K2 WIND POWER PROJECT
PROJECT SUMMARY REPORT

A Summary of Draft Renewable Energy Approval Reports

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1.0 INTRODUCTION

1.1 Project Overview

K2 Wind Ontario Inc., in its capacity as general partner of K2 Wind Ontario Limited Partnership (the Proponent or K2 Wind), is proposing to develop, construct and operate the K2 Wind Power Project (the Project) in the Township of Ashfield-Colborne-Wawanosh (Township of ACW) north of Goderich, Ontario (see Figure 1, Appendix A for a map of the Project Location). The Proponent is a limited partnership formed under the *Limited Partnerships Act* (Ontario), with K2 Wind Ontario Inc. as general partner and CP K2 Holdings Inc. (an affiliate of Capital Power Corporation), Samsung Renewable Energy Inc., and Pattern K2 LP Holdings LP (an affiliate of Pattern Renewable Holdings Canada ULC), as limited partners. The Project would supply approximately 270 megawatts (MW) of electricity to the Ontario power grid. The development of the Project would help the province of Ontario meet its goal of increasing the proportion of electricity generated from renewable sources. The Project is subject to Ontario Regulation 359/09 – Renewable Energy Approvals under Part V.0.1 of the *Environmental Protection Act* (O. Reg. 359/09).

Key Project components would consist of up to 140 wind turbines, electrical collection and communications systems including a transmission line, a transformer station, a substation, an operation and maintenance building, meteorological towers (met towers), access roads, and temporary construction and laydown areas.

The Proponent has elected to assess and seek approval for some alternative Project configurations. The Renewable Energy Approval (REA) application process will consider two potential transmission line voltages (138 kV vs. 230 kV), two potential line routes, several alternate access road alignments. Final selection of the sites to be used would be based on the results of consultation activities, detailed design / engineering work, and the conditions experienced during construction.

The Proponent retained Stantec Consulting Ltd., SENES Consultants Limited, and AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC) to assist in the preparation of the REA application with input from Timmins Martelle Heritage Consultants Inc., Selde Corporation and Zephyr North Canada.

1.2 Project History

Wind development has been part of the Township of ACW for approximately a decade. An affiliate of Capital Power Corporation currently operates Kingsbridge 1 Wind Power, located within the Township of ACW and has worked in and with the community for many years, helping to create a greater awareness of the benefits of wind power generation within the province.

In 2011, K2 Wind Ontario Limited Partnership was established and proposed the development of the Project using Siemens wind turbine technology.

To ensure that the Project meets current provincial regulatory and consultation requirements, the Proponent is undergoing the Ministry of the Environment's (MOE) REA process, under O. Reg. 359/09. This process ensures that community members, Aboriginal communities, municipal representatives and other interested parties have the opportunity to learn more about the newly proposed infrastructure and are able to provide their comments regarding the Project plans.

1.3 Report Requirements

O. Reg. 359/09 requires the preparation of a series of reports which are submitted as part of the REA application to the MOE, and are provided in draft format for review and comment to Aboriginal communities, municipalities, and the public.

This *Project Summary Report* provides a summary of each draft REA report (with the exception of the *Consultation Report*) that will be included as part of the REA application. Comments and feedback received from Aboriginal communities, municipalities, and the public will be considered by the Project team and incorporated into the project design and reports, as appropriate, prior to the final public meeting for the Project and submission of the REA application to the MOE.

This includes a summary of the following draft reports:

- *Project Description Report;*
- *Construction Plan Report;*
- *Design and Operations Report;*
- *Decommissioning Plan Report;*
- *Natural Heritage Assessment and Environmental Impact Study Reports;*
- *Water Assessment and Water Body Reports;*
- *Heritage Assessment Reports; and*
- *Stage 1 and 2 Archaeological Assessment Reports*.

2.0 PROJECT INFORMATION

2.1 Overview of Project Components

The basic components of the Project include:

- Up to 140 Siemens SWT-2.3 wind-powered turbines, each located on agricultural lands with access roads, and associated culvert installations at watercourse crossings where necessary;
- Padmount transformers located on the ground adjacent to each wind turbine to transform the electricity created in the nacelle to a standard operating power line voltage (i.e. 690 V to 34.5 kV);
- An electrical and data collection system (collector system) consisting of:
  - Predominantly underground 34.5 kV collector lines and data cabling that would generally follow the access roads on turbine sites and municipal road allowances (road allowances). Splice vaults or junction boxes would be used as necessary for splicing of the underground collector lines either within road allowances or on participating private land; and
  - Predominantly underground 138 or 230 kV transmission line on road allowances and privately owned lands to connect the transformer station to the substation. Splice vaults or directly buried splices would be used as necessary for splicing of the underground transmission line either within the road allowance or on participating private land.
- A transformer station to allow approximately one half of the 34.5 kV lines from the turbines to step-up to 138 or 230 kV to reduce the number of circuits entering the substation;
- A substation to allow for interconnection of the electrical collection system to the Hydro One switching station;
- Stormwater management (SWM) systems located at the transformer station and the substation properties;
- Three meteorological (met) tower locations; and
- An operation and maintenance building and protection and control buildings on the substation site, including associated parking area, septic system and water well.

Temporary components during construction include staging areas at the turbine locations; construction pads; staging areas along access roads; delivery truck turnaround areas; a central laydown area; and crane paths and associated culvert installations at watercourse crossings where necessary.

2.2 Project Activities

A general overview of the activities that would be engaged in during construction, operation, and decommissioning of the Project are provided in Table 2-1.

Table 2-1: Key Project Activities

Project Phase	Activities
Construction	**Turbine Sites & Met Tower Sites**
	Staking of site work area and significant natural features, and installation of erosion and runoff controls
	Vegetation clearing, trimming of trees, and site grading
	Delineation of temporary work areas and installation of temporary facilities
	Construction of culverts and temporary access roads and crane paths
	Installation of construction pads or mats
	Installation of turbine and met tower foundations
	Installation of concrete pedestal for the turbine padmount transformer
	Installation of padmount transformers and grounding grid
	Turbine and met tower erection
	Installation of underground collector and data lines parallel to access roads
	Installation of underground cabling and data lines for met tower
	Completion of permanent access roads
	Restoration of temporary work areas (de-compaction, topsoil replacement, reseeding, etc.)
	Collector System/Transmission Line
	Staking of site work area and significant natural features, and installation of erosion and runoff controls
	Vegetation clearing, trimming of trees, and site grading
	Installation of cable trenches (underground), cabling, splice vaults or directly buried cable splices, junction boxes and data lines within the existing road allowance or directly adjacent to the road allowance on private land
	Installation of above ground gathering lines on wooden poles or infrastructure along road allowances for major river and valley crossings and where necessary due to construction constraints
	Grading and restoration of the site
	Substation Site
	Assessment and possible decommissioning the existing well and septic system
	Staking of site work area and significant natural features, and installation of erosion and runoff controls
	Vegetation clearing, trimming of trees, and site grading
	Preparation of central laydown area
	Installation of SWM features
	Construction of concrete footings and pads
	Installation of the grounding grid
	Installation of substation and connection to the switching station
	Installation or recommissioning of septic system and water well
	Construction of operation and maintenance building and permanent access roads

Project Phase	Activities
	Restoration of temporary work areas (de-compaction, topsoil replacement, possible reseeding, etc.)
	Installation of fencing and landscaping of the site
	Connection to Hydro One grid (performed by Hydro One)
	Commissioning of the Project
	Transformer Station
	Staking of site work area and significant natural features, and installation of erosion and runoff controls
	Vegetation clearing, trimming of trees, and site grading
	Installation of SWM features
	Construction of concrete footings and pads
	Installation of grounding grid
	Installation of transformers and all other equipment
	Restoration of temporary construction areas
	Installation of site fencing and landscaping or berm
Operation	**Turbine Sites**
	Preventative and routine maintenance
	Unplanned maintenance
	Meter calibrations
	Grounds keeping
	Substation Site/Transformer Station
	Preventative and routine maintenance
	Unplanned maintenance
	Remote wind farm condition monitoring
	Operation and maintenance building maintenance
	Additional Activities
	Collector line maintenance
Decommissioning	**Turbine Sites**
	Removal of turbine and met tower infrastructure
	Turbine site grading (dependent upon new proposed use)
	Possible removal of access roads dependent upon agreement with landowner
	Possible excavation and removal of underground collector lines depending upon depth and agreement with property owner
	Substation Site/Transformer Station
	Disconnection of substation from the Hydro One switching station
	Removal of substation and transformer station
	Potential removal of operation and maintenance building
	Decommissioning of septic system and water well
	Additional Activities
	Component removal and reuse, recycling, or proper disposal at a landfill
	Removal of above ground and underground collector system in municipal road allowances (remove wires and poles as required, dependent upon agreement with Huron County)

2.3 Project Schedule

The projected start dates for Project construction, operation and decommissioning activities are provided in Table 2-2 below.

