AMHERST ISLAND WIND ENERGY PROJECT
DESIGN AND OPERATIONS REPORT

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Prepared for:

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1.0 Introduction

1.1 PROJECT OVERVIEW

Windlectric Inc. (the Proponent or Windlectric) is proposing to develop, construct, and operate the 56 - 75 megawatt (MW) Amherst Island Wind Energy Project (the Project) within Loyalist Township (the Township) in the County of Lennox and Addington (the County) in eastern Ontario, in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province.

The basic components of the proposed Project include up to 36 Siemens wind turbines. The turbine model proposed utilizes the same 36 turbine pad locations that have been subject to the assessment required under the Renewable Energy Approval (REA). The layout includes 24 Siemens SWT-2.3-113 2300 kW and twelve (12) Siemens SWT-2.3-113 2221 kW model wind turbines. The final layout will result in a total installed nameplate capacity of approximately 56 - 75 MW. The number of wind turbines will be dependent upon final selection of the model of the wind turbine most appropriate to the proposed Project.

The proposed Project will also include a 34.5 kilovolt (kV) underground and/or overhead electrical power line collector system, fibre optic data lines from each turbine and/or wireless technology for the communication of data, a transmission line, truck turnaround areas, a submarine cable, an operations and maintenance building, permanent dock, a substation, a switching station, an unserviced storage shed, one connection point to the existing electrical system, cable vault areas, meteorological tower(s) (met tower(s)), access road(s) to the met tower site(s), and turbine access roads with culvert installations, as required, at associated watercourse crossings.

Temporary components during construction may include staging areas for the turbines, access roads, met tower(s), collector line and transmission line as well as staging areas, crane paths, a temporary dock, site office(s), batch plant, central staging areas, and associated watercourse crossings. The electrical power line collector system would transport the electricity generated from each turbine to the substation, along the submarine cable to the mainland and then to a switching station located near to an existing Hydro One Networks Inc. (HONI) 115 kV transmission line.

The Proponent has elected to assess and seek approval for some alternative Project configurations. The REA application process will consider:

- two alternative mainland transmission line routes;
- two alternative switching station locations and corresponding point of common coupling with the HONI line;

- three alternative mainland temporary dock locations along the mainland;
- a submarine cable with three alternative submarine cable routes near the mainland;
- three alternative mainland submarine cable landing locations and corresponding cable vault locations;
- up to three alternative met tower locations; and,
- up to three potential locations for an operations and maintenance building.

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.

Windlectric has retained Stantec Consulting Ltd. (Stantec) to prepare a Renewable Energy Approval (REA) application, as required under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the Act of the *Environmental Protection Act* (O. Reg. 359/09). According to subsection 6(3) of O. Reg. 359/09, this Project is classified as a Class 4 Wind Facility. The *Draft Design and Operations Report* is one component of the REA application for the Project, and has been prepared in accordance with O. Reg. 359/09, and the Ministry of the Environments' (MOE) *Technical Guide to Renewable Energy Approvals* (MOE 2011).

1.2 REPORT REQUIREMENTS

The purpose of the *Draft Design and Operations Report* is to provide the public, Aboriginal communities, municipalities, and regulatory agencies with an understanding of the design and operations components of the proposed.

The *Draft Design and Operations Report* has been prepared in accordance with Table 1 of O. Reg. 359/09 and the Ministry of the Environment's (MOE's) guidance document *Technical Guide to Renewable Energy Approvals.*

The following table summarizes the documentation requirements as specified under O. Reg. 359/09:

Table 1.1: Design and Operations Report Requirements (as per O. Reg. 359/09 – Table 1)

Requirements	Section Reference
1. Set out a site plan of the project location at which the renewable energy project will be engaged in, including,	
i. one or more maps or diagrams of,	
A. all buildings, structures, roads, utility corridors, rights of way and easements required in respect of the renewable energy generation facility and situated within 300 m of the facility,	Appendix A
B. any ground water and surface water supplies used at the facility,	N/A
C. any things from which contaminants are discharged into the air,	N/A

Table 1.1: Design and Operations Report Requirements (as per O. Reg. 359/09 – Table 1)

Requirements	Section Reference
D. any works for the collection, transmission, treatment and disposal of sewage,	4.7
E. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	4.5.1
F. the project location in relation to any of the following within 125 m: the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Conservation Plan, the area of the Niagara Escarpment Plan, the Protected Countryside, the Lake Simcoe watershed, and	Appendix A
G. any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility,	Appendix B
ii. a description of each item diagrammed under subparagraph i,	3.0
iii. one or more maps or diagrams of land contours, surface water drainage and any of the following, if they have been identified in complying with this Regulation: properties described in Column 1 of the Table to section 19, heritage resources, archaeological resources, water bodies, significant or provincially significant natural features and any other natural features identified in the Protected Countryside or in the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Plan.	Attachment A, NHA/EIS, and Protected Properties Assessment, Built Heritage Assessment, and the Stage 1, Stage 2 and Marine Archaeological Assessments
iv. a description, map or diagram of the distance between the base of any wind turbines and any public road rights of way or railway rights of way that are within a distance equivalent to the length of any blades of the wind turbine, plus 10 metres,	Appendix A
v. a description, map or diagram of the distance between the base of any wind turbines and all boundaries of the parcel of land on which the wind turbine is constructed, installed or expanded within a distance equivalent to the height of the wind turbine, excluding the length of any blades,	Appendix A
vi. a description, map or diagram of the distance between the base of each wind turbine and the nearest noise receptor	Appendix A
2. Set out conceptual plans, specifications and descriptions related to the design of the renewable energy generation facility, including a description of,	
i. any works for the collection, transmission, treatment and disposal of sewage, including details of any sediment control features and storm water management facilities,	4.7 and 4.8
ii. any things from which contaminants are discharged into the air,	4.5.2
iii. any systems, facilities and equipment for receiving, handling, storing and processing any waste, biomass, source separated organics, farm material and biogas, and	N/A
iv. if the facility includes a transformer substation, the works, facilities and equipment for secondary spill containment.	4.2
3. Set out conceptual plans, specifications and descriptions related to the operation of the renewable energy generation facility, including,	
i. in respect of any water takings,	N/A

