# Bird and Bat Environmental Effects Monitoring Plan:

## McLean's Mountain Wind Farm

*September 16, 2011*

*09-1983*

*Submitted by:*

**Dillon Consulting Limited**

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# 1.0 INTRODUCTION

Northland Power Inc. (Northland Power) and Mnidoo Mnising Power (MMP), propose to develop a wind facility with a maximum name plate capacity of 60 megawatts (MW) located south of Little Current in the Town of Northeastern Manitoulin and the Islands, Ontario (**Figure 1**). The renewable energy facility will be known as the McLean's Mountain Wind Farm and will be rated as a Class 4 wind facility. Northland Power has received a contract from the Ontario Power Authority (OPA) for the purchase of electricity generated by wind turbines from this renewable facility through the Province's Feed-in-Tariff (FIT) program (enabled by the *Green Energy and Green Economy Act*). Natural Heritage Assessment reporting was submitted to the Ontario Ministry of Natural Resources (MNR) and confirmation in writing was received that reporting fulfilled the requirements of relevant sections of the *Ontario Energy Approvals* (*Ontario Regulation 359/09*).

A requirement of *Ontario Regulation 359/09* is the preparation of an Environmental Effects Monitoring Plan for birds and bats. In developing this Plan, protocols outlined in *Bird and Bird Habitats: Guidelines for Wind Power Projects (MNR 2010)* and *Bat and Bat Habitat – Draft Guidelines for Wind Power Projects* (MNR 2011) were used. In addition, mitigation/monitoring requirements, as outlined in the Environmental Impact Study (EIS), which form the final component of the Natural Heritage Assessment reports, was used. The MNR are being consulted to confirm this monitoring strategy. Once their input is received, this plan will be finalized.


**Figure 1: General Location of the McLean's Mountain Wind Farm Project in Ontario**

# 2.0 EXISTING ENVIRONMENTAL CONDITIONS OF RELEVANT NATURAL FEATURES

Existing environmental conditions for the project location and surrounding areas was determined through the records review and site investigation, which comply with Section 25 and 26 of the *REA* process. An evaluation of significance, consistent with Section 27 of the *REA* identified four bird wildlife habitats that required an EIS. Based on the EIS, specific monitoring requirements for these four bird wildlife habitats were identified. Below, we provide the EIS commitments made regarding pre and post-construction monitoring, which is to help confirm the predicted environmental effect and inform an adaptive management strategy.

*Waterfowl Nesting Area 1, 4 and 5 & Raptor Winter Roosting and Feeding Area 3 and 4*

- Additional pre-construction surveys will be conducted to further assess the significance of these features. If these features continue to be considered significant a 3 year post-construction behavioural and mortality monitoring, consistent with MNR protocols, to assess impacts of turbines on birds for the purpose of advising on mitigation strategies to be used as part of an adaptive management plan. Methods to be followed for behavioural monitoring are outlined in Section 4.2.1 below. Mortality monitoring methods are outlined in Section 4.2.2.

*Area Sensitive Species: Forest Birds 1 - Including Canada Warbler, Common Night Hawk & Area Sensitive Species: Open Country Breeding Birds 3 and 4 - Including Short-eared Owl, Common Night Hawk*

- A 3 year post-construction mortality monitoring, consistent with MNR protocols will be undertaken to assess impacts of turbines on birds for the purpose of advising on mitigation strategies to be used as part of an adaptive management plan. Mortality monitoring methods are outlined in Section 4.2.2.

*Bats*

- According to Section 23.1 of the REA a 3 year post-construction mortality monitoring, consistent with MNR protocols will be undertaken to assess impacts of turbines on birds for the purpose of advising on mitigation strategies to be used as part of an adaptive management plan. Mortality monitoring methods are outlined in Section 4.2.2.