Construction is anticipated to commence in mid-2013 and finish in late 2014. Operation and maintenance activities would occur as required throughout the life of the Project. The specific schedule for decommissioning would be determined at the time it is undertaken.

The wind turbines used for the Project can be expected to be in service for the term of the 20 year Ontario Power Authority Power Purchase Agreement. Following the term of the contract, a decision would be made regarding whether to extend the life of the facility or to decommission. Barring routine scheduled maintenance, the turbines are expected to be operational 24 hours a day, 7 days a week, assuming appropriate wind conditions.

Table 2-2: Major Project Phases and Scheduling Milestones

Construction	Operation	Decommissioning/Repowering
Mid-2013 to Late 2014	Late 2014 to Late 2034	Late 2034

3.0 SUMMARY OF DRAFT REA DOCUMENTS

The following sections provide a summary of each draft document that will be provided as part of the Project's REA application that will include comments and feedback from Aboriginal communities, municipalities, agencies and the public. Each document summarized below was prepared in accordance with O. Reg. 359/09, and in consideration of the MOE's *Technical Guide to Renewable Energy Approvals*.

3.1 Project Description Report

The *Project Description Report* is the central summary document for the REA application. This report provides an overall view of the Project along with details regarding the type of energy, facilities, equipment, and technology to be used. This includes detailed descriptions of Project components such as the turbines, electrical infrastructure, access roads, substation, met towers, and temporary construction areas. The activities to be engaged in, an overall Project schedule, and the regulatory framework (including examples of other permits and approvals that apply to the Project outside of the REA process) are identified. The report also summarizes the potential environmental effects of the Project, providing the key results of the more detailed assessments conducted in other REA reports.

3.1.1 Methodology of Effects Assessment

O. Reg. 359/09 requires that adverse environmental effects that may result from engaging in the Project be described. The term "environment" in O. Reg. 359/09 has the same meaning as in the *Environmental Assessment Act*, and includes the natural, physical, cultural, and socio-economic environment.

The following is a high level summary of the methodology that has been applied in order to identify potential negative environmental effects that may result from construction and operation of the Project:

- Collect information on the existing environment using available background information, consultation with stakeholders, and site investigations.
- Review proposed Project activities in order to predict the potential interactions between the Project and environment.
- Identify potential interactions that could cause an adverse effect on the environment.
- Develop measures to avoid, mitigate, and monitor potential adverse effects.

Based on an assessment of the existing environment, experience gained during the Project planning phase, as well as the requirements of the REA process, the following environmental features have been assessed as part of the REA application process:

- Archaeological and Cultural Heritage Resources;
- Natural Heritage Resources;
- Water Bodies and Aquatic Resources;
- Air Quality;
- Environmental Noise;
- Land Use and Socio-Economic Resources;
- Existing Local Infrastructure;
- Public Health and Safety; and
- Contaminated Lands.

For some natural environment and socio-economic features, avoidance during Project siting and mitigation measures are anticipated to eliminate all effects. The application of these principles has greatly reduced the potential for adverse environmental effects from the Project.

3.2 Construction Plan Report

The *Construction Plan Report* details the Project activities related to the construction phase so that potential adverse environmental effects may be identified. This includes descriptions of the construction and installation activities, the location, timing and duration of construction activities, the potential adverse effects as a result of constructing the Project, and the proposed mitigation and monitoring measures.

3.2.1 Construction Activities Overview

The stages of construction activities are provided in Table 2.1 above. The buildable area includes the footprint of the facility components, plus any temporary work and storage locations. Construction activities would be conducted within this designated area. The underground collector lines (and above ground in some locations) would generally be installed within the boundaries of the municipal road allowance. In some locations the collector system and transmission lines are proposed within private lands based on agreements with the landowners. The buildable area generally consists of the following:

- Substation property (includes the substation, operation and maintenance building, protection and control buildings, SWM pond, main construction staging area, and Hydro One switching station): approximately 604 m x 680 m.
- Transformer station property (including the grounding grid, protection and control buildings, SWM features, and temporary construction area): approximately 200 m x 200 m.
- Access road and underground collector and transmission line locations: approximately 15 m wide corridor at each turbine location; includes 5 to 8 m wide gravel road;

underground electrical collector and transmission lines, data cable and junction boxes; culverts (where necessary); and temporary staging area.

- Turbine locations: approximately 160 m x 160 m, includes turbine tower, foundation, approximately 3 to 5 m gravelled collar around the turbine base, and temporary staging area.
- Crane paths: temporary 15 m wide corridor between some turbine locations.
- Met tower locations: 150 m x 150 m, includes tower on a concrete foundation (approximately 10 m x 10 m), guy wires, temporary staging area, underground power and data cabling, and temporary access route.
- Municipal road allowances: above ground and underground collector lines data cables and junction boxes; transmission line; and splice vaults or directly buried cable splices would be installed within the boundaries of the road allowance or directly adjacent to the road allowance on private land.

Where possible, temporary staging areas have been reduced in size on a site-specific basis to exclude natural features and water bodies as part of the proposed mitigation.

Prior to construction, the Proponent or appointed Contractor will develop agreements with Utility companies for the temporary relocation or adjusted location of utilities (i.e., low slung electrical collector lines that impede the flow of large equipment may need to be lifted) within the Project Location, or within the transportation routing. Generally the relocation or adjustment of utilities for this purpose is completed by the Utility Owner and would generally not be undertaken by the Proponent.

Preliminary geotechnical work was completed to obtain general subsurface information within the vicinity of the Project Location. This information was used to aid in evaluating estimates with regards to foundation design and construction for wind turbines.

3.2.1.1 Turbine and Met Tower Sites

The construction phase of the complete Project would last approximately 18 to 24 months. Key components that would be constructed or erected on each turbine site include:

- Foundations;
- Concrete pedestal for Padmount transformers;
- Towers;
- Turbine generators (nacelles, hubs and rotors);
- Padmount transformers;
- Switchgears;
- Access roads;
- Temporary crane paths (connecting some turbine locations);
- Construction pads; and
- Power (collector) and data lines.

Key components for the met towers would include:

- Footings;
- Towers;
- Guy wires (if not self-supporting)
- Temporary construction area and access; and
- Power supply and data cabling.

3.2.2 Collector System and Transmission Line

To allow for the collector system to be predominantly buried (as opposed to above ground), as requested by the Township of ACW and local residents, and to reduce the number of circuits entering the main substation, approximately one half of the 34.5 kV lines would be routed to the transformer station where there will be a step-up to 138 or 230 kV. All circuits (138 or 230 kV and 34.5 kV) would then feed into the substation, which is located adjacent to an existing Hydro One 500 kV transmission line.

All cables would be buried according to electrical code requirements. Power and control cabling leaving the wind turbines would be buried beneath or adjacent to the turbine access road. From the junction of each turbine access road and the municipal road allowance, underground cables would be installed in the municipal road allowance in trenches between the property line and the travelled portion of the roadway or directly within the road bed.

Data cabling would generally be laid in the same trenches as collector lines and would follow the routes of the access roads wherever possible.

Where necessary, partially buried junction boxes will be placed at the junction where the collector line from the turbine meets the collector line in the road allowance. The junction box would be located either on participating private land or within the road allowance. At several points along the length of the cable installations, cable splice points would be required to allow cable lines to be spliced together. To facilitate the cable splice points, a junction box or splice vault would be installed. Wherever possible, junction boxes at the end of turbine access roads would be used for cable splice locations to reduce the number of junction boxes required.

Where there are crossings of watercourses, the lines would generally be installed by open cut, on above ground poles, on infrastructure (i.e., bridges) or by directional drilling. The final design will be determined by the Construction Contractor in consultation with the Maitland Valley Conservation Authority (MVCA), as required. If site conditions require directional drilling to cross roads, streams or other obstacles, lines would be installed in plastic conduits.

For above ground construction, existing power line corridors would be used where possible. Existing poles would need to be replaced with taller poles to allow for the addition of new lines. New poles would be installed using linemen trucks with mounted augers. Where trimming of vegetation is required within the road allowance, it would be completed in accordance with

Township/County and/or Hydro One requirements. Following installation of poles and hardware the new cabling would be strung to complete the connection to the substation.