Table 1.1: Design and Operations Report Requirements (as per O. Reg. 359/09 – Table 1)

Requirements	Section Reference
A. a description of the time period and duration of water takings expected to be associated with the operation of the facility,	N/A
B. a description of the expected water takings, including rates, amounts and an assessment of the availability of water to meet the expected demand, and	N/A
C. an assessment of and documentation showing the potential for the facility to interfere with existing uses of the water expected to be taken,	4.6
ii. a description of the expected quantity of sewage produced and the expected quality of that sewage at the project location and the manner in which it will be disposed of, including details of any sediment control features and storm water management facilities,	4.7
iii. a description of any expected concentration of air contaminants discharged from the facility,	4.5.2
iv. in respect of any biomass, source separated organics and farm material at the facility,	N/A
A. the maximum daily quantity that will be accepted,	N/A
B. the estimated annual average quantity that will be accepted,	N/A
C. the estimated average time that it will remain at the facility, and	N/A
D. the estimated average rate at which it will be used, and	N/A
v. in respect of any waste generated as a result of processes at the project location, the management and disposal of such waste, including,	
A. the expected types of waste to be generated,	4.5.1
B. the estimated annual average quantity that will be accepted,	4.5.1
C. the estimated average time that it will remain at the facility, and	4.5.1
D. the estimated average rate at which it will be used.	4.5.1
vi. if the facility includes a transformer substation,	
A. a description of the processes in place to prevent spills,	4.10
B. a description of the processes to prevent, eliminate or ameliorate any adverse effects in the event of a spill, and	4.10
C. a description of the processes to restore the natural environment in the event of a spill.	4.10
4. Include an environmental effects monitoring plan in respect of any negative environmental effects that may result from engaging in the renewable energy project, setting out,	
i. performance objectives in respect of the negative environmental effects,	Appendix C
ii. mitigation measures to assist in achieving the performance objectives mentioned in subparagraph i,	Appendix C
iii. a program for monitoring negative environmental effects for the duration of the time that the project is engaged in, including a contingency plan to be implemented if any	Appendix C

Table 1.1: Design and Operations Report Requirements (as per O. Reg. 359/09 – Table 1)

Requirements	Section Reference
mitigation measures fail.	
5. Include a response plan setting out a description of the actions to be taken while engaging in the renewable energy project to inform the public, aboriginal communities and municipalities, local roads boards and Local Services Boards with respect to the project, including,	
i. measures to provide information regarding the activities occurring at the project location, including emergencies,	7.0
ii. means by which persons responsible for engaging in the project may be contacted, and	7.0
iii. means by which correspondence directed to the persons responsible for engaging in the project will be recorded and addressed.	7.0
6. If the project location is in the Lake Simcoe watershed, a description of whether the project requires alteration of the shore of Lake Simcoe, the shore of a fresh water estuary of a stream connected to Lake Simcoe or other lakes or any permanent or intermittent stream and,	
i. how the project may impact any shoreline, including the ecological functions of the shoreline, and	N/A
ii. how the project will be engaged in to,	N/A
A. maintain the natural contour of the shoreline through the implementation of natural shoreline treatments, such as planting of natural vegetation and bioengineering, and	N/A
B. use a vegetative riparian area, unless the project location is used for agricultural purposes and will continue to be used for such purposes.	N/A
7. If it is determined that the project location is not on a property described in Column 1 of the Table to section 19, provide a summary of the matters addressed in making the determination.	Appendix C, Draft Built Heritage Assessment
8. If section 20 applies in respect of the project and it is determined that the project location does not meet one of the descriptions set out in subsection 20 (2) or that the project location is not in an area described in subsection 20 (3), provide a summary of the matters addressed in making the determination.	
9. If subsection 21 (3) or 23 (2) applies, provide a summary of the matters addressed in making the determination,	Appendix C, and the Stage 1, Stage 2 and Marine Archaeological Assessments
i. under subsection 21 (3) or clause 23 (2) (a), as the case may be, including a copy of the document completed under the applicable provision, and	Appendix C, Draft Built Heritage Assessment
ii. under clause 23 (3)(b), if applicable.	Appendix C, Draft Built Heritage Assessment

2.0 Site Plan

2.1 SITE PLAN MAPPING AND DESCRIPTIONS

The Site Plan information is provided in **Appendix A**.

The Site Plan provides the following information:

- Facility components, including: turbine locations, underground/overhead collector lines/fibre optic cabling, a transmission line, truck turnaround areas, a submarine cable, an operations and maintenance building, permanent dock, a substation, a switching station, an un-serviced storage shed, one connection point to the existing electrical system, cable vault areas, meteorological tower(s), access road(s) to the met tower site(s), and turbine access roads with culvert installations, as required, at associated watercourse crossings
- Project Location: the outer limit of all components of the Project, including temporary work areas during construction. The Project Location is used for defining setback and site investigation distances.
- Roads, utility corridors, road allowances, and easements within 300 m of the Project Location.
- Location of property lines.
- Location of heritage resources within 125 m of the Project Location.
- Cultural and natural features including topographic contours, surface water drainage, heritage and archaeological resources, and natural features and water bodies.
- Noise receptors (non-participating and vacant lots). These features are illustrated within the Draft Noise Assessment Report (Appendix B). Additionally, setbacks to noise receptors and associated noise calculation tables are provided within Appendix B.
- Visual representation of setback buffer areas from the Project Location to heritage resources, water bodies and significant or provincially significant natural features.

