Minimizing Surface Disturbance of Alberta's Native Prairie

Background to Development of Guidelines for the Wind Energy Industry

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1.0 Introduction

Wind power is a clean and renewable form of energy. Wind energy development is a young and rapidly growing industry in southern Alberta. As with any form of development, there are impacts on the land, including native prairie. This document summarizes the potential impacts of wind energy development on native prairie in Alberta. It identifies resources that can be used to avoid and minimize impacts. These resources are largely based on lessons learned through decades of addressing similar challenges by the oil and gas industry. The current regulatory framework for wind energy projects is defined.

Wind farms in Alberta that are currently connected to the grid produce approximately 500 megawatts (MW) of power (Alberta Energy 2009). This is generated from a few hundred wind turbines (1-2 MW/turbine) some of which are located in native prairie. In December 2007 the Alberta Energy System Operator lifted a cap on wind energy development. There are approximately 5500-6000 MW of wind generation projects that have applied for connection to the transmission system as of Spring 2010 with projections of 11,000 to 12,000 MW of potential wind generation in future (Alberta Energy 2009, Southern Alberta Alternative Energy Partnership 2009). Approximately 1100 - 5500 turbines could be installed over the next few decades in Alberta, estimating 2-5 MW of power generated per turbine. Since the prairie ecological region is strongly correlated with the area of mean wind energy best suited to wind development, wind energy projects are, and likely will continue to be, concentrated in the Grassland, Parkland and Montane natural regions of southern and central Alberta where grasslands naturally occur (Environment Canada 2008, Natural Region Committee 2006).

It is important for proponents and regulators of wind farm developments to consider a project's potential effect on native prairie. Native grasslands are a key component of biodiversity, provide essential habitat for wildlife and perform important ecological functions such as water storage and carbon capture. Healthy native grasslands are essential for a sustainable ranching industry by providing high quality forage, stable production and operational flexibility combined with low maintenance costs. Native prairie offers high quality recreational opportunities.

Large blocks of native prairie are few. Remaining native prairie is often fragmented and degraded. Native grasslands constitute about five percent of the provincial land base, and yet support approximately half of the rare ecological communities (grassland, shrubland and wetland), 40% of rare vascular plant species and 70% of mammal, bird, reptile and amphibian species considered "at risk" or "may be at risk" (Alberta Native Plant Council 2001, Alberta Sustainable Resource Development 2005, Allen 2009, Kemper 2009, Natural Region Committee 2006, Prairie Conservation Forum 1999, see APPENDIX). Key reasons for the rarity of these ecological communities and species include loss of native prairie through conversion to cropland, fragmentation of native habitats from roads and industrial development, weed invasion and altered hydrology. Some of the species have limited occurrence because they are at the northern limit of their range in Alberta and restricted in distribution.

Over the last few decades, growing public appreciation of native grasslands and increased understanding or threats has resulted in significant efforts to minimize the effects of human activity on native ecosystems and to preserve and restore habitats where possible. Our governments have made commitments to preserve biodiversity through federal and provincial strategies such as protected areas and species-at-risk legislation and programs. The provincial government has issued *Information Letters* and *Guidelines* to alert the petroleum industry to the environmental and economic risks of developing on native prairie and appropriate practice. Since 1989 through

Alberta's Prairie Conservation Forum, representatives of all levels of government, private industry, conservation associations, universities, and landowner groups have been working together to conserve biological diversity in native prairie and parkland. The fourth generation of the Alberta Prairie Conservation Action Plan (2006-2010) focuses on research, stewardship and education (Prairie Conservation Forum 2006).

The receipt of several applications, by the Alberta Utilities Commission, for development of major wind turbine projects that propose up to 20% of turbines on native prairie, suggests that, the current regulatory framework for wind energy projects in Alberta is inadequate for minimizing impacts on native prairie. Learning from the petroleum industry experience, the wind energy industry can avoid unnecessary controversy and expense by recognizing the potential environmental impacts of proposed projects on native prairie and defining, implementing, monitoring and continuously improving practices to minimize these impacts.

