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.

Rob Rowland
Senior Project Manager

Kerrie Skillen
Project Manager

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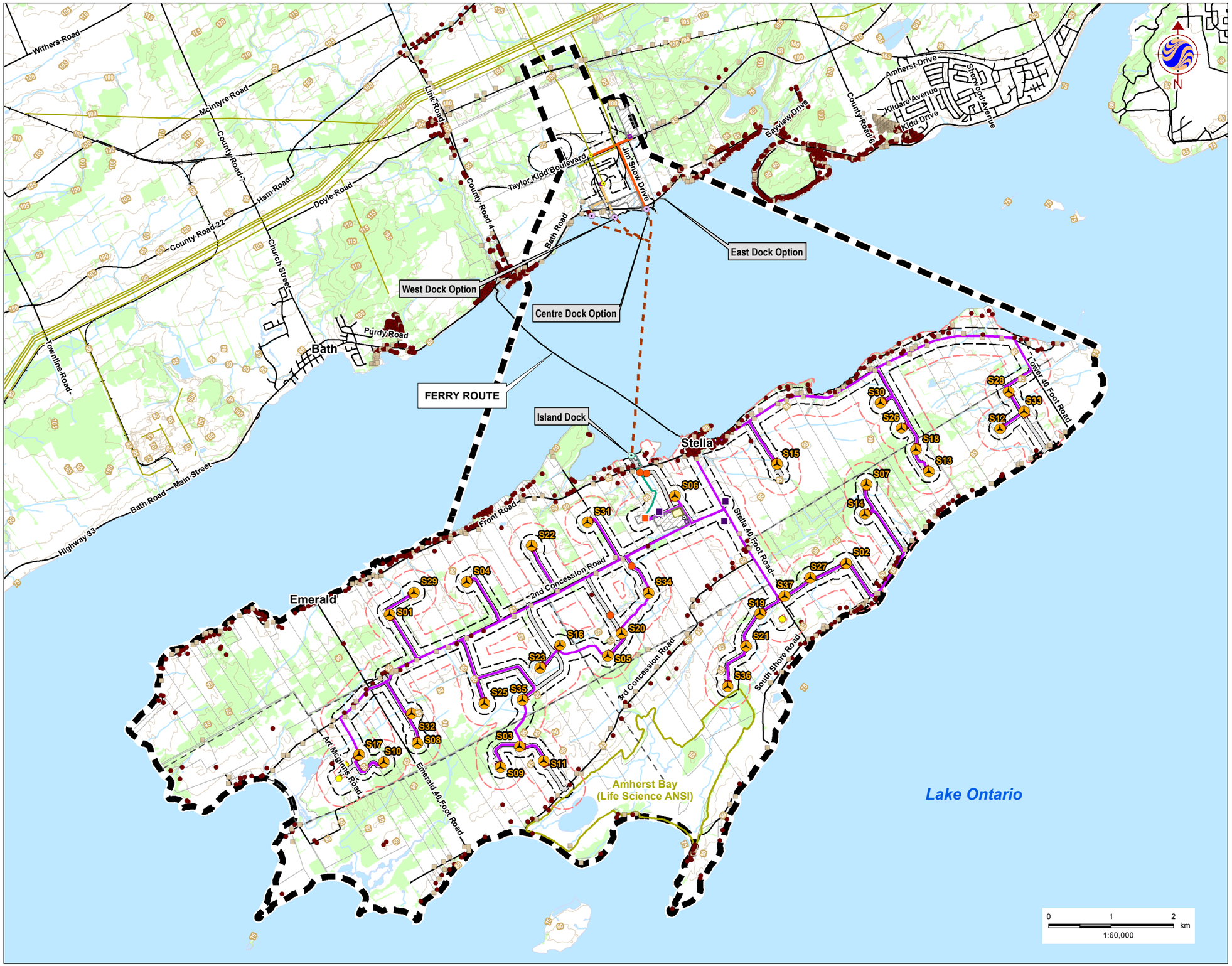
Appendix A

Site Plans



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.

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160960595

Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1

Title

Project Location & Study Area

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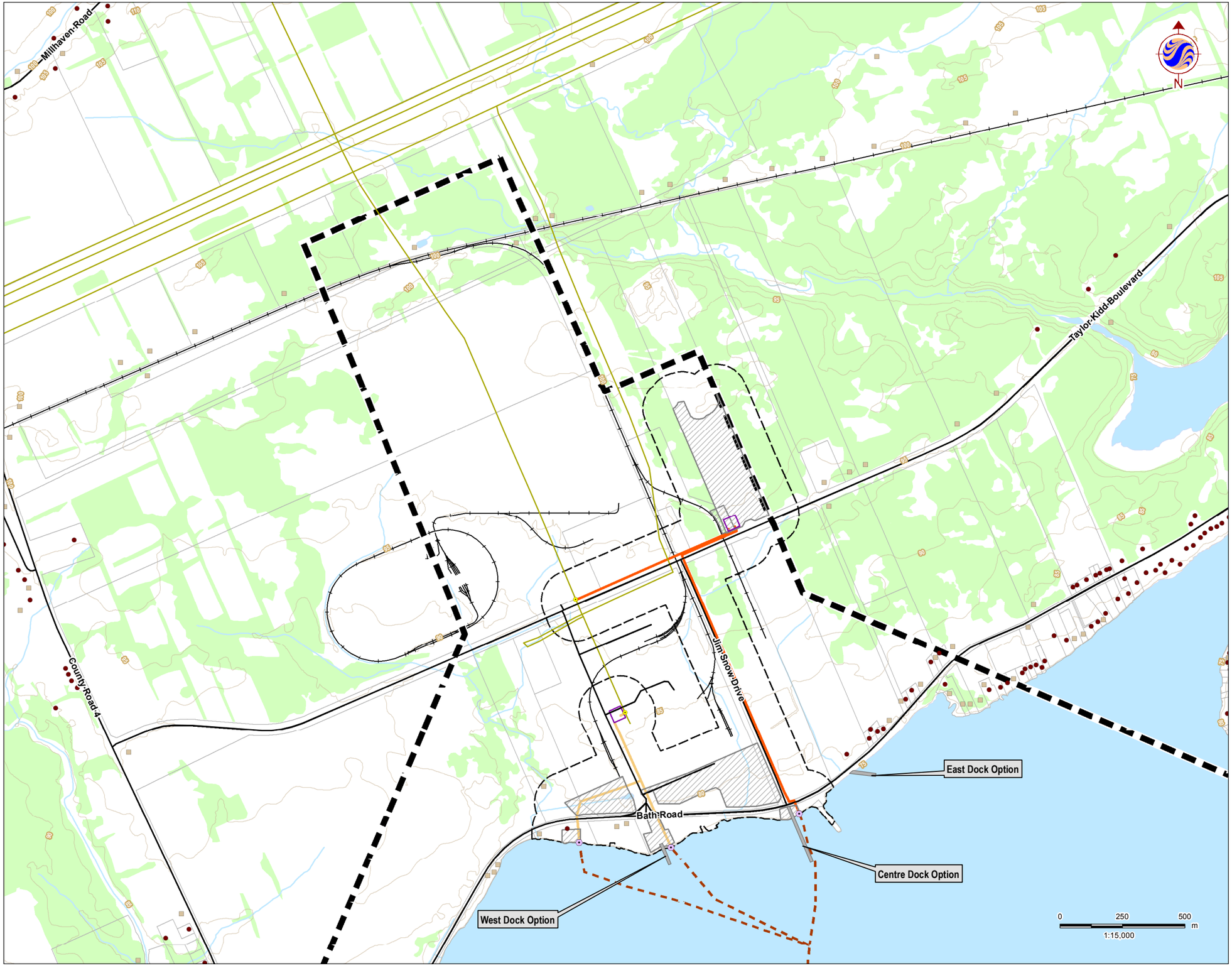

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
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- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

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- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
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- Watercourse
- Waterbody
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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1.1

Title

Project Location & Study Area

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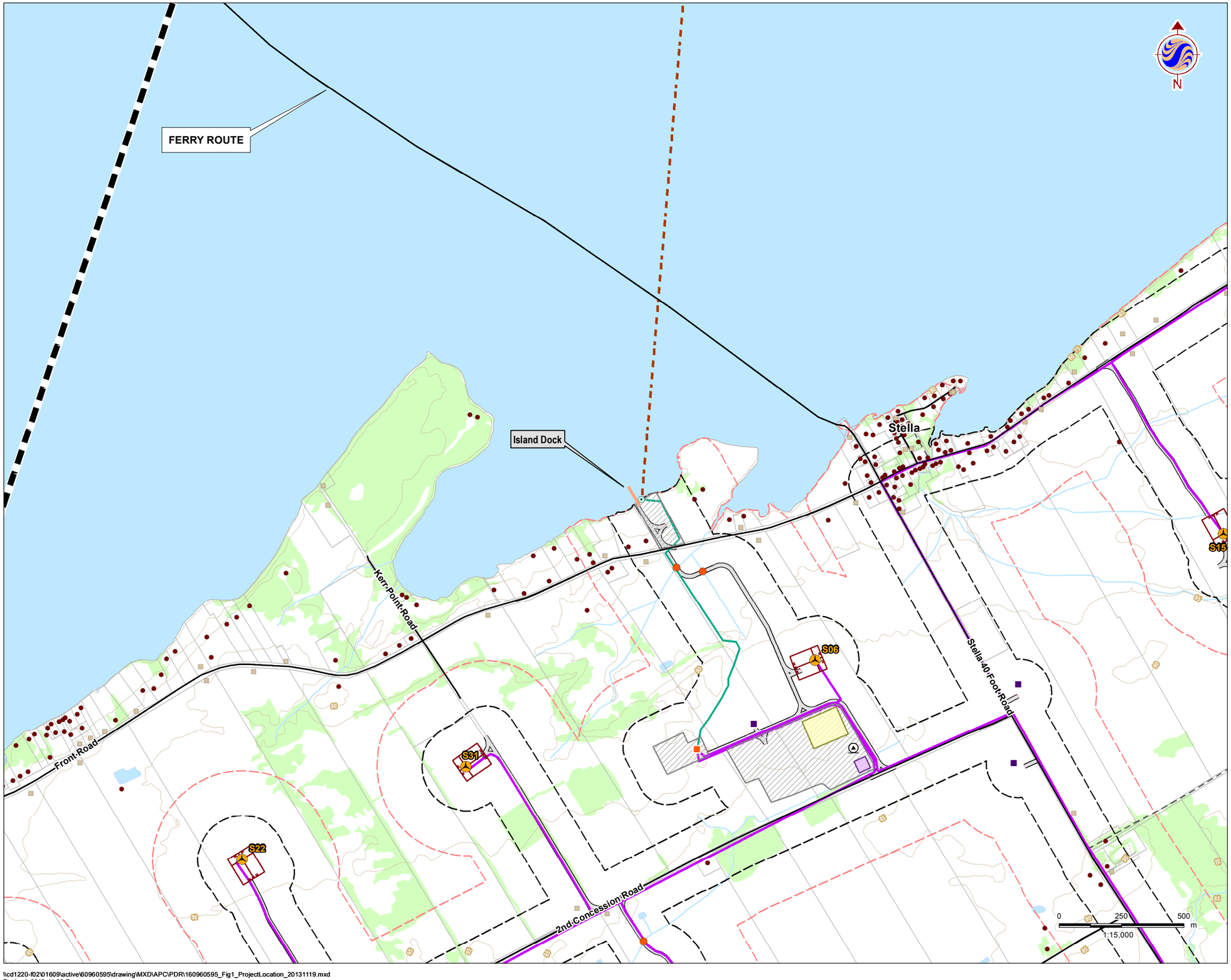

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
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- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
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- Watercourse
- Waterbody
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- Property Boundary

Notes

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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1.2

Title

Project Location & Study Area

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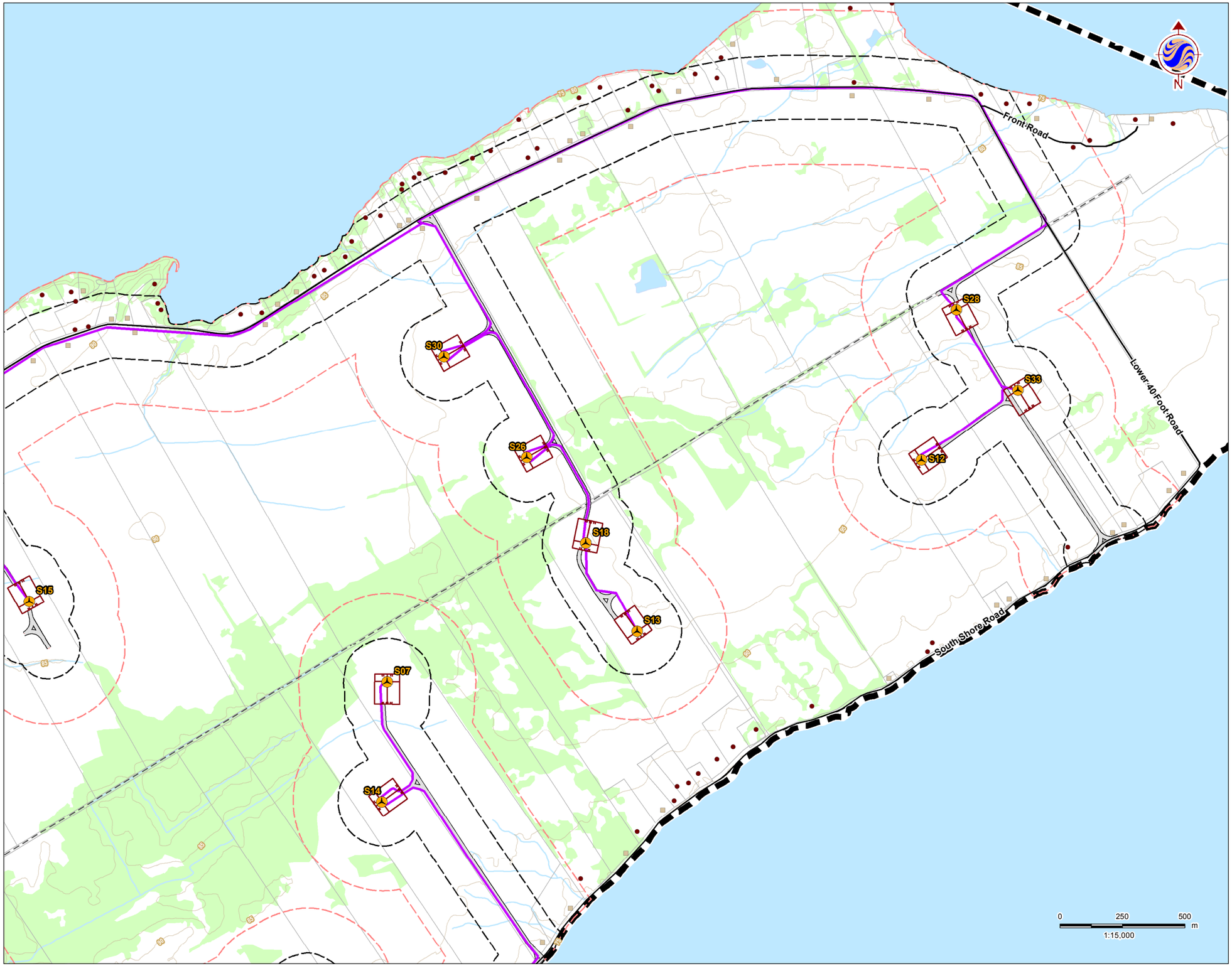

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
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- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Hydro Line
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- Property Boundary

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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1.3

Title

Project Location & Study Area

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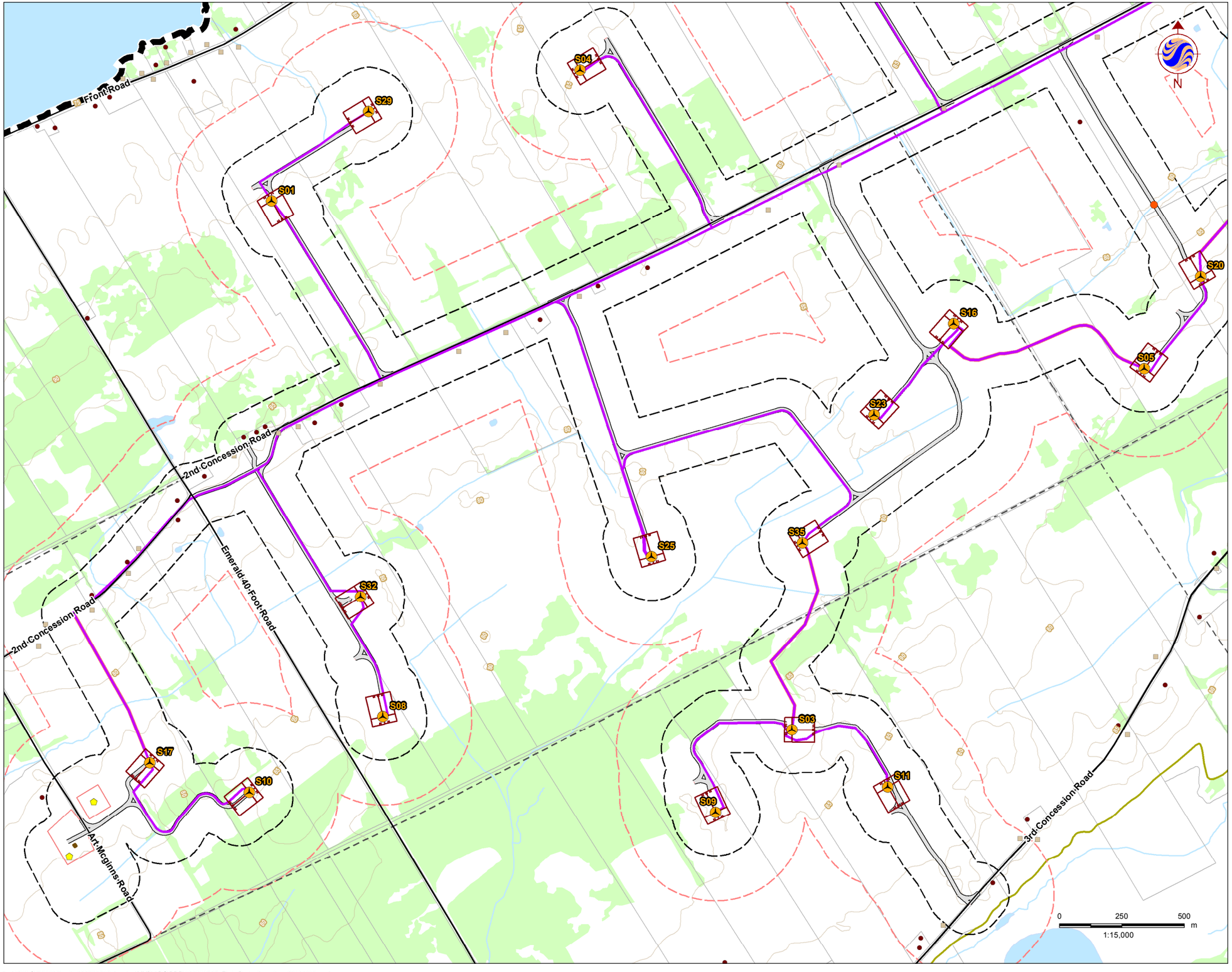

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
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- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

Notes

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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

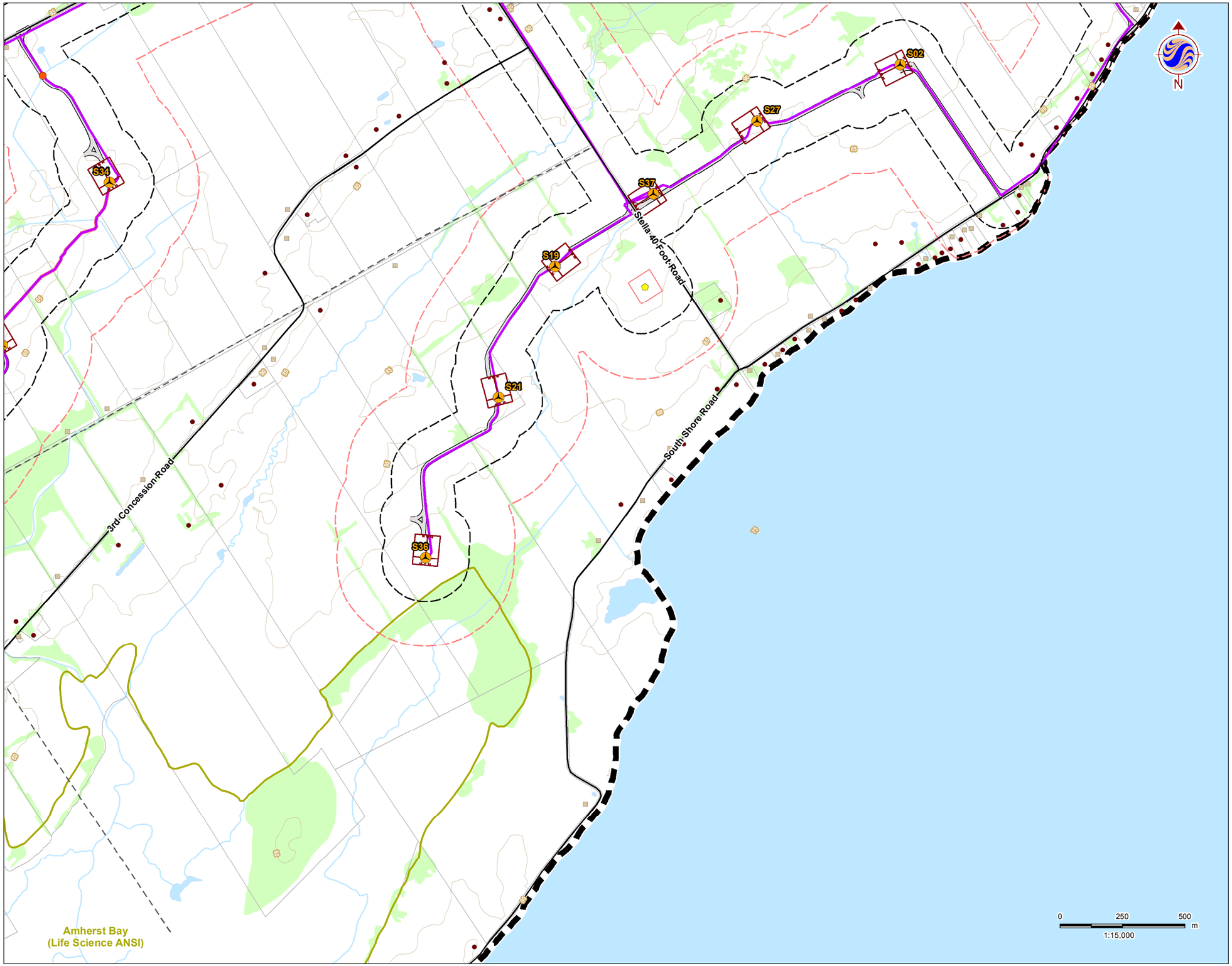
Figure No.