2.2 SETBACK DISTANCES

O. Reg. 359/09 provides setback distances between the Project Location and:

- Significant and provincially significant natural features (120 m; 50 m for Earth Science Areas of Natural & Scientific Interest (ANSI));
- Provincial parks and conservation reserves (120 m); and
- REA defined water bodies (120 m).

O. Reg.359/09 also provides setback distances between wind turbine base and:

- Property lines (hub height);
- Public road right-of-ways (blade length plus 10 m);
- Railway right-of-ways (blade length plus 10 m); and
- Noise receptors (minimum 550 m).

Visual representation of the setback distances are illustrated on the Site Plan (**Appendix A**) and within the *Draft Noise Assessment Report* (**Appendix B**). Within O. Reg. 359/09, there are some setbacks 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 proposed 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.

The substation has been assessed as part of the *Draft Noise Assessment Report* (**Appendix B**) and thus setbacks do not apply. In addition, a sound attenuation wall will be built around three sides of the substation transformer to minimize the escape of transformer noise into the surrounding environment.

3.0 Facility Design Plan

This section provides a description of the key facility design components identified on the Site Plan (**Appendix A**). A detailed description of each Project component is provided in the *Draft Project Description Report.*

3.1 WIND TURBINE GENERATORS

The proposed Project will include 24 Siemens SWT-2.3-113 2300 kW and twelve (12) Siemens SWT-2.3-113 2221 kW model wind turbines. (**Appendix A)**.

Detailed information about the turbine model is provided in the *Draft Wind Turbine Specifications Report.*

Transport Canada, NAV Canada, Department of Defense, and the Kingston Airport were contacted during the development of the site plan to ensure that the locations of the turbines would not present any aviation hazards.

Lighting of turbines would be in accordance with Transport Canada Regulations.

3.2 TURBINE FOUNDATIONS

During the operation of the turbines the majority of the foundation will be covered with top soil, except for a gravelled collar (approximately 3m to 5m) surrounding each turbine, enabling the landowner to continue to utilize the land as prior to construction and operation of the wind farm.

3.3 CRANE PADS

A gravel area (crane pad) adjacent to each turbine will be approximately 25 m x 60 m, to allow for crane redeployment should a major maintenance event occur.

3.4 ACCESS ROADS

Access roads are required for operation of the Project components including wind turbines, met tower(s), operations and maintenance building, substation, temporary and permanent dock and switching station.

Access roads will be approximately 4 - 6 metres wide and will not require resizing for the operation phase, with the exception of the entrances off the Township or County roads that require wider turning radii, of approximately 10-15 m, during operations.

Some access roads require turnaround areas for delivery trucks. These turnaround areas will be the same width as access roads, with turning radii.

If required, during operations, access roads, turning radii and entrances off the Township or County roads may be reinstalled as per the *Draft Construction Plan Report*.

3.5 WATER CROSSINGS

Permanent culvert installations would be required along access roads and associated underground collector and data lines that cross watercourses. All crossings would require permit approval from the Cataraqui Region Conservation Authority (CRCA) and/or the Department of Fisheries and Oceans (DFO).

Culverts required for any water crossings are described in the *Draft Water Assessment and Water Body Report*.

3.6 ELECTRICAL INFRASTRUCTURE

3.6.1 Turbine Transformers and Collector system

A pad mount transformer, located on the ground adjacent to the tower of each wind turbine, is required to transform the electricity created in the nacelle to the collection system voltage (i.e. 690 V to 34.5 kV).

A 690 V cable runs down the turbine tower to the pad mount transformer. From the pad mount transformer, underground and/or overhead 34.5 kV collector lines will carry the electricity to the municipal road allowances following the turbine access roads or, along the most direct path possible between two turbines (i.e. across a field), to the substation.

All proposed collector lines on private property have been routed on lands under contract with the Proponent. Where possible, the underground and/or overhead collector lines have been incorporated into the design of the access roads to reduce the area required for construction and minimize the potential construction impacts. Junction boxes are required at the junction of an underground collector line going from private land to the public road allowance.

Some sections of the collector system may have to be installed above ground if required to pass sensitive natural features or other obstacles.

Data cabling, if installed, would run with the collector lines, both above and below grade.

3.7 SUBSTATION

Associated with the Project will be a substation. At the substation, the accumulated power from the collector lines will be transformed from a 34.5 kV collection voltage to a 115 kV transmission voltage. The substation will be located on private land on the north side of 2nd Concession Road between Stella 40 Foot Road and Dump Road. A chain link safety fence, with barbed

wire top section, will enclose the substation. A locked vehicle gate will allow for maintenance access.

The substation will house the switching, control, protection, communication and metering systems required to support the operation of the substation. The substation will include one (1) 34.5/115 kV transformers.

A sound attenuation wall will be built at the substation transformer. The barrier will be continuous and its surface density will be 184 kg/m^2, exceeding the 20-kg/m^2 requirement established by MOE and further described in the *Draft Noise Assessment Report*.

An access road for the substation will be constructed from 2nd Concession Road.

The substation will be operated, monitored and controlled 24-hours a day via a telecommunication system.

3.8 TRANSMISSION LINE

The 115 kV (nominal) transmission line connecting the substation to the HONI electrical grid can be broken into three distinct geographic sections:

1. Amherst Island: approximately1.5 km of overhead line to connect the substation with the submarine cable.

2. Lake Ontario: approximately 4.5 km of submarine cable to connect Amherst Island to the mainland.

3. Mainland: there are currently two options for the transmission line route on the mainland.

There are currently two options for the mainland transmission line route.

Mainland Transmission Line Option 1 the transmission line would be comprised of approximately 0.7 km of underground or overhead line, across Highway 33 (in consultation with the Ministry of Transportation (MTO), to a switching station located near the Invista Transformer Station, where it will be connected to the to an existing HONI 115 kV transmission line (Q6S) which currently connects to the Invista Transformer Station. In order to connect to the HONI QS6, three (3) new wooden poles will be installed by HONI within their approved right of way.