2.0 Definition of Native Prairie

Prairie is defined by deep-rooted grasses and other drought-resistant vegetation, but shrubs and trees grow in moister areas and, at its fringe, grasslands intermingle with aspen woodlands. Small wetlands and riparian areas dot the landscape. Beyond the Grassland Natural Rregion (Dry Mixed, Mixed, Foothills Fescue, Northern Fescue subregions) and Central Parkland Natural Subregion of south east and east central Alberta, native prairie can also be found in the Foothills Parkland and Montane natural sub-regions, with remnant sites in the Peace River Parkland (Natural Region Committee 2006).

Native grasslands include lands that are permanently grassed with a native component (Alberta Environment 2010). Plant communities may be dominated by native species or modified, that is more than 70% of the community is composed of non-native species due to past disturbance (Adams et al. 2005). Native grasslands do not include tame grasslands that have been cultivated/seeded to agronomic species with the goal of management as a pasture. Range plant community guides are available for each natural subregion in southern Alberta and can be accessed by visiting the website of Alberta Sustainable Resource Development, Lands Division.

3.0 Potential Impacts of Wind Energy Projects on Native Prairie Vegetation

Only within the last few years have wind energy projects been constructed on native prairie in southern Alberta. Some of these projects have occurred in native rough fescue grasslands of southwestern Alberta. Science based cumulative effects assessment is lacking in the planning phase. Best management practices for design, construction and operations have not been defined. Monitoring requirements through all phases of development have yet to be established. Long term impacts are undocumented including the feasibility of restoring native plant communities

It is possible that wind development can have a positive environmental impact if it helps reduce fragmentation of large contiguous areas of native prairie. The additional revenue that a wind development would provide a landowner who values native prairie may increase the financial viability of his/her agricultural operation such that the financial incentive to sub-divide and sell land for residential or recreational development may be reduced (Weiss et al. 2010).

Even though our knowledge of the specific impacts of wind energy projects on native grassland vegetation is in its infancy, there is considerable information about the impacts of oil and gas energy

projects with similar, often smaller and shorter term, land use footprints (wellsites, pipelines, access trails) upon which predictions can be based. Wind-energy projects can be expected to alter ecosystems through the following mechanisms. Some of these impacts will persist only during construction, others will persist over the lifetime of the project and still other impacts may persist even after decommissioning.

Impacts of wind energy projects on native grassland include:

- Direct removal of native vegetation. This occurs primarily on the locations cleared for installation of turbine towers, control buildings, transformer pads, electric substations, and other ancillary structures. Removal of vegetation also generally occurs for construction of roads for access by heavy construction vehicles and maintenance vehicles. Recently some companies are not constructing permanent trails but instead accessing sites during the operational phase by driving on native prairie.

- Soil disturbance and compaction. Permanent soil disturbance occurs where facilities are constructed. Soil compaction occurs where there is heavy equipment (e.g. trails over which heavy equipment is hauled, lay-down areas for towers, trails receiving repeated and frequent use). Accessing a site in wet weather can lead to rutting and additional disturbance of soils. These changes in habitat alter the composition of plant communities. It can take several decades for the original soil structure and chemistry to return.

- Changes in hydrologic features. Compacted soils impede the downward flow of water in the soil. Altered microtopography due to construction of facilities and roads may alter natural runoff. These changes in habitat alter the composition of plant communities and affect wildlife.

- Impacts on wetlands and riparian areas. Minimum setbacks to protect wetlands and water bodies have been defined however these are sometimes compromised and replaced with a requirement for site berms to prevent spills from entering the water body. This practice may protect water quality but can lead to severe compaction of moist soils, alteration of drainage patterns and disturbance of species dependent on the riparian area.

- Soil erosion. Disturbed soils are particularly susceptible to erosion if the substrate is sandy and if the site has steep slopes or exposure to the wind. Again, this change in habitat alters the composition of the plant community on the site.

