Sector Guideline

Additional Information Requirements for Wind Turbines

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Department of Environment and Local Government
Environmental Impact Assessment Branch

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Pursuant to Section 5(2) of *Regulation 87-83*, the *Environmental Impact Assessment Regulation - Clean Environment Act*, this document is intended to assist proponents in preparing a registration submission for projects involving wind turbines. A complete list of potential triggers for project registration is provided in *Schedule A* of *Regulation 87-83*. To determine if registration is required for a specific project, please contact the Environmental Impact Assessment (EIA) Branch, Department of Environment and Local Government at (506) 444-5382.

This guideline is applicable to wind turbine projects with a combined design production rating of three megawatts or more, as per *Schedule A*, category (b) of *Regulation 87-83*.

These guidelines should be read in conjunction with the General Information Requirements outlined in the latest version of the *Registration Guide*. Note that the following items are requirements **in addition to** those items required in the *Registration Guide*. After reviewing a registration submission, the Technical Review Committee (TRC) may request other information beyond the items listed below and in the *Registration Guide*.

For further assistance, please contact the EIA Branch, Department of Environment and Local Government at (506) 444-5382.

1.0 THE PROPONENT

See *Registration Guide*.

2.0 THE UNDERTAKING

(v) Siting Considerations:

- One of the most commonly cited environmental concerns associated with wind energy projects is the potential for injuring or killing bats and birds. It is widely recognized that siting of wind turbines plays an important role in determining potential effects on various bird and bat species and that proper consideration of siting and facility design can greatly reduce these effects. Therefore, siting criteria for the wind turbines should include a consideration of factors such as the use of the site and surrounding areas by birds and bats, the importance of the site for wildlife at risk, and typical weather conditions at the site as they affect the visibility of the project to birds. Proponents are required to prepare a Pre-Construction Site Survey Plan and a Post-Construction Monitoring Plan for review by the Canadian Wildlife Service (CWS) and the Department of Energy and Resource Development (ERD). Information collected throughout the pre-construction site surveys and post-construction monitoring will be used to inform and direct mitigation and site planning. It is strongly recommended that consultation with CWS and ERD take place early within project planning (i.e. prior to EIA registration) to accommodate survey requirements and time constraints (e.g. breeding season).

    - **For all operations including wind turbines**, please note that the TRC may recommend 1-2 years of pre-construction surveys (e.g. feeding, migration, breeding, nesting, wintering, etc.) to establish an adequate understanding of bird and bat use at a proposed site. In addition, projects that move forward with *Certificates of Determination* under *Regulation 87-83* may also be required to complete post-construction mortality surveys for up to 3 or more years. The lengths and intensities of surveys depend on site sensitivity and the number of turbines. As these studies may have a significant impact on the project schedule, early pre-submission consultation is strongly encouraged.

- **In addition to the above, operations with turbine heights greater than 150 m** must also undertake two years of pre-construction radar and acoustic monitoring. Further, projects that move forward with *Certificates of Determination* under *Regulation 87-83* must conduct post-construction mortality surveys for a minimum of two years. Please refer to Appendix 1 for further detail. These requirements apply regardless of the number of turbines and location. As these studies may have a significant impact on the project schedule, early pre-submission consultation is strongly encouraged.

  Note: Wind turbine height is defined as the distance from the base to the highest point on the structure. For a horizontal-axis wind turbine, the highest point is defined as the tip of the blade when the blade is in a vertical position above the hub where the rotor is attached.

- Hazards associated with the presence of wind turbines include, but are not limited to, ice throw, blade throw, tower collapse, fire, and explosion. To protect people traveling on public highways and roads from harm and to protect infrastructure that is under its jurisdiction, the Department of Transportation and Infrastructure (DTI) requires that wind turbines be set back:

  - five hundred metres (500 m) or a distance equal to three and a half (3.5) times the wind turbine height (whichever is greatest) from the right-of-way of **public highways**[1] under the administration and control of the Minister of Transportation and Infrastructure, including areas declared as Department of Transportation Development Areas; or

  - a distance equal to one and a half (1.5) times the wind turbine height from a **public non-maintained**[1] road right-of-way.