Mainland Transmission Line Option 2 the transmission line would be comprised of an approximately 1.7 km underground or overhead line from the cable vault, across Highway 33, along the east side or west side of Jim Snow Drive, to a switching station located north east of the intersection of Jim Snow Drive and Taylor Kidd Blvd, along the north side of Taylor Kidd Blvd. where it will connect to the HONI Q6S. Consultation with the MTO and the County will be

required for the placement of the line. In order to connect to the HONI QS6, three (3) new wooden poles will be installed by HONI within their approved right of way.

A conceptual drawing of the cable termination on the mainland is shown in *Draft Project Description Report.*

The land-based transmission line on Amherst Island will be constructed as an overhead or underground line. If required, a 115 kV riser will be installed to transition from the overhead line to the submarine cable. A conceptual drawing of the submarine cable termination on Amherst Island is shown in *Draft Project Description Report*.

The Township will be kept informed with respect to the final design of a 115 kV cable risers.

3.9 SUBMARINE CABLE

A submarine cable is required to convey electricity from Amherst Island to the mainland.

Specifications (final specifications subject to final manufacturer)

- Voltage: 115kV (nominal)
- Material: galvanized steel armour cable (crosslinkable polyethylene (XLPE) insulation)
- Diameter: 170mm ± 20mm
- Conduit: High-density polyethylene (HDPE) schedule 40 and diameter is 14” ± 2”

The submarine cable will be protected by electrical protection relays and high voltage circuit breakers, as well as remote teleprotection to HONI’s system. A cross section of a submarine cable is shown in the *Draft Project Description Report*

The submarine cable will also contain a fibre optic data cable to facilitate supervisory control and data acquisition (SCADA) and protection requirements.

The submarine cable will extend from the landfall location on Amherst Island, approximately 750 m west of Stella, to a landfall near the intersection of Jim Snow Drive and Bath Road on the mainland. Three landfall locations on the mainland are being considered as part of this REA application. Only one option will be constructed and used as part of the Project.

The three submarine cable landfall locations being considered on the mainland are:

1. South of Jim Snow Drive
2. South of the Invista Transformer Station
3. Approximately 300 m west of Option 2.

The submarine cable will connect directly to the overhead or underground cable on Amherst Island and the underground or overhead cable on the mainland with splices located in concrete cable vaults approximately 50 m inland from both shorelines. A conceptual drawing of the cable vaults is shown in the *Draft Project Description Report.*

To facilitate the installation of the submarine cable and to provide an additional level of protection, Windlectric is proposing to utilize a protective cable technology (such as steel armouring or a protective conduit) at the two landings. The use of armouring or conduits could require trenching near the shoreline. The submarine cable will be laid to avoid any water intakes. The two submarine cable ends (island side and mainland side) would be pulled through or trenched into the buried concrete cable vaults.

Nearshore survey work at the landfall locations has been completed to confirm the location of existing utilities and the geophysical characteristics of the lake bottom that will be encountered when installing the conduits.

Windlectric has and will continue, to consult with DFO, as required, to ensure compliance with DFO's *Operational Statement for Underwater Cables*.

The proposed route of the submarine cable crosses the existing MTO air bubbler system, which is used for ice control on the water surface, to allow for the Amherst Island Ferry to travel between the mainland and the island during the winter months. Windlectric has, and will continue, to consult with MTO, as required, to determine an approach for crossing the Amherst Island Ferry bubbler system.

3.10 SWITCHING STATION

Associated with the proposed Project will be a switching station where the electrical infrastructure will be connected to the existing HONI QS6. The switching station will consist of a prepared area of approximately 2500 m^2 in size and will be located on private land.

As discussed in Section 3.4.3 there are currently two options for the mainland transmission line route. Each option requires a switching station.

For *Mainland Transmission Line Option 1* the switching station would be located near the Invista Transformer Station. A conceptual drawing of the switching station on the Invista property is shown in the *Draft Project Description Report.*

For *Mainland Transmission Line Option 2* the switching station would be located north east of the intersection of Jim Snow Drive and Taylor Kidd Blvd. A conceptual drawing of the switching station is shown in the *Draft Project Description Report.*

3.11 ISLAND DOCK

As part of the proposed Project, a permanent docking facility is required on Amherst Island to meet shipping and construction requirements. The dock structure has to accommodate large barges and be capable of handling heavy items associated with the construction of the proposed Project. The dock will be located approximately 750 m west of Stella.

The dock types under consideration are as follows (note: the labeled designations below correspond to conceptual design nomenclature information that was submitted to the DFO:

1. Dock Type Option 2 - Steel frame on rock lake bottom (posts) with concrete slab decking. Requires a concrete abutment.

2. Option 2A – Drive piles into lake bottom and level at pile caps. Platform (decking) constructed of a light steel frame or concrete slabs on the piles. Requires a concrete abutment.

3. Option 3 – Drive piles into lake bottom and level at pile caps. Platform is concrete slabs with sides and bottom that is back-filled with gravel. Requires a concrete abutment.

All of the above options include a length of fixed dock of approximately 30 m by 7 m in size [+/- 50%], with a single jack-up barge, of approximately 20 m by 12 m in size [+/- 50%], on the off-shore end that is adjustable due to water levels changes. Total area (above the water) for the dock including the jack-up barge is 450 m2 [+/- 50%].

The dock design, and construction will be completed in consultation with the DFO, as required, to ensure compliance with their *Operational Statement (OS) for Dock and Boathouse Construction*. A conceptual drawing of the island dock is shown in the *Draft Project Description Report.*

3.12 OPERATIONS AND MAINTENANCE BUILDING

An operations and maintenance building will be required on the island to facilitate the day-to-day operations of the Project. The building footprint is approximately 1100 m^2 while the basic dimensions of the building would be approximately 30 m x 60 m. The footprint for the entire yard for the building is approximately 4900 m^2.