# 3.0 PROJECT TEAM

**Table 1: Post Construction Environmental Monitoring Team**

| Staff | Role |
|---|---|
| Michael Enright | Dillon Consulting Limited – Project Manager |
| Dave Restivo | Dillon Consulting Limited – Field Ornithologist |
| Richard Baxter | Dillon Consulting Limited – Field Ornithologist |

***Michael Enright, B.Sc. (Hons)*** - is a Terrestrial Biologist with eleven years of education and professional employment in the biological sciences. During this time, Michael has acquired an in-depth knowledge of natural systems and their protection under the various levels of the legislative framework. He has been involved in numerous Renewable Energy Projects and developed environmental solutions for multi-disciplinary projects. Michael is currently the Project Manager for two post-construction monitoring studies for birds and bats in Ontario.

***David Restivo, B.Sc. (Hons), CEPIT*** - is a Biologist with over seven years of professional experience conducting biological assessments including avian surveys. Prior to working with Dillon, David worked with Bird Studies Canada conducting migration monitoring studies on the shores of Lake Erie. David has been involved in avian surveys for six wind power projects.

***Richard Baxter, B.Sc.*** - is a Biologist with over four years of professional experience conducting biological assessments including avian surveys. Prior to working with Dillon, Richard worked with Ducks Unlimited Canada as a Biological Technician, the University of Alberta as a Research Assistant on a cavity nester study and with Bird Studies Canada conducting migration monitoring studies on the shores of Lake Erie. Richard has been involved in avian surveys for four wind power projects.

# 4.0 BIRD AND BAT ENVIRONMENTAL MONITORING PLAN

## 4.1 The Need for Monitoring - Bird and Bat Mortality at Wind Farms in North America

*Birds*

Data available from studies of wind farms in North America indicate that the number of passerine birds killed due to blade strikes is not numerically significant in terms of population effects. Estimates of total passerine fatalities from a review of 14 studies of North American wind farms vary considerably, however on a per turbine and per MW basis, fatality rates are similar (Arnett 2007). Annual fatality rates ranged from 0 at a Searsburg, Vermont wind farm (Kerlinger 1997 *in* Arnett 2007) to 11.7 birds/MW/year at Buffalo Mountain, Tennessee (Nicholson 2003 *in* Arnett 2007). Most studies indicate that passerine fatalities occur throughout the wind farm facility, with no relationship to specific features within the facility. In general, fatalities occur throughout the year but are most common from April to October (Arnett 2007). It appears that certain seasons pose a higher risk to birds at specific facilities; for example spring migration at Buffalo Ridge, Minnesota (Johnson et al 2002 *in* Arnett 2007) and fall migration at Stateline, Washington (Erickson et al 2004 *in* Arnett 2007).

The highest recorded raptor fatality rates relating to wind power facilities have occurred in California at a few specific sites that were designed and constructed with little thought given to impacts on avian resources. Outside of California, studies of 14 newer generation wind farm facilities in North America indicate that the mean fatality rate for raptors was 0.03 raptors per turbine and 0.04 raptors per MW. These studies occurred over at least a one-year period and included correction for scavenging and searcher efficiency (Arnett 2007).

Several studies on wind farms in Ontario have been performed which can provide more area specific context for the McLean's Mountain Wind Farm. James (2003) reported finding 3 bird carcasses in association with the single turbine present near the Lake Ontario shore at Pickering, with monitoring conducted throughout 2002. James and Coady (2004) reported finding 2 bird carcasses in association with the single turbine present at Exhibition Place in Toronto, over 11 weeks of monitoring during the spring and fall of 2003. James (2008) estimated a range of 0.41-2.6 native birds/turbine/year at the 66 turbine Erie Shores Wind Farm near Port Burwell. For the Erie Shores project, all but 4 individual turbines had estimates of below 1 bird/turbine/year. For raptors a mortality estimate of 0.04 raptors/turbine/year was observed at Erie Shores. Natural Resource Solutions Inc. (2008) estimated an annual mortality rate for birds at 0.39 birds/turbine (0.26 birds/MW) at the 126 turbine Prince Wind Power Project (Stantec 2008a). Stantec Consulting Ltd (2008b) estimated an annual mortality rate for birds at 1.4 birds/turbine (0.9 birds/MW) at the Melancthon 1 Wind Plant, based on 12 weeks of post construction monitoring during the spring and fall of 2007 (Stantec 2008a).