3.2.3 Substation, Operation and Maintenance Building, Temporary Construction Laydown Area and Transformer Station

As part of the construction phase at the substation property, an existing house, associated farm buildings and infrastructure would be demolished and the site graded in accordance with the design. If, after assessment, the existing septic system and water well meet the needs of the operation, the systems will be recommissioned and permitted as appropriate. If the onsite systems do not meet the requirements for the operations facility they will be decommissioned and new systems will be installed.

The construction of facility components at the substation property would last approximately 18 months, although use of the site as the base for construction management and laydown would last for the duration of Project construction. Key components that would be constructed or erected at the substation property would include:

- Site access roads;
- Footings for buildings;
- Operation and maintenance building;
- Water well and septic system for operation and maintenance building (if existing septic system and well do not meet the needs of the operation;
- Concrete equipment pads and transformer pits;
- Grounding grid;
- Transformers and switchgear;
- Breakers, disconnect switches, PTs and CTs, surge arresters and connecting busbars;
- Electrical building;
- Protection and control buildings;
- Metering, monitoring and control equipment;
- Stormwater management features;
- Grid interconnection (by Hydro One);
- Berming and landscaping as required; and
- Security fencing.

The construction of the transformer station would last approximately 12 months. Key components that would be constructed or erected at the transformer station property would include:

- Site access roads;
- Footings;
- Concrete equipment pads and transformer pit;
- Grounding grid;
- Transformer;

- Switchgear and Control building;
- Breakers (34.5 kV, 138 kV and 230 kV), disconnect switches, PTs and CTs , surge arresters and connecting busbars;
- Stormwater management features;
- Berming as required; and
- Security fencing.

A Traffic Management Plan would be developed in consultation with the construction and turbine contractors, the Proponent, the Township of ACW, Huron County and Bruce County based on the requirements of the roads leading up to construction. The Construction Contractor would implement a Traffic Management Plan to identify and deal with specific traffic planning issues including the management of traffic and the delivery of materials. The Traffic Management Plan would include details on the size and number of trucks, and the timeline and operational plan for transporting materials to the Project sites (including the sequence of events, duration of activities, and timing with respect to season). The Traffic Management Plan may also include the use of signage, road closures, speed restrictions, truck lighting, load restrictions, and equipment inspections. The plan would be developed during the detailed design phase, once the construction contracts have been awarded.

3.2.4 Site Restoration

The access roads and turbine working area would be completed to specifications including removal of excess gravel placed around the turbines and the access roads except for a gravelled truck turnaround area at the base of each turbine. Areas temporarily used to accommodate the construction, such as crane paths and around the turbine, would be restored to a condition determined in consultation with the land owner. Temporary construction areas would be rehabilitated as appropriate. Any plantings or re-vegetation for erosion control would be installed in accordance with the detailed design.

The clean-up of the construction site is the final construction activity to be conducted. The clean-up crew would pick up debris and remove surplus materials and equipment. Temporary construction offices and trailers would be removed from the substation property and gravelled surfaces used for parking and laydown would be rehabilitated to meet the final detailed design. Any landscaping plantings would be installed in accordance with the detailed design.

3.2.5 Summary of Key Potential Construction Effects, Mitigation, and Monitoring

During construction, potential environmental effects resulting from construction activities will be mitigated through the use of standard good site practices. This includes feature avoidance, delineation and staking of construction areas so that no workers or equipment encroach upon them, and proper storage of fuel and hazardous chemicals. Key Project-specific potential net effects include:

- There is potential to discover artefacts during the construction phase; however, with the implementation of the mitigation measures and best management practices, no adverse

residual effects on archaeological resources are anticipated. Should archaeological materials be encountered during excavation and construction activities, the appropriate steps will be followed.

- During construction, potential effects include localized dust generation, soil erosion and sedimentation, root zone damage to edge trees, changes to wetland hydrology, an increase in traffic and the potential for accidental spills. Construction areas would be well delineated with stakes and flagged so that construction does not encroach upon natural features. Proper storage of fuel and hazardous chemicals will minimize the risk of spills and contamination of the surrounding environment.

- Construction activities may cause short-term sensory disturbance to species in the area and an increased risk of amphibian mortality from collisions with vehicles. To the extent practical, vegetation clearing will be completed prior to or after the breeding season for migratory birds (May 1st to July 31st). Should vegetation clearing or construction activities within 30m of the woodland or wetland edge be required, surveys will be undertaken prior to these activities to identify presence/absence of breeding birds and a buffer will be applied if a nest is located. As practical, timing of construction activities will be adjusted to minimize impacts of wildlife and after turbines have been assembled, the temporary turbine construction area will be restored to pre-existing conditions as soon as practical. Wildlife (i.e., turtles, snakes) found within the buildable area during construction activities will be safely relocated. To prevent wildlife from entering turbine excavation areas, the edge of excavation areas will be fenced off where excavations are left overnight. Vehicle traffic will be primarily restricted to daytime hours and speed limit signage will restrict speeds to 30km/h or less, where appropriate.

- Dewatering activities may be required in proposed construction areas. A preliminary hydrogeological assessment has been completed and indicates that the potential effects from construction could include groundwater interference to local private and/or municipal water well supplies without appropriate mitigation. Additional areas requiring assessment and possible mitigation include function of identified groundwater discharge features and pump water discharge back into the environment. Mitigation measures include the establishment of a private water well monitoring program as appropriate, monitoring groundwater-surface water interactions in the event of an interference, and filtering discharged water to reduce suspended solids.

- Erosion and sediment concerns could arise both during the construction phase of the Project and following construction. Erosion and sedimentation control measures would contain excavated soils on site and prevent construction related sediment from entering watercourses. Disturbed areas would be re-vegetated as soon as conditions allow to prevent erosion and to restore habitat functions.

- There is the potential for increases in dust, noise and air emissions in the Project Location during construction activities. There is also the potential for an increase in traffic. Equipment would be maintained in good working order, dust suppression would

be used as required, and adherence to appropriate noise setback requirements would mitigate the potential effects resulting from dust, noise and air emissions. The Construction Contractor would implement a Traffic Management Plan to identify and deal with specific traffic planning issues including the management of traffic and the delivery of materials. Implementing transportation planning and safety measures during construction would minimize the potential for traffic related safety concerns.

- A positive net effect is anticipated on the local economy during construction of the Project. The Project will provide employment and other fiscal benefits to the local area, including the County of Huron, the Township of ACW and participating landowners. Existing businesses within the local communities could benefit from the demands of the Project workforce during construction.

After application of mitigation and monitoring measures, potential effects during construction are expected to be minor.

3.3 Design and Operations Report

According to O. Reg. 359/09, the *Design and Operations Report* is the principal document where the details of a renewable energy generation facility are presented. It builds on the *Project Description Report* by defining:

- the site plan;
- the design of the facility and the equipment to be used;
- how the facility will be operated;
- how environmental effects will be monitored and mitigated; and
- how emergencies and communications will be managed.

3.3.1 Site Plan

The Site Plan is provided in Appendix A, and is presented as a series of four figures:

- Figure 1: Project Location - Overview
- Figure 2: Socio-Economic Features
- Figure 3: Natural Heritage Features and Waterbodies
- Figure 4: Noise Contours and Receptors

The Site Plan provides the specific location and extent of all Project components, along with relevant existing features that are subject to the siting requirements of O. Reg. 359/09.

3.3.2 Facility Design Plan

The facility design plan includes an overview of how electricity will be generated by the Project, and descriptions of the facility components, including specifications and descriptions of the equipment that will generate electricity.

The facility design plan also provides information on general design and siting considerations; during siting of the Project the key mitigation strategy used to address potential environmental

effects from operation of the facility was avoidance of natural environment features and cultural heritage features to the extent possible. The Project was designed to meet the mandatory setbacks within O. Reg. 359/09 in all cases. Within O. Reg. 359/09 there are some setbacks that are not mandatory, for which studies that identify potential negative environmental effects and mitigation measures can be conducted in lieu of meeting the setback requirements. In some instances in the facility design, Project components are proposed within the defined setbacks for natural features, water bodies, and property lines. In these instances, additional assessments have been conducted as per the requirements of O. Reg.359/09.

3.3.3 Facility Operations Plan Overview

Operation activities include daily monitoring of the wind turbines, function of the operation and maintenance building, maintenance activities, and monitoring of meteorological data. To ensure that the appropriate assessment and maintenance of the facility are undertaken, an Operations Plan would be implemented.

The Proponent may retain one or more specialized Operations and Maintenance Contractors for specific maintenance tasks. The Proponent and/or its Operations and Maintenance Contractors would carry out the daily operations and maintenance tasks for the facility. It is expected that approximately 18 to 24 personnel would be required for Project operations.