The building will be located on private land and have space for parking and on-site storage. The building will include office space, warehouse and workshop space, kitchen, and restrooms. It would also include areas for storage of equipment and spare parts, and would have a secure area for hazardous materials and lubricant storage.

The operations and maintenance building yard may include a chain link fence. The proposed layout for the operations and maintenance building is shown in the *Draft Project Description Report*.

Several locations are being considered for the location of the operations and maintenance building. Only one location will be used as part of the Project.

The wind farm will be operated, monitored and controlled 24-hours a day. To facilitate this monitoring, fibre optic data cable and/or wireless technology would be used. If data cabling is used it will be installed in conjunction with the collector line system, from each wind turbine to the substation and then to the operations and maintenance building.

An underground septic tank (capacity of 10,000L) and aboveground non-potable water tank (capacity of 10,000L) would service the operations and maintenance building. The final design of the septic system would conform to local building code and health unit requirements.

No groundwater or surface water supplies are anticipated to be used for the facility. Above ground water tanks for non-potable and potable water will be installed. It is expected that water will be used to hose down the floor or the workshop. A sump/drainage pit will collect the residues and drain to the septic system.

Electrical power for the operations and maintenance building will be delivered by an overhead HONI line, which will terminate on a transformer pole adjacent to the facility. The transformer will step down the power supply to a voltage that can be utilized within the operations and maintenance building. The final connection of the power will be made through underground cable from the transformer pole to the building electrical service located within the building.

3.13 STORAGE SHED

An unserviced storage shed will be situated across Art McGinns Road from S17 and S10. The building will measure approximately 6 m x 8 m, situated on a gravel base area of approximately 7m x 9 m base, and is anticipated to be a prefabricated engineered structure with a concrete foundation that will extend below the frost line. The building will house equipment and spare parts to be used during construction and operations of the Project.

3.14 MET TOWER

1-3 permanent met towers would be installed for use during the operation phase of the Project. The met towers would be a steel lattice structure 60 or 100 m high.

The tower foundation design is dependent on ground conditions and is typically a steel reinforced concrete-filled pedestal foundation. The towers will either be freestanding supported entirely by the foundation or would have guy wires for lateral support anchored with reinforced buried concrete. The 100 m met tower foundation will be approximately 5 m x 5 m, and its

associated anchor blocks (if required) will be approximately 2 m x 2 m. The 60 m met tower will be approximately 1 m x 1 m, and its associated anchor blocks (if required) will be approximately 1 m x 1 m.

The met tower(s) will carry instrumentation for collecting wind data to support operation of the Project. Power and data cabling for the met tower(s) would be trenched in from the nearest collector line system.

Windlectric has a 60 m re-instrumented tubular guyed met tower which was installed in 2005. This met tower has been used to identify the quality of wind resource for the proposed Project. The wind data collected will be used to determine the best orientation of the wind turbines. This tower is a prospecting tower and may be removed upon reaching commercial operation.

The lighting requirements will depend on location and requirements of Navigation Canada and Transport Canada regulations. The permanent meteorological equipment will remain for the duration of the Project.

4.0 Facility Operations Plan

Operation activities include daily monitoring of the wind turbines, operation of the operations and maintenance building, maintenance activities, and monitoring of meteorological data.

4.1 SITE SUPERVISION

Windlectric may hire a specialized operations and maintenance contractor to carry out various on-going activities, including daily operations and maintenance, associated with the Project. Additional staff will be brought in on an as needed basis to support the maintenance activities required for the Project. It would be expected that approximately 4-6 personnel would be required for Project operations.

4.2 MAINTENANCE PROGRAM

During pre-operational mobilization, Windlectric and/or the operations and maintenance contractor would develop an operations and maintenance program. The program would be designed to ensure compliance with any applicable municipal, provincial, and/or federal requirements. As appropriate, the program would cover staff training, predictive/preventive maintenance, routine maintenance, unscheduled maintenance (including appropriate environmental mitigation measures), annual overhauling, inspection of equipment and components, and procurement of spare parts. It would also include a schedule for regular inspections of the Project's facilities.

The maintenance of the turbines would be the responsibility of Windlectric and/or the operations and maintenance contractor. The maintenance staff would be able to monitor the performance of all turbines on-line in real time basis. Monitoring of the turbines would occur 24 hours a day/7 days a week within the operations and maintenance building and remotely. The on-line system would identify any potential problems so that pro-active inspection and maintenance can be undertaken. Potentially damaged turbines would be shut down until maintenance staff can perform a site inspection. Regular maintenance of Project equipment would be a key method of mitigating potential effects such as equipment failure. Scheduled maintenance will likely cover the following:

- Visual inspection;
- Inspection of mechanical components, stormwater management, high voltage systems;
- Inspection of electrical components; and
- Greasing and general maintenance.

Although the exact oil and grease requirements for the wind component of the Project are not known at this time, oil changes will be completed in accordance with oil analysis recommendations. The amount of oil and grease stored on site would depend on availability, transportation schedules, and the service cycle. Used oil would be stored in a designated area of the operations and maintenance building, and picked up by certified contractor with the appropriate manifests in place.

If there is oil/grease detected in the transformer catch basin, the liquid would be removed from site via a licensed waste hauler and the source of the leakage would be determined and rectified.

4.3 UNSCHEDULED MAINTENANCE

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 Windlectric and/or an operations and maintenance Contractor. Other unscheduled maintenance activities will include ongoing upkeep of other Project facilities including repairs to electrical infrastructure, operations and maintenance building, snow removal, and landscaping.

4.4 MONITORING METEOROLOGICAL DATA

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. Additional data would be captured by instrumentation on the met towers. This would be relayed to the operations and maintenance building for use by the monitoring system for:

- Providing wind direction, wind shear, air temperature and barometric pressure to optimize Project performance; and
- Providing back up information should there be a problem with an individual turbine's sensors.