*Bats*

Large numbers of bat fatalities have been reported at some wind energy facilities in North America. In general, bat fatalities at wind farms are higher than at other man made structures. Estimates of bat fatalities from 21 studies located at 19 wind farms in North America range from 0.9-53.3

bats/MW/year. The highest bat fatality rates have been found to occur near forested ridges. Bat fatalities appear to be higher in late summer and early fall, with migratory species like hoary bat, eastern red bat and silver haired bat being most susceptible. Bat activity and associated wind farm mortality appear to be higher on nights with low wind speeds (Arnett 2007).

## 4.2 Methods

### 4.2.1 Pre-Construction Monitoring

Waterfowl Nesting Area 1, 4 and 5

For pre-construction waterfowl breeding surveys, a standardized fixed width linear transect area search methodology will be used in Waterfowl Nesting Area 1, 4 and 5 (**Figure 2**). Surveys will include a single survey event between April 15 and May 15. This method requires that the area being searched and the search effort be strictly standardized. The number of individuals of each species detected during the sampling period is recorded to provide an index of abundance. The number of transects and fixed width of observations will be confirmed with the MNR prior to implementation. Information recorded for each survey event will include:

- The level of effort for each visit (date, start time, finish time, hours of searching, width and length of transect;
- A complete list of species detected and an estimate of the number of individuals actually detected (by sound or by sight);
- Data on any breeding evidence detected, using standard breeding bird atlas codes; and
- A basic description of the habitat(s) covered.

This survey will be repeated in a similar manner 3 years post-construction, where pre-construction surveys support the designation of these habitats as significant.

Raptor Winter Roosting and Feeding Area 3 and 4

For pre-construction raptor winter and feeding area surveys, an area search methodology will be used in Raptor Winter Roosting and Feeding Area 3 and 4 (**Figure 3**). Surveys will include three survey events between November 15 and February 15. This method requires that a similar transect path and survey duration be completed during each. Each transect will sample both portions of both open areas as well as adjacent wooded areas within 120 metres of open areas. The general route of transects will be confirmed with the MNR prior to implementation. Information recorded for each survey event will be the same as above width exception to the width of transect, which not required.

This survey will be repeated in a similar manner 3 years post-construction, where pre-construction surveys support the designation of these habitats as significant.

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# McLean's Mountain Wind Farm
# Figure 2: Waterfowl Nesting Areas of Significance

**Legend**

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community
- Waterfowl Nesting Areas (Including: MAMM1, MAMM3, MASM1, MASM1-1, MASM1-14, ME, SWDM2,SWDM2-1, SWDM2-2, SWDM3, SWDM4-5, SWTM2-5, SWTM3

**Project Components**

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

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# McLean's Mountain Wind Farm
# Figure 3: Raptor Winter Feeding and Roosting Areas of Significance

**Legend**

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community
- Raptor Winter Feeding and Roosting Area (120m Buffer) (Including: OAGM4)

**Project Components**

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

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### 4.2.2 Post-Construction Mortality Monitoring

Post-construction mortality monitoring for birds and bats will be done concurrently to improve efficiency of fieldwork. As this project has been assigned as a REA Class 4 wind facility it will be subject to the environmental effects monitoring surveys for the first three years (for each phase) of wind turbine operation. Monitoring will include carcass removal trials, searcher efficiency trials and post-construction mortality monitoring around a minimum of 30% of the turbines. Monitoring for all birds and bats will take place twice per week from May 1 to October 31 in each monitoring year. As this wind farm plans to construct 24 turbines, a stratified sample of 8 turbines, which reflect the various habitat types and distribution of the wind farm, will be selected for monitoring.

In addition to this, specific raptor mortality surveys will be continued once per week through the month of November at the stratified sample turbine locations. All turbines are to be searched at least once during the month of November. These additional surveys are not to be added to the sample survey mortality estimate calculations. Rather, the purpose of the raptor mortality surveys is to identify any individual or groups of turbines that may exceed the significant mortality threshold. Searcher efficiency and scavenger removal trials are only necessary for raptors considered as part of bird/bat mortality survey monitoring, but are not necessary when conducting raptor mortality surveys.