- For wind turbines located on Crown Land, setbacks may be imposed as per ERD's *Allocation of Crown Lands for Wind Power Projects Policy* (see Other Applicable Guidelines below).

- Indicate whether any existing land use on the site would be continued (e.g. continued concurrent agricultural use, forestry, etc.).

- Wind turbines should be sited to minimize direct impact to archaeological resources. In areas where a historical background study or the most current Archaeological Predictive Model indicates that archaeological resources may be present, an Archaeological Impact Assessment (AIA) will need to be conducted by a **licensed Professional Archaeologist**, with the results submitted for review to the Archaeological Services Branch, Department of Tourism, Heritage and Culture as soon as the AIA is completed. Based on the results, micro-siting of individual turbines may be recommended to minimize potential impacts to important archaeological resources identified in the AIA. If the archaeological resource is extensive or of exceptional importance, mitigation of the resource or complete avoidance of the area may be recommended. The proponent is encouraged to conduct an AIA early in the planning phase of the project to avoid areas of archaeological importance and the

[1] Definitions

Public highways: Highways, as defined by the *Highway Act*.

Public non-maintained road: Type of public highway that is not constructed or maintained to a standard that supports year-round use or activities for commercial, industrial, or dwelling purposes. These roads typically receive little or no motor vehicle traffic. For the purposes of this guideline, this includes resource access roads.

Maps showing the different types of highways and roads in New Brunswick are available at https://www.gnb.ca/0113/maps/Mapbooks/2019-Mapbooks-e.asp.

issues arising from late identification of archaeological resources. As pedestrian surveys and manual subsurface testing are often required to assess the archaeological potential of an area, assessments must be carried out when the ground is thawed, the water table is at a reasonably low stand (for test locations where this is applicable), and, preferably, when there is a minimal amount of ground cover.

(vi) Physical Components and Dimensions of the Project

- Ensure that the site plan shows the location of each individual wind turbine plus associated infrastructure (e.g. laydown areas, storage sites, transformer stations, electrical cable network, access roads, meteorological towers, on-site concrete plants, etc.). The proponent may wish to consider including several alternative turbine locations that could be developed should one or more of the primary turbine locations be found to be unacceptable during the review.

- Discuss potential alternatives for the turbine tower foundation design (e.g. footprint size, anchoring method, volume of excavation, alternative construction methods, etc.). Note whether blasting will be required.

- Provide summary tables listing the key impacts of the project (e.g. total lengths of new roads, improved roads, powerlines, etc.; total hectares of forest to be cleared (by forest type); total number of road crossings of streams; etc.).

- Note if an on-site water supply will be required for construction activities (e.g. pressure washing of components, concrete manufacture, dust control, etc.) or if water will be trucked in. If water will be used, indicate the anticipated amount that will be required.

- Indicate whether electrical powerlines will be trenched or overhead.

- Describe how turbine(s) will be connected to the existing power transmission system. If a connection powerline is required, outline whether it is considered part of the windfarm project and, if so, provide further detail (e.g. evaluation of alternative alignments and the selection of a preferred alignment).

- Demonstrate how the proposed structures and transmission line configuration are optimal for avoidance of bird and bat collisions and electrocution.

- Indicate the turbine blade speed in revolutions per minute.

- Describe the tower dimensions and design (e.g. height, rotor diameter, guy wires, noise production, etc.) for the wind turbine(s) and meteorological tower(s).

- Describe turbine lighting requirements (if applicable), and provide a description of the types of lights to be used. Identify any existing sources of light in the vicinity of the project that may attract birds to the area.

3.0 DESCRIPTION OF EXISTING ENVIRONMENT

Include all relevant environmental features as noted in the *Registration Guide*. For this class of project, the required information includes, but is not limited to:

- a description of habitat types at and surrounding each turbine site, including the presence of wetlands;

- a description of weather conditions at the site (e.g. average number of fog days per year and per season, when during the day fog usually occurs);

- a presentation and discussion of wind statistics in relation to power generation and design at the various sites (i.e. demonstrate that conditions are adequate for power generation and that the project design can accommodate extreme conditions, such as strong winds and ice loads); and

- a description of other projects or infrastructure in the vicinity that may compound the effects of the project.