4.5 KEY PROCESSES FEATURES AND MITIGATION MEASURES

Key process features are those processes identified in O. Reg. 359/09 and MOE guidance documents as having specific information requirements if they occur as part of Project activities. These processes include: waste management, air emissions, water taking, wastewater management, and stormwater management. The sections below describe key process features as they relate to the proposed Project, and outline the proposed environmental protection and mitigation measures that would be implemented during Project operation.

4.5.1 Waste Management

The Project's waste management program would be designed to prevent potential effects to natural and socio-economic features associated with the improper collection, storage, and disposal of wastes.

Lubricating and hydraulic oils associated with turbine maintenance and operation would be used for the facility, and waste materials, such as oil, grease, batteries, and air filters and a minor amount of domestic waste (i.e. garbage, recycling, and organics), would be generated during standard operation and maintenance activities.

Waste materials would be temporarily stored at the operations and maintenance building and would require reuse, recycling, and/or disposal at an appropriate off-site facility. There would be no on-site disposal of waste during the operation of the facility. Used oil would be stored in a secondary containment structure until removal by a certified contractor with the appropriate manifests in place.

Hazardous materials are limited to lubricants and fluids that would be on-site for the operation and maintenance of the turbines, substation, and other equipment. These materials will be stored in appropriate storage containers during the operation phase by the operations and maintenance contractor. Designated storage areas and the type of storage areas would be confirmed by the operation contractor prior to operation. Disposal of any hazardous materials will be in accordance with regulatory requirements. There are no other known hazardous by-products of the wind energy generation process itself.

During operations, Windlectric and/or the operations and maintenance contractors would implement a site-specific waste collection and disposal management plan, which may include good site practices such as:

- Systematic collection and separation of waste materials within on-site storage areas in weather-protected areas located at the operations and maintenance building;
- Contractors would be required to remove all waste materials from the turbine siting areas during maintenance activities;
- All waste materials and recycling would be transported by private waste material collection contractors licensed with a Certificate of Approval – Waste Management System (if applicable);
- Labelling and proper storage of liquid wastes (e.g. used oil, drained hydraulic fluid, and used solvents) in a secure area that would ensure containment of the material in the event of a spill. As per s.13 of the *Environmental Protection Act*, all spills that could potentially have an adverse environmental effect, are outside the normal course of events, or are in excess of the prescribed regulatory levels would be reported to the MOE's Spills Action Centre;

- As appropriate, spill kits (e.g., containing absorbent cloths and disposal containers) would be provided on-site during maintenance activities and at the operations and maintenance building;
- Dumping or burying wastes within the Project sites would be prohibited;
- Disposal of non-hazardous waste at a registered waste disposal site(s);
- If waste is classified as waste other than solid non-hazardous, a Generator Registration Number is required from the MOE and the generator would have obligations regarding manifesting of waste. Compliance with Schedule 4 of Regulation 347 is mandatory when determining waste category; and
- Implementation of an on-going waste management program consisting of reduction, reuse, and recycling of materials.

4.5.2 Air Emissions

In accordance with s.8 of O. Reg. 419/05, air emission rate calculations and dispersion modeling do not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

Based on the preliminary facility design, the following sources of air contaminant emissions have been identified:

- Fuel combustion from on-site vehicles;
- Maintenance use of solvent-based cleaners;
- Maintenance welding activities (no dedicated fume hoods);
- Maintenance building ventilation exhausts; and,
- Batteries.

Based on the guidance given in Table B-3 of Procedure for Preparing an Emission Summary and Dispersion Modelling (ESDM) Report (Version 3, February 2009), the following facility sources are defined as sources that emit contaminants in negligible amounts:

- Small maintenance and janitorial activities;
- Maintenance welding stations; and,
- Batteries.

Therefore, as O. Reg. 419/05 does not apply to discharges of contaminants from motor vehicles and all other facility sources can be considered negligible per the information provided above, no further assessment is required.

4.6 WATER TAKING

Aboveground potable and non-potable water tanks (capacity of 10,000L) would service the operations and maintenance building. The above ground potable water tank will be replenished as required by a licensed hauler.

No groundwater or surface water supplies are anticipated to be used for the facility. It is expected that water will be used to hose down the floor or the workshop. A sump/drainage pit will collect the residues and drain to the septic system.

4.7 SEWAGE MANAGEMENT

The operations and maintenance building would contain restroom and shower facilities that would be serviced by a septic system. Based on the Ontario Building Code criteria, it is anticipated that each employee will generate 125 L of wastewater per shift with the use of showers and other common daily general usage. A conservative estimate of 20 employees was assumed to calculate total sewage generation at 2,500 L/day. An underground septic tank (capacity of 10,000L) would service the operations and maintenance building. Therefore the septic system will have a capacity of four times the required volume.

The final design of the septic system would conform to local building code and health unit requirements.

As appropriate, the contents of the septic tank will be pumped and hauled for off-site disposal by a license waste hauler. It is not anticipated that any chemical inputs will be required for the proper functioning of the septic system.

4.8 STORMWATER MANAGEMENT

The Project is not anticipated to require significant alteration to surface water runoff, or to involve the storage of surface water. As the Subject Property is of limited topographic relief, erosion of excavated materials and changes to stormwater runoff is not anticipated. If required a Stormwater Management Plan would be implemented for the substation property. The Stormwater Management Plan, will be designed in compliance with the “Stormwater Management Planning and Design Manual” (MOE, 2003) and Cataraqui Region Conservation Authority (CRCA) requirements.

4.9 EROSION AND SEDIMENTATION

Erosion and sedimentation are naturally occurring processes that involve particle detachment, sediment transport and deposition of soil particles. The erosion and sediment control plan for the Project will be compliant with the following guidelines:

- Erosion and Sediment Control practices study technical report, MOE, 1995;
- Guidelines for Evaluating Construction Activities Impacting on Water Resources, MOE, 1995; and,
- Conservation Authority Guidelines on Erosion and Sediment Control for Urban Construction Sites, 2006.