Mortality Surveys will use the Baerwald Spiral Method which includes circular transects within 50 m of the turbine base, spaced 5.0 – 6.0 metres apart allowing for a visual search of 2.5 – 3.0 metres on each side. Carcass searches will be performed by trained technicians, under the guidance of an experienced biologist. All carcasses found will be photographed and recorded/labelled with species, sex, date, time, location, carcass condition, searcher, injuries, distance and direction to nearest turbine, ground cover/substrate, estimated number of days since time of death and distance to plot centre. The condition of each carcass collected should be recorded in one of the following categories:

- Intact – a carcass that is not badly decomposed and shows no sign of having been fed upon by a predator or scavenger, although it may show signs of traumatic injury such as amputation from a turbine collision;
- Scavenged – an entire carcass that hows signs of having been fed upon by a predator or scavenger or a partial carcass that has been fed upon, with portions of it found in more than one location

Each carcass should be collected (using vinyl, latex or rubber gloves), bagged and stored in a freezer for future reference, identification, and/or necropsy. In the case of bats, White Nose Syndrome Protocol is to be used throughout all monitoring, which includes the use of 1 pair of latex gloves per bat carcass handled. A copy of the data sheet should be kept with the carcass at all times. All searchers will have updated rabies pre-exposure vaccination. Carcasses found during bird mortality searches may be used in carcass removal or searcher efficiency trials.

The following equation will be used to calculate Corrected Mortality Estimates:

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

$$C = c/[(S_e)(S_c)(Ps)]$$

Where:

C - is the corrected number of bird/bat fatalities
c - is the number of carcasses found
$S_e$ - is the searcher efficiency
$S_c$ - is the proportion of carcasses not removed by scavengers over the search period
Ps - is the percent of the area searched

Percent Area Searched

Most birds/bats appear to fall within 50m of a wind turbine base. Therefore, a circular search area consisting of a 50m radius will be used for all mortality searches, unless specific site attributes require a reduced search area (e.g. steep slopes, active cultivation, etc.). In cases where a reduced search area is necessary, the actual available area to be searched during the mortality survey will be mapped and calculated at each turbine and a correction factor applied.

A description of habitat, as well as other physical attributes, (e.g. % vegetation cover, vegetation height, steep slopes, active cultivation, etc.) within the 50m radius search area will be mapped and described to determine the respective visibility class as outlined in MNR 2010 and 2011. Changes in visibility class will be updated on a continuous basis to inform the need for additional searcher efficiency trials.

The following equation will be used to calculate Percent Area Searched:

$$P_s = \text{actual area searched} / \Pi r^2$$

R = 50 m

Carcass Removal Trials

Levels of carcass scavenging will be determined through carcass removal trials. In these trials, carcasses are planted around the wind turbines and monitored until they disappear or have sufficiently decomposed (2 weeks). Carcass Removal Trials will be conducted once a month during each monitoring year and will be performed to estimate the proportion of carcasses that are scavenged.

Carcass Removal Trials will use native bird/bat species that are freshly dead or frozen while freshly dead. Where possible, an equal amount of bird and bat carcasses should be used throughout carcass removal trials. Trials using other small mammals may also be used, where birds and bats are not available. Technicians will wear gloves to avoid getting human scent on the test specimens, which could bias results.

Carcasses will be laid out in a search area before daylight with their location marked by GPS in advance of a search being conducted. Weather conditions will be recorded. Carcasses should be laid out for trials at each turbine that will be searched, with a small number used (1 to 2 specimens) at each site. To avoid confusion with turbine-related fatalities, carcasses should be discreetly marked (e.g., clipping the ear, wing leg, fur; hole-punching ear; etc.). Carcasses should be distributed on substrates in proportion to the availability of these substrates. Scavenger trials will be repeated during each monitoring year, as efficiency of scavengers may change among years. Presence or absence of scavenging, and degree of scavenging if present, will be recorded for trial specimens.