The Project would have a supervisory control and data acquisition (SCADA) system with data cable links between each turbine and the control room within the operation and maintenance building. The SCADA system would be designed to provide real time monitoring of each turbine's performance. Monitoring of the turbines would occur within the operation and maintenance building and/or from a remote location. The SCADA system would identify any potential problems so that proactive inspection and maintenance could occur. Potentially damaged turbines would be shut down for a detailed inspection and any necessary repair.

Occasional breakdowns of the turbines or related infrastructure could be expected during the life of the Project. Unscheduled maintenance of the turbines would be carried out by the Proponent and/or an Operations and Maintenance Contractor. Where maintenance of a turbine necessitates the use of cranes, a temporary construction pad would be constructed of gravel in the same location used during Project development wherever possible.

Other unscheduled maintenance activities will include ongoing upkeep of other Project facilities including repairs to electrical infrastructure, operation and maintenance building, snow removal, and landscaping.

Each turbine would have instrumentation mounted on the nacelle to measure wind speed and direction. This data would control the operation of the turbine including the pitch of the blades, orientation of the turbine into the wind and would also shut the turbine down during low and high wind conditions.

3.3.4 Noise Assessment Report

The *Noise Assessment Report* has been prepared to meet the reporting requirements related to wind project noise for a REA under the *Green Energy and Green Economy Act* 2009 (Government of Ontario, 2009).

Receptors and participants were identified through mapping, aerial photographs, and on-site surveys of the area. Typically, for this area receptors are residential dwellings of individuals and families not associated with the subject project. Receptors within 1.5 km of any K2 Wind turbine or transformer have been included and reported in the noise impact analysis. All receptors have been considered to be designated as rural.

For the purposes of noise assessment, participants have been defined as dwellings occupied by landowners who receive financial compensation for the placement of project hardware (turbines, cables, roads, substations, etc.) on their properties.

For information, 482 receptors, 303 vacant lot surrogate receptors, and 50 participants (total 835) have been identified within 2 km of any Project turbine; 248 vacant lots have also been identified within 2 km of any project turbine.

Other existing wind projects in the area that were considered during the noise assessment include the Kingsbridge I Wind Power operation, which consists of 22 Vestas V80 and one Vestas V47 wind turbines; the Ripley Wind Power Project, which consists of 38 Enercon E82 turbines; and one privately owned Enercon E33 turbine.

Transformers were also considered in the noise assessment. For the Project, one transformer would be located at the Transformer Station and two would be located at the Substation Property (see Figures, Appendix A). The substations associated with the Kingsbridge I Wind Power operation and the Ripley Wind Power Project were not included due to the significant distance of the substations from the Project. There is no substation associated with the privately owned turbine.

The noise impact assessment for the Project determined that the estimated sound pressure levels at receptors and vacant lot surrogate receptors in the Project area comply with the Ontario Ministry of Environment sound level limits at all qualified points of reception.

3.3.5 Property Line Setback Assessment

This Assessment summarizes the features over which Project turbine locations overlap the 99.5 m setback, potential adverse impacts on those features, and preventative measures to address potential adverse impacts. Lands within the overlap areas are primarily used for agriculture.

Setback requirements within O. Reg. 359/09 state that a turbine must be a distance of at least the blade length plus 10 m from the road allowance, which for the K2 Wind turbines is 59 m. All proposed turbine locations meet the setback requirement from public road rights of way.

Nineteen turbine setbacks overlap with agricultural land. Adverse impacts to agricultural land, including crop damage and soil compaction, may occur in the unlikely event of turbine collapse. Should any fencing be damaged during the unlikely event of turbine collapse, repairs to the damaged fencing would be undertaken in consultation with the landowner. Eleven turbine setbacks overlap with hedgerows. Adverse impacts to hedgerows, including vegetation damage and disturbance to related wildlife, may occur in the unlikely event of turbine collapse.

The turbines will be designed by professional engineers, constructed according to that design and manufacturer's specifications, undergo regular maintenance and monitoring by operational staff, and contain automatic shutdown mechanisms in instances such as extreme weather or unbalanced turbine blades. In the unlikely event of damage to agricultural land due to turbine collapse, landowners would be compensated by the Proponent for any crop damage.

3.3.6 Stormwater Management Plan

Stormwater Management (SWM) Plans were developed for runoff control from the substation and transformer station properties in accordance with the *Stormwater Management Planning and Design Manual* (MOE 2003) and the MVCA guidelines (see Appendix C of the *Design and Operations Report*).

The primary component of the *SWM Plan* at the substation site is a stormwater retention pond, located at the southwest corner of the main operations area, which would receive runoff from the site. The stormwater retention pond would reduce peak stormwater flows and promote sedimentation prior to discharge to the drainage along Glens Hill Road. The retention pond would provide quantity control for stormwater runoff from developed areas of the site. The total storage volume of the SWM pond would be approximately 730 m^3 and would have continuous side slopes of 3:1 (H:V) resulting in an overall top of pond surface area of about 900 m^2. The SWM pond would have a total depth of 1.3 m comprised of active storage (1.0 m) and freeboard (0.3 m). Stormwater runoff from the developed site area would be conveyed to the SWM pond via drainage ditches. The storm sewer system would be sized to convey the 100 year design storm. The SWM pond would discharge to the existing Glens Hill Road roadside ditch.

The outlet structure is designed as a detention control device consisting of one 650 mm diameter culvert with an inlet elevation of approximately 245 m. As appropriate, a shut-off mechanism will be incorporated into the design of the SWM pond outlet chamber to provide the opportunity to close off discharge from the substation property in the event of an emergency during which material other than stormwater enters the SWM system. An oil/grit separator (OGS) may be used if there is potential for oils and/or grease to be washed from the site with stormwater runoff. An OGS traps and retains oil and sediment in a detention chamber. It operates based on the principles of gravity-based sedimentation for the grit and phase separation for the oil. It is often used for spill control, or as a pre-treatment device or end-of-pipe control as part of a multi-component approach for water quality control.

A 2 m long overflow broad-crested weir with a crest elevation set at 245.7 m will be a component of the outlet configuration. This weir will assist in limiting the maximum depth of the SWM pond. It will also serve the secondary purpose as emergency overflow bypass.

Four diversion ditches will be constructed along the north, west, south and east development perimeter to convey “clean” surface runoff from the upstream undeveloped areas of the substation property around the developed area.

The *SWM Plan* for the transformer station determined that the change in post-development flows versus predevelopment flows was minimal and that a retention pond would not be required to control peak runoff.

Belgrave Road and Lanesville Line represent the upstream boundary for localized drainage at the proposed transformer site. As such, no perimeter ditches will be necessary to route “clean” runoff from un-developed upstream areas of the site. The site will be developed to ensure that on-site drainage will follow, to the extent possible, the existing drainage pattern.

Vegetated filter strips and grass lined drainage ditches are a low-cost best management practice designed to improve the quality of stormwater runoff by using biological and chemical processes in soils and vegetation to filter out contaminants. They function by slowing runoff velocities and filtering out sediment and other pollutants, and providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice, and have more recently evolved into an urban practice.

Grassed swales are most effective for quality control when the depth of flow is minimized, bottom width is maximized (≥0.75 m) and channel slope is minimized (e.g. ≤1%). Grassed swales with a slope up to 4% can be used for water quality purposes, but effectiveness diminishes as velocity increases. As appropriate, grass lining will be allowed to grow higher than 75 mm to enhance the filtration of suspended solids.

Vegetated filter strips (minimum 10 m wide) will be integrated into the drainage design for the development.

3.3.7 Summary of Key Potential Operation Effects, Mitigation, and Monitoring

During operation, potential environmental effects resulting from operation and maintenance activities will be mitigated through the use of standard good site practices. This includes maintaining vehicles and equipment in good working order, proper waste collection and disposal, conducting refueling and equipment maintenance activities away from natural features, and proper training of personnel. Contingency measures for typical operation and maintenance activities will be addressed through standard containment facilities and emergency response materials being maintained on-site as required, and adherence to the Complaint Response Protocol. Key Project-specific potential net effects include:

- Project infrastructure will be visible to residents; the changed visual landscape would be present during the life of the facility. K2 Wind has committed to landscaping at the substation and transformer station properties, which may include the planting of various trees and shrubs where appropriate, while ensuring that the visibility and building security are maintained. The substation and transformer station may be surrounded by berms to mitigate the visual impact of the site. The Project is expected to operate for a minimum of 20 years and land will be restored during the decommissioning phase of the Project.