- Introduction of non-native species. The presence of disturbances, including roads and trails, increases the spread of weeds legislated as ‘prohibited noxious’ and ‘noxious’ under the *Alberta Weed Control Act* (2010) as well as of agronomic species, such as crested wheatgrass, timpothy, smooth brome, Kentucky bluegrass and reed canarygrass, that are known to invade and cause degradation of native prairie plant communities. There are three key factors the lead to the establishment of non-native species: the presence of altered habitat, increased stress to or removal of native species, and easier access to disturbed habitats by human vectors. For example, seeds of non-native species may be hauled to the site in soil and gravel used to backfill and grade portions of a construction site. Seeds can adhere to tire treads or in soil or mud on vehicles or other equipment and be transported to the disturbed, potentially suitable habitats. In addition, poor reclamation practices may lead to unintentional establishment of invasive plant species through contaminated seed.

- There is ample evidence of the spread of invasive species into surrounding native grassland plant communities in southern Alberta resulting in plant communities dominated by invasive

species. The magnitude and extent of invasive plant establishment at a wind energy site would be a function of the aggressiveness of the introduced plants, the number and frequency of seed introductions to a particular area, the availability of suitable conditions (e.g., disturbed habitat) for colonization by the introduced seeds, and the susceptibility of surrounding native vegetation to invasion.

- Cumulative effects. Cumulative effects refer to the effect on the environment as it results from a project or activity when combined with effects of other past, existing and reasonably foreseeable projects and activities (Golder 2009). When individual activities of disturbances interact spatially or temporally, their combined effects can result in environmental impacts that may differ in nature or extent from the effects from the individual project or activity.

4.0 Land Use Footprint of Wind Energy Projects

Native prairie is potentially impacted during the construction, operation and decommissioning phases of a wind energy project. The construction phase of a 50-turbine project is estimated to occur over a period of approximately two years (Nexen 2009). The operations phase is expected to extend over at least 25 years. The time frame for decommissioning a wind energy project and reclaiming disturbances is not known since it has not yet been attempted.

Construction of a wind energy project potentially involves the following activities that affect native vegetation through direct removal of vegetation and soil, through soil compaction or erosion and though introduction of non-native species (from BLM 2005, Golder Associates Ltd. 2009, Nexen 2010, West WindEau Inc. 2007):

- Establishing site access and constructing an all-weather graded road or two-track trail system that connects to turbine sites. Routes need to be 3-9 m wide and able to accommodate heavy and oversized vehicles as well as temporary work space (lay down areas). Grading, spreading of gravel, installing culverts and construction of borrow pits may be required.
- Establishing temporary storage and office areas to store construction equipment, turbines, cranes and trailers that serve as offices with associated parking.
- Constructing a temporary cement plant (may or may not be required).
- Grading and/or clearing of tower sites. Towers may be up to 80m tall in 3-4 sections and blade diameter may be of up to 90 m, with 3 blades in two sections of 45 m each. Each turbine base with cables and transformer requires a permanent lease of 625 m^2 (25 m x 25 m). Associated with each tower is a temporary crane pad (400-500 m^2 / 13-16 m x 25-36 m) and temporary work space (1 ha/100 m x 100 m).
- Excavating for tower foundations (3-8 m depth depending on substrate) and installing cement foundations. Several trips by cement and water trucks are required.
- Installing towers, blades and nacelles (gearbox, electric generator, turbine control equipment, cooling/heating equipment). Gravel may need to be hauled in to support 100 – 500 ton cranes that are assembled on site.
- Installing a pad-mounted transformer (9 m^2 / 3m x 3m) for each turbine.
- Building a central transformer station (transformer, bussing, lightning protection, control building, safety fencing), weatherproof equipment storage area and if needed, permanent meteorological towers (1-2 ha).
- Interconnecting turbines and the transformer station with power cables and signal cables (trenching to 1 m depth). A minimum of 10 meter wide workspace between connection points is required.
- Installing a transmission line to connect to the electrical grid.

Site operation involves:

- Regular visits (weekly) for routine maintenance of turbines (e.g. oil changes), power lines and all-weather access routes over the life of the project. Turbine life is estimated to be about 25 years. Maintenance may require temporary work space of large equipment.
- Repowering may be undertaken which is replacing existing turbines with new technology and extending the lifetime of the project to several decades.