Proportions of carcasses remaining after each search interval are pooled to calculate the overall scavenger correction ($S_c$) factor using the following equation:

$$S_c = (nvisit1 + nvisit2 + nvisit3)/ (n\ visit0 + nvisit1 + nvisit2)$$

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
nvisit1- nvisit3 - are the numbers of carcasses remaining on visit 1 through 3

Searcher Efficiency Trials

Searcher efficiency will vary between each searcher as well as between different sites. To correct for this, searcher efficiency trials will be conducted at least once a season for each surveyor during mortality monitoring surveys. A minimum of 10 carcasses per searcher per visibility class will be used. These trial carcasses will be spread out over the trial period and conducted with the bird/bat mortality surveys. Searcher efficiency trials will be conducted for each individual searcher. The searcher will not be notified when they are participating in an efficiency trial to avoid potential search biases. Trial carcasses will be discreetly marked (e.g., clipping of ear, wing leg, fur or hole punching ear) with a unique identification so that they can be identified as a trial carcass. 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. Bird/bat carcasses (including at least one raptor) will be used for searcher efficiency trials. Bat species known to be prone to white nose syndrome will not be used in searcher efficiency trials. Where frozen carcasses are used, they will be thawed prior to beginning searcher efficiency trials. Trails will be repeated for all post-construction monitoring years.

The date, time and location that test specimens were planted will be recorded, as will the date it was searched for and whether or not it was retrieved. The condition of the carcass when it was retrieved will also be recorded.

The following equation will be used to calculate Searcher Efficiency:

$S_e$ = number of test carcasses found / # of test carcasses placed – # 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

### 4.2.3 Post-Construction Disturbance Effect Monitoring

If pre-construction surveys support the designation of Waterfowl Nesting Area and Raptor Winter Roosting and Feeding Area habitats as significant, pre-construction surveys are to be repeated post-construction for three years. These surveys will be used to assess potential disturbance effects for these habitat types.

Additional disturbance effect monitoring is required for Sites Supporting Area Sensitive Species: Open Country 3 and 4 (**Figure 4**) and Sites Supporting Area Sensitive Species: Forest Birds 1 (**Figure 5**). Monitoring will occur twice between June and July. Methodology will include the use of paired ten minute fixed radius point counts (with point counts located 100m and 300m from the edge of a turbine or other infrastructure component). This pairing of point counts will allow analysis of possible change of bird diversity or abundance as it relates to the distance from a turbine (e.g. 0-50, 50-100, 100-150… up to 400 m away). Only turbines with similar habitat type extending out for at least 400m, will be sampled for disturbance effects. Specific turbines which confirm to the above will be determined prior to monitoring in consultation with the MNR.

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# McLean's Mountain Wind Farm
# Figure 4 : Sites Supporting Area-Sensitive Species: Forest Birds

**Legend**

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community (< 200m from edge)
- Unclassified Woodland Community (Interior > 200 m from edge) (Including: FOD, FODM1, FODM5-1, FODM8-1, FOMM10, FOMM4, FODM5-1, SWCM1-2, SWDM2-1, SWDM2-1, SWDM2-2, SWDM2, SWDM3, SWDM4-5, SWMM1-1, SWMM3-2, SWMM4)

**Project Components**

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

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# McLean's Mountain Wind Farm
# Figure 5 : Sites Supporting Area-Sensitive Species: Open Country Breeding Bird Habitat

**Legend**

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community
- Open Country Breeding Bird Habitat > 30 ha (Including: OAGM4, ME)

**Project Components**

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

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# 5.0 REPORTING

Reporting of fieldwork results will be submitted annually, and results will be expressed both in terms of fatalities/turbine/year and fatalities/MW/year, to enable comparison between studies. Reports will include comparisons between projected annual avian and bat mortality rates for the McLean's Mountian Wind Farm and rates reported at other projects in North America (e.g., as summarized in Arnett 2007). If these projected annual mortality rates fall within the low or middle ranges of reported rates, no immediate mitigation is needed. However, if mortality rates begin to approach, meet or exceed the significant mortality threshold numbers outlined below, Northland Power will consult with the relevant agencies as needed to determine the reasons for the high mortality rates. Subsequently, Northland Power will develop possible mitigation measures and adjust monitoring as needed. If needed, Northland Power may take action prior to contacting the relevant agencies.