Note that any available site-specific weather data should be supplemented with long-term data from the nearest representative climate station.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

All anticipated impacts should be described and discussed. These will depend on the scope and complexity of the project as well as the project location. See the *Registration Guide* for further information. Examples of impacts resulting from this class of project may include, but are not limited to, those listed below.

Biota

- Provide a site-specific analysis of anticipated bird and bat mortality due to turbine lighting and impact with blades, towers, or support wires/structures (see Section 2.0 (v) above).

- Provide a site-specific analysis of the anticipated disturbance to birdlife cycle (e.g. flight paths, wintering, breeding, resting, feeding, etc.) (see Section 2.0 (v) above).

- For offshore installations, describe anticipated impacts on marine habitat due to transmission of noise and vibration into the marine environment.

Noise

- Provide a noise impact study assessing all noise sensitive locations (i.e. recreational, residential, and institutional uses) within 1 km of the nearest turbine. The study must demonstrate compliance with the noise criteria predicted at the building exterior, as set out in Table 1 of *Wind Turbines and Sound: Review and Best Practice Guidelines* (HGC Engineering for the Canadian Wind Energy Association, February 2007). Table 1 of these Guidelines is reproduced below. Predictions of sound levels must be made using an accepted methodology that considers the layout of the windfarm and the topography of the surrounding area. ISO 9613, Acoustics-Attenuation of sound during propagation outdoors is the internationally recognized standard.

Table 1. Recommended Sound Criteria for Wind Turbines

Wind Speed (m/s)	4	5	6	7	8	9	10	11
Wind Turbine Noise Criteria (dBA)	40	40	40	43	45	49	51	53

Visual

- Provide a visual impact analysis including, but not limited to:
    - "worst-case" computer-generated zone of influence mapping that indicates all locations from which the proposed turbines will be visible given existing topography and ignoring intervening vegetation or buildings; and
    - computer-generated photomontage visual simulations of the facility as viewed from selected sensitive locations within the zone of visual influence (e.g. publicly accessible areas, highways, recreation spaces, residential areas, etc.).
- Provide a moving shadow (i.e. shadow flicker) assessment comprised of a worst-case computer-generated analysis of impacts as experienced on occupied adjacent lands and public roadways, ignoring intervening vegetation or buildings, when the sun is low on the horizon. The report must include a description of the mitigation measures that the proponent will use to mitigate this effect on sensitive receptors, such as the relocation of turbines (preferred); screening of receptors with vegetation, awnings, and/or structures; and/or, operational controls. Where the proponent can demonstrate that mitigation is not feasible, the number of shadow flicker hours at a receptor must be limited to 30 hours per year for a maximum of 30 minutes per day based on a "worst case" calculation (i.e. maximum shadow between sunrise and sunset on a cloudless day).

Communication Facilities

- Discuss the location of the site with respect to television, microwave, and cellphone transmission facilities, and assess the potential for moving turbine blades to block or deflect such signals. See "Technical Information on the Assessment of the Potential Impact of Wind Turbines on Radio Communication, Radar and Seismoacoustic Systems" (CANWEA, April 2007).

Hydrology

- If deep foundations are required, describe possible groundwater quality and quantity impacts, including potential impacts on surrounding existing water supplies.

Electromagnetic Fields

- In the context of the proposed project, discuss the current state of scientific knowledge regarding possible health effects from electric and magnetic field exposure from wind turbines, as well as provide a review of current exposure guidelines, recommendations, and position statements from health-related organizations.

Public Safety

- Assess the potential for possible injury to the public due to ice thrown from rotating blades during cold weather, damaged blades thrown from turbines, and tower collapse or catastrophic failure.
- Assess the possibility of increased fire hazard due to the presence of electrical generating equipment, etc.

Note that the consequences for human safety regarding design failure under extreme weather conditions will take on added importance if the turbines are to be constructed on or near school property, recreational lands, residential properties, etc. For proposed wind turbine developments located on or near such features, the assessments listed above shall be prepared by a **Professional Engineer licensed to practice in the Province of New Brunswick**.