Site decommissioning involves:

- Removal of turbines and other equipment including power cables and transformer stations.
- Partial excavation and removal of cement tower base to depth >1.5 meters.
- Reclamation of disturbed areas, including access routes if required by the landholder.

Estimates of direct surface disturbance per turbine vary depending on terrain and turbine size and type. The Bureau of Land Management (BLM 2005) estimates the surface disturbance per turbine to be approximately 0.5-1.5 ha (1-3 acres). For recent Alberta wind projects, the area of permanent surface disturbance over the lifetime of the project for a 1.5 - 2 MW turbine 80m in height and with 90m blade diameter is estimated to be .06 ha (25 m x 25 m) (Golder 2009, Nexen 2010, West WindEau Inc. 2007). The area of temporary surface disturbance during construction for each turbine is 1 ha (100 m x 100 m). In addition there is surface disturbance for an access route and a power cable trench to each turbine, the area of disturbance varying according to the project site.

A wind energy project may have several to dozens of turbines. Large turbines in a row are spaced 250 m apart and rows of turbines are spaced 500 m apart (five to ten turbine diameters of spacing). Given this spacing, the project area encompassing a dozen 2 MW towers (25-megawatt wind project) may be between 100 ha (250 ac), if all in a row, and 250 ha (about 1 section, 625 ac) if in three rows. As well each project requires access routes, power cable trenches and one or more transformer stations (1-2 ha each). The area of direct disturbance of native vegetation for all activities related to a wind energy project, is conservatively estimated to be 5 to 10% of the total project area (BLM 2005, National Research Council 2007, Canadian Wind Energy Association 2010). Additional vegetation disturbance results through compaction by heavy equipment and introduction of invasive non-native species.

There are approximately 5500-6000 MW of wind generation projects that have applied for connection to the Alberta transmission system as of Spring 2010 with projections of 11,000 to 12,000 MW of potential wind generation in future (Alberta Energy 2009, Southern Alberta Alternative Energy Partnership 2009). Approximately 1100 - 5500 turbines could be installed over the next few decades in southern and central Alberta, estimating 2-5 MW of power generated per turbine. Given that surface disturbance per turbine is 0.5 – 1.5 ha, a total direct surface disturbance footprint of 550 - 8250 ha can be anticipated that would increase with indirect impacts such as introduction and spread of non-native species into native vegetation. This footprint distributed across the remaining native prairie can potentially have significant negative impact.

5.0 Challenges in Prairie Restoration

Very little information is available on decommissioning and reclamation of wind power projects since very few have been decommissioned in the prairies. We can however learn from the results of reclamation efforts related to other types of activities.

An analysis by Gramineae Services Ltd. (2007) of revegetation strategies for industrial disturbances on native prairie sites in Alberta contains the following key findings:

- Mixed Grasslands – Natural recovery of dry mixed grasslands does occur if fragmentation is minimal, disturbance is minimized and grazing is managed to benefit restoration of native vegetation. Moist mixed grasslands are more fragmented than dry mixed grasslands and more susceptible to invasion by invasive non-native species such as smooth brome and crested wheat grass. For both dry and moist mixed grasslands a recommended strategy is avoidance. If avoidance is not possible, then minimize disturbance and use natural recovery.

- Rough Fescue Grasslands – Successful restoration of rough fescue grasslands has not been documented. Climate in regions supporting rough fescue grasslands presents numerous challenges for industrial development. Revegetation success is hampered by invasive non-native species such as smooth brome, Kentucky bluegrass and timothy. Avoidance is the preferred strategy.

In 2006 the Foothills Restoration Forum came together to accomplish the restoration of the native grassland ecosystems of southwestern Alberta. Focus has been on fostering research and filling critical gaps in our knowledge base regarding restoration of rough fescue grasslands (see www.foothillsrestorationforum.com).