1.4

Title

Project Location & Study Area

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig1_ProjectLocation_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

Notes

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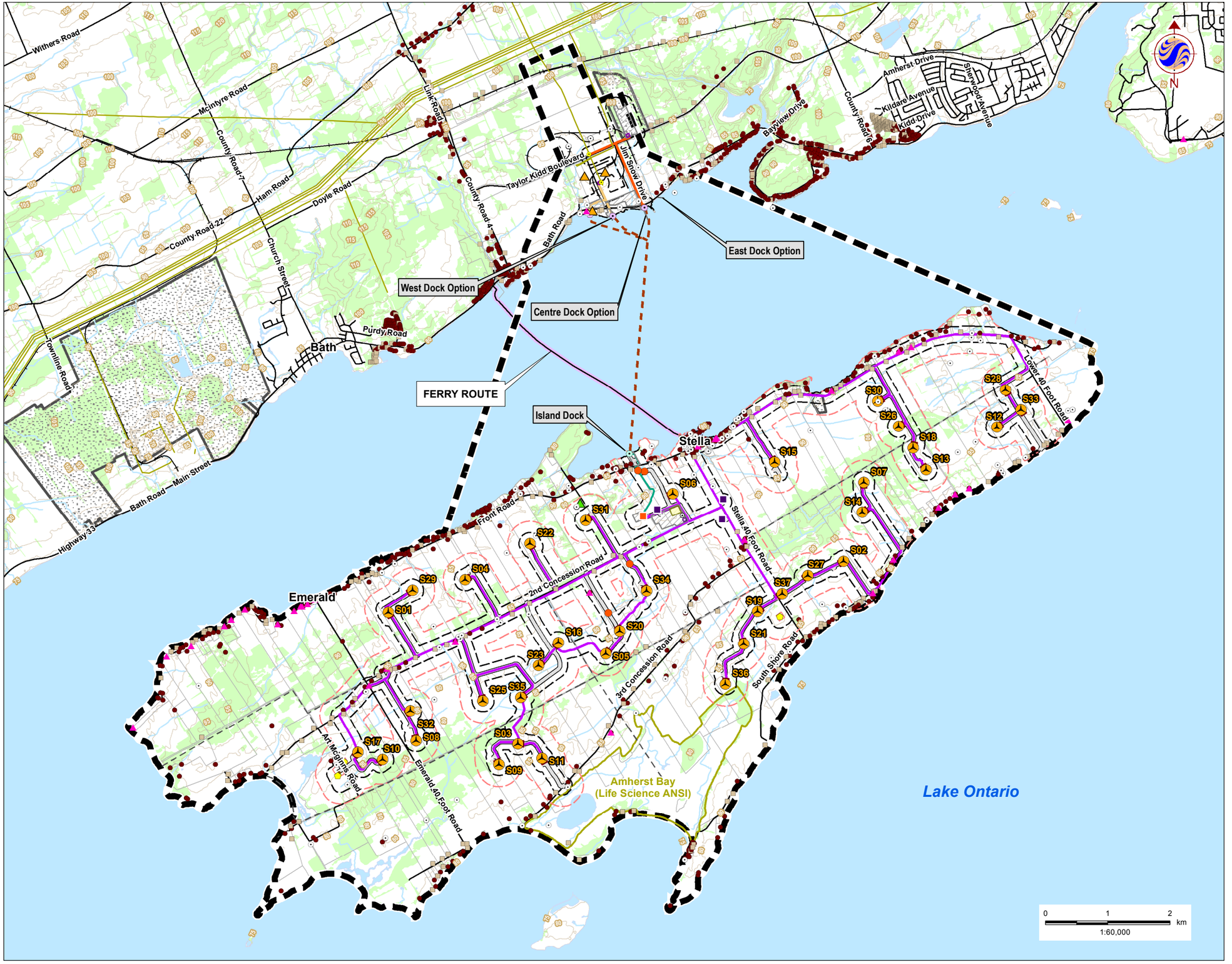
Figure No.

1.5

Title

Project Location & Study Area

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig1_ProjectLocation_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- Aggregate Site - Active
- ANSI Boundary
- Property Boundary
- Landfill - Active
- Landfill - Closed
- Water Well Record
- Built Heritage Resource
- Ferry Landscape
- Village of Stella

Notes

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Client/Project

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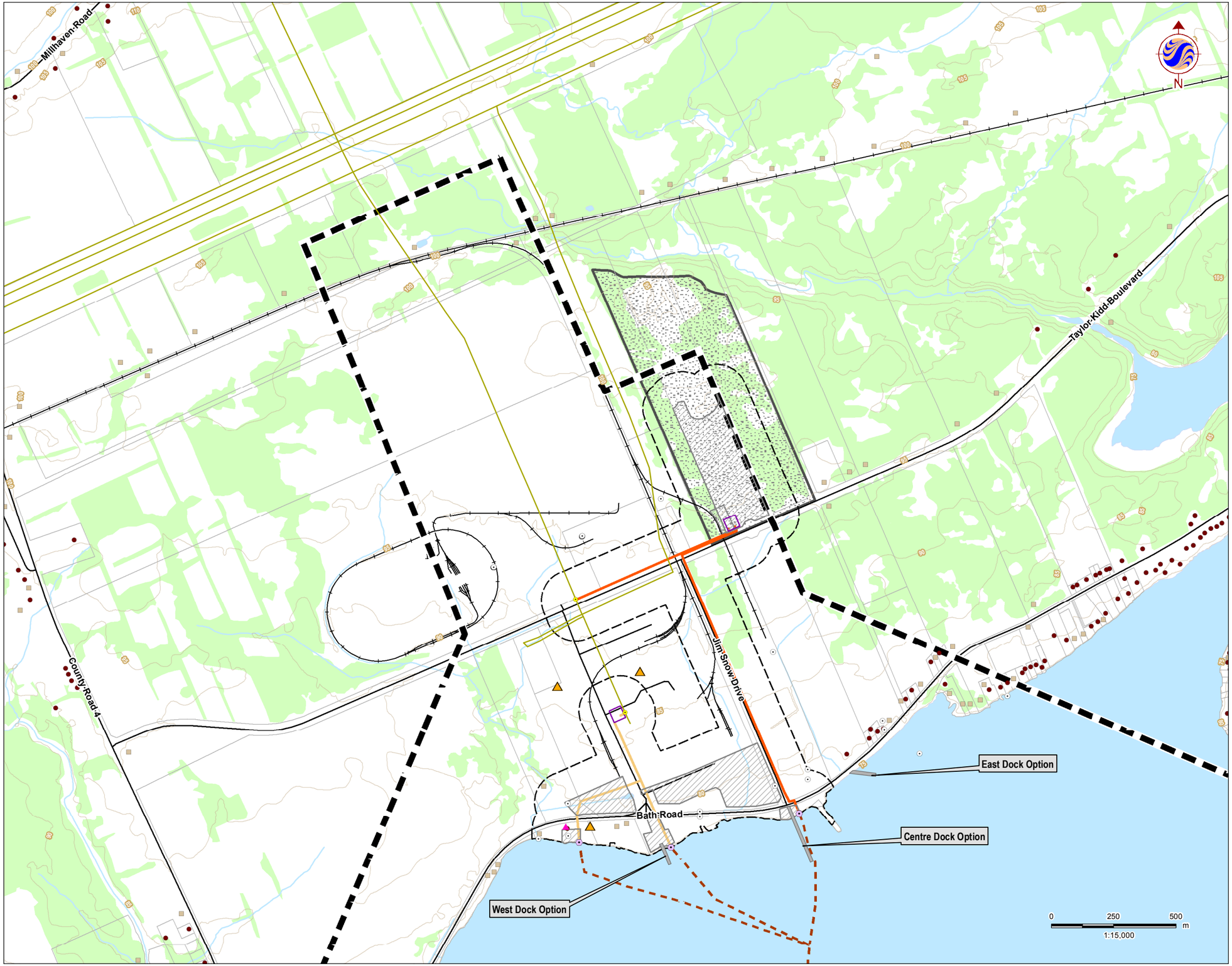
Figure No.

2

Title

Socio-Economic Features - Overview

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig2_SocioEconomic_Overview_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Watercourse
- Hydro Line
- Waterbody
- Wooded Area
- Aggregate Site - Active
- ANSI Boundary
- Property Boundary
- Water Well Record
- Built Heritage Resource
- Ferry Landscape
- Village of Stella
- Landfill - Active
- Landfill - Closed

Notes

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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

2. 1

Title

Socio-Economic Features

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Revised: 2013-11-20 By: pworsell

FERRY ROUTE

Island Dock

Stella

Kerr Point Road

Front Road

2nd Concession Road

Stella 40 Foot Road

S06

S15

S22

S31

N

0 250 500 m

1:15,000

Legend

Project Study Area
300m Zone of Investigation
120m Zone of Investigation

Project Components

Turbine
Met Tower (Potential Location)
Substation (Potential Location)
Access Road
Collector Lines
Submarine Cable Path
Laydown Area and Crane Path
Operation and Maintenance Building (Potential Location)
Potential Culvert Location
Point of Common Coupling
Mainland Cable Vault (Potential Location)
Island Cable Vault
Aboveground Storage Tanks (Potential Location)
Constructible Area
Mainland Dock (Potential Location)
Island Dock
Batch Plant (Potential Location)
Site Office (Potential Location)
Storage Shed

Transmission Lines

Mainland Option1
Mainland Option 2
Island Transmission Line

Land Use

Central Staging Area
Switching Station (Potential Location)

Noise Receptors

Existing
Vacant

Existing Features

Road
Unopened Road Allowance
Railway
Elevation Contour (metres ASL)
Watercourse
Hydro Line
Waterbody
Wooded Area
Aggregate Site - Active
ANSI Boundary
Property Boundary
Water Well Record
Built Heritage Resource
Ferry Landscape
Village of Stella
Landfill - Active
Landfill - Closed

Notes

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Client/Project

WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

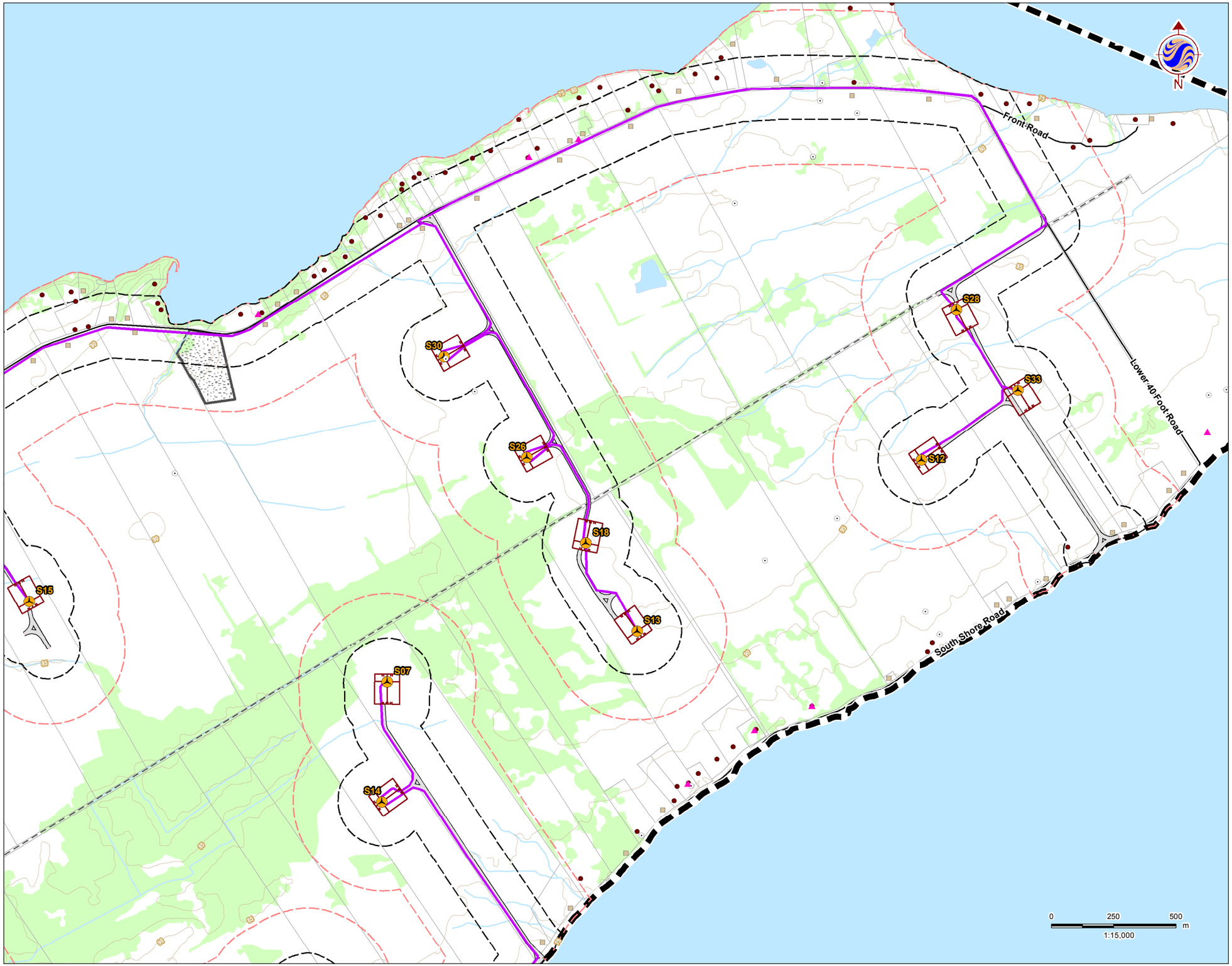
Figure No.

2. 2

Title

Socio-Economic Features

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig2_SocioEconomic_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Watercourse
- Hydro Line
- Waterbody
- Wooded Area
- Aggregate Site - Active
- ANSI Boundary
- Property Boundary
- Water Well Record
- Built Heritage Resource
- Ferry Landscape
- Village of Stella
- Landfill - Active
- Landfill - Closed

Notes

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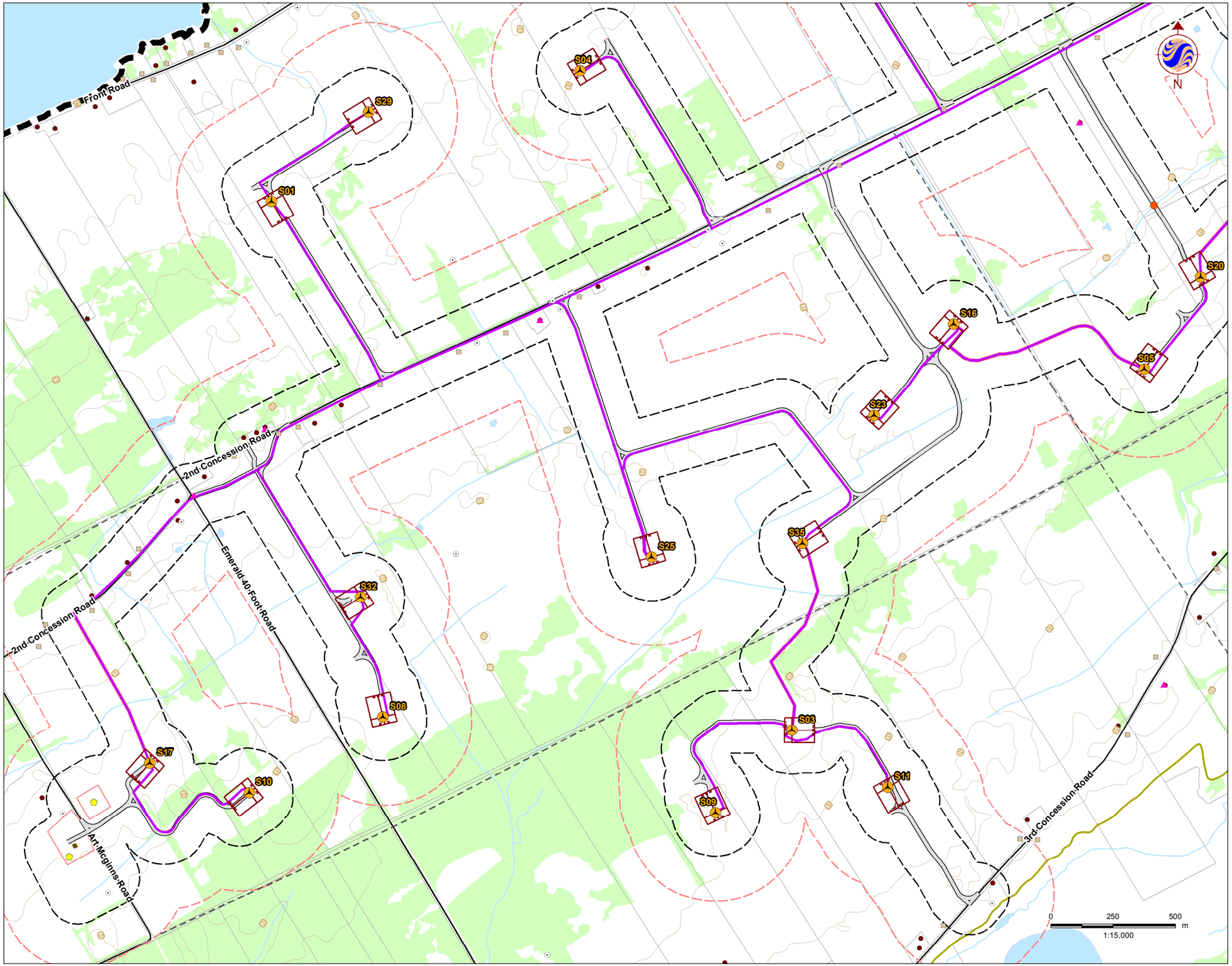
Figure No.

2. 3

Title

Socio-Economic Features

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig2_SocioEconomic_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Watercourse
- Hydro Line
- Waterbody
- Wooded Area
- Aggregate Site - Active
- ANSI Boundary
- Property Boundary
- Water Well Record
- Built Heritage Resource
- Ferry Landscape
- Village of Stella
- Landfill - Active
- Landfill - Closed

Notes

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WINDLECTRIC INC.
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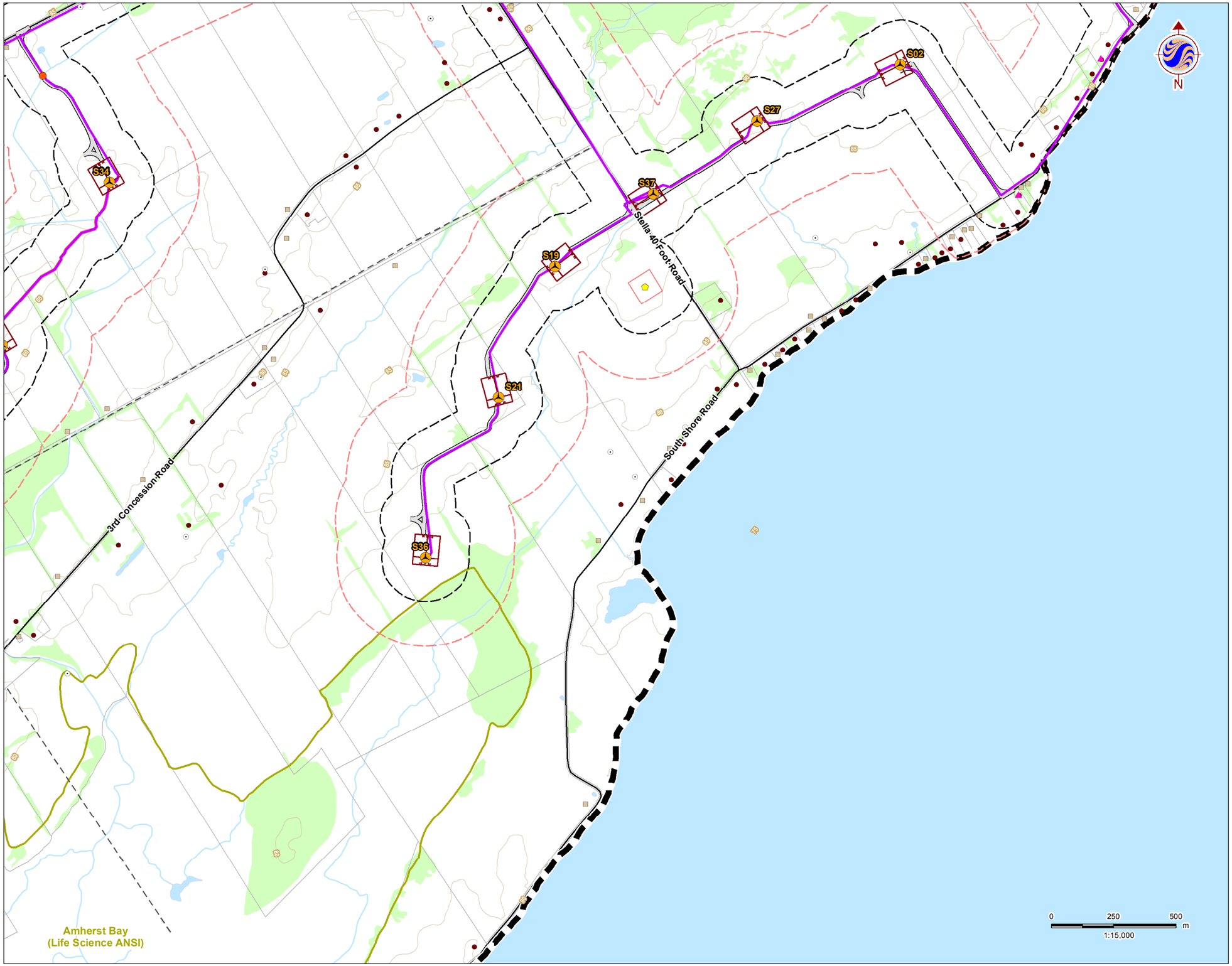
Figure No.