- There is the potential for increases in dust, noise and air emissions in the Project Location during maintenance activities. There is also the potential for short-term localized disturbance to traffic patterns, increases in traffic volume and/or the creation of potential traffic safety hazards. Equipment would be maintained in good working order, dust suppression would be used as required, and adherence to appropriate noise setback requirements would mitigate the potential effects resulting from dust, noise and air emissions. As appropriate, permits, escort vehicles and notification of non-conventional load movements would mitigate the potential effects to local traffic.

- The lands which will be occupied by facility components would be removed from their present land-use. Siting of turbines will comply with MOE guidelines, and operational and maintenance activities would be restricted to areas where Project components are located. In addition, landowners are being financially compensated for the lease of private lands and siting of the turbines, access roads, and other infrastructure was completed in consultation with participating landowners.

- A positive net effect is anticipated on the local economy during operation of the Project. The Project will provide employment and other fiscal benefits to the local area. Huron County and the Township of ACW would receive ongoing property tax income from the Project, the participating landowners would receive land lease payments, and owners of residences within a specified distance of a Project wind turbine would receive Community Renewable Energy Benefit payments. Existing businesses within the local communities would likely benefit from the demands of the Project workforce during operation.

- Potential effects to the natural environment during operation are anticipated to be minimal following the implementation of mitigation measures. Potential effects include those from accidental spills, improper waste disposal, avoidance behaviour and/or direct mortality of wildlife.

The environmental effects monitoring plan for Project operation has been designed to monitor implementation of the proposed protection and mitigation measures and to verify compliance of the Project with O. Reg. 359/09. After application of mitigation and monitoring measures, potential effects during operations are expected to be minor.

3.3.8 Emergency Response and Communications Plan

An Emergency Response and Communications Plan is provided in the *Design and Operations Report*, and will be communicated and confirmed by Town of ACW and County of Huron's Emergency Services Departments.

The Emergency Response and Communications Plan will be implemented throughout the life of the Project and will be updated to include key contact information for emergency service providers, a description of the chain of communications and how information would be disseminated between K2 Wind and the relevant responders.

Project personnel will be trained in the emergency response and communication plan procedures outlined in the Plan, which include how to handle a fire, personal injury, and accidental spills on the Project Site.

3.3.9 Non-Emergency Communications

K2 Wind will continue to have contact with Project stakeholders (public, Aboriginal communities, and the municipalities) for all Project phases via the posting of a telephone number for contacting the Proponent and/or the Contractor along with the mailing/e-mail address on the Project website (www.K2Wind.ca). This contact information would be provided directly to the Township of ACW, Huron County and MOE. These would be the direct contact points for the Proponent and/or the Operation and Maintenance Contractor during all phases of the Project.

3.4 Wind Turbine Specifications Report

The *Wind Turbine Specifications Report* provides descriptive information on the wind turbine model to be used for the Project, including the make, model, name plate capacity, hub height above grade, rotational speeds and acoustic emissions data, including the sound power level and frequency spectrum, in terms of octave-band power levels.

The Project includes up to 140 Siemens SWT-2.3 wind turbines. A summary of the basic specifications of the turbine model is provided in Table 4-1 below.

Table 3-1: Basic Wind Turbine Specifications

Basic Wind Turbine Specifications	
Manufacturer	**Siemens**
Model	SWT-2.3-101
Name plate capacity (MW)	Rated between 1.824 and 2.300 MW
Hub height above grade	99.5 m
Blade length	49 m
Full blade diameter	101 m
Blade sweep area	8,000 m^2
Nominal revolutions (rotational speed)	6-16 rpm

Basic Wind Turbine Specifications	
Manufacturer	**Siemens**
Frequency spectrum	60 Hz
Sound power nameplate (1.824 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.3 dBA; 5 m/s – 98.1 dBA; 6 m/s – 100.5 dBA; >7 m/s – 101.0 dBA
Sound power nameplate (1.903 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.5 dBA; 5 m/s – 99.0 dBA; 6 m/s – 101.5 dBA; >7 m/s – 102.0 dBA
Sound power nameplate (2.030 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.6 dBA; 5 m/s – 99.8 dBA; 6 m/s – 102.5 dBA; >7 m/s – 103.0 dBA
Sound power nameplate (2.126 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.7 dBA; 5 m/s – 100.3 dBA; 6 m/s – 103.5 dBA; >7 m/s – 104.0 dBA
Sound power nameplate (2.221 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.7 dBA; 5 m/s – 100.5 dBA; 6 m/s – 104.5 dBA; >7 m/s – 105.0 dBA
Sound power (nameplate 2.300 MW)	3 m/s – 91.4 dBA; 4 m/s – 95.7 dBA; 5 m/s – 100.6 dBA; 6 m/s – 105.4 dBA; >7 m/s – 106.0 dBA

The maximum overall sound power rating of the highest rated turbines (2.300 MW) is 106.0 dBA.

3.5 Decommissioning Plan Report

According to O. Reg. 359/09, the *Decommissioning Plan Report* is required to describe how the applicant proposes to restore the Project Location to a clean and safe condition suitable for the likely future use of the land on which it is located. This includes retiring the elements of the renewable energy generation facility, restoring the land and water and managing the excess materials and waste.

3.5.1 Decommissioning During Construction (Abandonment of the Project)

In the event that the Proponent cannot successfully complete the construction of the Project, the rights to the Project (and any associated liabilities and obligations) may be sold to allow the Project to be constructed by the purchasing developer. In the event that a delay occurs in the purchasing of the Project by another developer, the Proponent would be responsible for interim environmental protection. In the event that the Project is not purchased by another developer, the Proponent would be responsible for decommissioning of the Project.

3.5.2 Decommissioning Procedures

During decommissioning and restoration activities, general environmental protection and mitigation measures would be implemented. Prior to engaging in any decommissioning works, the Proponent will develop a decommissioning plan in accordance with MOE requirements at the time of decommissioning. Decommissioning and restoration activities will be performed in accordance with relevant statutes in place at the time of decommissioning.

Prior to any dismantling or removal of equipment, staging areas would be delineated at each turbine site and at the substation and transformer station properties. Decommissioning activities would be conducted within these designated areas. Work to decommission the transmission line

and collector lines would be conducted within the boundaries of the municipal road allowance and appropriate private lands.

The turbine foundations would be partially removed to a depth of approximately 1 m below grade to enable normal agricultural practices to be conducted over the foundation areas. The concrete would be removed from the site by dump truck. It is not anticipated that blasting would be used to remove the turbine foundations, however if required for turbine foundation removal, blasting may be considered and appropriate consultation would occur with required authorities.

The turbines would be dismantled into their original component parts. The turbine components would be temporarily stored at the staging area at each turbine site until removed from the site by truck.

To the extent possible, crane paths for the decommissioning phase would follow the same routes used for the construction phase.

Underground collector lines and the transmission line on participating properties would remain in place, with both ends that come to the surface excavated and removed to approximately 1 m below grade, in consultation with the landowner and in accordance with the land lease agreements. Any junction boxes will be removed. Underground collector lines, the transmission line, splice vaults and junction boxes installed in the road allowances would be removed, if required by the agreements with the Township of ACW and/or the County.

Above ground collector lines and poles in the municipal road allowance would be removed if necessary. In areas where above ground collector lines are strung on shared use poles, only the lines would be removed, unless otherwise required by the shared use agreement that would be developed with other users.

Padmount transformers, located immediately adjacent to each turbine, would be dismantled as agreed to, or as necessary, in accordance with the land agreement. Transformers and grounding grids would be removed, and the associated concrete foundation would be removed to approximately 1 m below grade.

The substation and transformer station would be dismantled. The transformers, switchgear, and grounding grids would be removed, and the concrete foundations would be removed to approximately 1 m below grade. This may include removal of the transformer pit and sump pump, and the drainage system. Granular and geotextile materials would be removed from the site. All electrical system components would be taken off-site.

The switching station adjacent to the substation and the interconnection to the Hydro One 500 kV transmission lines will be owned and operated by Hydro One. The continued operation or decommissioning of these facilities will depend on Hydro One's requirements. Any eventual decommissioning will be conducted by Hydro One in accordance with its procedures.

Access roads would be removed. All granular and geotextile materials would be removed from the site by dump truck. Where landowners see it advantageous to retain access roads, these would be left in place.

Culverts would be removed if requested by the landowner and approved by the Township, County, the Ministry of Natural Resources (MNR), the MVCA and/or Fisheries and Oceans Canada (DFO), as appropriate.

The operation and maintenance building would be demolished, if appropriate, and all building materials removed from the site. The building's concrete foundation would be removed to a depth of approximately 1 m below grade. In the event that a future use is identified for the operation and maintenance building, it may be maintained on site.

The septic system would be decommissioned in accordance with local and/or provincial requirements at the time (e.g., *Environmental Protection Act*), as appropriate. This may include pumping out, filling with sand, and capping of the tank and tile bed.