6.0 Information Letters, Principles and Guidelines for Minimizing Native Prairie Disturbance

In 1996 the Energy Resources Conservation Board issued an Information Letter (ERCB IL 96-9) alerting all oil, gas and pipeline operators to the environmental and economic risk of developing native prairie and parkland environments. Concern about loss and fragmentation of native prairie from petroleum industry activity and a desire to improve industry practices prompted the provincial government to develop this initial set of guidelines for minimizing disturbance. Several documents have since been produced regarding minimizing surface disturbance of native prairie by the petroleum industry. The following provide valuable lessons that can, with some modification, be applied to the wind energy industry.

- *Energy Resources Conservation Board Information Letter 2002-1 Principles for Minimizing Surface Disturbance in Native Prairie and Parkland Areas*.
  EUB IL 2002-1 supersedes ERCB IL 96-9 and is a set of principles reflecting continuing improvement in industry practices and understanding of native prairie and parkland environments. Principles were developed and endorsed by a team of representatives from government agencies having jurisdiction over petroleum industry activities - Alberta Energy, Alberta Environment, Alberta Sustainable Resource Development and the Special Areas Board. IL 2002-1 states that although the principles were developed specifically for the petroleum industry, they are applicable to any other activities proposed for an area of native prairie or parkland. Their implementation is encouraged for development on both public and private land.

- *Petroleum Industry Activity in Native Prairie and Parkland Areas: Guidelines for Minimizing Surface Disturbance* (Native Prairie Guidelines Working Group 2001)
  The Guidelines are intended to be a planning tool for project applicants and operators and serve as the best practices needed to achieve the principles of minimal disturbance identified in EUB IL 2002-1. They detail how oil and natural gas exploration, development, production, and pipeline activities should be conducted in areas of native prairie and parkland in Alberta. Although the guidelines were developed specifically for the petroleum industry, there is an explicit statement that the principles and practices should be applied to any other activities

proposed for an area of native prairie or parkland and that their implementation is encouraged for development both on public and private land. The guidelines are considered to be the minimum standard that many stakeholders already meet or surpass.

- *Prairie Oil and Gas: A Lighter Footprint* (Sinton 2001).
  This publication by Alberta Environment presents information about best management practices for oil and gas activity in native prairie and parkland areas, consistent with the Guidelines, but in an illustrated, more educational format.

- *Minimizing the Effects of Oil and Gas Activity on Native Prairie in Alberta* (Sinton and Pritchard 2002).
  This is an Occasional Paper of the Prairie Conservation Forum that explores the impacts of various activities and presents options for conducting oil and gas operations in a manner that causes minimal disturbance to native prairie and parkland environments. It was produced and distributed to enhance broader awareness of the principles and guidelines among industry project planners and co-ordinators but also among landowners who own or manage areas of native prairie and members of the public who want to conserve native prairie ecosystems.

- *Recommended Land Use Guidelines For Protection Of Selected Wildlife Species And Habitat Within Grassland And Parkland Natural Regions Of Alberta (*Alberta Sustainable Resource Development 2001*)*
  These guidelines are designed to help land users minimize, or avoid, potential adverse effects on selected wildlife and wildlife resources when conducting activities on public and private lands within the Grassland and Parkland natural regions of Alberta. They focus on species that have been identified as at risk of extirpation, or that may be at risk of extirpation, or that are sensitive and require special attention within the prairie and parkland natural regions in Alberta. They recommend restricted activity dates and setback distances by land use category. For example it is recommended there be no industrial activity within 100 m of water bodies (wetlands, ponds, creeks, rivers, lakes, including dry water bodies) or within 100 m of the crest of any coulee associated with riparian areas or unique geographical features like hummocky moraines

- *Alberta Sustainable Resource Development Wildlife Guidelines for Alberta Wind Energy Projects* (Alberta Sustainable Resource Development 2006).
  This document summarizes potential wildlife issues associated with wind energy developments in Alberta and provides guidelines for minimizing impacts. It guides ASRD Fish and Wildlife Division staff in their advisory role to wind energy developers. Issues include bird and bat mortality due to collisions with wind turbines and associated infrastructure, disturbance of birds caused by rotor blade rotations and increased human activity and loss of habitat. With respect to native grasslands and wetlands, the document states:
  - Field investigations should be carried out to determine the presence and extent of native grasslands and other important natural habitats (e.g. wetlands, riparian habitats).
  - If development is being considered on native grasslands, then consideration should be given to the feasibility of restoration.
  - Native grasslands and other important natural habitats, including Environmentally Significant Areas, should be avoided wherever possible. Where a mosaic of native grasslands and cultivated areas occurs, wind turbines should be diverted to the cultivated areas. When avoidance is not possible discussions should occur with the SRD-Wildlife Biologist as well as with other parties such as conservation organizations, landowners and SRD-Public Lands staff in regard to mitigation/reclamation measures.
  - Where native grasslands with “species at risk” are identified another location should be selected.