2. 4

Title

Socio-Economic Features

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig2_SocioEconomic_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Elevation Contour (metres ASL)
- Watercourse
- Hydro Line
- Waterbody
- Wooded Area
- Aggregate Site - Active
- ANSI Boundary
- Property Boundary
- Water Well Record
- Built Heritage Resource
- Ferry Landscape
- Village of Stella
- Landfill - Active
- Landfill - Closed

Notes

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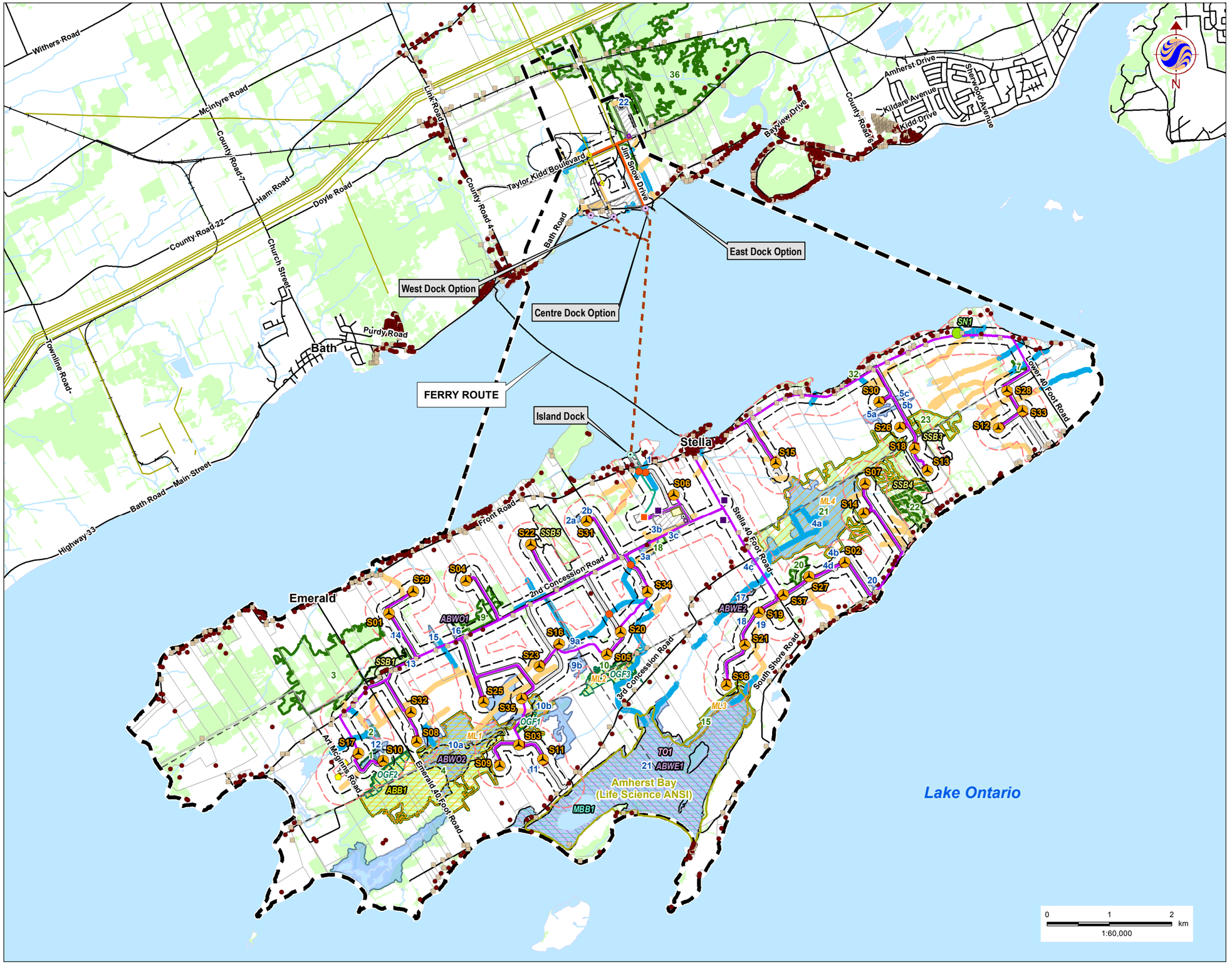
Figure No.

2. 5

Title

Socio-Economic Features

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig2_SocioEconomic_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

Project Components
- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation
- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines
- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use
- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors
- Existing
- Vacant

Existing Features
- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status
- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features
- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Woodland
- Significant Wetland

Notes

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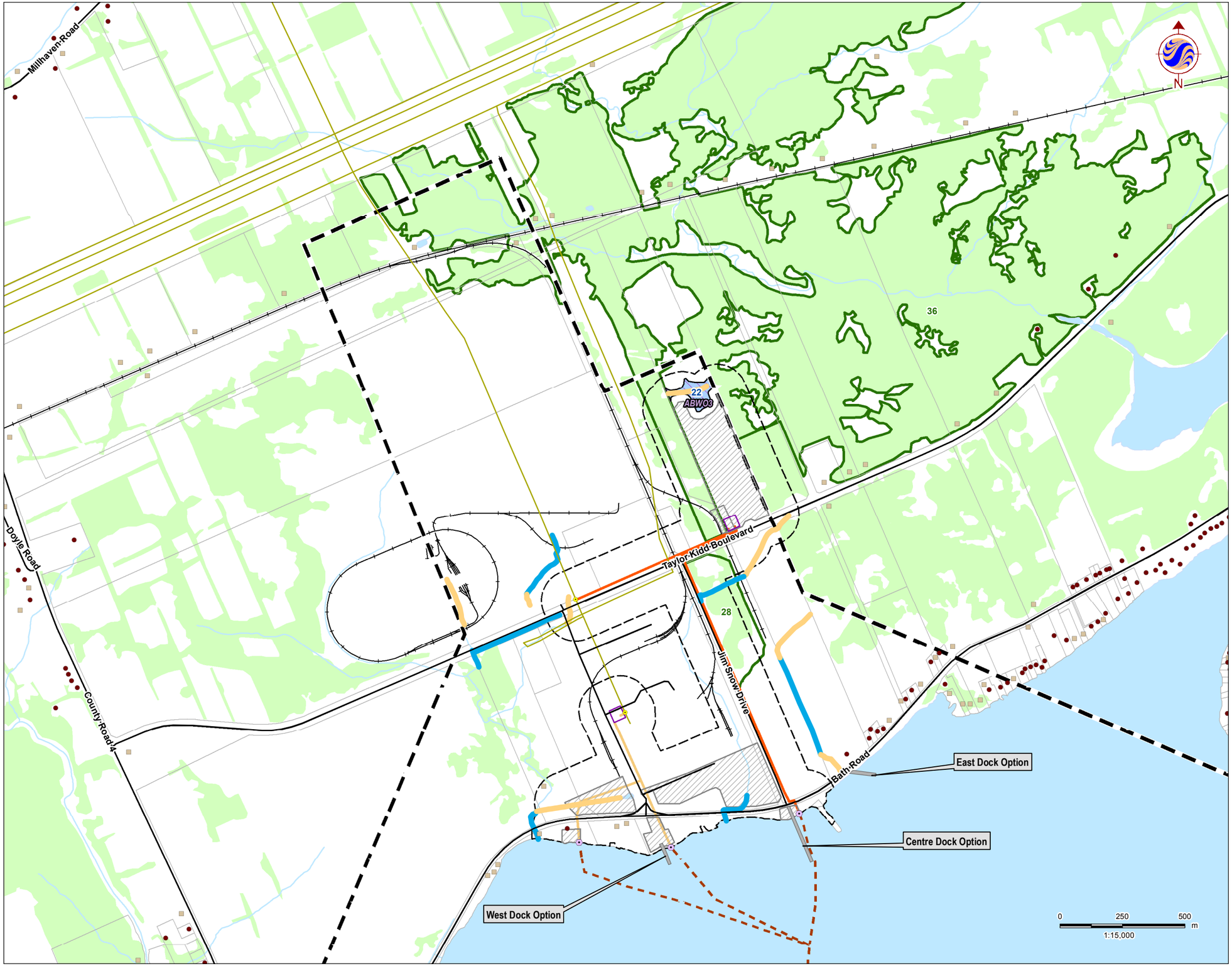
Figure No.

3

Title

Significant Natural Features, Wildlife Habitat and Waterbodies - Overview

\\cd1220-f02\01609\active\60960595\drawing\MXD\APC\PDR\160960595_Fig3_NH_Features_Waterbodies_Overview_20131119.mxd
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status

- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Wetland
- Significant Woodland

Notes

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Figure No.

3.1

Title

Significant Natural Features, Wildlife Habitat and Waterbodies

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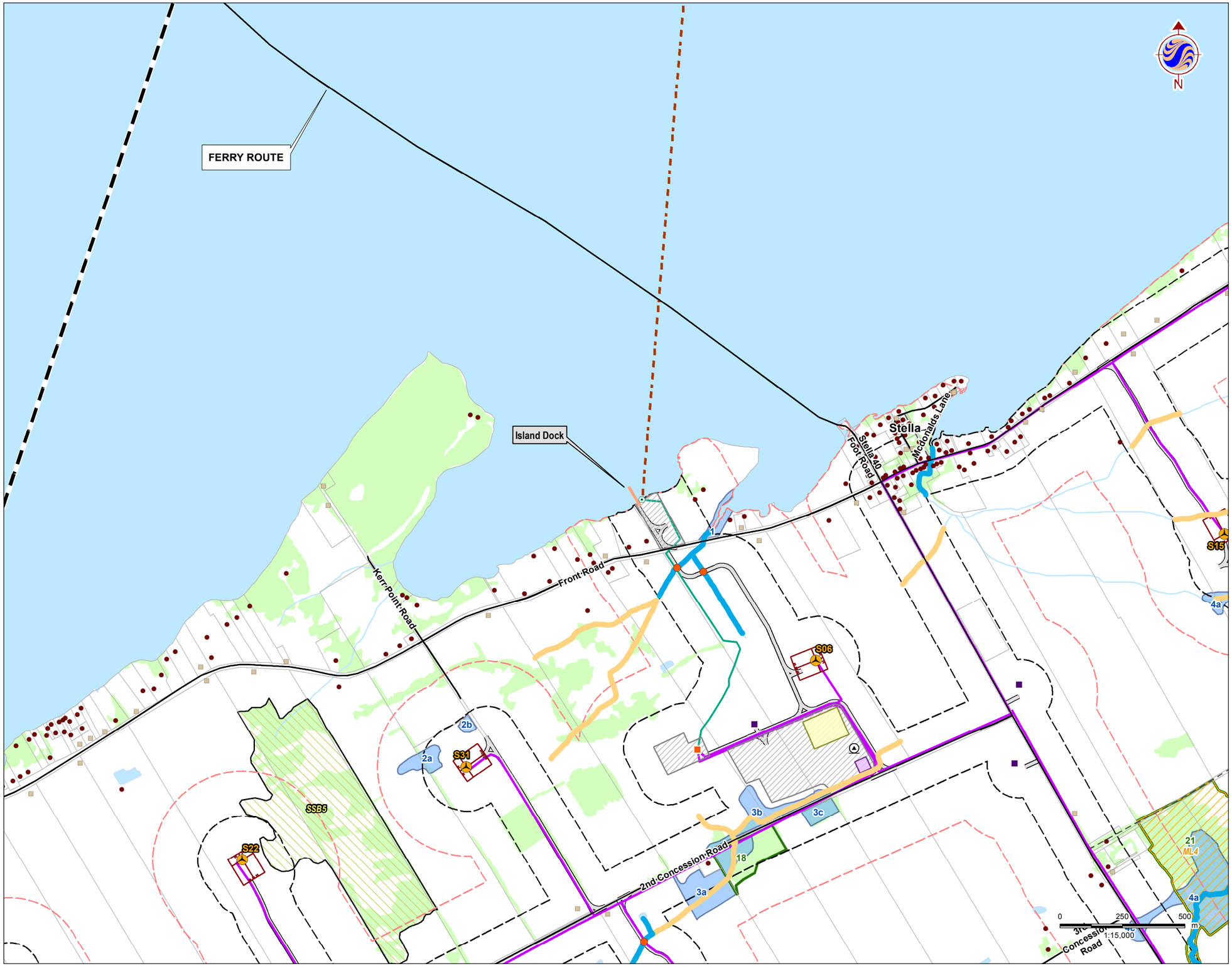
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status

- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Wetland
- Significant Woodland

Notes

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Figure No.

3.2

Title

Significant Natural Features, Wildlife Habitat and Waterbodies

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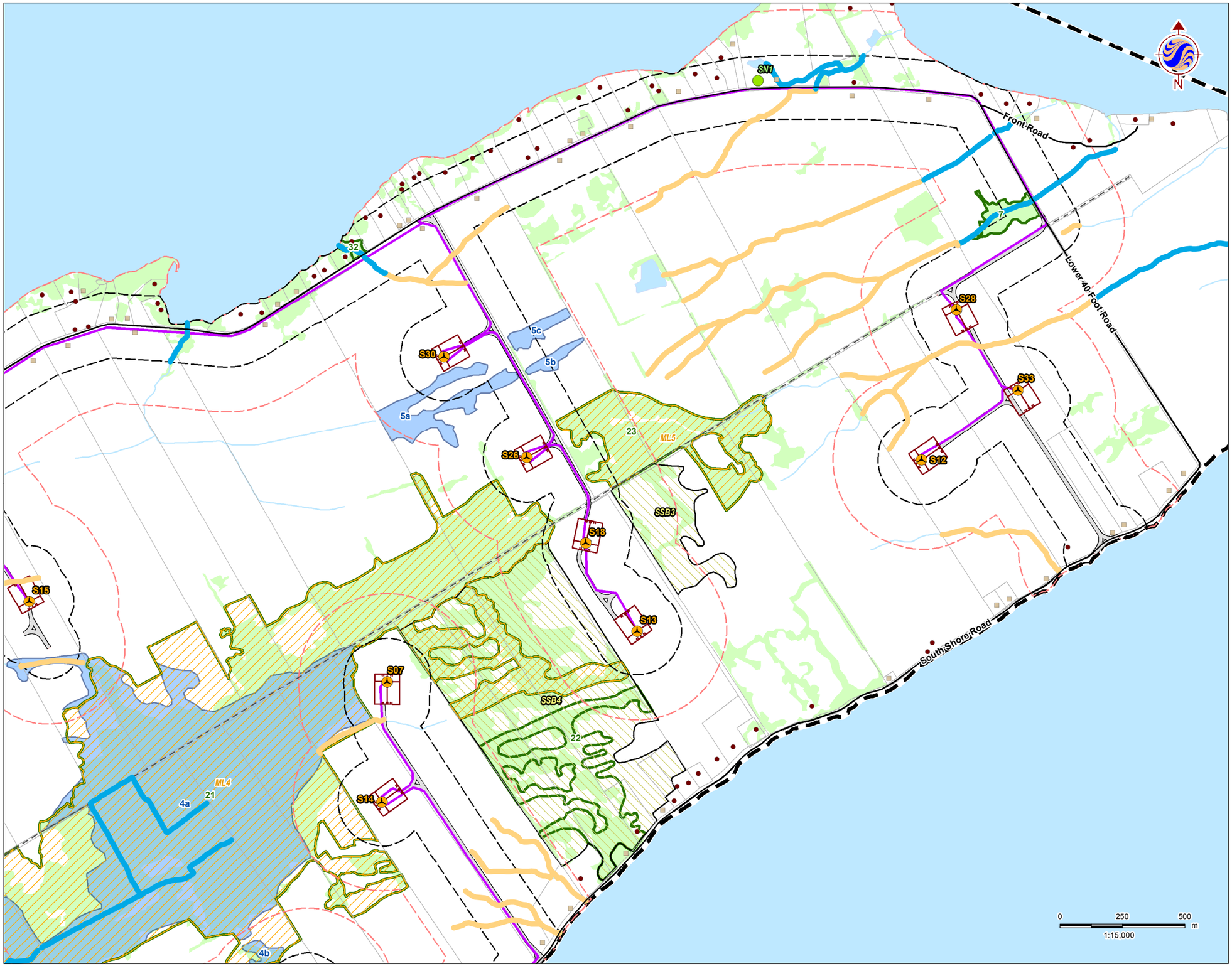
Revised: 2013-11-20 By: pworsell



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status

- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Wetland
- Significant Woodland

Notes

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Figure No.

3.3

Title

Significant Natural Features, Wildlife Habitat and Waterbodies

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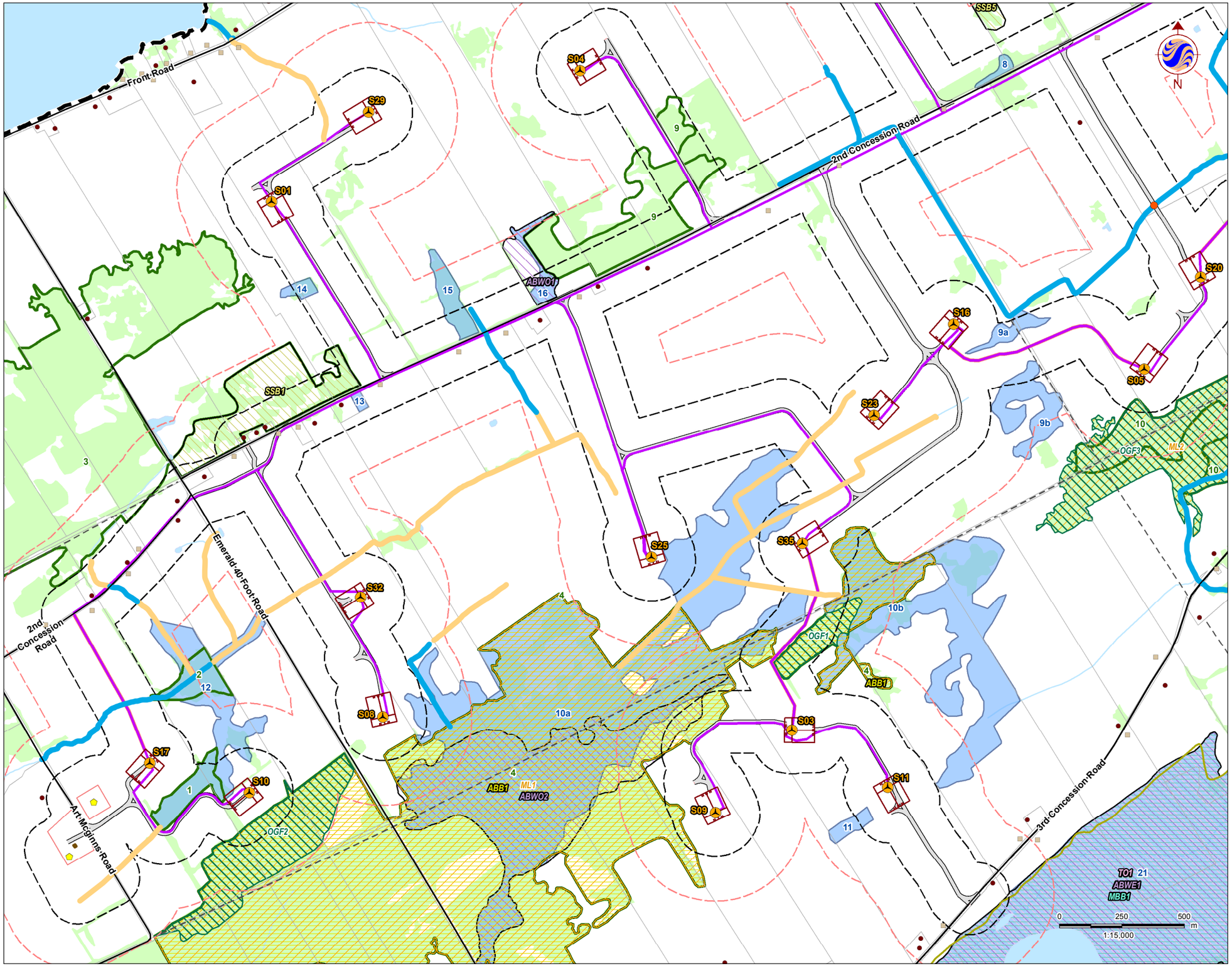
Revised: 2013-11-20 By: pworsell



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Revised: 2013-11-20 By: pworsell

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Aboveground Storage Tanks (Potential Location)
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status

- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Wetland
- Significant Woodland

Notes

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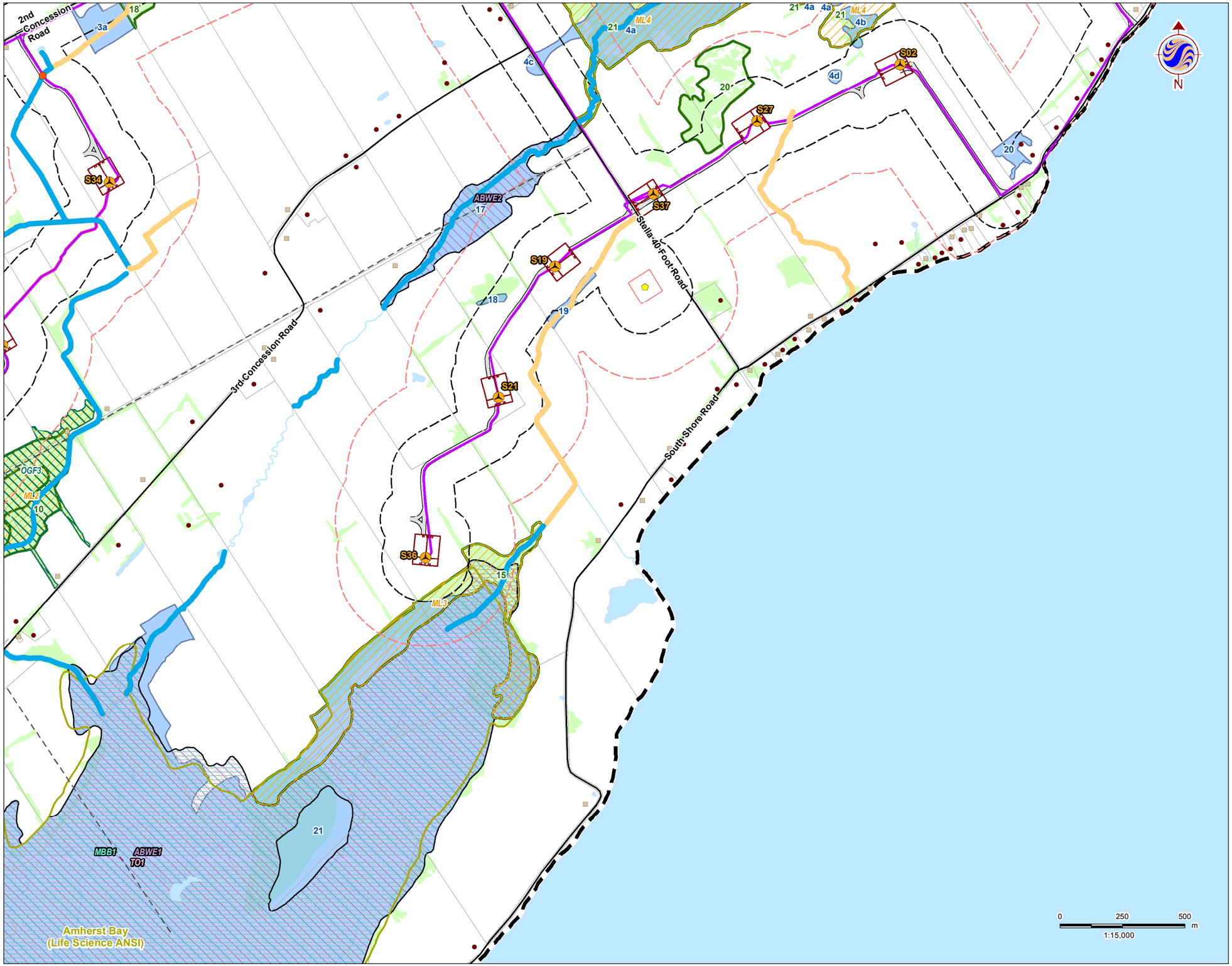
Figure No.

3.4

Title

Significant Natural Features, Wildlife Habitat and Waterbodies



Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
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- Substation (Potential Location)
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Transmission Lines

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- Island Transmission Line

Land Use

- Central Staging Area
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Noise Receptors

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- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary

REA Status

- REA Water Body
- Not a REA Water Body

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
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- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Wetland
- Significant Woodland

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Figure No.

