Appendix K

Adaptive Management Plan

Draft Adaptive Management Plan

Wocawson Energy Project

September 2018

Contents

Introduction

Wocawson Energy Limited Partnership (the Proponent) is proposing to develop the Wocawson Energy Project (WEP or the Project) as part of NB Power's LORESS program, which aims to help New Brunswick achieve its mandated targets for renewable energy production.

The Project consists of 6-12 wind turbines capable of producing 20-40 MW of renewable energy to be constructed, owned, operated and maintained by the Proponent that will be connected to the existing NB Power transmission grid via a new 5.25km 69kV transmission line to be constructed, owned, operated and maintained by NB Power. The Proponent is developing and permitting both portions of the Project.

Due to the rated capacity of the proposed WEP, the Project requires a provincial Environmental Impact Assessment (EIA). As part of the EIA, the Proponent is proposing an Adaptive Management Plan to address issues that may arise during the post-construction monitoring efforts related to birds and bats at the turbine locations.

The goal of an Adaptive Management Plan is to closely monitor the in-situ impacts of a project once it is in operation.

The Adaptive Management Plan for the WEP will be finalized in consultation with CWS and approved by DELG prior to start of the Project's post-construction monitoring.

Purpose

The purpose of this Draft Adaptive Management Plan is to provide DELG with the Proponent's preliminary plan to address the risk of impacts to migrant avian species due to the perceived risk associated with the turbine height proposed.

The Adaptive Management Plan will:

- support science-based management of the Project to ensure wildlife and habitat impacts resulting from the Project are avoided, minimized, or offset;
- improve the understanding of interaction between wind turbines with heights over 150m and migrant avian species using evidence-based monitoring results in the field; and
- ensure that mitigation measures are implemented as required and that these measures are evaluated and continually improved.

Regulatory Framework

Below are the two regulatory frameworks which are necessary to consider for the development of an Adaptive Management Plan; the provincial Clean Environment Act and the federal Migratory Birds Convention Act.

Clean Environment Act

The New Brunswick *Environmental Impact Assessment Regulation - Clean Environment Act* requires all proposed wind projects with a combined design production rating equal to or greater than 3 MW to conduct an EIA. As the Project will have a nameplate capacity greater than 3 MW, an EIA was required. The EIA has been prepared for the proposed WEP in accordance with the New Brunswick DELG guidelines entitled *A Guide to Environmental Impact Assessment in New Brunswick* (DELG, 2012).

Migratory Birds Convention Act

As a tall structure, there is a possibility for the WEP to impact migratory birds. The Proponent recognizes their responsibility under the Federal *Migratory Birds Convention Act* and the implications should a migratory species be impacted.

Migratory birds and their eggs, nests, and young are protected under the *Migratory Birds Convention Act* (MBCA). Migratory birds protected by the MBCA generally include all seabirds (except cormorants and pelicans), all waterfowl, all shorebirds, and most land birds (birds with principally terrestrial life cycles). The list of species protected by the MBCA can be found at: https://www.ec.gc.ca/nature/default.asp?lang=En&n=496E2702-1. Bird species not listed may also be protected under other legislation.

Under Section 6 of the *Migratory Birds Regulations* (MBR), it is forbidden to disturb, destroy, or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. It is important to note that under the MBR, no permits can be issued for the incidental take of migratory birds caused by development projects or other economic activities.

Adaptive Management

The Saskatchewan Adaptive Management Guidelines for Wind Energy Projects (MOE, 2018) defines adaptive management as a systematic science-based process intended to improve policies and practices by learning from the outcome of management decisions and to reduce scientific uncertainty. It further allows for adaptability in monitoring, management actions based on observed outcomes, and utilizes feedback from assessment of project design and operation.

The wind industry has advanced in recent years with onshore wind turbines growing larger with current blade tips reaching up to 205m. Though literature on altitudinal distribution of migratory species (Mabee, 2006) demonstrates that an increased risk to migratory birds is not expected as turbines increase from 100m to 150m and up to ~200m, this Draft Adaptive Management Plan outlines the monitoring, consultation, and mitigation that will be implemented based on the observed impact. This plan will ensure that there is an increase level of effort in management of potential impacts through mitigation and offset approaches appropriate to impacts detected on

site. This in turn will provide additional certainty that impacts beyond those predicted through the EIA process will be assessed and addressed for the WEP which proposes to use a turbine with a maximum height of 205m.