5.0 SUMMARY OF PROPOSED MITIGATION

Describe all mitigative measures that will be employed to minimize the potential environmental impacts identified above. See the *Registration Guide* for additional guidance. Note that a description of a proposed follow-up monitoring program designed to verify bird and/or bat turbine interactions and the effectiveness of mitigation measures will be required for all projects, regardless of turbine height (see Section 2.0 (v) above). Follow-up monitoring for other environmental elements (e.g. fish habitat, wetlands, noise, etc.) may also be required.

6.0 PUBLIC INVOLVEMENT

See *Registration Guide*

7.0 APPROVAL OF THE UNDERTAKING

See *Registration Guide*

8.0 FUNDING

See *Registration Guide*

9.0 SIGNATURE

See *Registration Guide*

10.0 SUBMISSION INSTRUCTIONS

See *Registration Guide*

ONLINE RESOURCES

Department of Environment and Local Government, Environmental Impact Assessment website: https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment.html.

Department of Environment and Local Government. 2018. *A Guide to Environmental Impact Assessment in New Brunswick*. Available online: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/GuideEnvironmentalImpactAssessment.pdf.

Department of Environment and Local Government, online listing of projects that must be registered under EIA (*Schedule A* of *Regulation 87-83*): https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/projects.html.

OTHER APPLICABLE GUIDELINES

Wind Turbines and Birds: A Guidance Document for Environmental Assessment. 2007. Canadian Wildlife Service. Available online: http://publications.gc.ca/site/eng/458437/publication.html.

Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. 2007. Canadian Wildlife Service. Available online: http://publications.gc.ca/collections/collection_2013/ec/CW66-364-2007-eng.pdf.

Avoiding Harm to Migratory Birds: Avoidance Guidelines. 2017. Available online: http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1.

Crown Lands – Windfarm Lease. 2018. NB Department of Energy and Resource Development. Available online: http://www2.gnb.ca/content/gnb/en/services/services_renderer.200867.Crown_Lands_-_Wind_Farm_Lease.html.

Allocation of Crown Lands for Wind Power Projects. 2012. NB Department of Natural Resources. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/Publications/CLM0172005.pdf.

NB Department of Natural Resources Pre-Construction Bat Survey Guidelines for Windfarm Development in NB. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/ForestsCrownLands/BATS_PreConstructionBatSurveyGuidelinesForWindFarmDevelopmentInNB.pdf.

NB Department of Natural Resources Post-Construction Bat and Bird Mortality Survey Guidelines for Windfarm Development in NB. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/Wildlife/WindPower-PostConstructionBatAndBirdMortalitySurveyGuidelinesForWindFarmDevelopment.pdf.

Please consult with the Canadian Wildlife Service, Environment and Climate Change Canada to determine their latest requirements.

Appendix 1

Wind Turbines and Birds Updated Guidance for Environmental Assessment and Monitoring
Canadian Wildlife Service – Atlantic Region
May 2018

The Canadian Wildlife Service (CWS) (2007a) document "Wind Turbines and Birds: A Guidance Document for Environmental Assessment" and the CWS (2007b) document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" provided information on assessing risk to migratory birds and monitoring protocols based on information available at the time. Since these documents were produced, many wind turbines have been installed, new data has become available, and turbines have increased in height and rotor sweep diameter. The following offers advice related to risk assessment and monitoring for wind turbines taller than 150 m in addition to previous advice provided in CWS 2007a and 2007b.

CWS would classify all turbine sites with wind turbines greater than 150 m in height as Very High site sensitivity because they are within a known migratory corridor as per Table 1 in the CWS (2007a) guidance document. Turbine heights greater than 150 m in height are in the 150-600 m nocturnal flight corridor of songbirds (Horton et al. 2016). For sites with Very High site sensitivity, and hence categorized as Level 4 concern, proponents are strongly encouraged to design and initiate baseline surveys as far in advance as possible (CWS 2007a). The use of radar and acoustical monitoring is recommended as per Section 8.2 of the CWS (2007a) guidance document in addition to other standard monitoring.