Development of Project components should not contribute to erosion and transport and deposition of suspended sediment downstream into surrounding natural areas, including watercourses (fish habitat), woodlots and wetlands as well as adjacent private lands.

4.10 ACCIDENTAL SPILLS

Some materials, such as fuel, lubricating oils and other fluids associated with turbine maintenance, transformers and/or the septic system, have the potential for discharge to the onsite environment through accidental spills. Design features to prevent and contain spills are discussed in Section 3.0.

Standard containment facilities and emergency response materials (spill kits) will be maintained on-site as required. Refuelling, equipment maintenance, and other potentially contaminating activities will occur in designated areas.

In the event of a potential discharge of fluids associated with Project operation, the operations and maintenance contractor will immediately stop work and rectify the accidental spill. Once the spill is under control the contractor will remove contaminated soil and dispose of it in accordance with the current appropriate provincial legislation, such as Ontario Regulation 347, the General – Waste Management Regulation. The Emergency Response Plan will contain procedures for spill contingency and response plans, spill response training, notification procedures, and necessary cleanup materials and equipment. As per s. 13 of the *Environmental Protection Act*, all spills that could potentially have an adverse environmental effect, are outside the normal course of events, or are in excess of prescribed regulatory levels should be reported to the MOE's Spills Action Centre.

An Emergency Response and Communications Plan would be developed by Windlectric and/or the operations and maintenance contractor and would include protocols for the proper handling of material spills and associated procedures to be undertaken in the event of a spill.

See Section 7.0 for more information on the Emergency Response and Communications Plan.

4.11 ACCIDENTS AND MALFUNCTIONS

The potential exists for full or partial blade detachment from the turbine, resulting in damage to the landing area from the impact. Garrad Hassan Canada undertook a review of publicly-available literature on turbine rotor failures resulting in full or partial blade throws (Garrad Hassan Canada, 2007). Such events were found to be very rare; therefore data describing these events are scarce.

Root causes of blade failure have been continuously addressed through developments in best practice in design, testing, manufacture and operation; much of these developments have been captured in the International Electrotechnical Commission (IEC) standards to which all current large wind turbines comply (Garrad Hassan Canada, 2007).

Turbine control systems are subjected to rigorous specification in the design standards for wind turbines (IEC 61400-1) and exhaustive analysis in the certification process. Turbines with industry certification must have a safety system completely independent of the control system. In the event of a failure of one system, the other is designed to control the rotor speed.

Lightning protection systems for wind turbines have developed significantly over the past decade and best practices have been incorporated into the industry standards to which all modern turbines must comply. This has led to a significant reduction in events where lightning causes structural damage.

Even in the rare event of a blade failure in modern turbines, it is much more likely that the damaged structure would remain attached to the turbine rather than separating (Garrad Hassan Canada, 2007). Reviews of available information did not find any recorded evidence of injury to the public as a result of turbine blade or structural failure (Garrad Hassan Canada, 2007; Chatham-Kent Public Health Unit, 2008).

Given that accidents or malfunctions of the turbines are considered to be infrequent events, and turbines would be located at least the minimum regulated setback distance from any residence, the event of a failure of the structure would likely not fall beyond the setback distance and not affect public health and safety.

The possibility also exists for accidents related to third party damage of the wind turbines. However, given the location of the turbines (set back in agricultural fields) and the structural integrity of the turbines, major structural impacts to the turbines are highly unlikely.

5.0 Potential Environmental Effects

O. Reg. 359/09 requires that any adverse environmental effects that may result from engaging in the proposed Project be described in the REA application. 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 adverse 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.

The following environmental features have been assessed as part of the REA application process:

- Heritage and Archaeological Resources;
- Natural Heritage Resources;
- Water Bodies and Aquatic Resources;
- Air, Odour, Dust;
- Environmental Noise;
- Land Use and Socio-Economic Resources;
- Provincial and Local Infrastructure; and,

  Public Health and Safety.

Mapping provided in **Appendix A** illustrates the natural environment and socio-economic features and shows the 300 m study area around the Project Location boundary.

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.

The key performance objective for each of the features noted above is avoiding and/or minimizing potential effects (through the use of appropriate mitigation measures) to the features throughout the operation phase of the Project. The proposed mitigation measures would assist in achieving this performance objective.

A summary of potential effects and mitigation strategies with corresponding performance objectives, monitoring plans and contingency measures that have been identified which may result from the operation of the Project is provided in **Appendix C**.

A description of the existing environment can be found within the *Draft Natural Heritage Assessment/Environmental Impact Study (NHA/EIS)*, *Draft Heritage Assessment*, *Draft Protected Properties Assessment*, *Draft Stage 1 and Stage 2 Archaeological Assessments*, *Draft Underwater Archaeological Assessment*, and *Draft Water Assessment and Water Body Report*.

6.0 Environmental Effects Monitoring Plan

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. Windlectric and/or the operations and maintenance contractor would be the primary party responsible for the implementation of operational effects monitoring. Implementation of these measures would be undertaken in compliance with applicable municipal, provincial, and federal standards and guidelines.

Appendix C summarizes operation-specific potential effects and mitigation measures and provides the performance objectives, monitoring plans, and contingency measures associated with these mitigation measures.

7.0 Emergency Response and Communications Plan

The following sets out a description of the actions to be taken during all Project phases to inform the public, aboriginal communities, the Township, County, leaseholders and relevant Ministries regarding activities occurring at the Project site (including emergencies), means by which stakeholders can contact Windlectric and/or the Contractor, and means by which correspondence sent to Windlectric and/or the Contractor would be recorded and addressed.

As appropriate, Windlectric and/or the Contractor would review the Emergency Response and Communications Plan prior to and during each phase of the Project.

