Project name: ______________________________ **Year :** _______ **Turbine number:** __________ **Season :** _______________

date placed dd/mm	species	condit. (fresh/ frozen)	UTM position (NAD83)		position from turbine		visibil. (1-4)	visit 1			visit 2			visit 3			visit 4		
			easting	northing	dist. (m)	direct.		date	weather	scav. (Y/N)	date	weather	scav. (Y/N)	date	weather	scav. (Y/N)	date	weather	scav. (Y/N)

Wind Energy Bird and Bat Monitoring Database (post-construction)

7. Carcass Removal Trials Summary Form

Project name: _____ **Year :** _____

Spring (May-June)

Turbine Number	Number of carcasses placed (N0)	Number of carcasses found per visit			Scavenger correction SC
		N1	N2	N3	

Spring Total

Summer (July-August)

Turbine Number	Number of carcasses placed (N0)	Number of carcasses found per visit			Scavenger correction SC
		N1	N2	N3	

Summer Total

Fall (September-October)

Turbine Number	Number of carcasses placed (N0)	Number of carcasses found per visit			Scavenger correction Sc
		N1	N2	N3	

Fall Total