- Wind turbines should not be constructed within 100 metres of any permanent or temporary (ephemeral) wetland. For major wetlands providing habitat for large numbers of migrating or breeding waterfowl, the set-back may need to be greater.
- A habitat reclamation plan that emphasizes restoration of natural habitats (e.g. native grasslands) should be developed for each site. Non-permanent roads constructed for the developments should be re-contoured and re-vegetated. Permanent access roads should be minimized. A development and reclamation plan should be provided as part of the site assessment.

° *Energy Resources Conservation Board Information Letter (IL) 93-9 Oil and Gas Development Eastern Slopes (Southern Portion)* and *Bulletin 2007-35: Clarification of Information Letter (IL) 93-9.* (Energy Resources Conservation Board 1993 and 2007)
This information letter was developed in 1993 to ensure a common understanding of requirements for developments along the southern portions of Alberta's Eastern Slopes. Requirements include an effective consultation program, definition of the overall extent of development, environmental assessments and consolidation of plans and activities with other operators. Bulletin 2007-35 clarifies the areas of IL 93-09 related to development plans, environmental assessment, and public consultation. It states that the EUB continues to use IL 93-09 and expects companies to consider all aspects of this IL when submitting applications for development in the Eastern Slopes area whether on Crown or private land.

° *Energy Resources Conservation Board Directive 56: Energy Development Applications and Schedule (2008)*
Section 7.10.12.1 of this Directive requires that a well centre be sited a minimum of 100m from a water body unless acceptable measures are in place to protect the water body from contamination during drilling and future production operations.

° *Alberta Water Council Recommendations for a New Alberta Wetland Policy (September 16, 2008)*
The recommended policy provides direction and a framework for protecting, conserving and restoring Alberta's wetlands. It covers all wetlands, including ephemeral and seasonal water bodies, ponds, lakes and constructed wetlands. The mitigation decision framework requires the regulator and proponent to use the following in descending order of preference – 1) avoid loss or degradation, 2) minimize loss or degradation, and 3) compensate, as a last resort, for loss of wetland area or for wetland degradation. The recommended policy is currently before the Minister of Environment.

° *Alberta Sustainable Resource Development Information Letter 2010-2: Foothills Fescue Grassland, Principles for Minimizing Disturbance* (Alberta Sustainable Resource Development 2010a)
The Rangeland Management Branch of Alberta Sustainable Resource Development, in consultation with multiple stakeholders participating in the Foothills Restoration Forum, placed Protective Notations (PNT) on specified public lands that are known to include large areas of foothills rough fescue grassland. The purpose of the PNT is to alert industry to the environmental and economic risk of developing on these lands. ASRD IL 2010-2 was issued to define expectations for planning and development standards on lands under PNT and to the particularly sensitive nature of rough fescue grasslands. Development activity is defined to include renewable energy and associated infrastructure.

- *Industrial Activity in Foothills Fescue Grasslands, Guidelines for Minimizing Surface Disturbance* (Alberta Sustainable Resource Development 2010b).
  This preliminary background document was prepared to supplement ASRD IL 2010-2. It details why rough fescue grasslands are particularly sensitive to surface soil disturbance with limited potential for restoration success

While many of the information letters, principles, guidelines and policies have been specifically designed to reduce the footprint of the petroleum industry in native grassland, some also state it is expected that all industrial development will adhere to the broad concepts and develop industry specific best management practices. Some broad concepts regarding minimizing disturbance in native prairie and parkland are:

- *Avoid* disturbing native prairie and wetlands, and especially environmentally significant areas, sensitive areas and vegetation types that are problematic to restore. Locate developments on lands that have been previously disturbed.
- If avoidance is not possible, *minimize* disturbance and impacts.
- Reduce overall/cumulative effects.
- Conduct predevelopment surveys for rare species and communities.
- Use natural recovery and/or native plants in reclamation.
- Train staff about beneficial practices.
- Retain qualified environmental specialists to monitor construction and reclamation

Trends in provincial land use policy (e.g. Land Use Framework and Watershed Plans) are increasingly requiring there be consideration of cumulative effects and minimizing footprint when making decisions about regional plans and specific project proposals. Industry sectors that have demonstrated not only beneficial management practices but also a willingness to work together to minimize overall impacts and share infrastructure will be in a better position to realize opportunities.

7.0 Regulatory Framework for Minimizing Environmental Effects of Wind Energy Developments

The following is a summary of the regulatory process currently governing the approval, operation and decommissioning of wind energy projects in Alberta with respect to environmental effects.

Alberta Utilities Commission

The Alberta Utilities Commission (AUC) regulates electric, gas and water utilities including wind energy projects pursuant to the *Alberta Utilities Commission* Act, and the *Hydro and Electric Energy Act* and *Gas Utilities Act*. AUC is charged to protect social, economic and environmental interests of Alberta when considering these projects.

AUC has two Rules that apply to environmental considerations of applications for wind energy developments. These are:

- *AUC Rule 007: Applications for Power Plants, Substations, Transmission Lines, and Industrial System Designations* (Alberta Utilities Commission 2009)
  Applicants for wind power plants 1MW or greater are required to contact Alberta Environment to determine if an EIA is required (not mandatory) and to refer the application to Alberta Sustainable Resource Development – Fish and Wildlife Division for sign-off. Other environmental information required is a general overview of environmental impacts, identification of land-use issues and evaluation of visible impacts. Clearance from Alberta Culture and Community Spirit regarding protection of historical resources according to the

Alberta Historical Resources Act is also required. Consultation is required only with directly affected persons. Applications for transmission lines must include environmental information, with the level of detail needed to describe the impacts created by the project. AUC determines the detail on a case by case basis and decides if an Environmental Impact Assessment is required. The applicant also is directed to contact Alberta Environment to determine if their approval is required.

- *AUC Rule 012: Noise Control* (Alberta Utilities Commission , February 23, 2010)
  Applicants for wind power plants must provide a Noise Impact Assessment (NIA) which is a documented prediction of noise to be generated by proposed wind turbines. The NIA must evaluate noise to be generated by the facility(ies) proposed, ambient noise and noise from all existing and proposed energy-related facilities. The predicted cumulative noise levels must not exceed the Permissible Sound Level at dwellings, or, in the absence of dwellings, at a distance of 1.5 km from the facility fence line.

AUC does not currently administer a compliance assurance program and is assessing its compliance assurance strategies.

Alberta Environment

Wind energy projects consist of two activities, the first being power production from wind turbines and the second being transmission of the power from the turbines to Alberta's power grid. Power production from wind turbines is not a defined activity in the *Activities Designation Regulation* (ADR) of The *Environmental Protection and Enhancement Act* (EPEA). Therefore there are no approvals, registrations or notifications required under EPEA for power production from wind turbines.

"Transmission lines" in the ADR means a transmission line as defined in EPEA, and any infrastructure in connection with that transmission line, with a voltage of 130 kilovolts or more and in respect of which an environmental impact assessment report is required. However, the *Environmental Assessment (Mandatory and Exempted Activities) Regulation* exempts a transmission line from requiring an environmental impact assessment. Therefore there are no approvals, registrations or notifications required under EPEA for transmission lines.

Part 5 of EPEA prohibits the release of a substance into the environment that causes or may cause a significant adverse effect. If such a release occurs then it must be reported to Alberta Environment as required in the *Release Reporting Regulation*. The responsible party for the release has a duty to take remedial measures as described in sections 110 and 112 of EPEA.