7.1 EMERGENCY RESPONSE PLAN

Windlectric and/or the operations and maintenance contractor would develop the Emergency Response Plan for the Project and discuss it with the Township's Emergency Services Departments.

The Emergency Response Plan would include a plan for the proper handling of material spills and associated procedures to be undertaken during a spill event. The Emergency Response Plan would also specify containment and clean-up materials and their storage locations. The Emergency Response Plan would include general procedures for personnel training. As appropriate, the Emergency Response Plan may cover response actions to high winds, fire preparedness, evacuation procedures, and medical emergencies. Developing this plan with local emergency services personnel would determine the extent of emergency response resources and response actions of those involved.

The Emergency Response Plan would include key contact information for emergency service providers, a description of the chain of communications and how information would be disseminated between Windlectric and/or the operations and maintenance contractor and responders. The plan would also indicate how Windlectric and/or the operations and maintenance contractor would contact (via phone or in-person) Project stakeholders who may be directly impacted by an emergency so that the appropriate actions can be taken to protect health and safety.

7.1.1 Environmental Plans, Programs, and Procedures

As appropriate, Windlectric and/or the operations and maintenance contractor would implement the programs, plans, and procedures to prevent environmental contamination and injury to personnel. Windlectric and/ or the operations and maintenance contractor would take steps to ensure that they have appropriately skilled personnel to carry out the responsibilities as defined in this document. All organizations associated with the Project operational activities would develop responsive reporting systems that clearly assign responsibility and accountability.

During the operation of the facility, changes to operational plans may be required to address unforeseen or unexpected conditions or situations. Windlectric and/ or the operations and maintenance contractor would be responsible for ensuring environmental and safety issues are addressed for any such changes.

The following procedures may be employed during operations:

- *Environmental calendar:* to establish the specific dates and times for environmental inspections of turbines, monitoring events, and emergency notifications;
- *Spills and releases:* to identify the specific procedures for the prevention, response, and notification of spills. In addition, it will establish the general procedures for spill clean-up, personnel training, and material handling and storage to prevent spills;
- *Hazardous waste management:* to outline the procedures for proper identification, temporary storage, handling, transport, and disposal of hazardous waste; and,
- *Non-hazardous waste management:* to establish alternative procedures for the management and disposal of non-hazardous waste.
- *Personnel training:* to ensure personnel receive appropriate training in relation to operation and maintenance programs, environmental, health, and safety procedures, and the Emergency Response Plan.
- *Public Safety Plan*: measures to be implemented (such as appropriate signage near electrical equipment) to ensure local residents are protected from personal injury during operations and maintenance activities.

7.2 PROJECT UPDATES AND ACTIVITIES

During the operation of the facility, changes to operational plans may be required to address unforeseen or unexpected conditions or situations. Windlectric and/or the operations and maintenance contractor would be responsible for ensuring environmental and safety issues are addressed for any such changes. Windlectric and/ or the operations and maintenance contractor would undertake any significant changes to the Project programs, procedures and plans throughout the operation of the facility with the goal of avoiding or minimizing environmental effects.

Windlectric and/or the contractor will continue to contact Project stakeholders (public, aboriginal communities, and the Township) during the operation of the Project for as long as this seems an effective two-way channel of communication including providing Project updates on the Project website (http://amherstislandwindproject.com/). As a long-term presence in the Township, Windlectric will continue to develop contacts and to develop local relationships and channels of communication, which could benefit the local area.

In the event of an emergency, Windlectric and/or the operations and maintenance contractor will initiate the Emergency Response Plan and will directly contact (via phone or in-person) Project stakeholders who may be directly impacted so that the appropriate actions can be taken to protect stakeholders health and safety. Additional updates (non-emergency related) may be provided via letters/newsletters, newspaper notices, or direct contact.

7.3 COMMUNICATIONS AND COMPLAINT RESPONSE PROTOCOL

The following has been developed for all Project phases to address any reasonable concern from the public and would be implemented by Windlectric and/or the operations and maintenance contractor.

A telephone number for contacting Windlectric and/or the operations and maintenance contractor along with the mailing/e-mail address would be posted on the Project website (http://amherstislandwindproject.com/) and provided directly to the Township and MOE. These would be the direct contact points for Windlectric and/or the operations and maintenance contractor during all phases of the Project. The Emergency Response and Communications Plan would include key contact information for emergency service providers, a description of the chain of communications and how information would be disseminated between Windlectric and/or the operations and maintenance contractor and the relevant responders. This information would be obtained during consultations with the Township's Emergency Services Departments.

The telephone number provided for the reporting of concerns and/or complaints would be equipped with a voice message system used to record the name, address, telephone number of the complainant, time and date of the complaint along with details of the complaint. All messages would be recorded in a Complaint Response Document to maintain a record of all complaints. Windlectric and/or the operations and maintenance contractor would endeavour to respond to messages within 48 hours. All reasonable commercial efforts would be made to take appropriate action as a result of concerns as soon as practicable. The actions taken to remediate the cause of the complaint and the proposed actions to be taken to prevent reoccurrences of the same complaint in the future would also be recorded within the Complaint Response Document. If appropriate, the MOE Spills Action Centre (1-800-268-6060) would be contacted to notify them of the complaint. Records of correspondence and actions taken to address them by Windlectric and/ or the operations and maintenance contractor would be made available to MOE staff on request.

Ongoing stakeholder communication would allow Windlectric and/or the operations and maintenance contractor to receive and respond to community issues on an ongoing basis.

8.0 Closure

The Amherst Island Wind Energy Project *Draft Design and Operations Report* has been prepared by Stantec for Windlectric in accordance with Ontario Regulation 359/09, and in consideration of the *Technical Guide to Renewable Energy Approvals*.

This report has been prepared by Stantec Consulting Ltd. for the sole benefit of Windlectric, and may not be used by any third party without the express written consent of Windlectric and Stantec Consulting Ltd. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of the Report.

STANTEC CONSULTING LTD.

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