3.5

Title

Significant Natural Features, Wildlife Habitat and Waterbodies

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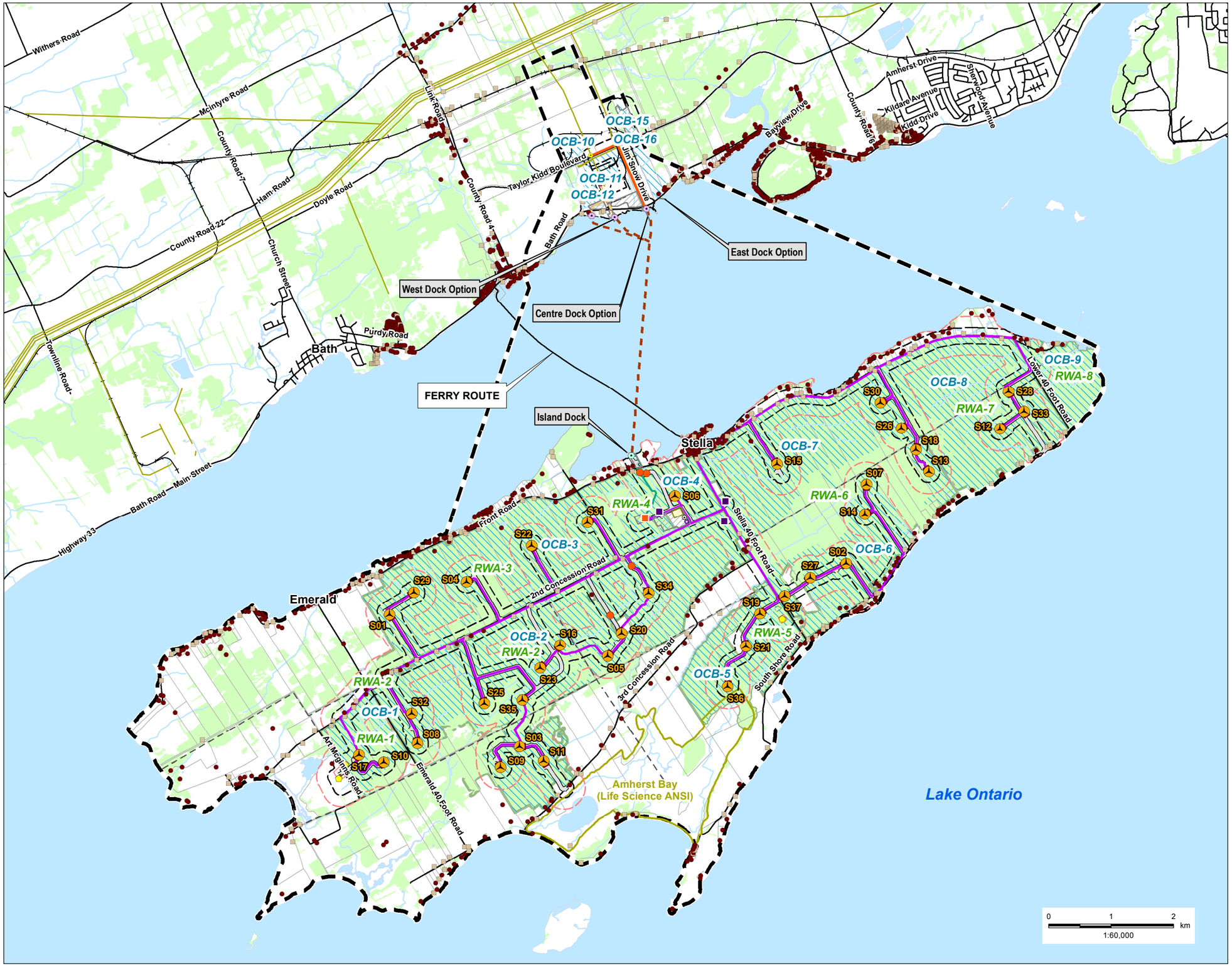

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
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- Access Road
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- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
- Watercourse
- Waterbody
- Wooded Area
- ANSI Boundary
- Property Boundary
- Open Country Breeding Bird Area (OCB)
- Raptor Wintering Area (RWA)

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Figure No.

4

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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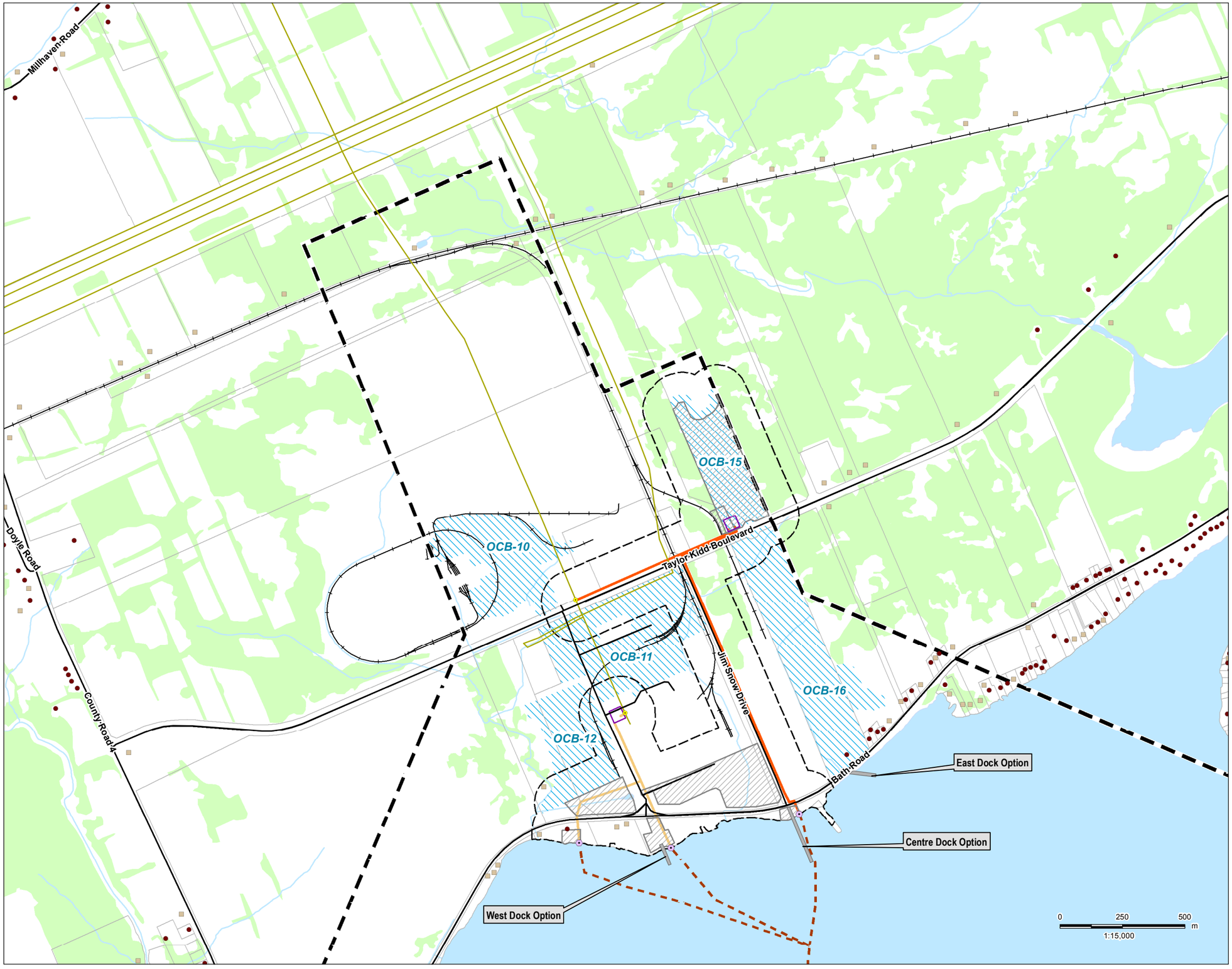

Legend

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- 300m Zone of Investigation
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Project Components

- Turbine
- Met Tower (Potential Location)
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- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Hydro Line
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Figure No.

4.1

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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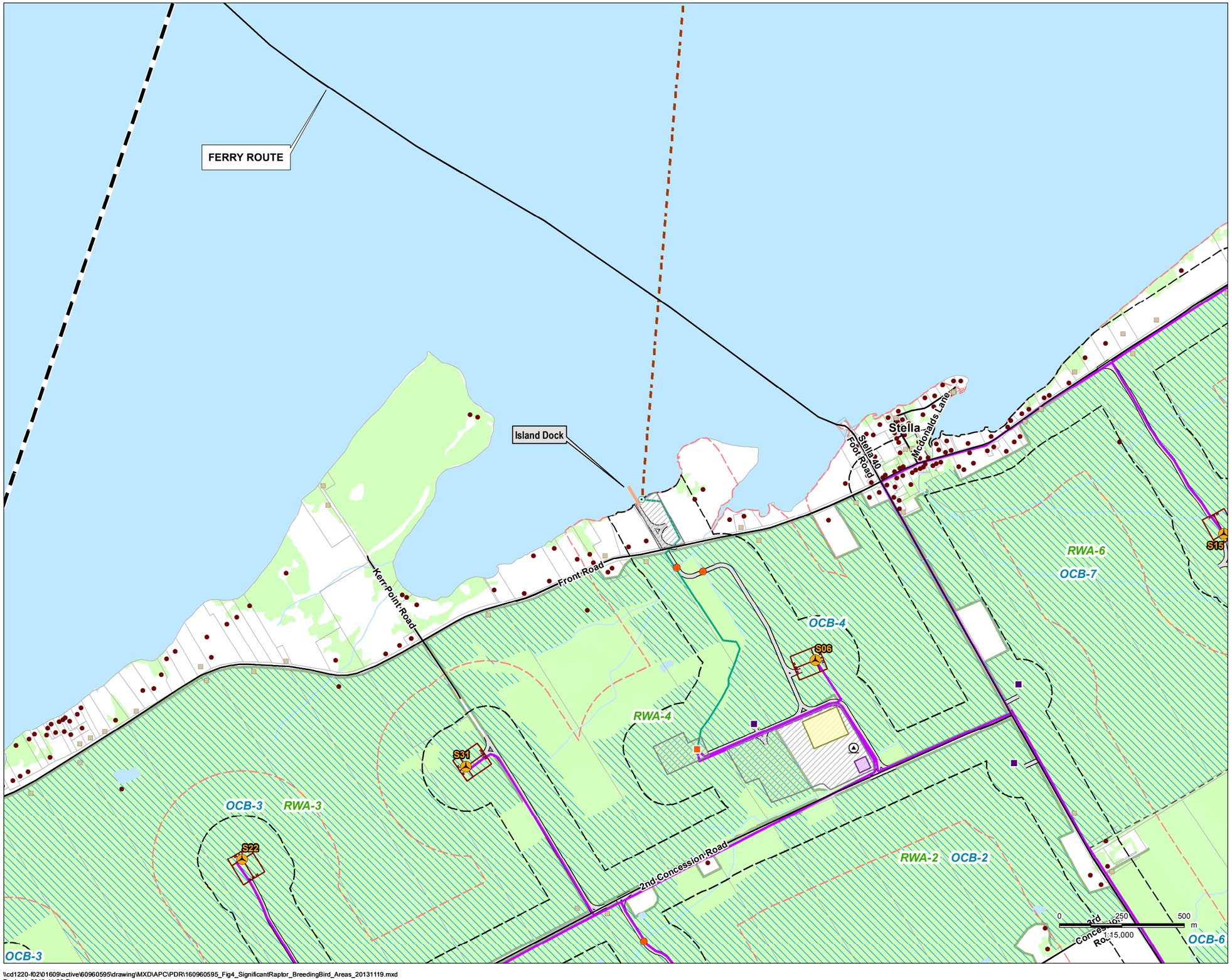

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
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Transmission Lines

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- Mainland Option 2
- Island Transmission Line

Land Use

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- Switching Station (Potential Location)

Noise Receptors

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Existing Features

- Road
- Unopened Road Allowance
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Figure No.

4.2

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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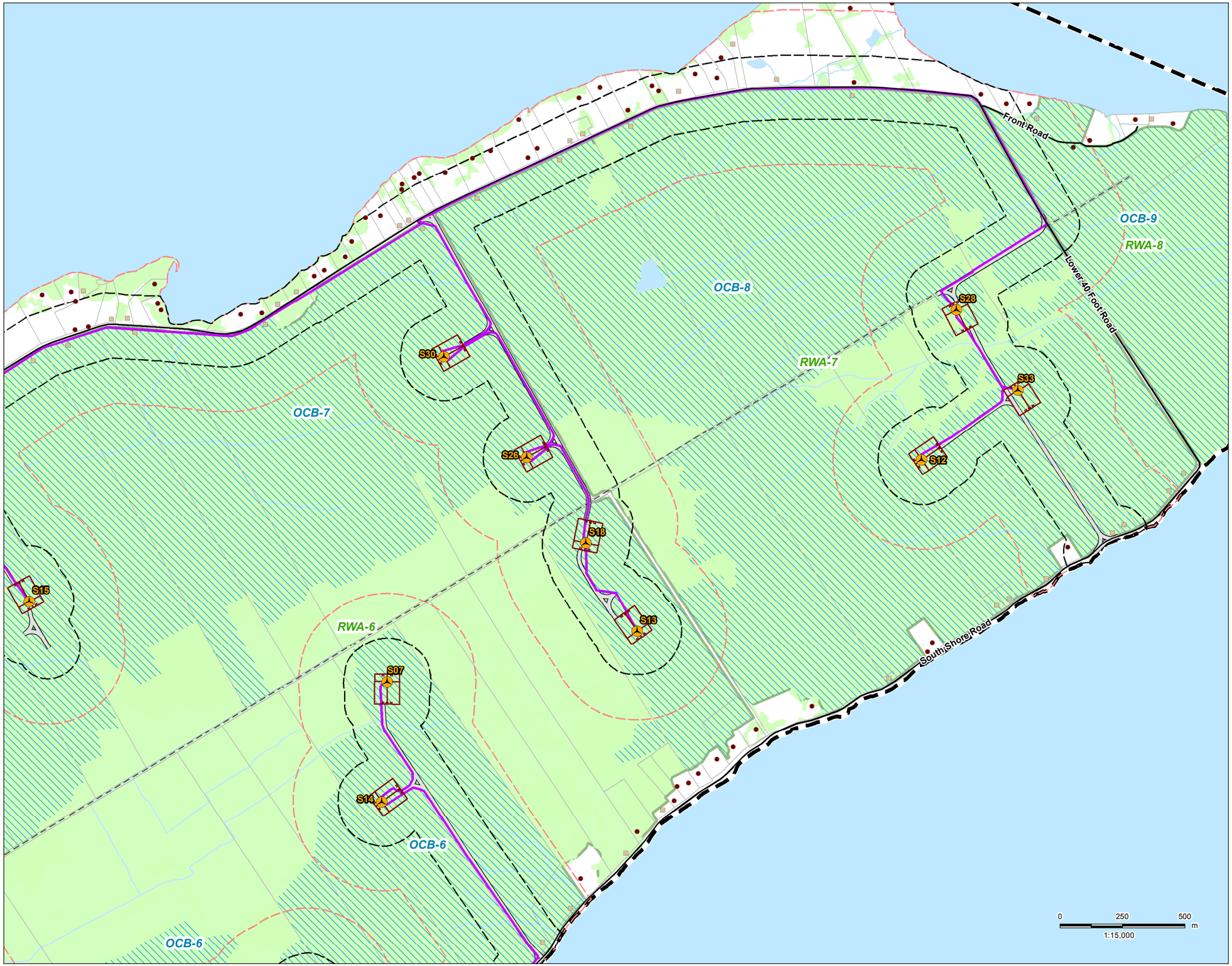

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
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Figure No.

4.3

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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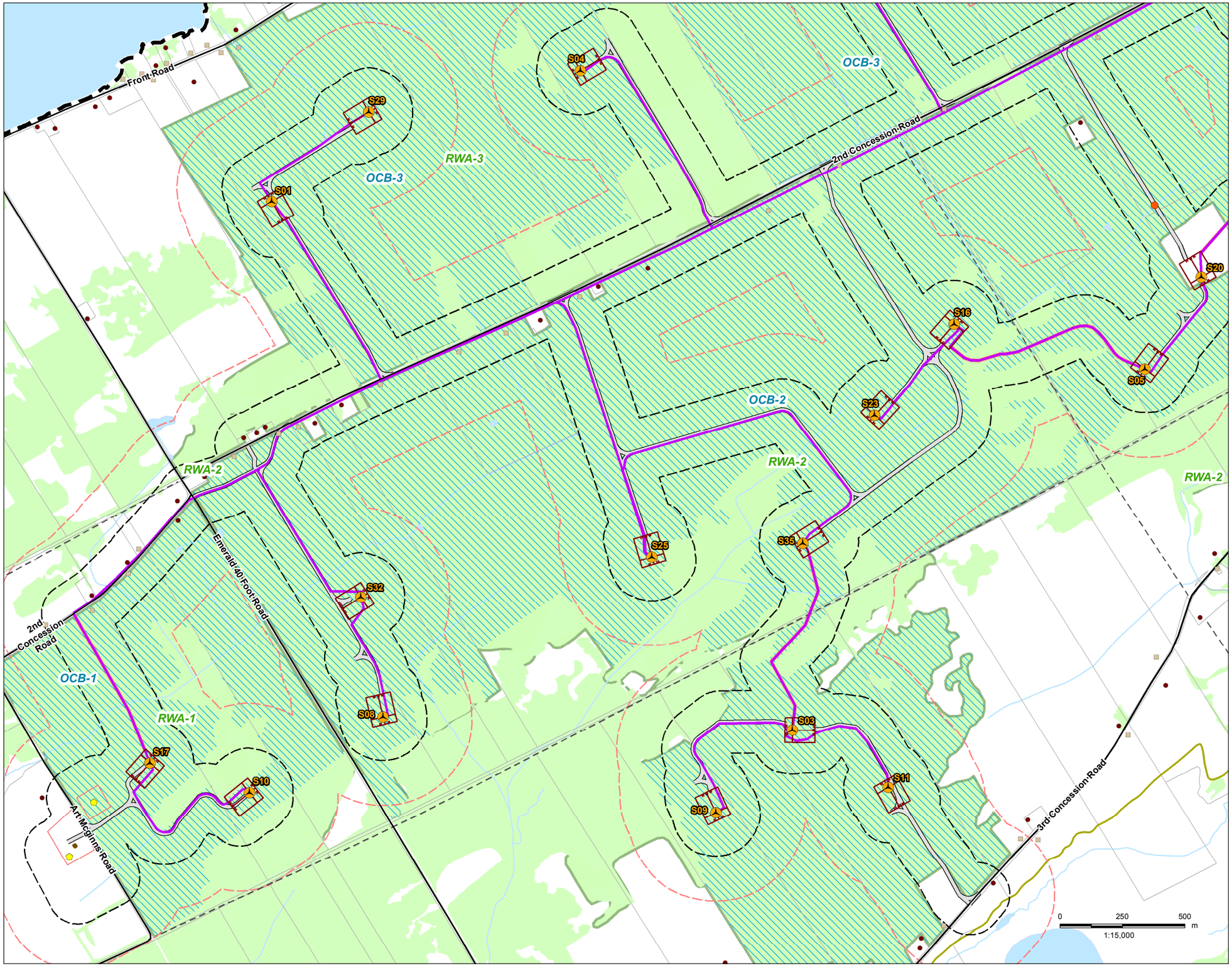

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
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Figure No.

4.4

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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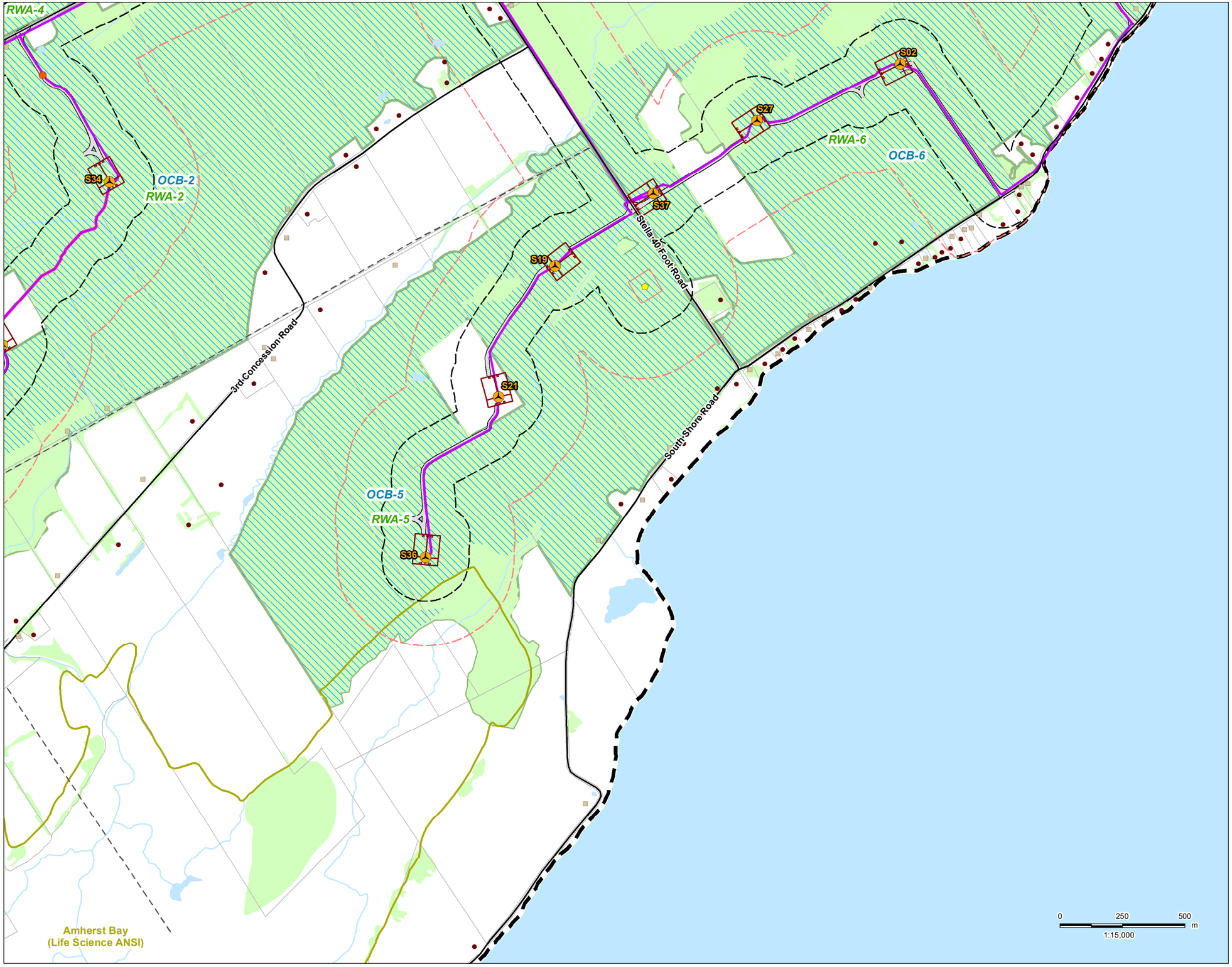

Legend

- Project Study Area
- 300m Zone of Investigation
- 120m Zone of Investigation

Project Components

- Turbine
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Transmission Lines

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Land Use

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Noise Receptors

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- Vacant

Existing Features

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Figure No.