The water well would be decommissioned in accordance with local and/or provincial requirements at the time, as appropriate. This may include capping the well below grade and removal of pump.

The SWM pond would be decommissioned in accordance with local and/or provincial requirements at the time, as appropriate. The pond areas would be backfilled using clean fill and imported topsoil and reseeded as required in consultation with the landowner.

The met towers would be disassembled and removed by truck from the site. Foundations would be partially removed to a depth of approximately 1 m below grade. The site would be accessed using the same route as in the construction phase where possible.

Power and data cabling would remain in place, with both ends that come to the surface excavated, cut, and removed to approximately 1 m below grade. The excavation would be backfilled in consultation with the landowner and in accordance with the land agreement.

3.5.2.1 Site Restoration Plan

Areas that may have become compacted due to facility operation or decommissioning activities, including construction pads and access roads, would be de-compacted using chisel ploughing and/or sub-soiling, or other appropriate technique, as determined by an environmental advisor. Any agricultural tile drains damaged during decommissioning, would be repaired by a drainage tile contractor. After repair of the agricultural tile drains the landowner would be invited to inspect the repair.

Topsoil would be added to similar depth as surrounding areas, where necessary. Imported topsoil added to agricultural areas would be of the same or similar soil type and texture as pre-construction conditions and/or adjacent lands and would be selected with input from the

landowner. Areas would be graded to pre-construction conditions and restored appropriately, in consultation with the landowner.

In the event that any of the optioned properties where the facility components are sited are no longer under agricultural production, slightly different methods would be used. The subsoil would be restored and de-compacted, and topsoil added. The areas would be re-seeded or re-vegetated with the same or similar vegetation as adjacent areas to prevent topsoil erosion.

Where Project infrastructure has been removed, roadside ditches would be seeded with quick growing native species to prevent topsoil erosion; the seed mixture would be determined at that time in consultation with the Township of ACW, the County and/or the MVCA. Erosion and sediment control measures in areas of re-seeding would be left in place until seed is fully established, as determined by an environmental advisor.

If any underground collector lines require removal by request of the Township of ACW or the County, the area would be rehabilitated to pre-existing conditions as appropriate in consultation with the Township of ACW/County.

Any proposed decommissioning works within or near watercourses would be discussed with the Township of ACW, County, MNR, MVCA and/or DFO, as necessary, to determine any applicable guidelines, permitting, site-specific mitigation and/or remediation plans. It is envisioned that similar mitigation and monitoring measures implemented during construction would be used for the decommissioning of the Project. Measures are anticipated to include standard best management practices including erosion and sediment control during removal of the structures.

3.5.2.2 Managing Excess Materials & Waste

Spill prevention procedures will be in place during operation. There is still the potential for small accidental spills to occur. If soil contaminants are noted, they will be excavated and removed according to the standards in place at that time.

K2 Wind will follow the applicable regulations in place at the time of decommissioning during dismantling and demolition of the Project. Principles that will be followed include the reduction of the amount of waste generated, reuse of materials, and recycling of materials that cannot be reused. As much of the facility would consist of reusable or recyclable materials, there would be minimal residual waste for disposal as a result of decommissioning the facility.

Small amounts of registerable waste materials would be managed in accordance with O. Reg. 347 or the applicable legislation at the time.

3.5.2.3 Monitoring

For agricultural land, potential soil problem areas including trench subsidence, soil erosion and/or stoniness would be noted. For municipal road allowances, a review should occur of the establishment and health of re-vegetation as required, depending on pre-construction

conditions. Additional monitoring activities may also be conducted, depending upon the site conditions at the time of decommissioning. If negative impacts are noted during monitoring activities, appropriate remediation measures would be implemented as necessary, and additional follow-up monitoring would be conducted, as appropriate and determined in consultation with required authorities.

3.5.2.4 Notification

Prior to decommissioning, the Proponent would consult with interested parties regarding the details of decommissioning and would prepare an updated and comprehensive decommissioning plan as required to meet regulatory requirements in effect at that time.

3.6 Natural Heritage Assessment and Environmental Impact Study Reports

A *Natural Heritage Assessment and Environmental Impact Study* (*NHA/EIS*) was completed in May 2012 and confirmed by the MNR on May 9, 2012 for a previous Project layout. The Proponent identified the need to make modifications to the Project layout as it was presented in the original *NHA/EIS* and therefore an *NHA/EIS Addendum* (June 2012) was completed for the Project. Additional changes to the collector line and transmission line were completed after the Addendum, so the *NHA/EIS Addendum 2* was completed in August 2012.

An *NHA* is required to determine whether any of the following features exist in and/or within 120 m of the Project Location:

- Wetlands;
- Coastal wetlands;
- Life Science Areas of Natural and Scientific Interest (ANSIs);
- Earth Science ANSIs (within 50 m);
- Valleylands;
- Woodlands;
- Wildlife habitat; and
- Provincial parks and conservation reserves.

The NHA identifies the existence and boundaries of all natural features in and within 120 m of the Project Location based on a review of background records and on-site field investigations.

As the Project Location is within 120 m of natural features, the Project's *NHA* and *NHA Addenda* provide an evaluation of significance for each identified feature based on either an existing MNR designation of the feature or by using evaluation criteria or procedures established or accepted by the MNR.

If the Project extends into the 120 m zone of investigation for any of the identified significant features (50 m of a provincially significant Earth Science ANSI, 120 m for all other specified natural features) an *EIS* is required that identifies and assesses any negative environmental effects and identifies mitigation measures.

The *NHA/EIS* must be submitted to the MNR for confirmation in advance of public release of the REA reports. Written confirmation from the MNR was received for the Project's *NHA/EIS* on May 9, 2012 and for the *NHA/EIS Addendum* on June 29, 2012. The *NHA/EIS Addendum 2* was submitted to the MNR for comment.

3.6.1 Records Review

Background data was collected and reviewed to identify natural features located in, or within the regional area and/or 120 m of the Project Location. Documents reviewed and agencies contacted as part of the Records Review Report include, but were not limited to Environment Canada, the MNR, Huron County, and the MVCA.

3.6.2 Site Investigations

A site investigation was required to confirm the status and boundaries of natural features identified through the records review, and to identify additional natural features in or within 120 m of the Project Location.

Based on site investigations, several candidate significant natural features are located within the Project Location, including the five candidate significant valleylands and eight candidate significant amphibian corridors. In addition, the provincially significant Lothian-Lake Warren Shorelines ANSI is located within the Project Location. A number of natural features are located within 120 m of the Project Location. As such, candidate significant natural features require an evaluation of significance.

3.6.3 Evaluation of Significance

Based on the results of the evaluation of significance, the following significant natural features have been identified in, or within 120 m of, the Project Location:

- Significant Woodlands;
- Significant Wetlands;
- Significant Valleylands;
- Significant Wildlife Habitats (SWH);
- Regionally Significant Life Science ANSI; and
- Provincially Significant Earth Science ANSI.

3.6.4 Environmental Impact Study

An *EIS* is required to identify and assess negative environmental effects and develop mitigation measures for significant features in or within 120 m of the Project Location. Table 3-2 provides a summary of the potential adverse effects to significant features as well as mitigation strategies and monitoring plans.

Table 3-2 Summary of Potential Effects and Recommended Mitigation Measures for Significant Natural Heritage Features during Construction and Operation

Significant Natural Feature Type	Potential Effects of Operation of the Project	Mitigation Measures
Provincial Parks and Conservation Reserves	• None identified.	• Not applicable.
Wetlands	• No direct loss of wetland habitat or function. • Accidental chemical and/or fuel spills and contamination. • Improper waste disposal (fluids, containers, cleaning materials) could also have a negative impact. • Localized dust generation, soil erosion and sedimentation, root zone damage to edge trees (soil compaction), changes to wetland hydrology either by increasing or decreasing surficial runoff and disturbance to wetland wildlife. • During construction, there will be increased traffic and the potential for accidental spills.	• Mitigation measures for spills. • Mitigation measures for waste. • Mitigation measures for sediment and erosion control. • Proposed mitigation for each wetland feature. • Excavation of soils for the purpose of underground collector system installation will occur at the minimum distance of 5 m from the wetland boundary. • For construction on private lands, no construction is proposed within 5 m of any significant wetland feature. Should any disturbance occur to vegetation within 5 m of a wetland due to construction, the disturbed area will be seeded with species native to the ecoregion to establish the 5 m buffer. • Where possible, and as appropriate, access roads will be constructed at or near existing grade to maintain surface flow contributions.
ANSI – earth science	• No operational impacts are predicted. • Degradation and erosion of soils, loss of landscape form and potential changes to hydrological drainage patterns.	• The limit of the 'buildable areas' for Turbines 335, 339, 340 and 341 and their associated infrastructure (roads, collector lines/data cables, and temporary crane paths and construction pads) will be staked and flagged prior to construction. • Access roads will be constructed at grade for Turbines 340 and 341 and within the offshore sand bar areas. • Excavation of soils for the purpose of turbine and underground collector system installation will be filled as quickly as practicable to grade. Excess soil will be re-used on site as feasible and applicable. Where there is a risk of soil migration into a nearby watercourse, excavated soils will be stockpiled, stabilized and silt-fencing will be installed as appropriate. • Power and data cable trenches within the offshore sand bar trenches will be bedded with sand or similar and backfilled with native soils or appropriate fill material, and if appropriate, clay plugs will be installed every 30 m. • Photographs will be taken prior to construction activities to document the shape of the sand bar areas. Upon competition of construction, the photographs will be used as a guide to assist in re-shaping the areas disturbed by temporary construction. • After turbines have been assembled, the temporary