As stated in the Wind Turbines and Birds A Guidance Document for Environmental Assessment (CWS, 2006), "adopting an adaptive management approach and reporting on the successes and the failures of certain methods will help guide future research and development in wind energy."

Management Guidelines

The Proponent is proposing draft management guidelines to be finalized in consultation with CWS and DELG. This proposed plan demonstrates a tiered approach and should an impact be observed, some form of assessment and mitigation will be required based on the severity of impact. As an adaptive management plan is meant to be flexible to adapt to the situation at hand, all scenarios in which impacts are observed will be reported and further consultation will provide an additional safeguard to arrange for the implementation of the appropriate mitigation measures if required.

Management Response

Avoidance

The first step in adaptive management is to implement measures that will help to avoid impacts which can be effectively accomplished within the initial site finding phase of project development. Throughout the development phase of the WEP the following measures have been implemented to avoid impacts on migratory species:

- Siting the project away from Important Bird Areas;
- Situating the project on previously disturbed lands;
- Following the Department of Energy and Resource Development's (DERD) recommendation to setback 150m from provincially significant wetlands;
- Avoiding wetland disturbance with transmission line poles and,
- Micro-siting the turbines and transmission line poles away from observed species at risk.

Mitigation

If impacts to migratory species due to the turbine or transmission line cannot be avoided, the second step in adaptive management is mitigation. Mitigation measures can be implemented during the construction and operation phase of the Project which have been found to effectively reduce impacts. The mitigation measures proposed throughout the EIA process that will be implemented for the WEP include the following:

- Reducing the footprint of the project through selection of a turbine that can produce more energy thus reducing the number of turbines on site;

- Using the minimum amount of pilot warning and obstruction avoidance lighting as determined by Transport Canada;
- Using lights with short flash durations and ability to emit no light during the “off phase” of the flash;
- Using lights that operate at the minimum intensity and minimum frequency allowable by Transport Canada;
- Ensuring maintenance protocols instruct workers to turn off all work lights upon leaving the site;
- Minimizing potential interaction with ground nesting species by revegetating the project area where possible; and,
- Developing a comprehensive follow-up avian mortality survey in consultation with CWS and DERD which includes this draft Adaptive Management Plan.

As the WEP becomes operational, and post-construction monitoring is conducted to determine impacts, additional mitigation may be required. There are several mitigation measures that can be implemented during operation to support efforts to reduce unanticipated mortalities. The Proponent is proposing to use the tiered adaptive management approach to address unanticipated impacts, however the Proponent will consult with DELG and further Technical Review Committee (TRC) members to determine the most appropriate response when an unanticipated mortality event occurs on site. Outlined below in the following sections are the management responses proposed. Management responses can be adapted after a single spring or fall monitoring event, season or after the full year. DELG and CWS will be notified of the results at the end of each monitoring season or within 24 hours of a mortality event and a formal report will be prepared annually. The mortality of an individual migratory bird species at risk or 10 or more migratory birds in one night is considered a mortality event.

Tier 1 Management Response

The management response for Tier 1 will include the typical post-construction mortality monitoring as outlined in the EIA and discussed with DELG. Generally, this includes two years of post-construction carcass searches. If continued observance over these two years shows low impacts, reduced monitoring or no additional monitoring may be implemented.

The Proponent may choose to continue a third year of post-construction monitoring in year 5 of operation if it is of interest to DELG under the Tier 1 Management Response.

Tier 2 Management Response

If, during any post-construction monitoring period, impacts are observed, further consultation with DELG and TRC members will occur to determine the appropriate response. Tier 2 management response includes passive mitigation measures. The mitigation implemented at Tier 2 will provide additional information on the potential cause of impact. The level of effort, based on the observed impact, will be further determined with DELG and TRC members. Some measures proposed for this tier include the following:

- Cause and effect analysis;
- Extended monitoring program; and
- Increased reporting frequency;

Tier 3 Management Response

If, during any post-construction monitoring period, impacts are observed that are considered significant after further consultation with CWS, additional active mitigation will be implemented. The level of effort and mitigation approaches will be determined based on the observed impact and in consultation with DELG and TRC members. Mitigation measures proposed for this tier include the measures from Tier 2 described previously and may include the following should they be deemed necessary through consultation with appropriate bodies:

- Blade feathering;
- Compensation for fatalities; and,
- Extended monitoring program to determine mitigation effectiveness.