4.5

Title

Significant Open Country Breeding Bird & Raptor Wintering Areas

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Revised: 2013-11-20 By: pworsell

Appendix B

Noise Assessment Report

HATCH™

Windlectric Inc.

Noise Assessment Report

For

Amherst Island Wind Project

H340642-0000-07-124-0002
Rev. 5
September 5, 2013

Windlectric Inc.

Noise Assessment Report

For

Amherst Island Wind Project

H340642-0000-07-124-0002
Rev. 5
September 5, 2013

Project Report

September 5, 2013

Windlectric Inc.

Amherst Island Wind Project

Noise Assessment Report

Hatch

Prepared by:

Oleg Belashov, M.A.Sc., P.Eng.
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Tel: 905-374-0701 x 5269

September 5, 2013
Date

Approved by:

Joaquin Moran, Ph.D., P.Eng.
e-mail: jmoran@hatch.ca
Tel: 905-374-0701 x 5236

LICENSED PROFESSIONAL ENGINEER
J.L. MORAN GONZALEZ
100148574
Sep 05/2013
PROVINCE OF ONTARIO

September 5, 2013
Date

Windlectric Inc.

Approved by:

Sean Fairfield
e-mail: Sean.Fairfield@algonquinpower.com

September 5, 2013
Date

Table of Contents

List of Tables

List of Figures

Noise Assessment Report Revision Summary

Revision #	Summary
5	The Noise Assessment Report dated March 22, 2013 (Revision 4) has been revised to address MOE comments submitted by Kristina Rudzki. The following changes were made: • Table B.5 Wind Turbine Generator Sound Power Level Adjustment was added in Appendix B.

REPORT DISCLAIMER

This report has been prepared by Hatch for the sole and exclusive use of Windlectric Inc. (Proponent), for the purpose of assisting the management of the Client in making decisions with respect to the potential development of the Amherst Island Wind Project, and for attachment to their application for a Renewable Energy Approval from the Ontario Ministry of the Environment (MOE) and shall not be (a) used for any other purpose, or (b) provided to, relied upon or used by any third party.

This report contains opinions, conclusions and recommendations made by Hatch, using its professional judgment and reasonable care. Use of or reliance upon this report by Client is subject to the following conditions:

(a) the report being read in the context of and subject to the terms of the agreement between Hatch and the Client dated January 20, 2012 (the "Agreement"), including any methodologies, procedures, techniques, assumptions and other relevant terms or conditions that were specified or agreed therein;

(b) the report being read as a whole, with sections or parts hereof read or relied upon in context;

(c) the conditions of the site may change over time or may have already changed due to natural forces or human intervention, and Hatch takes no responsibility for the impact that such changes may have on the accuracy or validity or the observations, conclusions and recommendations set out in this report; and

the report is based on information made available to Hatch by the Client or by certain third parties (Siemens, Land Information Ontario, First Base Solutions), including publicly available information; and unless stated otherwise in the Agreement, Hatch has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith.

1. Introduction

This report presents the results of the noise assessment study required for Wind Farms under Ontario Regulation 359/09 [1] and its amendment Ontario Regulation 521/10 [2], as part of the Renewable Energy Approval ("REA") Process.

Windlectric Inc. (hereinafter referred to as the "Proponent") is proposing to develop the Amherst Island Wind Project, a 75-MW wind energy project (the "Project"). The Project will be located on Amherst Island, within Loyalist Township in the County of Lennox and Addington, Ontario about 11 km southwest of Kingston.

A total of 37 sound sources were included in this study. Twenty four (24) Siemens SWT-2.3-113, twelve (12) SWT-2.221-113 wind turbine generators (WTGs), and one 34.5-kV/115-kV/85-MVA substation transformer were evaluated for noise compliance, in an area extending approximately 14 km by 5 km. It should be emphasized that the Project capacity of 81.9 MW evaluated for noise impact will be reduced to 75 MW and only thirty three (33) wind turbine generators will be installed. Removal of three (3) WTGs will further reduce the overall noise impact from the Project.

The report was prepared according to the publication entitled "Noise Guidelines for Wind Farms" [3] by the Ministry of the Environment (2008) and includes a general description of the Project, noise sources, noise receptors, assessment of compliance, and all supporting information relevant to the Project.

2. Project General Description

It is intended to permit 36 locations for twenty four (24) Siemens SWT-2.3-113 and twelve (12) SWT-2.221-113 wind turbine generators for a total capacity of 81.9 MW, and one for a 34.5-kV/115-kV/85-MVA substation transformer. However, as mentioned before only 33 WTGs will be eventually installed for a total Project capacity of 75 MW. Basic characteristics of the proposed WTG models are available in Table 3.1.

The 34.5-kV power from the WTGs will be transmitted to the substation where it will be stepped up to 115 kV by a 34.5-kV/115-kV/85-MVA transformer.

The Project is considered to be a Class 4 Wind Facility, according to the classification presented in Ontario Regulation 359/09.

2.1 Site Location

The Project will be located on Amherst Island, within Loyalist Township in the County of Lennox and Addington, Ontario. The Project Area, extending 14 km by 5 km, is situated about 11 km southwest of Kingston on land, most of which is zoned as prime agricultural, and the rest as rural. Figure A.1 in Appendix A shows the geographical location of the Project along with topographical features. The detailed Land Use Schedule obtained from Loyalist Township, is available in Figure A.2 of Appendix A.

2.2 Acoustical Environment

The Project WTGs will be situated on private land on the island. There are no major industrial facilities on the island; however a number of large manufacturing facilities, such as Lafarge cement plant and Lennox generating station, are located on the mainland along the shore opposite to the Project Area. Noise emitted by these facilities can be heard along the island north shore during day and night time. The Frontenac II, a vessel used to transport people and goods from the mainland to the island, is a significant background noise contributor near the town of Stella. Stella, the largest populated center on the island, is located in the middle of the northern side of the Project. Most of the noise receptors on the island are located along its shoreline.

2.3 Approach to the Study

The sound pressure levels at the Points of Reception (POR) used to model the noise receptors were predicted using procedures from ISO 9613-2, which is a widely used standard for evaluation of noise impact in environmental assessments referenced in the Noise Guidelines for Wind Farms document [3].

The sound power levels for the WTGs were provided by Siemens, and are included in Appendix B. This information is presented as frequency spectra from 63 Hz to 8,000 Hz, for wind speeds from 6 to 10 m/s.

At this stage of project design, the transformer manufacturer has not been selected. Thus, the sound power level was estimated based on the National Electrical Manufacturers Association (NEMA) standard, which represents a worst-case scenario (highest sound emissions) for the transformers.

The software package CADNA-A, which implements ISO 9613-2 standard recommended by the MOE in Reference [3], was used to predict the noise levels at the POR. Some of the CADNA-A configurations recommended by MOE that were used in the modeling are shown in Figure 2.1, with more details available in Appendix D. The height contours for the area were taken from the Ontario Base Maps ("OBM"). Any obstacle, (ground surface or physical barrier) that did not break the source-POR line of site was not taken into account as attenuation contribution (no negative path difference).

For modelling purposes, the vegetation and other obstacles (such as barns) that block some of the POR from the sources have not been incorporated. Exclusion of these obstacles from the model results in more conservative sound pressure levels predicted at the POR. In reality, these obstacles may help reduce noise impact at the POR.

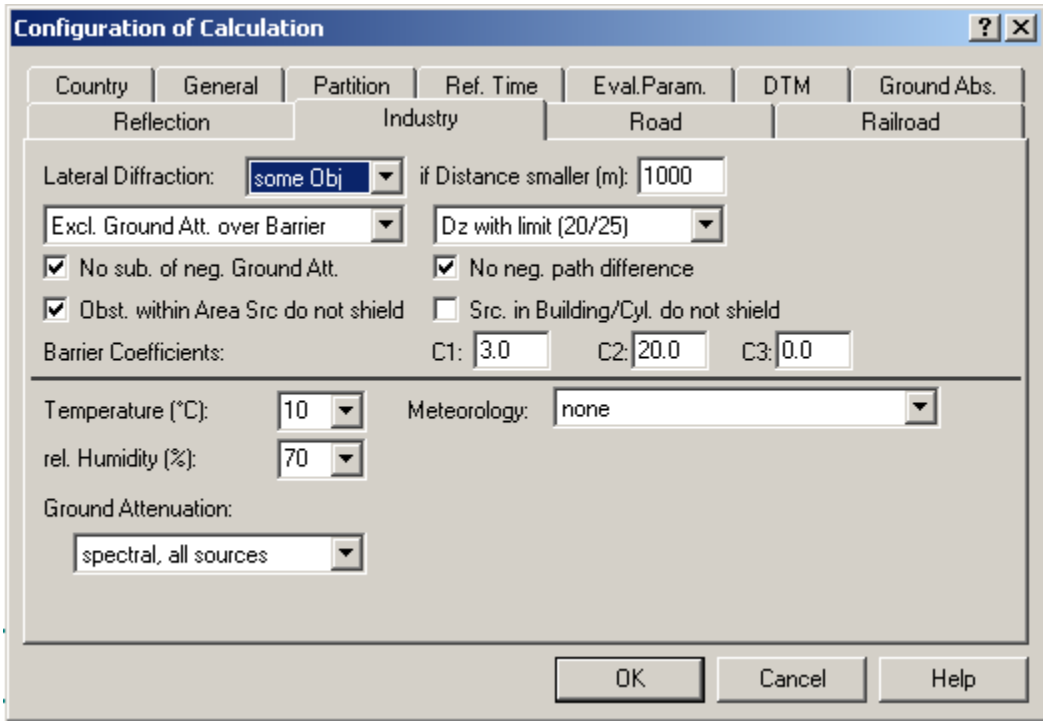

Figure 2.1 CADNA-A Configurations

3. Noise Sources

A total of 36 Amherst Island Wind Project WTGs and one substation transformer were evaluated in this study. Table B.1 and Table B.2 in Appendix B present the coordinates of each source included in the model. The sound power levels of the sources are listed in Table B.6.

3.1 Substation Transformer

The Proponent will have one substation containing one 34.5-kV/115-kV/85-MVA transformer as part of the Project. The 34.5-kV electrical power generated by the WTGs will be stepped up to 115-kV by the transformer.

Since the transformer make and model have not been selected at this point, although it is known that the transformer will be of ONAF (oil natural air forced) type, a conservative estimate of sound power level was based on the data from NEMA TRI – 1993 (2000) and 62.9-m^2 transformer surface area. This standard provides maximum sound level values for transformers, and manufacturers routinely meet this specification. The results, based on NEMA, will slightly overestimate the impact on the POR since the actual transformer to be procured for the project will be below the NEMA specified sound levels.

The NEMA levels were converted into frequency spectra using empirical correlations for transformer noise [4]. This calculation is available in Figure B.1 of Appendix B. The basic transformer dimensions are expected to be similar to those shown in Figure B.2. The noise source height representing the transformer was assumed at 4.0 m above ground level.

Power transformers are considered by the MOE to be tonal noise sources. A 5-dB penalty was added to the sound power spectrum, as recommended by Publication NPC-104, “Sound Level Adjustments” for tonality [8]. Table B.6 in Appendix B shows the frequency spectrum used to model the substation transformer.

The Proponent is committed to installing a transformer that will be quieter than the modeled one.

3.2 Unit Transformers

Each WTG has a 34.5-kV unit transformer located outside of the tower right beside the tower base. These transformers are not considered significant noise sources relative to WTGs, as stated by the MOE Guidelines for Wind Farms [3].

3.3 Wind Turbine Generators

The Proponent is planning to permit a total of thirty six (36) locations, where twenty four (24) Siemens SWT-2.3-113 and twelve (12) SWT-2.221-113 wind turbine generators are modelled. The basic characteristics of the SWT-2.3-113 and SWT-2.221-113 models are presented in Table 3.1. More technical details on the WTGs, including acoustical data provided by Siemens, can be found in Appendix B. WTG coordinates are presented in Table B.1 while sound power level spectra used in the modeling are available in Table B.6. According to the manufacturer and Reference [3], wind turbines do not present any tonality issues; therefore no tonality penalty was added to the sound power spectrum.

The decision regarding which three of the 36 WTG locations to be excluded will be made based on optimization and agency consultations. Removal of three WTGs will further reduce the overall noise impact from the Project.

Table 3.1 Basic Characteristics of Siemens SWT-2.3-113 and SWT-2.221-113 WTG Models

	SWT-2.3-113	SWT-2.221-113
Official model name as provided by Siemens*	SWT-2.3-113 rev1, Max Power 2300 kW	SWT-2.3-113 rev1, Max Power 2221 kW
Type	3-bladed, horizontal axis	3-bladed, horizontal axis
Hub height	99.5 m	99.5 m
Nominal capacity	2.3 MW	2.221 MW
Total maximum sound power	105 dBA	104 dBA
Rotor diameter	113 m	113 m
Swept area	10,000 m^2	10,000 m^2
Blade length	55 m	55 m
Rotor chord	4.2 m	4.2 m
Rotor tilt	6 deg	6 deg
Rotor speed range	6–13 rpm	6–13 rpm
Cut-in wind speed	11 km/h (3 m/s)	11 km/h (3 m/s)
Nominal wind speed	45 km/h (12.5 m/s)	45 km/h (12.5 m/s)
Cut-out wind speed	90 km/h (25 m/s)	90 km/h (25 m/s)

*"SWT-2.3-113 rev1, Max Power 2300 kW" model has been referred in the report as SWT-2.3-113 and "SWT-2.3-113 rev1, Max Power 2221 kW" model has been referred in the report as SWT-2.221-113

3.3.1 Adjustment to Wind Turbine Generator Acoustic Emissions for Wind Speed Profile

The acoustical data provided by Siemens was adjusted to the site specific conditions, and is available in Table B.5 and Table B.6. The acoustical data used in the analysis (Table B.6) is equivalent to the maximum sound emissions reported by Siemens, which corresponds to the wind speed of 7 m/s for SWT-2.3-113 model and 6 m/s for SWT-2.221-113 model. These noise emissions were tested in accordance with IEC 61400-11.

3.4 Adjacent Wind Farms

The closest wind farms proposed in the vicinity of the Project are Ernestown and Dorland, both located on the mainland, north and northwest of the Project, respectively. The information regarding these adjacent wind projects was obtained from their official web sites http://www.ernestownwind.com and http://www.gileadpower.com/projects_eastern_dorland.htm.

Ernestown wind farm is a 10-MW project containing five WTGs. The shortest distance from the Ernestown WTGs to the Amherst Island Wind Project noise receptors is 5,260 m.

Dorland wind farm is an 80-MW project for which no layout is publicly available. Since no data on the WTG locations can be presently obtained, the Dorland project site boundary, available at the web site, was used as a reference. It was determined that the closest Amherst Island Wind Project noise receptor is located at 5,574 m from the Dorland project site boundary.

Following the Noise Guidelines for Wind Farms document [3], no noise contribution from the adjacent wind farms was taken into account since there are no adjacent WTGs at less than 5,000 m from the Project noise receptors.

4. Noise Receptors and Points of Reception

The noise receptors modeled in the study were obtained using Ontario Base Maps, high-resolution satellite imagery, and data from site inspections. The Loyalist municipality was contacted for the approved building permits and all corresponding locations were considered as noise receptors. Also, the noise receptors corresponding to the vacant lots were added based on parcel information provided by First Base Solutions (Teranet Data - 2012) and located according to the requirements outlined in Ontario Regulation 359/09, and its amendment Ontario Regulation 521/10.

The noise receptors were represented by points of reception (POR) in the CADNA model. Each noise receptor was modeled by two POR: one placed in the middle of the receptor footprint and elevated at 4.5 m above ground; and another one by a point located within 30-m distance from the receptor center where the sound pressure is maximum at 1.5-m above ground elevation.

The minimum distance between WTGs and non-participating noise receptors was kept above 550 m. The minimum distance from the existing participating noise receptors was kept at 400 m. No distance restrictions were applied for the participating vacant lot noise receptors. The distances were measured between the noise receptor footprint center and WTG tower center.

The total number of noise receptors located within 1,500 m from any of the Project WTGs and within 1,000 m from the Project substation is 487. As specified by the Noise Guidelines for Wind Farms, the noise receptors were classified as either participating or non-participating. Participating noise receptors correspond to land owners that have some infrastructure on their property. Infrastructure includes wind turbine generators, substation, underground collector cables, access roads, operation and maintenance building, and storage building. For this Project, there are a total of 51 participating noise receptors. All other potential noise receptors (436) are considered non-participating for the purpose of verifying compliance with the MOE guidelines.

5. Mitigation Measures

An acoustical barrier is required at the substation transformer in order to achieve noise compliance at the noise receptors located in the vicinity of the substation. The material for the barriers was assumed to be Durisol Richmond Panel manufactured by Armtec. Table B.3 in Appendix B presents absorption coefficients used in the CADNA-A model, while Figure B.2 shows details of the proposed barrier. 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. More information on the Durisol Richmond Panel can found in Appendix B. The Proponent is committed to using barrier material which will have equivalent or higher absorption coefficients than those used in the modeling.

Table B.4 lists UTM coordinates, height, and length of the substation barrier as it was modeled in CADNA-A.

6. Noise Impact Assessment

The purpose of the acoustic assessment report is to demonstrate that the Project is in compliance with the noise performance limits. All noise receptors considered in the study were assumed to be located in Class 3 areas as defined in Publication NPC-232 by the MOE. A Class 3 area means a rural area with an acoustical environment that is dominated by natural sounds having little or no traffic. Table 6.1 shows the performance limits set by the MOE for Class 3 areas, according to Noise Guidelines for Wind Farms publication.

Table 6.1 Sound Pressure Limits for Class 3 Areas

Wind Speed at 10-m Height [m/s]	4	5	6	7	8	9	10
POR sound pressure limits (dBA)	40.0	40.0	40.0	43.0	45.0	49.0	51.0

For this study, the overall ground attenuation coefficient was assumed to be 0.7, as recommended by the MOE for evaluating the noise impact of renewable energy facilities. The maximum sound pressure level specified at 6 m/s (40.0 dBA) was used as the compliance criterion for the POR representing non-participating noise receptors.

As outlined by Section 6.7 of the Noise Guidelines for Wind Farms (MOE 2008), a manual calculation was carried out to confirm the results obtained using CADNA-A for a single source-POR pair. For this Project, MathCAD was used as a calculating tool, and the source-POR pair selected was S11 and POR at 4.5 m representing R080 noise receptor. R080 is a non-participating noise receptor located 575 m from wind turbine generator S11. The MathCAD printout is included in Appendix D and confirms the results of the CADNA-A model. In addition, a sample calculation from the CADNA-A model for R080 is provided in Appendix D to demonstrate the outputs as wells as the inputs placed into the CADNA-A software.

6.1 Compliance with Performance Limits

Table C.1 in Appendix C presents calculated sound pressure levels at the POR corresponding to non-participating noise receptors and it also lists distances to the nearest noise sources. Table C.2 lists results for the POR representing participating noise receptors. Figure C.1 displays sound pressure contours calculated at 4.5 m. Figure C.2, presented in A0 size, shows more detail regarding setback from wind turbines and property lines, along with the 40 dBA contour line (as per MOE's request on August 28, 2013). Satellite imagery was not added for clarity of the other elements.

The findings of this study show that all non-participating noise receptors are compliant with MOE guidelines based on the performance limit of 40 dBA and 550-m noise receptor-WTG distance.

7. Conclusions and Recommendations

For the Amherst Island Wind Project, the sound pressure levels at the noise receptors have been estimated using the CADNA-A model based on ISO 9613-2. The performance limits used for comparison correspond to Class 3 areas with 40.0-dBA limit.

Based on the results obtained in this study it is concluded that the sound pressure levels, resulting from the Amherst Island Wind Project operation based on 36 WTG locations and one substation transformer, at the noise receptors located within 1,500 m from any of the Project wind turbine generators and within 1,000 m from the Project substation will be compliant with the MOE requirements for Class 3 areas of 40.0 dBA at all times. The removal of three WTGs will further reduce the overall noise impact from the Project.

8. References

[1]. Ontario Regulation 359/09; Environmental Protection Act; Renewable Energy Approvals under Part V.0.1 of the Act.

[2]. Ontario Regulation 521/10 made under the Environmental Protection Act; Amending Ontario Regulation 359/09.

[3]. Noise Guidelines for Wind Farms; Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities; Ministry of the Environment; October 2008.

[4]. Robert D. Stevens; Chris Hung; Toward A Realistic Estimate of Octave Band Sound Levels for Electric Transformers

[5]. NEMA; Standards Publication No. TR 1-1993 (R2000); Transformers, Regulators and Reactors; National Electrical Manufacturers Association.

[6]. ISO 1996-1 Description; Measurement and Assessment of Environmental Noise – Part 1; Basic Quantities and Assessment Procedures.

[7]. International Organization for Standardization (ISO). Standard 1913-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation

[8]. NPC-104, “Sound Level Adjustments,” Ontario Ministry of the Environment

[9]. MOE 1995; Sound Level Limits for Stationary Sources in Class 3 Areas (Rural); Publication NPC-232; Ontario Ministry of the Environment.

[10]. MOE 1995; Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban); Publication NPC-205; Ontario Ministry of the Environment.