Significant Natural Feature Type	Potential Effects of Operation of the Project	Mitigation Measures
		turbine construction area will be restored to pre-existing conditions and the offshore sand bars will be re-shaped to resemble the pre-construction form and function as soon as practical. The pre-existing conditions at each turbine site are agricultural and thus, will be converted back into agricultural production.
ANSI – life science	• Short-term, localized dust generation, soil erosion and sedimentation. • The use of construction equipment creates the potential for negative effects related to chemical and/or fuel spills.	• Mitigation measures for spills. • Mitigation measures for waste. • Mitigation measures for sediment and erosion control.
Woodlands	• Accidental chemical and/or fuel spills and contamination. • Improper waste disposal (fluids, containers, cleaning materials) could also have a negative impact. • Short-term, localized dust generation, soil erosion and sedimentation, root zone damage to edge trees and disturbance to wildlife. • Soil migration associated with excavation, soil compaction from heavy equipment, potential changes in hydrological low/drainage. • Trenching, which is required to install the underground collector system, has the potential to injure roots that might extend from trees located along the edge of the woodland boundary.	• Mitigation measures for spills. • Mitigation measures for waste. • Mitigation measures for sediment and erosion control. • Mitigation measures for vegetation removal. • Excavation of soils for the purpose of underground collector system installation will occur at the minimum distance of 5 m from the woodland boundary (drip line).
Valleylands	• Accidental chemical and/or fuel spills and contamination. • Improper waste disposal (fluids, containers, cleaning materials) could also have a negative impact. • Short-term, localized dust generation, soil erosion and sedimentation. • The use of construction equipment creates the potential for negative effects related to chemical and/or fuel spills.	• Mitigation measures for spills. • Mitigation measures for waste. • Mitigation measures for sediment and erosion control.
SWH – seasonal concentration areas	• Potential direct mortality of herons, waterfowl, raptors, bats.	• Post-construction monitoring for mortality. • Three-year post-construction monitoring plan on

Significant Natural Feature Type	Potential Effects of Operation of the Project	Mitigation Measures
	• Avoidance behaviour of herons, waterfowl, raptors, bats. • Short-term disturbance from construction activity, such as increased traffic, noise, or dust. • Potential short term changes to surface water hydrology and drainage to/from the natural feature is a potential risk from construction activities.	natural features where avoidance behaviour of significant wildlife habitat has been identified as a potential effect of operations.
SWH – rare vegetation communities and specialized habitat for wildlife	• Accidental chemical and/or fuel spills and contamination to rare vegetation communities. • Direct mortality of amphibians may result due to vehicles using the access roads. • Short-term, localized dust generation, soil erosion and sedimentation. • Short-term sensory disturbance to species using these areas, localized dust generation, soil erosion. • Short-term disturbance from construction activity, such as increased traffic and noise may also result in avoidance of habitats. • Sedimentation and chemical or fuel spills. • Amphibians are at an increased risk from vehicle collisions in spring.	• Mitigation measures for spills. • Vehicle traffic shall primarily be restricted to daytime hours. Speed limit signage will be erected and shall be restricted to 30 km/h or less, where appropriate.
SWH – habitat for species of conservation concern	• Risk of collision on access roads to Snapping Turtle. • Short-term disturbance from construction activity, such as increased traffic, noise, or dust, may result in avoidance of habitats. • Snapping Turtles are at an increased risk from vehicle collisions.	• Vehicle traffic shall primarily be restricted to daytime hours. • Speed limit signage will be erected and shall be restricted to 30 km/h or less, where appropriate.
SWH – animal movement corridors	• Sensory disturbance of amphibians using the corridors. • Short-term disturbance from construction activity, such as increased traffic, noise, or dust, may result in avoidance of habitat. • Amphibians are at an increased risk from vehicle collisions.	• Three-year post-construction monitoring plan on natural features where avoidance behaviour of significant wildlife habitat has been identified as a potential effect of operations.

Significant Natural Feature Type	Potential Effects of Operation of the Project	Mitigation Measures
Birds and Bats	• Mortality from turbine operation.	• Post-construction monitoring for mortality.

Additional mitigation measures for SWH are provided in the *NHA/EIS*.

3.6.5 Conclusions

The impact study concluded that through the application of best management practices and the prescribed mitigation measures and management plans, adverse residual effects resulting from the Project's construction, operation, and decommissioning will not be significant. Post-construction monitoring programs have been designed to assess operational mortality rates for bird and bats and to assess any avoidance of habitats by birds, bats and amphibians due to operational activities.

3.7 Water Assessment and Water Body Reports

A *Water Assessment Report* and a *Water Bodies Report* were completed in June 2012 for a previous Project layout. The Proponent identified the need to make modifications to the Project layout as it was presented in the original *Water Assessment Report* and *Water Bodies Report* and therefore an *Addendum to K2 Wind Power Project – Water Assessment Report,* which included a *Supplemental Water Body Information Report for Project Modifications,* was completed for the Project in July 2012.

The *Water Assessment and Water Bodies Report* and subsequent addendum provide an assessment of potential Project-related negative impacts on water bodies in the 120 m zone of investigation. The Water Assessment identifies the existence and boundaries of all water bodies, as defined by O. Reg. 359/09, in and within 120 m of the Project Location based on a review of background records and on-site field investigations.

If the Project extends into the 120 m zone of investigation for any water bodies (assuming that no Lake Trout lakes that are at or above development capacity are identified within 300 m), a Water Bodies Report is required that identifies and assesses any negative environmental effects and identifies mitigation measures.

3.7.1 Records Review

Records reviewed to acquire background data of the Project area included those from the MNR, DFO, MVCA, Natural Resources Canada, Township of ACW, Huron County, and government of Canada.

Mapping provided by the agencies indicated in the preceding sections delineated four major watersheds within the regional area. These include from south to north: Mid Shore Watershed, Nine Mile Watershed, North Shore Watershed, and Eighteen Mile Watershed. The Project area

was determined to contain mapped watercourses requiring site investigations to determine if they met the definition of "water body" as defined by O. Reg. 359/09.

3.7.2 Site Investigations

The purpose of the site investigations was to:

- Ground truth the results of the records review to identify any required corrections;
- Determine whether any additional water bodies exist, other than those identified in the records review; and
- Identify the boundaries of any water body located within 120 m of the updated Project Location.

Site investigations were conducted at areas of expected Project component crossing, encroachment or access and provided information crucial to further assessment. Through the site investigations, it was determined that several water bodies are within 120 m of the Project Location. Existing fish community data was reviewed and a general habitat assessment was conducted to identify areas of direct and indirect fish habitat.

3.7.3 Potential Effects

Excavations, grading and other construction activity in the vicinity of water courses could affect the quality of stormwater runoff. Crossings of intermittent or permanent water courses would entail the installation of culverts, sized to meet flow conditions. Power cables and data cables would also be required to cross water courses both at the turbine sites and along the municipal road allowances. The *Water Assessment and Water Bodies Reports* provide details of the Project components which are within 120 m of a water body, their potential effects and mitigation measures to minimize effects.

The potential for effects on watercourses during operations exists from soil erosion, which in turn results from unavoidable removal of stabilizing vegetative cover during maintenance activities. Erosion can cause downstream sediment transport and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. Due to the Project Location's rural and agricultural land uses, the watercourses are not highly sensitive to temporary disturbances. However, the magnitude and duration of potential effects to watercourses depend on the specific characteristics of each watercourse (e.g., flow regime, water velocity, bed substrates, bank conditions, local soils and the extent and duration of exposure). Some materials, such as fuel, lubricating oils and other fluids associated with turbine maintenance and/or the septic system, also have the potential for release to the environment in the event of accidental spills.