Transmission lines, as defined in EPEA, are included in the definition of "specified land" in the *Conservation and Reclamation Regulation*. As such, transmission lines and associated substations are to be conserved and reclaimed as required under Part 6 of EPEA.

Under the *Water Act* if the wind energy project involves any work within a water body or any de-watering of groundwater from excavations, there may be requirements under the *Water Act* in which case the proponent should contact the local regional Alberta Environment office for specific information.

Alberta Sustainable Resource Development – Fish and Wildlife Division

AUC requires that applications for wind energy developments be referred to Alberta Sustainable Resource Development (ASRD) – Fish and Wildlife Division for review and sign-off. Fish and Wildlife Division's *Wildlife Guidelines for Alberta Wind Energy Projects (April 2006)* (ASRD 2006b) provide guidance on protecting bats, birds and other species, including species at risk, when locating a wind turbine on public or private land in Alberta. The Fish and Wildlife Division also participated in the development of *Bats and Wind Turbines. Pre-siting and pre-construction survey protocols (May 2008)* (Lausen et al. 2008), which are directed at preventing bat mortality. These guidelines, available on the department's external website, are amended from time to time and have been recently updated.

At the current time for projects proposed on private land, the Fish and Wildlife Division works directly with the wind power industry and the Alberta Utilities Commission to minimize impacts on wildlife. Conditions that reflect ASRD guidelines may be applied to a project approval by the Alberta Utilities Commission.

Field surveys are conducted after development to collect further information regarding wildlife in an area. Regulatory authority and responsibility for ensuring compliance with conditions applied by ASRD is unclear.

ASRD does not participate in hearings of the Alberta Utilities Commission unless called to testify.

Alberta Sustainable Resource Development – Public Lands

Approval of the allocation and use of public land for development of projects is the responsibility of Alberta Sustainable Resource Development (ASRD). Currently there are no approved wind power projects on public lands managed by ASRD. The department accepts applications for exploration for a maximum term of two years on the condition that all future decisions on land allocation are deferred pending completion of guidelines.

ASRD is reviewing policy options regarding the location of long-term, permanent wind power developments on public land, including development of guidelines that will have criteria to review applications. Of particular consideration are sensitive public land areas including native prairie, high value wildlife areas, and other high value resource or conservation lands. A key principle of any development on public land is to avoid, minimize or mitigate impacts on environmentally sensitive lands, including impacts on sensitive native grasslands.

ASRD is anticipating that regional plans, which are being prepared under Alberta's Land-use Framework, will provide clear guidance for managing public land, including land use decision-making for wind power projects.

Special Areas Board

Wind power project development is not allowed on public lands managed by the Special Areas Board.

Federal Government

Application for funding of a wind power project to the federal government (e.g. ecoENERGY for Renewable Power program of Natural Resources Canada) triggers the need for a federal environmental assessment pursuant to Section 5(1)(b) of the *Canadian Environmental Assessment Act (CEAA*). The agency overseeing funding is the Responsible Authority under CEAA.

Any project requiring federal permits from the list of regulations under *CEAA* must also have an environmental assessment. The Law List regulation that may apply to wind projects are *The Fisheries Act* and *The Navigable Water Act*.

There are federal guidelines dealing with the assessment of effects on birds prepared by the Canadian Wildlife Service of Environment Canada (CWS 2005).

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Appendix 1: Area Estimate of Native Grassland

Natural Subregion	NSR Area (km^2)[1]	Percent Native Grassland[2]	Native Grassland Area (km^2)
Dry Mixedgrass	46,937	40	18,775
Mixedgrass	20,072	20	4,014
Northern Fescue	14,933	20	2,987
Foothills Fescue	13,623	20	2,725
Central Parkland	53,706	5	2,685
Foothills Parkland	3,921	20	784
Montane	8,768	30	2,630
Total	**161,960**	**21.4**	**34,600**

Total area of Alberta is 662,583 km^2 therefore native grassland is 5.2% of the province.

Note: These results are based on air photo analysis and include both native and modified plant community.

[1]Source: Natural Region Committee (2006)
[2]Source: Native Prairie Baseline Inventory and Protected Areas Systems Analysis