Bird, raptor and bat mortality will be considered significant when a threshold of annual mortality exceeds the following:

- 18 birds/ turbine/year at individual turbines or turbine groups;
- 0.2 raptors/turbine/year (all raptors) across a wind power project;
- 0.1 raptors/turbine/year (raptors of provincial conservation concern) across a wind power project;
- 2 raptors/wind power project (<10 turbines); or
- 10 bats/turbine/year (averaged over the entire wind farm)

Studies indicate that turbine-related mortality maintained below these thresholds is unlikely to affect bird populations. Thresholds have been established based on the highest reported bird mortality at wind power projects in North America, outside California.

A single mortality event will be considered significant when a bird mortality event exceeds:

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

These thresholds are not intended to replace any species-specific approaches that may be needed to comply with the Endangered Species Act.

# 6.0 ADAPTIVE MONITORING AND MANAGEMENT

In general, if observed mortality impacts for any group of birds, bats and/or Species at Risk are found to exceed thresholds noted in **Table 2** above, EC and the MNR will be consulted to establish the appropriate mitigative response, which could include: conducting research with the goal of identifying the factors leading to the observed mortality rate; conducting more frequent surveys; increasing reporting frequency; and operational modifications.

If bats are experiencing disproportionate mortality, and rates are near the higher reported levels, Northland Power may consider installation of ultrasonic deterrent devices. However, as yet this technology has limited ability to effectively deter bats from areas as large as a turbines blade-sweep radius (Szewczak and Arnett 2008). Furthermore, the wind speed required to start turbines (i.e., increasing the turbine cut-in speed to 5.5 m/s or controlled idling) could be implemented on select turbines of the wind power project should the mortality threshold rates be met. This method could help to mitigate bat mortality if implemented during peak bat activity (July 15 to September 30 or overnight), as bats tend to be active at lower wind speeds (Arnett 2007).

If a review of environmental conditions unrelated to the wind farms operation is unable to shed light on increased mortality rates, then further action will be required. This could include blade feathering, and if necessary, shutting down specific problem turbines.

Blade feathering involves adjusting the pitch of the turbine blade such that reduced aerodynamics precludes efficient turbine operation. Blade rotation would be slowed and energy output reduced. This approach would be used to manage the turbine operation during specific time periods or weather conditions considered a high risk for bats or birds.

Turbine shut down would include the temporary removal of a turbine from service, stopping production of power. This action would be taken during a set period, such as a core seasonal migration window, and turbine operation would resume after the period of high risk has passed (EC 2007a).

These actions will be considered on a turbine by turbine basis or could be applied across the wind farm, based on areas of concern identified through the monitoring program and as deemed economically feasible. Actions taken in response to mortality events will depend on species involved, behaviour implicated (migration, foraging etc.) and geographical extent of the observed mortality, as agreed upon by the relevant agencies.

Where operational mitigation measures are required to reduce bird or bat mortality, the post-construction mortality monitoring period may be extended beyond the minimum requirement of three years to assess the effectiveness of mitigation.

# 7.0 SUMMARY

The Project Location for Northland Power's McLean's Mountain Wind Farm has been designated as REA Class 4 Wind Facility. This REA designation triggers the need for this post-construction monitoring plan as stipulated in MNR guideline documents. Some pre-construction monitoring is planned to confirm the significance of certain bird wildlife habitats. Post-construction monitoring is planned for three years after the wind farm is in operation. The MNR will be kept up to date on monitoring results through annual reporting and will be notified of unexpected negative environmental effects. Mitigation measures have also been outlined for unexpected negative environmental effects that may occur but cannot be explained by factors unrelated to the wind farms operation.

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