The presence of Juvenile Coho Salmon and year of young (YOY) Rainbow Trout in Kerry's Creek suggest that salmonid spawning and/or rearing habitat is present in the vicinity of the Project Location at the proposed sites of turbines 252 and 373. Since no in-water work is

proposed at these locations, it is very unlikely that any long-term negative impacts will occur given the implementation of the standard mitigation measures outlined below and in the *Water Bodies Report*. Given the sensitive nature of the habitat located within 120 m of the Project Location, it is possible that any silt/sediment releases or construction-related activities noted in the *Water Bodies Report* could impact the spawning and/or rearing habitat that is likely present.

Turbine access roads cross several water bodies, and in some cases, crane paths and underground collector lines are associated with the access roads. Culverts installed for the Project would be designed and installed in a manner that would not impede fish movement or water passage and, where possible, habitat enhancement measures would be incorporated into the design.

3.7.4 Mitigation and Monitoring Measures

The following general mitigation measures will be applied to the Project as a whole to minimize adverse environmental effects. The mitigation measures would be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on a regular basis, prior to and after runoff events as appropriate. Any accumulated materials would be cleaned out during maintenance.

Erosion and sedimentation control measures would contain excavated soils on site and prevent construction related sediment from entering watercourses. Disturbed areas would be re-vegetated as soon as conditions allow to prevent erosion and to restore habitat functions. Land based mitigation measures would not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures). This method would provide adequate erosion protection to disturbed work areas.

The grade or slope of the working areas that would be disturbed during the construction phase would determine the amount and complexity of the mitigative measures required to ensure adequate erosion and sediment control. Generally erosion and sediment control measures would include the application of structures such as:

- Runoff Controls – diversion berms, cross trenches, chutes, check dams, interceptor swales;
- Erosion Control – diversion ditch and dispersion aprons, gravel sheeting, mulch, erosion control blankets; and
- Sediment Control – sediment fence, straw bale barriers, filter berms, sediment traps, settling ponds.

Timing windows for any in-water work would be determined through consultation with the MNR.

As appropriate, the Construction Contractor (or designate) would be on-site during installation of watercourse crossings to ensure compliance with specifications and site plans. To minimize the risk of slope failure and siltation, vegetation removal on the slopes of watercourses would be minimized to the greatest extent possible. Stream banks (i.e., the area between erosion control

fences) would not be disturbed until necessary for maintenance activities. Materials removed or stockpiled (e.g., excavated soil, backfill material, etc.) would be deposited and contained to ensure sediment does not enter a watercourse.

As soon as possible, following completion of the maintenance activity, stream banks would be restored to their original grade.

To ensure impacts do not occur to the sensitive salmonid spawning and/or rearing habitat in Kerry's Creek near T252 and T373, Increased frequency of construction monitoring (at least twice per week) and post-construction monitoring (at least once a month) is recommended. Installation of a second row of silt/sediment control fencing along edge of Project Location facing water body is also recommended. It is expected that implementation of the site-specific mitigation measures listed above will prevent negative impacts to fish or fish habitat.

In the event of a spill or leak, appropriate remedial measures must be completed and additional follow-up monitoring conducted as appropriate and as discussed with the MOE (Spills Action Centre) as well as the MVCA. The level of monitoring and reporting is typically based on the severity of the spill/leak and must be discussed with the MOE.

3.7.5 Conclusions

With the application of proposed mitigation measures only minor and spatially and temporarily limited net effects are anticipated to water bodies and fish habitats.

3.8 Heritage Assessment Reports

A *Built Heritage and Cultural Heritage Landscape Assessment* was undertaken for the Project, to meet the O. Reg. 359/09 requirements for a Heritage Assessment and a Protected Properties Assessment. The *Built Heritage and Cultural Heritage Landscape Assessment* was completed and submitted to the Ministry of Tourism, Culture and Sport (MTCS), who provided written comments. A subsequent addendum to the report was prepared to address changes to the Project layout and was submitted to the MTCS, who indicated the layout changes did not affect the comments the MTCS had previously provided.

3.8.1 Methodology

The heritage property assessment involved archival research and visual assessment of potentially significant built heritage resources and potential components of cultural heritage landscapes in the vicinity of the Project Location. A visual survey was conducted on December 2, 6, and 21, 2010 and on June 21, 2011 to survey existing buildings, outbuildings or other built heritage remains.

3.8.2 Protected Properties, Built Heritage Resources, and Cultural Heritage Landscapes

The *Built Heritage and Cultural Landscape Assessment Report* determined that:

- No protected properties as defined by O. Reg. 359/09 are located near the Project Location.
- Built heritage resources are located in the vicinity of the Project Location, and include 3 barns, 1 commercial building, 4 churches, 7 schools, and 43 dwellings.
- 15 cultural heritage landscapes were identified in the vicinity of the Project Location, including 10 cemeteries.

3.8.3 Potential Effects

Visual effects of the turbines would occur to some of the properties and some visual effects have already occurred as a result of other wind farms in the area. Visual impacts will also result from installation of the transformer station and substation. These effects are not considered to have a permanent, negative impact on cultural heritage properties.

The *Built Heritage and Cultural Heritage Landscape Assessment* identified one site with cultural heritage value or interest, Landscape L09, the former site of the Port Albert Air Navigation School. At the time the report was written (February 2012) T224 and T229, and the associated access road and collector lines were in the vicinity of L09. With changes to the proposed Project infrastructure in this area, there is no longer proposed Project infrastructure at this location. The addendum to the *Built Heritage and Cultural Heritage Landscape Assessment* (June 2012) notes the lack of impact on any heritage resources.

3.8.4 Mitigation Measures

Mitigation measures to minimize potential effects from visual disturbances during operation of the facility would be implemented. In particular, the visual impact of the substation to cultural heritage resources would be minimized with appropriate landscape design such as massing and screening. Other more structural solutions are not necessary and would bring added and unnecessary change to the visual character of agricultural land use.

Mapping and surface survey of the Port Albert Air Navigation School lands was recommended as part of the Stage 2 Archaeological Assessment for the Project to mitigate impacts to this cultural landscape, as artefacts and cultural features may be encountered during this assessment. A Stage 2 Archaeological Assessment was conducted at this site and no artefacts were discovered.

3.8.5 Conclusions

Use of appropriate landscape design will result in minimal effects to protected properties, built heritage resources, and cultural heritage landscapes.

3.9 Stages 1 and 2 Archaeological Assessment Reports

In accordance with O. Reg. 359/09, a *Stage 1 Archaeological Assessment* and a *Stage 2 Archaeological Assessment* were completed for the Project. The reports were completed and submitted to the MTCS, who provided written comments. Several subsequent addenda to the

Stage 2 Archaeological Assessment have been prepared to address changes to the Project layout and have been submitted to the MTCS for comment. The following provides a summary of the potential effects and the associated mitigation measures as described in those reports. The locations of archaeological sites are sensitive information, and therefore mapping of these locations has been omitted from Project documentation to ensure the safety of the sites.

The *Stage 2 Archaeological Assessment* and associated addenda indicate that the potential for the presence of archaeological sites within the proposed construction areas would be low. Where required, a Stage 3 and 4 archaeological investigations will be conducted prior to construction of the Project.

Although the Project Location contains multiple hamlets and villages, which have altered the landscape, the majority of the lands are still under agricultural production.

3.9.1 Potential Effects

Given the results of the *Stage 2 Archaeological Assessment* and associated addenda, there is a low probability that archaeological resources would be excavated during the operation phase of the Project. Therefore, no potential effects are anticipated to archaeological resources during operation.

Although the previous studies indicated that the potential for the presence of archaeological sites within the areas of the proposed turbines and associated power lines would be low, there is potential to discover artefacts during the construction stage.

3.9.2 Mitigation Measures

General mitigation measures and best management practices will be implemented during construction. The buildable area would be well delineated with stakes and flagging so that no construction occurs outside of the assessed area.

The following steps would be taken by the Construction Contractor should archaeological materials be encountered during excavation and construction activities:

a) Construction/excavation activities in the vicinity of the find would be stopped immediately;
b) The Site Engineer and Construction Manager would be advised by the Construction Contractor;
c) A licensed archaeologist would be called in to investigate the find;
d) If the find is significant and warrants further investigation, the MTCS must be notified and activities in that area cannot resume until the site is cleared by the MTCS;
e) If the find is significant, local Aboriginal communities would be contacted; and
f) If human remains are identified the MTCS and Cemeteries Branch of the Ministry of Small Business and Consumer Services must be notified immediately and all work must stop until the area is cleared by the Cemeteries Registrar.