Radar monitoring protocols are described briefly in the CWS 2007(b) document. It is recommended that radar units be used in spring and fall. Acoustical data can provide information on the species composition of nocturnal migrants and is complementary to radar data. Acoustical arrays have a maximum detection of 200 m above ground level similar to the height of proposed wind turbines. Species composition information is especially important to understand the potential risk to species at risk. A study by Longcore et al. (2013) indicated that communication towers may be responsible for annual mortality of 1.5% of the population of Canada Warbler (a species at risk).

Monitoring for nocturnal migrants should occur from April 15-June 7 and August 15-October 31. It is recommended that a minimum of two years of data be collected in order to understand variance in flight height in relation to environmental conditions. Ideally this monitoring would be conducted pre-construction to quantify risk at a proposed turbine site prior to approval. For projects where provincial approvals do not require pre-construction monitoring, CWS would recommend initiating monitoring as soon as possible for a minimum 2-year period. Monitoring could be started during the construction year presuming construction doesn't happen at night and wouldn't impact results.

It is projected that by 2019 New Brunswick weather radar will be upgraded from C-band to dual pol S-band radar. This would improve weather radar sensitivity by reducing attenuation, offering a strong signal at long ranges, improving sensitivity, and being better able to distinguish between meteorological and non-meteorological targets such as birds and insects. As this technology comes online and available, efforts will be made to better map and understand bird migration and movement through the region at a landscape scale.

For projects that receive provincial approval, post-construction mortality surveys should be conducted for 2 years at a minimum with potential for required extension if data warrants. Two types of surveys should be conducted:

1. Systematic. During spring and autumn, regular (according to guidelines) regardless of weather. Weather conditions need to be tracked. As per the guidance document for "very high risk" site sensitivity.

2. Episodic weather events: Conduct additional surveys immediately following specific types of weather events. Initial list of weather events of interest includes, but is not limited to, the following:

    - Autumn time period: Previous evenings that start with N or NE winds but change overnight to conditions that bring in fog or low-level cloud cover to coastal areas.

    - Spring time period: Previous evenings with S or SW winds but change overnight to conditions that bring in fog or low-level cloud cover to coastal areas.

References:

Environment Canada. 2007a. Wind Turbines and Birds: A Guidance Document for Environmental Assessment. 46pp.

Environment Canada. 2007b. Recommended Protocols for Monitoring Impacts of Wind Turbines in Birds. 33pp.

Horton K.G., B.M. Van Doren, P.M. Stepanian, A. Farnsworth A., and J.F. Kelly. 2016. Where in the air? Aerial habitat use of nocturnally migrating birds. Biol. Lett. 12: 20160591. http://dx.doi.org/10.1098/rsbl.2016.0591

Longcore, T., C. Rich, P. Mineau, B. MacDonald, and D.G. Bert. 2013. Avian mortality and communication towers in the United States and Canada: which species, how many, and where? Biol. Cons. 158: 410-419.

Excerpt from *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (2007a) regarding monitoring requirements for Category 4 projects:

> **Category 4**: Projects in this category present a relatively high level of potential risk to birds, and consequently are likely to require the highest level of effort for the environmental assessment (EA). As with category 3 projects, relatively comprehensive baseline surveys will usually be required. In many cases, these can still be completed over the course of one calendar year, unless there are specific factors that require more intensive survey (e.g. if there is a major concern over a species that shows considerable annual variation in abundance), in which case an additional year of pre-construction assessment may be required. For this reason, proponents are strongly encouraged to design and initiate baseline surveys as far in advance as possible, so that delays in data gathering do not affect EA approval of the project. Depending on the findings of baseline studies, project proponents whose projects fall into this category may be encouraged or even required to seek alternative locations if significant adverse effects on birds are anticipated. If the project does proceed, relatively detailed follow-up is likely to be required. Post-construction follow-up surveys, spread over two to three years and sometimes more, would likely be required to determine changes in bird use of the area associated with construction of the turbines. Carcass searching around turbines over at least 2 years is likely to be required during seasons when there is an elevated collision risk (e.g. when concentrations of birds are present, or during the migration season). Data gathering for more than two years would normally be targeted to answering very specific questions or concerns, and should in most cases only require limited work in the later years. For any category project, the extent of post-construction monitoring may be increased if unexpected high mortality or other adverse consequences are encountered. Such monitoring may be required particularly to evaluate the effectiveness of any proposed mitigation measures.