Compensatory Mitigation

The Proponent understands that incidental take of migratory birds could result in a financial penalty under the Migratory Birds Convention Act.

Additionally, if unanticipated impacts are associated with the WEP, and mitigation strategies prove to be ineffective, the following compensatory mitigation may be considered:

- Conservation land;
- Community fund for local environmental restoration; and/or,
- Community fund for avian research.

Post-Construction Monitoring and Reporting

The proposed protocols outlined below will be finalized in consultation with DELG and TRC members for approval prior to being implemented.

Mortality surveys will be conducted according to the protocols set out by Environment Canada's April 2007 "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds". Scavenger rates and searcher efficiency trials will also be implemented according to the recommended protocols. A request for a scientific collection permit will be submitted prior to the commencement of the surveys.

Carcass Searches

The following schedule and search effort for bird and bat carcass searches have been established following Environment Canada's Protocols and recommendations from CWS:

- Spring migration: April 15 – May 31 (6 weeks), twice per week; and,
- Fall staging and migration: September 1 – October 31 (8 weeks) twice per week.

An intensive survey area, or grid, of 100 m by 100 m in size, will be identified with a turbine base located at the centre. The grid will be divided into a series of transects, spaced six-meters apart, starting at the centre of each 100 m length of the grid. In total, the grid is divided into 17 transects, 100 m in length. Transects will be marked on each end with pin flags, of alternating color, and tracked with a GPS for simple and accurate repetition of surveys.

During each carcass search, all relevant information such as wind direction and other weather-related factors (fog, snow, etc.) will be recorded. In addition to weather related factors, the search area, date, and search time for the turbine will be recorded. Furthermore, for every carcass found, the following information will be recorded:

- The date and time it was found;
- The state of decomposition;
- The extent and type of injury sustained; and,
- The species (or best estimate of species).

The distance and direction to the turbine and GPS coordinates of the carcass;

- The substrate on which the carcass was found; and,
- An in-situ photograph will be taken.

Carcasses will be collected and stored in a freezer, until they can be provided to the Canadian Cooperative Wildlife Health Centre for necropsy, if required by the Approval.

If of interested to DELG and the TRC members, the Proponent would propose that during the post-construction monitoring periods, a large area surrounding the turbine is left cleared from revegetation to facilitate searcher efficiency. Finding potential collision mortalities within a forested or revegetated area can increase the likelihood of searchers unable to find these mortalities, as such, clearing a large area may provide more accurate results. The size of this area can be further discussed with DELG and TRC members. Once satisfactory results from post-construction monitoring can provide an accurate depiction of impacts associated with the Project, the area will be revegetated.

Scavenger Trials

Carcass removal rates by scavengers will be assessed during carcass searches in each season. In each season, carcasses will be placed in the grid and surrounding vicinity for scavenger trials. Some carcasses may be placed on access roads, to reduce the effect of artificial supplementation of scavengers, which has been shown to increase scavenger activity. Carcasses used for scavenger trials will be either domestic quail, or Australorp and Brahma chicks, purchased from a local farm. Birds used for scavenger trials will be frozen and resemble native birds.

Carcasses will be laid out in the grid and coordinates recorded. They will be placed no more than one day prior to a scheduled carcass search and assessed for persistence over various intervals (typically persistence is checked during the 4 carcass searches following placement). Carcasses will be randomly distributed on the turbine grid and associated access road. Two scavenger trial events will be conducted per season, with 10 individual quail placed per trial (20 quail per season). If scavenger rates approach 60% during the scavenger removal trials, the Proponent will consult with the Department of Energy and Resource Development (DERD) wildlife branch to determine whether carcass surveys should be continued or modified, as very high scavenger activity can bias the results of mortality surveys.