Appendix A

Geographic Location of Project Study Area, Wind Farm Layout, Land Use Schedule

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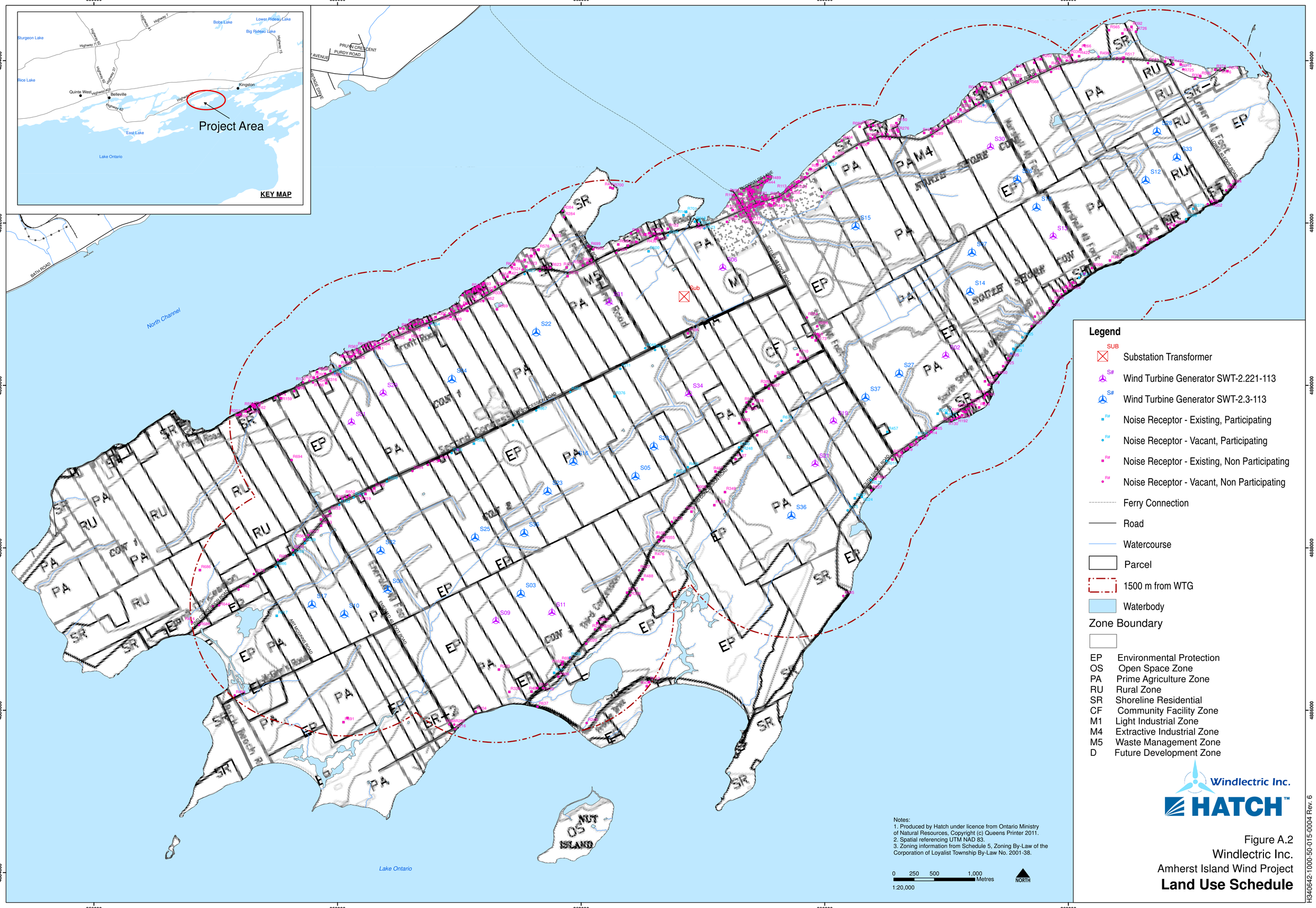

Windlectric Inc.

HATCH™

Figure A.2
Windlectric Inc.
Amherst Island Wind Project
Land Use Schedule

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Appendix B

Noise Sources

Table B.1 Wind Turbine Generator List (36 WTGs).

ID	Equipment make and model	UTM NAD 83, Zone 18		Spectra ID	Total sound power [dBA]	Height [m]
		X[m]	Y[m]			
S01	Siemens SWT-2.221-113	359172	4889551	SWT_22_113_6ms	104.0	99.5
S02	Siemens SWT-2.221-113	366489	4890373	SWT_22_113_6ms	104.0	99.5
S03	Siemens SWT-2.3-113	361257	4887434	SWT_23_113_7ms	105.0	99.5
S04	Siemens SWT-2.3-113	360408	4890076	SWT_23_113_7ms	105.0	99.5
S05	Siemens SWT-2.3-113	362668	4888881	SWT_23_113_7ms	105.0	99.5
S06	Siemens SWT-2.221-113	363743	4891454	SWT_22_113_6ms	104.0	99.5
S07	Siemens SWT-2.3-113	366812	4891637	SWT_23_113_7ms	105.0	99.5
S08	Siemens SWT-2.3-113	359618	4887487	SWT_23_113_7ms	105.0	99.5
S09	Siemens SWT-2.221-113	360951	4887104	SWT_22_113_6ms	104.0	99.5
S10	Siemens SWT-2.3-113	359083	4887184	SWT_23_113_7ms	105.0	99.5
S11	Siemens SWT-2.221-113	361641	4887206	SWT_22_113_6ms	104.0	99.5
S12	Siemens SWT-2.3-113	368952	4892526	SWT_23_113_7ms	105.0	99.5
S13	Siemens SWT-2.221-113	367813	4891841	SWT_22_113_6ms	104.0	99.5
S14	Siemens SWT-2.3-113	366790	4891157	SWT_23_113_7ms	105.0	99.5
S15	Siemens SWT-2.3-113	365379	4891960	SWT_23_113_7ms	105.0	99.5
S16	Siemens SWT-2.3-113	361904	4889060	SWT_23_113_7ms	105.0	99.5
S17	Siemens SWT-2.3-113	358685	4887302	SWT_23_113_7ms	105.0	99.5
S18	Siemens SWT-2.3-113	367607	4892193	SWT_23_113_7ms	105.0	99.5
S19	Siemens SWT-2.221-113	365107	4889563	SWT_22_113_6ms	104.0	99.5
S20	Siemens SWT-2.3-113	362894	4889249	SWT_23_113_7ms	105.0	99.5
S21	Siemens SWT-2.221-113	364881	4889039	SWT_22_113_6ms	104.0	99.5
S22	Siemens SWT-2.3-113	361447	4890656	SWT_23_113_7ms	105.0	99.5
S23	Siemens SWT-2.3-113	361586	4888696	SWT_23_113_7ms	105.0	99.5
S25	Siemens SWT-2.3-113	360694	4888128	SWT_23_113_7ms	105.0	99.5
S26	Siemens SWT-2.3-113	367371	4892536	SWT_23_113_7ms	105.0	99.5
S27	Siemens SWT-2.3-113	365916	4890146	SWT_23_113_7ms	105.0	99.5
S28	Siemens SWT-2.3-113	369091	4893127	SWT_23_113_7ms	105.0	99.5
S29	Siemens SWT-2.221-113	359562	4889909	SWT_22_113_6ms	104.0	99.5
S30	Siemens SWT-2.221-113	367040	4892941	SWT_22_113_6ms	104.0	99.5
S31	Siemens SWT-2.221-113	362343	4891028	SWT_22_113_6ms	104.0	99.5
S32	Siemens SWT-2.3-113	359530	4887967	SWT_23_113_7ms	105.0	99.5
S33	Siemens SWT-2.3-113	369337	4892806	SWT_23_113_7ms	105.0	99.5
S34	Siemens SWT-2.221-113	363324	4889901	SWT_22_113_6ms	104.0	99.5
S35	Siemens SWT-2.3-113	361299	4888183	SWT_23_113_7ms	105.0	99.5
S36	Siemens SWT-2.3-113	364589	4888397	SWT_23_113_7ms	105.0	99.5
S37	Siemens SWT-2.3-113	365501	4889854	SWT_23_113_7ms	105.0	99.5

Table B.2 Location of Substation Transformers.
Sound power level includes a 5-dBA tonality penalty.

ID	Description	UTM NAD 83, Zone 18		Spectra ID	Total sound power [dBA]	Height [m]
		X[m]	Y[m]			
Sub	34.5-kV/115-kV/ 85-MVA substation transformer	363269.13	4891095.48	Tr_34.5kV_115kV_85MW	105.2	4.0

Table B.3 Absorption Coefficient Spectrum for Acoustical Barrier at the Substation Transformer.

Material name	Spectra ID	Octave Spectrum									
		31.5	63	125	250	500	1000	2000	4000	8000	Aw
Durisol Richmond Panel	Durisol Richmond	0	0	0.29	0.53	0.97	0.87	0.89	0.90	0	0.8

Table B.4 Sound Barrier Coordinates.

Barrier ID	Source ID	Absorption Spectra ID	UTM NAD 83, Zone 18		Length [m]	Height [m]
			X[m]	Y[m]		
Barrier_Sub	Sub	Durisol Richmond	363265.12	4891094.03	17.04	6.0
			363266.88	4891090.09		
			363274.64	4891093.56		
			363272.91	4891097.41		

Table B.5 Wind Turbine Generator Sound Power Level Adjustment

Make and Model	Siemens SWT-2.221-113									
Electrical Rating [kW]	2221									
Hub Height [m]	99.5									
Wind Shear Coefficient	0.45									
Octave Band Sound Power Level [dBA]										
	Manufacturer's Emissions Levels					Adjusted Sound Power Level				
Wind Speed [m/s]	6	7	8	9	10	6	7	8	9	10
Frequency [Hz]										
63	84.8	83.6	83.5	83.7	83.4	84.8				
125	90.9	91.3	88.8	88.3	87.5	90.9				
250	97.6	97.7	97.2	96.7	95.9	97.6				
500	98.2	98.0	97.8	97.7	97.4	98.2				
1000	98.8	98.7	98.0	98.0	98.3	98.8				
2000	95.6	95.4	97.1	97.4	97.9	95.6				
4000	84.1	87.8	90.8	92.7	92.9	84.1				
8000	65.6	71.2	74.5	74.6	74.5	65.6				
Combined	104.0	104.0	104.0	104.0	104.0	104.0				

Make and Model	Siemens SWT-2.3-113									
Electrical Rating [kW]	2300									
Hub Height [m]	99.5									
Wind Shear Coefficient	0.45									
Octave Band Sound Power Level [dBA]										
	Manufacturer's Emissions Levels					Adjusted Sound Power Level				
Wind Speed [m/s]	6	7	8	9	10	6	7	8	9	10
Frequency [Hz]										
63	85.0	84.6	83.7	83.9	83.6	84.6				
125	91.3	92.4	89.2	88.7	87.9	92.4				
250	96.8	97.6	98.4	97.8	97.1	97.6				
500	98.9	99.4	99.3	99.2	98.9	99.4				
1000	99.7	100.3	98.9	98.9	99.2	100.3				
2000	95.3	95.9	97.9	98.2	98.7	95.9				
4000	84.9	86.1	90.8	92.7	93.0	86.1				
8000	67.4	68.1	74.4	74.5	74.4	68.1				
Combined	104.4	105.0	105.0	105.0	105.0	105.0				

Table B.6 Sound Power Spectra Used for Modelling the Noise Sources.
The WTG spectra are site adjusted. The data does not include tonality penalties for the transformer.

Spectra ID	Description	Octave spectrum [dBA]									
		31.5	63	125	250	500	1000	2000	4000	8000	Total
SWT_22_113_6ms*	Provided by Siemens for SWT-2.221-113 model for 6-m/s wind speed		84.8	90.9	97.6	98.2	98.8	95.6	84.1	65.6	104.0
SWT_23_113_7ms*	Provided by Siemens for SWT-2.3-113 model for 7-m/s wind speed		84.6	92.4	97.6	99.4	100.3	95.9	86.1	68.1	105.0
Tr_34.5kV_115kV_85MW	Estimated for 34.5-kV/115-kV/85-MW transformer using sound levels from NEMA TR 1-1993 (R2000) and empirical equations from Stevens & Hung paper	55.6	72.8	85.9	91.4	96.8	94.0	90.2	85.0	74.9	100.2

*for both models (SWT-2.3-113 and SWT-2.221-113) different wind speeds and combinations were tested as per data provided by Siemens. The results show that the worst case scenario corresponds to the combination of 7 m/s for SWT-2.3-113 and 6 m/s for SWT-2.221-113, due to the number of receptors closer to the 40.0 dBA performance limit.

Estimated Frequency Spectra for Transformers

Substation transformer - 34.5kV/115kV/85MVA - Oil filled

From Robert D. Stevens and Chris Hung, "Toward a realistic estimate of octave band sound levels for electrical transformers" paper

Average LpA	82.0 dBA	Based on NEMA TR1-1993 (R2000), Table 0-2, immersed power transformers
Estimated surface area	62.9 m^2	Estimated based on similar transformer dimentions

Correction factors to be used with meters^2

Freq. [Hz]	31	63	125	250	500	1000	2000	4000	8000
Correction [dB]	-5.0	-1.0	2.0	0.0	0.0	-6.0	-11.0	-16.0	-24.0

Sound Power Level calculated as Lw=Average LpA + 10*log(Estimated surface area in m^2) + C

Freq. [Hz]	31	63	125	250	500	1000	2000	4000	8000	Combined [dB]
Sound Power, Lw [dB]	95.0	99.0	102.0	100.0	100.0	94.0	89.0	84.0	76.0	**107.0**

Resulting A-weighted sound power level, LwA

Freq. [Hz]	31	63	125	250	500	1000	2000	4000	8000	Combined [dBA]
A-Weight [dB]	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	-
Sound Power, LwA [dBA]	55.6	72.8	85.9	91.4	96.8	94.0	90.2	85.0	74.9	**100.2**

Figure B.1 Substation transformer sound power calculations.

SWT-2.3-113, Rev. 1, Max. Power 2300 kW
Contract Acoustic Emission, Hub Height 99.5 m
Ontario - Canada

Sound Power Levels

The warranted sound power level is presented with reference to the code IEC 61400-11:2002 with amendment 1 dated 2006-05 based on a hub height of 99.5 m and a roughness length of 0.05 m as described in the IEC code. The sound power levels (LWA) presented are valid for the corresponding wind speeds referenced to a height of 10 m above ground level.

Wind speed [m/s]	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Up to cut-out**
Max. Power 2300kW	96.6	102.6	104.4	105.0	105.0	105.0	105.0	105.0	105.0	105.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW]

Typical Sound Power Frequency Distribution

Typical spectra for L_{WA} in dB(A) re 1pW for the corresponding centre frequencies are tabulated below for 6 - 10 m/s referenced to a height of 10.0 m above ground level.

	Wind Speed (m/s)				
Octave band, centre frequency [Hz]	**6**	**7**	**8**	**9**	**10**
63	85.0	84.6	83.7	83.9	83.6
125	91.3	92.4	89.2	88.7	87.9
250	96.8	97.6	98.4	97.8	97.1
500	98.9	99.4	99.3	99.2	98.9
1000	99.7	100.3	98.9	98.9	99.2
2000	95.3	95.9	97.9	98.2	98.7
4000	84.9	86.1	90.8	92.7	93.0
8000	67.4	68.1	74.4	74.5	74.4

Table 2: Typical octave bands for 6-10 m/s, L_{WA} [dB(A) re 1 pW]

Tonality

Typical tonal audibility for the Siemens wind turbine generators has not exceeded 2 dB as determined in accordance with IEC 61400-11:2002.

Measurement Uncertainty

A measurement uncertainty range of -1.5dB(A) to +1.5dB(A) is applicable.

SWT-2.3-113, Rev. 1, Max. Power 2221 kW
Contract Acoustic Emission, Hub Height 99.5 m
Ontario - Canada

Sound Power Levels

The warranted sound power level is presented with reference to the code IEC 61400-11:2002 with amendment 1 dated 2006-05 based on a hub height of 99.5 m and a roughness length of 0.05 m as described in the IEC code. The sound power levels (LWA) presented are valid for the corresponding wind speeds referenced to a height of 10 m above ground level.

Wind speed [m/s]	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Up to cut-out**
Max. Power 2221kW	96.6	102.6	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW]

Typical Sound Power Frequency Distribution

Typical spectra for L_{WA} in dB(A) re 1pW for the corresponding centre frequencies are tabulated below for 6 - 10 m/s referenced to a height of 10.0 m above ground level.

	Wind Speed (m/s)				
Octave band, centre frequency [Hz]	**6**	**7**	**8**	**9**	**10**
63	84.8	83.6	83.5	83.7	83.4
125	90.9	91.3	88.8	88.3	87.5
250	97.6	97.7	97.2	96.7	95.9
500	98.2	98.0	97.8	97.7	97.4
1000	98.8	98.7	98.0	98.0	98.3
2000	95.6	95.4	97.1	97.4	97.9
4000	84.1	87.8	90.8	92.7	92.9
8000	65.6	71.2	74.5	74.6	74.5

Table 2: Typical octave bands for 6-10 m/s, L_{WA} [dB(A) re 1 pW]

Tonality

Typical tonal audibility for the Siemens wind turbine generators has not exceeded 2 dB as determined in accordance with IEC 61400-11:2002.

Measurement Uncertainty

A measurement uncertainty range of -1.5dB(A) to +1.5dB(A) is applicable.

SIEMENS

SWT-2.3-113

Turning moderate wind into maximum results

At the leading edge of evolution

The new Siemens SWT-2.3-113 wind turbine is the ultimate choice for low to moderate wind conditions. The revolutionary direct drive generator and the new, optimized Quantum Blade are paired to extract as much energy as possible from the wind.

Efficient. Quiet. Robust and reliable. The Siemens SWT-2.3-113 is the new benchmark wind turbine for low to medium wind speeds. As a result of more than 30 years of research and development, it is designed to harvest more energy out of moderate wind conditions than anyone thought possible.

Proven design

The SWT-2.3-113 is built around the same revolutionizing direct drive generator as the SWT-3.0-101. The direct drive turbine offers exceptional reliability and efficiency – with only 50% of the parts normally required for a conventional wind turbine.
By using the same proven design and sharing the majority of components with its larger sibling, production costs and lead times can be kept down.

Unique aerodynamics

The Quantum Blade combines exceptional aerodynamic performance with patented manufacturing technology. Based on innovative aerodynamic solutions in the root and tip sections, the Quantum Blade offers maximum efficiency at low to medium wind speeds.

Maximum availability

Simplicity is the ultimate sophistication. With the simple and robust direct drive concept with 50% fewer parts, the SWT-2.3-113 wind turbine is designed for maximum availability. Furthermore, the spacious nacelle and the ergonomic working conditions facilitate serviceability and contribute to minimizing downtime for scheduled maintenance.


“You cannot change the wind.
It may be strong, it may be light.
This leaves it up to us to extract
as much energy as we can from it.
Anne Schannong Vinther, Quality Engineer

Innovation for efficiency

Siemens direct drive technology and the new Quantum Blade represent groundbreaking wind turbine design and technology. The result of these two key innovations is a turbine with maximum efficiency and reliability, which helps to enable a solid return on investment.

Maximized performance with 50% fewer parts

The Siemens direct drive design incorporates a permanent magnet generator with fewer moving parts than ever before.

The simple permanent magnet design offers increased efficiency directly by minimizing energy losses and indirectly by reducing maintenance needs. The outer rotor arrangement leads to a more compact and lightweight generator, making transportation and installation easier and faster.

The B55 Quantum Blade

The new generation of Siemens wind turbine blades is lighter than previous designs but retains the superior strength known from earlier generations of blades. Thanks to unique airfoils and redesigned tip and root sections, the blade offers superior performance at low to medium wind speeds. The root section uses Siemens "flatback" profiles to minimize root leakage and provide higher lift. The tip has also undergone a fine-tuning process to give enhanced lift and acoustic performance.

One-piece moulding

Like other Siemens blades, the new Quantum Blades are manufactured in Siemens proprietary IntegralBlade® process. Each blade is moulded in one single production step from fiberglass-reinforced epoxy resin, resulting in a stronger, lighter blade without any joints.

Lower noise

With a low 105 dB noise level, the SWT-2.3-113 is one of the quietest wind turbines on the market. As a result, this turbine type has an extremely high ratio of energy output per noise affected area, resulting in fewer disturbances to people and wildlife.

Superior grid compliance

The Siemens NetConverter® is designed for maximum flexibility in the turbine's response to voltage and frequency variations, fault ride-through capability and output adjustment. The advanced wind farm control system provides state-of-the-art fleet management.

Technical specification

Rotor

- Type: 3-bladed, horizontal axis
- Position: Upwind
- Diameter: 113 m
- Swept area: 10,000 m²
- Speed range: 6–13 rpm
- Power regulation: Pitch regulation with variable speed
- Rotor tilt: 6 degrees

Blade

- Type: Self-supporting
- Blade length: 55 m
- Tip chord: 0.63 m
- Root chord: 4.2 m
- Aerodynamic profile: NB 1-7, SWPNA1_XX12, FFAxxx
- Material: GRE
- Surface gloss: Semi-mat, <30 / ISO2813
- Surface colour: Light grey, RAL 7035

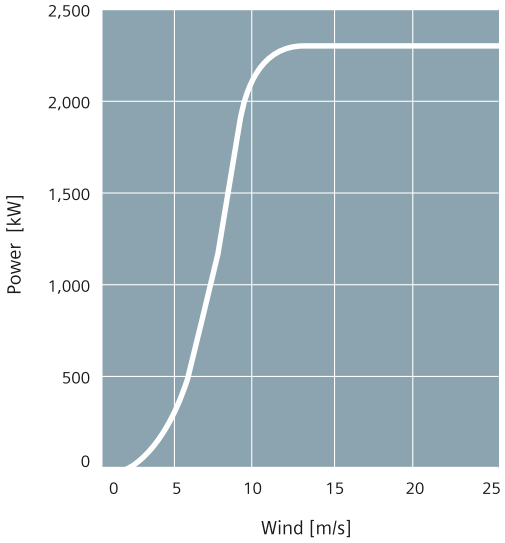
Aerodynamic brake

- Type: Full span pitching
- Activation: Active, hydraulic

Load-supporting parts

- Hub: Nodular cast iron
- Main shaft: Cast
- Nacelle bed plate: Cast

Sales power curve



Mechanical brake

- Type: Hydraulic disc brake
- Position: Generator rear end
- Number of callipers: 3

Canopy

- Type: Totally enclosed
- Surface gloss: Silk mat, 30–40 / ISO2813
- Colour: Light grey, RAL 7035

Generator

- Type: Synchronous, PMG
- Nominal power: 2,300 kW

Grid terminals (LV)

- Nominal power: 2,300 kW
- Voltage: 690 V
- Frequency: 50 Hz or 60 Hz

Yaw system

- Type: Active
- Yaw bearing: Externally geared
- Yaw drive: 8 (optional 10) electric gear motors
- Yaw brake: Passive friction brake

Controller

- Type: Microprocessor
- SCADA system: WPS
- Controller designation: SWTC, STC-1, SCS-1

Tower

- Type: Cylindrical and/or tapered tubular
- Hub height: 99.5 m or site-specific
- Corrosion protection: Painted
- Surface gloss: Silk mat, 30–40 / ISO2813
- Colour: Light grey, RAL 7035

Operational data

- Cut-in wind speed: 3 m/s
- Nominal power at: 12–13 m/s
- Cut-out wind speed: 25 m/s
- Maximum 3 s gust: 59.5 m/s (IEC version)

Weights (approximately)

- Rotor: 66,700 kg
- Nacelle: 73,000 kg
- Tower: Site-specific

1 Quantum Blade

- Unique design and manufacturing process
- IntegralBlade® one-piece moulding for maximum strength
- Optimized aerodynamics for low to medium wind conditions
- Increased length for higher energy yield
- Blade root – designed for minimized root leakage and increased lift