Results from the carcass removal trials will be used to calculate an overall scavenger correction factor. The scavenger correction factor will combine data from each seasonal scavenger trial to calculate an overall scavenger correction factor for the year. In addition, scavenger correction factors will be calculated for each season to help in discussion of seasonal effects of scavenger rates.

Searcher Efficiency Trials

Carcasses will be placed at random locations within the search area to test searcher efficiency. Carcasses were placed by a 'tester' unknown to the searcher and the location of each carcass will be recorded to retrieve the carcass should it not be found by the searcher. No more than three carcasses will be placed within the turbine grid on any given day, and the carcasses will be distributed across substrates. The searcher efficiency trials will be completed throughout the carcass searching program (once every season) for all searchers involved in the carcass searching program. Carcasses used for searcher efficiency trials will include either domestic quail, and Australorp and Brahma chicks (2-4 weeks of age). All carcasses used in searcher efficiency trials will be discretely marked to ensure that the searcher was aware that the carcass was part of the searcher efficiency trial, rather than a collision victim. Carcasses will be marked with a rubber band or twist-tie wrapped around a foot.

Any carcasses that are not found will be retrieved immediately after the search to determine whether they were scavenged or overlooked. Data recorded for each bird placed will include:

- Date, time and location it was placed, along with the species name;
- Date and time it was searched for; and,
- Whether it was found, overlooked or scavenged, along with the name of the searcher.

Reporting and Communication

Wocawson Energy Limited Partnership will stay in regular contact with the WEP Project Manager at DELG, Cassandra Colwell.

Contact Information: Cassandra Colwell, MSc.
Project Manager
Environmental Impact Assessment Branch
New Brunswick Department of Environment and Local Government
Phone: (506) 457-6747
Email Address: cassandra.colwell@gnb.ca

After each spring and fall monitoring period, the Proponent will provide an email update on the results of the monitoring and any impact observed to the Project manager at DELG to forward onto applicable TRC members such as DERD and CWS. Though an update will be provided after each monitoring period, should a significant mortality event occur, DELG will be notified as soon as reasonable.

In additional to seasonal updates, a formal annual report will be prepared by the third-party consultant conducting post-construction monitoring. This report will include the methods (to be approved by DELG and CWS), monitoring results, and recommendations from the Spring and Fall monitoring period and will include all applicable correction factors to determine accurate impacts related to the WEP operation.

Consultation with DELG, DERD, and CWS will be ongoing throughout the post-construction monitoring period and additional updates can also be provided upon request.

Closure

This Draft Adaptive Management Plan is being proposed for the WEP. Wocawson Energy Limited Partnership is proposing this Plan to closely monitoring the in-situ impacts of the proposed taller turbine which will reach a maximum height of 205m.

The approach presented in this Plan has been adapted from the Saskatchewan (2018) *Adaptive Management Guidelines for Saskatchewan Wind Energy Projects*. This adaptive management approach has been implemented in western jurisdictions as a solution to monitor the observed impacts from taller turbines.

The EIA conducted for the WEP anticipates low impact to avian species. Additionally, scientific literature on altitudinal distribution of migration does not suggest a new, increased risk to migratory species from increasing turbine heights to 205m. However, should there be unanticipated impacts, this Plan will ensure that an increase level of effort in mitigation and offset approaches appropriate to the impacts detected on site are implemented. This in turn will provide additional certainty that impacts beyond those predicted through the EIA process will be assessed and mitigated for the WEP.

The final Adaptive Management Plan will be developed in consultation with CWS and approved by DELG prior to project commissioning date.

References

CWS (2006) Wind turbines and birds: A guidance document for environmental assessment.

CWS (2007) Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds

DELG (2012) A Guide to Environmental Impact Assessment in New Brunswick.

Erickson, W.P. et al., (2014) A comprehensive analysis of small-passerine fatalities from collision with turbines at wind energy facilities. PLoS ONE 9:e107491.

Mabee et al. (2006) Nocturnal Bird Migration Over an Appalachian Ridge at a Proposed Wind Power Project. Wildlife Society Bulletin 34: 682-690

Saskatchewan Ministry of Environment (2018) Adaptive Management Guidelines for Saskatchewan Wind Energy Projects.

Zimmerling, J. et al. (2013) Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments. *Avian Conservation and Ecology* 8(2): 10.