2 Direct drive generator

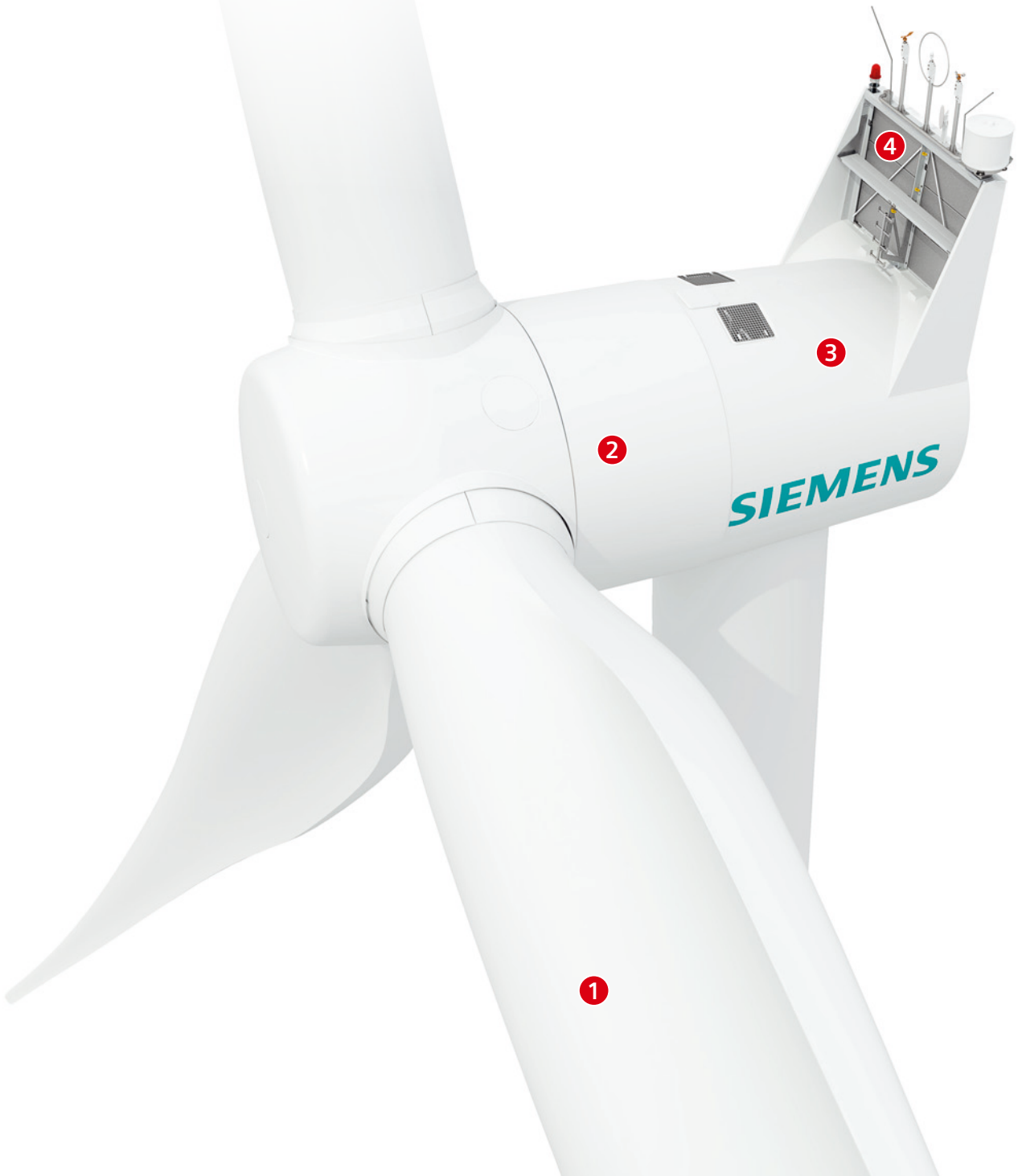
- Permanent magnet design
- Totally enclosed, easy to handle and lightweight design
- Optimum reliability and efficiency

3 Nacelle

- Solid, compact and lightweight structure
- Spacious, ergonomic design – maximum serviceability
- 50% fewer parts compared to geared turbines

4 Cooling

- Simple and robust LiquidLink® water cooling system
- Top-mounted passive cooling radiators
- High-efficient two-stage cooling as function of power



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(Charges depending on provider)
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The required technical options should therefore
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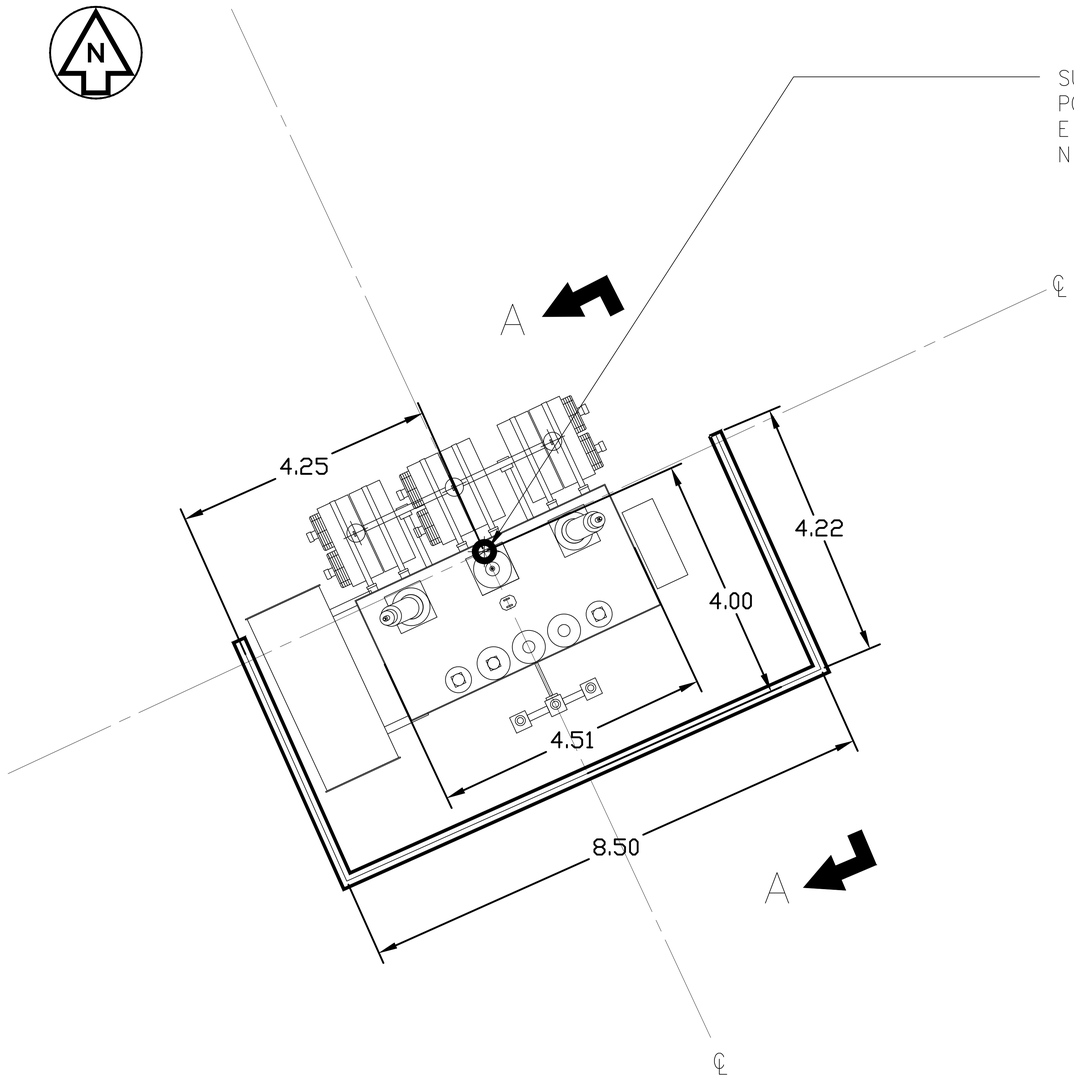
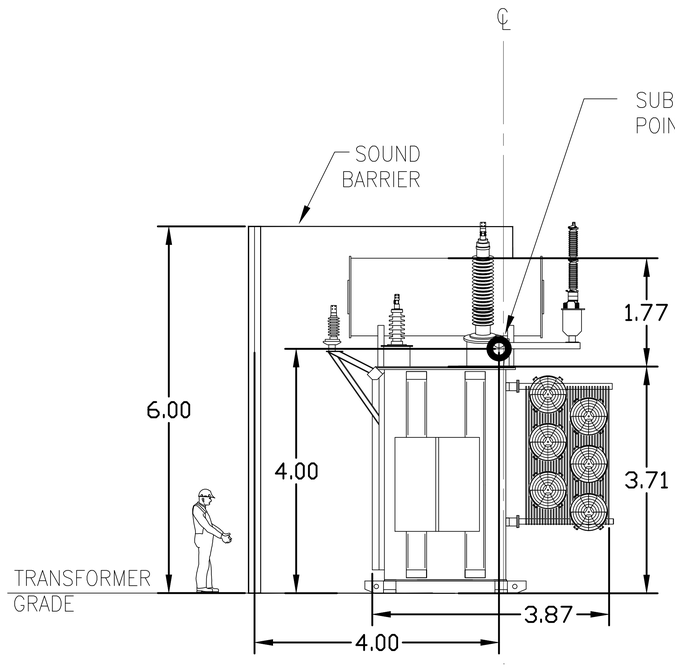


PLAN VIEW



SECTION VIEW
A–A

ALL DIMENSIONS IN METERS

Figure B.2

WINDLECTRIC INS

AMHERST ISLAND WIND PROJECT

SUBSTATION TRANSFORMER AND SOUND BARRIER

HATCH

STORK®

Materials Technology

Stork Twin City Testing Corporation

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Saint Paul, MN 55114
USA

Telephone :(651) 645-3601
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Website :www.twincitytesting.com

Investigative Chemistry
Non Destructive Testing
Metallurgical Analysis

Geotechnical
Failure Analysis
Materials Testing

Construction Materials
Product Evaluation
Welder Qualification

SOUND ABSORPTION TESTING CONDUCTED ON COMPOSITE CONCRETE PANELS

(Richmond Panel– Lid Side - Natural Stone Pattern)

Prepared for:
DURISOL, INC.
Attn. Jason Scarrow
PO Box 400
51 Arthur Street South
Mitchell, Ontario, Canada NOK1NO

Client Purchase Order Number: Verbal

Prepared By:

Mathew N. Botz
Project Manager
Product Testing Department
(651) 659-7353

Reviewed By:

Kyle T. Hall
Sr. Engineering Technician
Product Testing Department

The test results contained in this report pertain only to the samples submitted for testing and not necessarily to all similar products.

NVLAP®
NVLAP LAB CODE 200046-0

PROJECT NUMBER: 30160-06-80467-1

DATE: November 6, 2006

Noise Reduction Coefficient (ASTM C423-02)

INTRODUCTION:

This report presents the results of sound absorption testing conducted on concrete panels. The test unit was submitted by Mr. Jason Scarrow. This work was completed on October 20, 2006.

Stork Twin City Testing Corporation has been accredited by the U.S. Department of Commerce and the National Institute of Standards and Technology (NIST, formerly NBS) under their National Voluntary Laboratory Accreditation Program (NVLAP) for conducting ASTM C423 test procedures. This report may not be used to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.

TEST RESULTS SUMMARY:

Durisol Concrete Panels

				Test Results		
Test #	**Panel Identification**	**Exposed Surface**	**Weight (psf)**	**NRC**	**SAA**	**--**
1	Richmond Panel, Natural Stone Pattern	Lid Side	37.8	0.80	0.80	--

See 'TEST DATA' section for detailed results.

SPECIMEN DESCRIPTION: (Also see "Test Results")

The specimens were described as concrete panels and were identified by Durisol Inc. as Richmond Panels, RDNBP, with a Natural Stone / Natural Stone pattern. Each panel measured 48" x 36-1/2" x 8" and weighed 460-lbs each (37.8-psf). A total of six (6) panels were tested, for a total of 72-ft^2. The 'Lid' surface with the Natural Stone Pattern was tested. The panels were positioned in a 2x3 orientation. Side by side joints were flat butt-joints and stacked panels had tongue & groove joints.

PROJECT NUMBER: 30160-06-80467-1

DATE: November 6, 2006

TEST PROCEDURE

Sound Absorption Test

ASTM C 423-02," Sound Absorption and Sound Absorption Coefficient by the Reverberation Room Method", was followed in every respect. The panels were tested in Type A Mounting (on the floor). The panel edge/perimeter was covered with 8" tall border walls constructed from 5/8" sheetrock

NRC was calculated by rounding the sound absorption coefficients for 250, 500, 1000 and 2000 Hz to the nearest 0.05. SAA was calculated by rounding the sound absorption coefficients for the twelve frequencies from 200 Hz to 2500 Hz to the nearest 0.01.

TEST EQUIPMENT:

Manufacturer	Model	Description	S/N
Norwegian Electronics	NE830	Real Time Analyzer	11511
Brüel & Kjær	3923	Rotating Microphone Boom	815424
Norsonic (Source Rm)	1230	Pressure Condenser Microphone	26361
Brüel & Kjær (Term Rm)	4192	Pressure Condenser Microphone	2360314

REMARKS:

The test sample will be retained for a period of **15-days** and then discarded unless notified by the client.

PROJECT NUMBER: 30160-06-80467-1

DATE: November 6, 2006

TEST RESULTS:

Filename: test 1

ASTM C423 - Sound Absorption

Client	Product	Model #	Quantity	Comment
Durisol Inc.	Richmond Panel	RDNBP	1	Lid Side

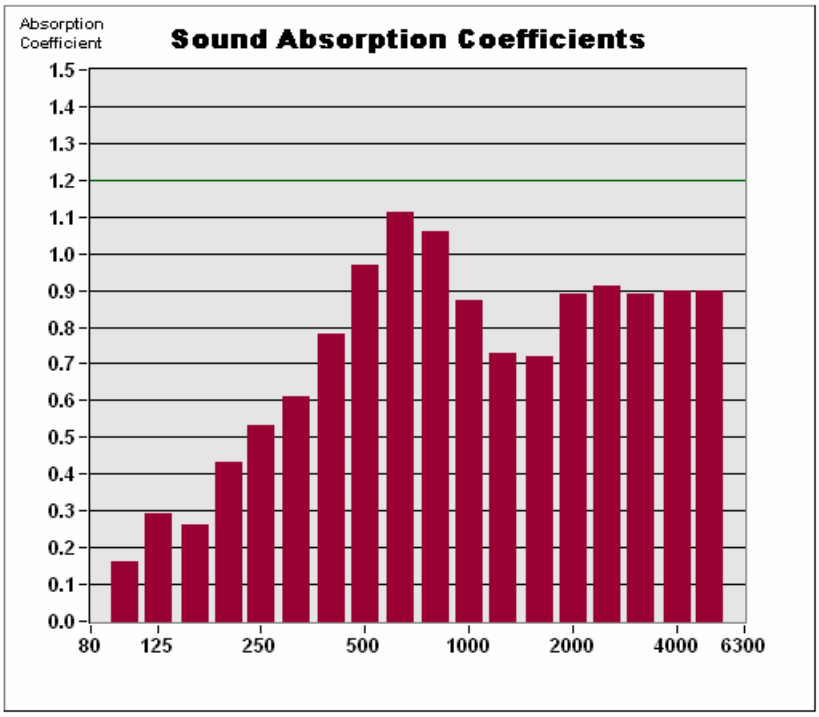
Sample Size - Wt.: 108.0 in x 96.0 in x 8" - 2760 lbs

Sample Description: Durisol Inc.: : Concrete Panel: Richmond Panel - RDNBP : Natural Stone / Natural Stone Pattern : 3' x 4' at 460-lbs each, 6 panels total :

Time Stamp: Fri, Oct 20, 2006 - 10:30 AM

Total Sample Area: 72.0 ft²

F (Hz)	Absorption Coefficient	Absorption (Sabins)*
100	0.16	11.53
125	0.29	21.14
160	0.26	18.73
200	0.43	30.66
250	0.53	38.49
315	0.61	43.93
400	0.78	55.85
500	0.97	69.98
630	1.11	79.60
800	1.06	76.37
1000	0.87	62.99
1250	0.73	52.27
1600	0.72	52.07
2000	0.89	64.41
2500	0.91	65.16
3150	0.89	64.29
4000	0.90	64.62
5000	0.90	65.09



Temp (°C)	R.H. (%)	ATM (mbar)
21.5	54	982

* total absorption based on 72.0 ft²

SAA = 0.80 NRC = 0.80

armtec
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NOISE CONTROL /

DURISOL PRECAST NOISE BARRIERS

ATTRACTIVE, SOUND-ABSORPTIVE WALLS MADE OF DURABLE, FIELD-PROVEN DURISOL MATERIAL

Armtec's Durisol precast noise barriers are made of a proprietary material consisting of organic softwood shavings processed to an acoustically engineered size and bonded together under pressure with Portland cement. Durisol is highly sound absorptive, porous, rigid, non-combustible, thermally insulating and freeze-thaw resistant.

Durisol precast noise barriers are panel and post systems. They are engineered in-house and specify the size for posts and the depth and diameter of footings. Standard steel posts or optional concrete posts can be accommodated.

Our standard systems are noise absorptive on both sides. They can also incorporate solid noise reflective or transparent elements, as well as integrated traffic barriers and retaining wall panels.

Visual appeal
Wide variety of architectural textures, patterns and colours

Panel and post design
Lightweight, easy-to-install systems

Acoustical Characteristics
Noise Reduction Coefficient of 0.70 or greater

TYPICAL APPLICATIONS
- Roads and highways
- Bridges
- Acoustic enclosures
- Residential developments

MITCHELL SYSTEM

Posts are spaced 3.65m apart

Wall height
Engineered for heights up to 6m

Versatile
Ideal for slope conditions, directional changes and areas with difficult site access

Flexible
Panels can be modified on-site for short bays

RICHMOND SYSTEM

Posts are spaced 4.56m apart

Wall height
Engineered for heights up to 11m or more

Economical
Fewer panels reduces on-site handling and installation costs

OHIO SYSTEM

Posts are spaced up to 7.3m apart

Wall height
Engineered for heights up to 11m or more

Cost-effective
Longest post spacing of the Durisol systems

Unique
Ideal for straight runs of wall with good site access where noise absorption is not required on the residential side

DURISOL NOISE BARRIER/ RETAINING WALL

Combination noise barrier/ retaining wall system

Innovative design
Noise barrier and retaining wall panels are stacked on top of each other

Minimal space requirements
Useful in tight spaces

Functional
Well-suited for areas where there are grade differences between the two sides of a barrier

armtec
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Armtec is a leading Canadian infrastructure and construction materials company combining creative engineered solutions, relevant advice, dedicated people, proven products and a national presence with a local focus on exceptional customer service.

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Appendix C

Sound Pressure Levels at Points of Reception, Sound Pressure Contours from CADNA-A

Table C.1 Noise Impact Summary – Non-Participating Project Nose Receptors (436 receptors)

The table is sorted by noise receptors ID; "Vacant" = vacant lot noise receptor, "Existing" = existing dwelling; "Total" = combined contribution from all sources (substation and WTGs); blank cells in "Sound pressure" columns = POR at more than 5000 m from source.

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R005	Existing	359893	4890564	710	S04	3418	12.9	39.2	39.2	12.0	37.4	37.5	40.0
R007	Existing	364239	4892296	976	S06	1543	27.7	35.5	36.2	25.3	33.4	34.0	40.0
R008	Vacant	363457	4888709	780	S20	2394	16.7	39.9	40.0	15.9	38.1	38.1	40.0
R011	Existing	366872	4893632	711	S30	4406	9.1	37.4	37.4	8.3	35.6	35.6	40.0
R014	Existing	366786	4893503	617	S30	4262	13.9	38.4	38.4	11.0	36.7	36.7	40.0
R017	Vacant	358641	4888158	857	S17	5482		39.0	39.0		37.1	37.1	40.0
R018	Existing	364059	4892107	725	S06	1283	29.8	36.8	37.6	27.6	34.9	35.6	40.0
R020	Existing	362062	4886820	571	S11	4442	9.0	39.6	39.6	8.2	37.9	37.9	40.0
R021	Existing	360101	4890790	777	S04	3183	13.9	37.8	37.8	13.0	36.0	36.0	40.0
R022	Existing	362789	4891859	942	S31	902	34.2	36.0	38.2	29.3	33.9	35.2	40.0
R025	Existing	367198	4890237	722	S02	4022	9.9	38.7	38.7	6.2	36.8	36.8	40.0
R026	Existing	367812	4891038	803	S13	4544	8.6	38.9	38.9	2.9	37.0	37.0	40.0
R027	Vacant	365534	4892983	1035	S15	2949	19.4	35.4	35.5	16.5	33.3	33.4	40.0
R028	Existing	364459	4892309	984	S15	1699	26.5	35.9	36.4	24.0	33.8	34.2	40.0
R029	Existing	367962	4891160	697	S13	4693	4.7	39.2	39.2	2.5	37.3	37.3	40.0
R031	Existing	359345	4888662	719	S32	4617	8.4	39.8	39.8	7.5	37.9	37.9	40.0
R033	Existing	360714	4891207	917	S22	2557	16.9	36.5	36.6	16.0	34.3	34.4	40.0
R034	Existing	363968	4892164	745	S06	1277	29.9	36.5	37.3	27.6	34.5	35.3	40.0
R035	Existing	361623	4891803	1058	S31	1792	25.9	35.2	35.6	23.4	33.1	33.6	40.0
R036	Existing	368045	4894070	1408	S28	5626		34.4	34.4		32.2	32.2	40.0
R040	Existing	365623	4888851	766	S21	3253	9.7	39.3	39.3	5.8	37.4	37.4	40.0
R041	Existing	359946	4890749	816	S04	3341	13.2	37.8	37.8	12.3	35.9	35.9	40.0
R045	Vacant	357945	4889761	1245	S01	5489		32.8	32.8		30.7	30.7	40.0
R049	Vacant	364068	4892424	1022	S06	1550	27.6	34.7	35.4	25.3	32.5	33.3	40.0
R051	Vacant	358267	4887854	693	S17	5961		38.7	38.7		37.0	37.0	40.0
R052	Vacant	360318	4890871	800	S04	2959	14.9	37.7	37.7	14.0	35.8	35.8	40.0
R054	Vacant	365772	4893093	1199	S15	3202	18.2	35.3	35.4	15.3	33.2	33.3	40.0
R055	Vacant	359694	4890626	729	S29	3606	12.1	38.2	38.2	11.2	36.4	36.4	40.0
R056	Existing	364908	4890729	1057	S37	1679	20.9	38.3	38.4	19.8	36.2	36.3	40.0
R057	Existing	364082	4892061	695	S06	1262	30.0	37.1	37.9	27.8	35.2	36.0	40.0
R058	Existing	364563	4892351	905	S15	1803	25.8	36.1	36.5	23.2	34.1	34.4	40.0
R060	Existing	358523	4889966	770	S01	4878	7.6	36.6	36.6	6.8	34.8	34.8	40.0
R061	Existing	364298	4892572	1243	S15	1800	25.9	34.3	34.9	23.3	32.1	32.7	40.0
R065	Existing	365563	4893048	1103	S15	3012	19.1	35.1	35.2	16.2	33.0	33.1	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R066	Vacant	357961	4889769	1231	S01	5472		32.9	32.9		30.7	30.7	40.0
R067	Existing	364146	4892216	861	S06	1423	28.6	35.9	36.7	26.3	33.9	34.6	40.0
R068	Existing	364914	4890629	972	S37	1710	20.9	38.6	38.7	19.8	36.6	36.7	40.0
R069	Existing	367873	4894024	1366	S30	5456		34.5	34.5		32.4	32.4	40.0
R070	Existing	357913	4889708	1269	S01	5533		32.7	32.7		30.5	30.5	40.0
R073	Vacant	364649	4892459	885	S15	1940	24.9	36.0	36.3	22.2	34.0	34.3	40.0
R074	Existing	369960	4893872	1145	S28	7244		34.3	34.3		32.4	32.4	40.0
R077	Vacant	367001	4889892	702	S02	3921	9.6	38.4	38.4	7.3	36.6	36.6	40.0
R078	Existing	360762	4891155	848	S22	2508	17.2	37.1	37.1	16.3	34.9	34.9	40.0
R079	Existing	359604	4890575	668	S29	3702	11.8	38.5	38.5	10.8	36.7	36.8	40.0
R080	Existing	362200	4887075	575	S11	4160	10.0	39.7	39.7	9.1	38.0	38.0	40.0
R081	Vacant	360150	4890764	735	S04	3137	14.1	38.2	38.2	13.2	36.3	36.4	40.0
R082	Vacant	363883	4892346	903	S06	1393	28.9	35.1	36.0	26.6	33.1	33.9	40.0
R083	Existing	365430	4893185	1226	S15	3006	19.1	34.1	34.3	16.3	32.0	32.1	40.0
R084	Vacant	361772	4892151	1260	S31	1832	25.6	33.2	33.9	23.2	31.1	31.7	40.0
R085	Existing	360668	4891181	939	S22	2602	16.7	36.5	36.6	15.8	34.3	34.4	40.0
R087	Existing	364076	4892451	1050	S06	1577	27.4	34.5	35.3	25.0	32.4	33.1	40.0
R088	Vacant	360378	4885827	1399	S09	6010		34.0	34.0		31.8	31.8	40.0
R089	Vacant	357464	4887281	1221	S17	6946		33.1	33.1		31.1	31.1	40.0
R090	Existing	358709	4890096	715	S01	4668	8.2	37.6	37.6	7.5	35.8	35.8	40.0
R091	Existing	366966	4889848	709	S02	3902	9.8	38.4	38.4	7.5	36.5	36.5	40.0
R092	Existing	368778	4894417	1327	S28	6432		33.0	33.0		30.9	30.9	40.0
R093	Existing	359060	4888604	791	S32	4891	7.5	39.1	39.1	0.8	37.2	37.2	40.0
R094	Existing	367581	4893976	1168	S30	5185		34.8	34.8		32.7	32.7	40.0
R096	Existing	362996	4891908	875	S06	857	34.7	36.1	38.5	32.6	34.1	36.4	40.0
R097	Existing	368666	4894336	1281	S28	6295		33.4	33.4		31.3	31.3	40.0
R098	Existing	359161	4890353	598	S29	4175	10.0	39.1	39.1	9.1	37.4	37.4	40.0
R099	Existing	368290	4891445	620	S13	5033		39.6	39.6		37.8	37.8	40.0
R100	Existing	357760	4889636	1414	S01	5699		31.9	31.9		29.7	29.7	40.0
R101	Existing	361821	4891454	673	S31	1491	28.1	38.4	38.8	25.6	36.5	36.8	40.0
R103	Existing	363864	4892163	719	S06	1222	30.4	36.6	37.5	28.1	34.7	35.6	40.0
R104	Existing	364124	4892384	1005	S06	1546	27.7	34.9	35.7	25.3	32.8	33.5	40.0
R105	Existing	367259	4890334	771	S02	4062	8.9	38.6	38.6	5.9	36.7	36.7	40.0
R107	Existing	363640	4888526	957	S36	2596	15.8	38.8	38.8	15.0	36.7	36.7	40.0
R109	Existing	362949	4888140	792	S05	2972	14.5	39.0	39.0	13.6	37.1	37.1	40.0
R112	Vacant	365595	4893202	1260	S15	3138	14.1	34.4	34.5	13.3	32.1	32.1	40.0
R113	Existing	364528	4892413	965	S15	1822	25.7	35.7	36.1	23.1	33.6	34.0	40.0
R114	Existing	366256	4889386	833	S27	3441	9.1	39.2	39.2	6.3	37.3	37.3	40.0
R118	Existing	367227	4893765	845	S30	4774	12.1	36.5	36.5	9.2	34.6	34.6	40.0
R120	Vacant	364131	4892300	930	S06	1481	28.2	35.4	36.2	25.8	33.3	34.0	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R122	Existing	363067	4891931	828	S06	860	34.7	36.2	38.5	32.3	34.0	36.2	40.0
R123	Vacant	358576	4890039	770	S01	4810	7.8	36.8	36.8	7.0	34.9	34.9	40.0
R124	Existing	364014	4892185	779	S06	1320	29.5	36.2	37.1	27.2	34.3	35.1	40.0
R125	Existing	369190	4893990	869	S28	6591		36.3	36.3		34.5	34.5	40.0
R126	Existing	360677	4891064	871	S22	2592	16.7	37.3	37.3	15.8	35.3	35.4	40.0
R127	Existing	363902	4889092	977	S36	2101	17.9	39.5	39.5	17.0	37.3	37.4	40.0
R128	Existing	366068	4889271	813	S37	3341	7.7	39.4	39.4	6.6	37.5	37.5	40.0
R130	Existing	366563	4889572	804	S02	3629	10.1	38.8	38.8	9.2	37.0	37.0	40.0
R131	Existing	366560	4893285	590	S30	3953	10.8	38.9	38.9	9.8	37.2	37.2	40.0
R132	Existing	364448	4892350	1010	S15	1721	26.4	35.7	36.2	23.8	33.6	34.0	40.0
R137	Existing	364030	4892155	757	S06	1304	29.6	36.5	37.3	27.4	34.5	35.3	40.0
R138	Existing	359899	4890759	851	S04	3387	13.0	37.6	37.6	12.2	35.7	35.7	40.0
R142	Existing	364168	4889387	794	S21	1930	18.7	39.8	39.8	10.3	37.6	37.6	40.0
R143	Vacant	367172	4893575	648	S30	4624	12.6	38.4	38.4	9.7	36.6	36.6	40.0
R145	Existing	364482	4890164	867	S19	1529	21.2	38.9	38.9	20.0	36.8	36.9	40.0
R149	Vacant	361532	4886274	938	S11	5125		37.1	37.1		35.1	35.1	40.0
R150	Vacant	366698	4889682	722	S02	3709	10.0	38.9	38.9	9.1	37.0	37.1	40.0
R151	Vacant	368981	4893971	851	S28	6395		36.5	36.5		34.7	34.7	40.0
R153	Vacant	368674	4893985	954	S28	6128		35.9	35.9		34.0	34.0	40.0
R157	Existing	360805	4891182	830	S22	2465	17.4	37.1	37.1	16.5	35.0	35.0	40.0
R159	Existing	358305	4889843	915	S01	5120		35.2	35.2		33.2	33.2	40.0
R160	Existing	366960	4889781	756	S02	3918	9.8	38.0	38.0	5.1	36.1	36.1	40.0
R161	Existing	364165	4892220	874	S06	1438	28.5	35.9	36.6	26.2	33.8	34.5	40.0
R162	Existing	357982	4889754	1207	S01	5455		33.1	33.1		30.9	30.9	40.0
R164	Existing	361050	4891333	785	S22	2232	18.7	37.1	37.2	17.8	35.3	35.4	40.0
R165	Existing	359814	4890699	829	S29	3478	12.7	37.8	37.9	11.8	36.0	36.0	40.0
R166	Existing	363313	4890643	742	S34	455	30.8	39.0	39.6	29.5	36.9	37.6	40.0
R167	Existing	359113	4888625	779	S32	4835	7.6	39.3	39.3	0.6	37.3	37.3	40.0
R168	Existing	361769	4886562	656	S11	4775	7.9	39.0	39.0	7.1	37.2	37.2	40.0
R169	Existing	364759	4892564	865	S15	2092	24.0	36.0	36.2	21.3	34.0	34.3	40.0
R171	Existing	364080	4892096	724	S06	1288	29.8	36.8	37.6	27.6	34.9	35.7	40.0
R172	Existing	364572	4892441	940	S15	1873	25.4	35.7	36.1	22.7	33.7	34.0	40.0
R173	Existing	364889	4890554	930	S37	1708	21.0	38.8	38.9	19.9	36.8	36.9	40.0
R175	Vacant	367980	4894001	1413	S28	5534		34.7	34.7		32.6	32.6	40.0
R176	Vacant	369874	4893890	1093	S28	7171		34.6	34.6		32.7	32.7	40.0
R178	Existing	364284	4892521	1196	S06	1750	26.2	34.5	35.1	23.7	32.3	32.9	40.0
R180	Vacant	366000	4889211	814	S37	3318	7.3	39.3	39.3	6.1	37.5	37.5	40.0
R182	Existing	360558	4890989	925	S04	2713	16.1	37.4	37.4	15.2	35.4	35.4	40.0
R184	Vacant	370001	4892471	744	S33	6871		37.9	37.9		36.2	36.2	40.0
R185	Vacant	358849	4890145	676	S01	4521	8.7	38.5	38.5	8.0	36.8	36.8	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R186	Vacant	358699	4890036	678	S01	4691	8.2	37.9	37.9	7.4	36.2	36.2	40.0
R190	Existing	365881	4893230	1194	S30	3373	17.5	35.1	35.1	12.3	32.8	32.9	40.0
R192	Existing	366628	4889597	788	S02	3678	10.0	38.7	38.7	9.1	36.8	36.8	40.0
R193	Existing	360787	4891238	880	S22	2487	17.3	36.6	36.7	16.4	34.5	34.6	40.0
R194	Existing	366226	4893109	831	S30	3577	12.3	37.1	37.1	11.3	35.2	35.2	40.0
R197	Existing	368995	4891793	734	S12	5768		38.8	38.8		37.0	37.0	40.0
R198	Existing	363999	4892125	718	S06	1262	30.0	36.8	37.6	27.8	34.9	35.6	40.0
R199	Existing	363909	4892311	873	S06	1374	29.1	35.3	36.3	26.7	33.3	34.2	40.0
R201	Existing	357805	4889647	1371	S01	5653		32.2	32.2		29.9	29.9	40.0
R202	Existing	367665	4894018	1246	S30	5278		34.6	34.6		32.4	32.4	40.0
R203	Existing	360989	4886500	604	S09	5130		39.7	39.7		38.0	38.0	40.0
R204	Existing	360702	4885983	1148	S09	5721		35.1	35.1		33.0	33.0	40.0
R205	Vacant	358654	4890060	727	S01	4730	8.0	37.3	37.3	7.3	35.5	35.5	40.0
R208	Existing	364074	4892408	1009	S06	1540	27.7	34.8	35.5	25.3	32.6	33.4	40.0
R213	Vacant	362172	4886997	570	S11	4243	9.7	39.7	39.7	8.8	38.0	38.0	40.0
R215	Vacant	363116	4888322	717	S05	2778	15.2	39.6	39.6	14.4	37.7	37.8	40.0
R216	Vacant	360447	4885766	1429	S09	6030		33.7	33.7		31.5	31.5	40.0
R219	Vacant	359279	4888645	723	S32	4682	8.1	39.7	39.7	7.3	37.8	37.8	40.0
R220	Vacant	365110	4892816	898	S15	2520	21.5	35.7	35.8	18.8	33.7	33.9	40.0
R222	Existing	359277	4890416	581	S29	4050	10.4	39.1	39.2	9.6	37.5	37.5	40.0
R226	Vacant	365709	4893089	1176	S15	3151	18.4	35.2	35.3	15.6	33.1	33.2	40.0
R227	Existing	365574	4888708	768	S21	3318	9.6	38.8	38.8	5.9	37.0	37.0	40.0
R229	Existing	363988	4892236	819	S06	1348	29.3	35.9	36.7	27.0	33.9	34.7	40.0
R230	Existing	364061	4892209	819	S06	1367	29.1	36.0	36.8	26.8	34.0	34.8	40.0
R231	Existing	362126	4891540	556	S31	1227	30.3	38.9	39.5	25.1	37.3	37.5	40.0
R232	Existing	364063	4892147	763	S06	1317	29.5	36.5	37.3	27.2	34.5	35.3	40.0
R233	Existing	358904	4888447	789	S32	5106		39.0	39.0		37.1	37.1	40.0
R235	Vacant	365888	4889147	806	S37	3265	7.1	39.5	39.5	5.8	37.6	37.6	40.0
R237	Existing	364222	4892513	1162	S06	1708	26.5	34.4	35.1	24.0	32.2	32.9	40.0
R238	Existing	364680	4892516	893	S15	2002	24.5	35.9	36.2	21.9	33.9	34.2	40.0
R239	Existing	366019	4889228	813	S37	3324	7.4	39.3	39.3	6.2	37.5	37.5	40.0
R244	Existing	360730	4891215	910	S22	2542	17.0	36.5	36.6	16.1	34.3	34.4	40.0
R245	Existing	365893	4893153	1166	S30	3334	13.3	35.4	35.4	12.3	33.2	33.3	40.0
R246	Existing	366902	4889729	765	S02	3881	9.8	38.0	38.0	5.2	36.1	36.1	40.0
R247	Existing	360436	4890915	839	S04	2839	15.5	37.6	37.6	14.6	35.6	35.7	40.0
R249	Vacant	362069	4885844	1428	S11	5387		33.0	33.0		30.8	30.8	40.0
R251	Vacant	366186	4889351	839	S27	3399	8.8	39.3	39.3	6.5	37.4	37.4	40.0
R253	Vacant	366368	4889475	809	S27	3497	10.1	39.2	39.2	5.9	37.3	37.3	40.0
R256	Vacant	368821	4891649	886	S12	5580		38.1	38.1		36.1	36.1	40.0
R259	Vacant	360151	4890808	775	S04	3132	14.2	37.8	37.8	13.3	35.9	36.0	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R261	Existing	364674	4890296	851	S19	1617	21.0	39.1	39.1	19.9	37.1	37.2	40.0
R263	Existing	364092	4892390	999	S06	1534	27.8	34.9	35.6	25.4	32.8	33.5	40.0
R264	Existing	364356	4892322	1062	S06	1639	27.0	35.5	36.1	24.4	33.4	33.9	40.0
R265	Existing	368058	4891269	622	S13	4792	4.7	39.6	39.6	2.7	37.8	37.8	40.0
R266	Existing	368149	4894137	1381	S28	5750		34.1	34.1		31.9	31.9	40.0
R267	Existing	365616	4893060	1125	S15	3060	18.9	35.2	35.3	16.0	33.0	33.1	40.0
R268	Existing	358467	4889930	801	S01	4942	7.4	36.3	36.3	6.6	34.4	34.4	40.0
R270	Existing	358452	4887973	710	S17	5740		39.1	39.1		37.4	37.4	40.0
R271	Existing	360734	4891167	877	S22	2536	17.0	36.9	36.9	16.1	34.7	34.7	40.0
R272	Existing	364271	4892333	1024	S06	1592	27.3	35.3	36.0	24.9	33.2	33.8	40.0
R273	Existing	364132	4892204	844	S06	1404	28.8	36.0	36.8	26.5	34.0	34.7	40.0
R274	Existing	363976	4892355	930	S06	1444	28.5	35.1	35.9	26.1	33.0	33.8	40.0
R275	Existing	361386	4891597	943	S22	1949	24.9	36.1	36.4	19.5	34.1	34.3	40.0
R276	Existing	365906	4893126	1149	S30	3328	13.3	35.6	35.6	12.5	33.4	33.4	40.0
R278	Existing	366657	4889616	775	S02	3697	10.0	38.6	38.6	9.1	36.8	36.8	40.0
R280	Existing	364392	4890113	902	S19	1492	21.2	38.8	38.8	20.1	36.7	36.8	40.0
R282	Vacant	360437	4885826	1377	S09	5982		34.0	34.0		31.9	31.9	40.0
R283	Existing	362698	4891900	942	S31	987	28.8	35.7	36.5	28.3	33.3	34.5	40.0
R284	Vacant	361792	4892073	1181	S31	1771	26.0	33.7	34.4	23.6	31.6	32.2	40.0
R287	Vacant	366449	4893198	644	S30	3812	11.3	38.4	38.4	10.4	36.7	36.7	40.0
R288	Vacant	360601	4890918	864	S04	2674	16.3	37.9	38.0	15.4	36.0	36.1	40.0
R289	Vacant	366325	4893068	726	S30	3637	12.0	38.0	38.0	11.0	36.1	36.1	40.0
R291	Existing	363359	4888447	816	S05	2650	15.7	39.2	39.2	14.8	37.3	37.3	40.0
R292	Existing	359462	4890503	602	S29	3853	11.2	39.0	39.0	10.2	37.3	37.3	40.0
R293	Existing	366725	4893495	637	S30	4207	9.8	38.2	38.2	9.0	36.4	36.4	40.0
R294	Vacant	360012	4890761	791	S04	3274	13.5	37.8	37.8	12.6	36.0	36.0	40.0
R295	Vacant	367768	4890950	892	S13	4501	8.8	38.5	38.6	3.9	36.6	36.6	40.0
R298	Existing	364002	4892399	980	S06	1495	28.1	34.8	35.6	25.7	32.7	33.5	40.0
R300	Existing	359452	4888735	772	S32	4488	8.8	39.7	39.7	7.9	37.7	37.7	40.0
R301	Existing	360046	4890779	790	S04	3239	13.7	37.8	37.8	12.8	35.9	35.9	40.0
R305	Existing	366313	4889429	820	S27	3470	10.1	39.1	39.1	6.2	37.3	37.3	40.0
R306	Existing	369559	4893778	802	S28	6838		37.2	37.2		35.5	35.5	40.0
R307	Existing	360208	4890842	792	S04	3071	14.4	37.6	37.7	13.5	35.8	35.8	40.0
R308	Existing	360481	4889210	870	S04	3366	12.8	39.7	39.7	11.9	37.6	37.6	40.0
R309	Existing	360738	4891222	908	S22	2534	17.0	36.5	36.5	16.2	34.3	34.4	40.0
R311	Existing	363960	4892107	687	S06	1225	30.4	37.0	37.8	28.1	35.1	35.9	40.0
R312	Existing	364228	4892321	993	S06	1556	27.6	35.4	36.0	25.2	33.2	33.9	40.0
R314	Existing	358234	4889849	984	S01	5187		34.6	34.6		32.6	32.6	40.0
R315	Existing	369384	4893953	876	S28	6749		36.3	36.3		34.4	34.4	40.0
R316	Existing	358861	4890030	571	S01	4535	8.7	39.5	39.5	7.9	37.9	37.9	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R321	Vacant	364300	4892531	1212	S06	1767	26.1	34.5	35.1	23.5	32.3	32.8	40.0
R322	Existing	365833	4889090	834	S37	3256	7.2	39.4	39.4	5.9	37.5	37.6	40.0
R323	Vacant	366808	4889767	684	S02	3780	10.0	38.9	38.9	9.2	37.0	37.1	40.0
R324	Vacant	362433	4891633	611	S31	994	32.8	38.1	39.3	30.7	36.4	37.5	40.0
R326	Vacant	360840	4891142	778	S22	2430	17.6	37.5	37.6	16.7	35.7	35.7	40.0
R327	Vacant	367547	4890730	868	S14	4293	5.5	38.5	38.6	4.7	36.6	36.6	40.0
R330	Vacant	364585	4892408	912	S15	1858	25.5	35.9	36.3	22.7	33.9	34.3	40.0
R331	Vacant	365802	4893036	1156	S15	3191	18.3	35.7	35.8	13.0	33.6	33.6	40.0
R332	Vacant	360897	4891167	751	S22	2373	17.9	37.7	37.7	17.0	35.8	35.9	40.0
R333	Existing	362146	4891676	677	S31	1264	25.5	37.2	37.5	24.8	35.3	35.7	40.0
R334	Existing	364084	4892284	897	S06	1441	28.5	35.5	36.3	26.1	33.5	34.2	40.0
R335	Existing	367376	4893735	863	S30	4882	11.7	36.7	36.7	8.9	34.7	34.7	40.0
R336	Existing	364175	4892438	1075	S06	1620	27.1	34.7	35.4	24.7	32.6	33.2	40.0
R338	Existing	361116	4886227	892	S09	5323		37.1	37.1		35.1	35.1	40.0
R339	Existing	366644	4893340	561	S30	4053	10.4	39.1	39.2	9.5	37.5	37.5	40.0
R340	Existing	364514	4892388	966	S15	1795	25.9	35.7	36.2	23.3	33.7	34.1	40.0
R341	Existing	364097	4892228	850	S06	1403	28.8	35.9	36.6	26.5	33.8	34.6	40.0
R342	Existing	368512	4891540	762	S13	5262		38.7	38.7		36.8	36.8	40.0
R343	Existing	364162	4892263	910	S06	1469	28.3	35.6	36.4	25.9	33.6	34.3	40.0
R344	Existing	364542	4892328	915	S15	1772	26.0	36.1	36.5	23.3	34.1	34.4	40.0
R345	Existing	364254	4892556	1215	S06	1762	26.1	34.3	34.9	23.6	32.1	32.7	40.0
R347	Existing	357871	4889681	1308	S01	5581		32.5	32.5		30.3	30.3	40.0
R348	Existing	360487	4890950	877	S04	2786	15.8	37.4	37.5	14.9	35.5	35.5	40.0
R349	Existing	363772	4888688	867	S36	2460	16.4	39.1	39.1	15.5	37.0	37.0	40.0
R350	Existing	366311	4893115	750	S30	3651	12.0	37.7	37.7	11.0	35.8	35.8	40.0
R351	Vacant	366775	4889715	717	S02	3768	9.9	38.7	38.7	9.1	36.8	36.8	40.0
R352	Vacant	369763	4892264	689	S33	6598		39.0	39.0		37.4	37.4	40.0
R353	Existing	359505	4890524	618	S29	3807	11.3	38.8	38.8	10.4	37.1	37.1	40.0
R354	Vacant	364781	4890839	1206	S06	1533	21.6	37.8	37.9	20.5	35.6	35.7	40.0
R355	Vacant	362901	4891871	940	S06	859	34.7	36.1	38.5	32.8	34.0	36.5	40.0
R356	Vacant	362602	4887414	984	S11	3741	11.5	37.4	37.4	10.6	35.3	35.3	40.0
R357	Vacant	366748	4889709	712	S02	3745	10.0	38.8	38.8	9.1	37.0	37.0	40.0
R360	Vacant	360396	4890844	768	S04	2884	15.3	38.0	38.0	14.3	36.2	36.2	40.0
R362	Vacant	369716	4892234	686	S33	6547		39.2	39.2		37.5	37.5	40.0
R364	Existing	358796	4888349	828	S32	5249		38.9	38.9		37.0	37.0	40.0
R365	Vacant	360797	4891118	798	S22	2472	17.4	37.5	37.5	16.4	35.6	35.6	40.0
R369	Existing	360965	4890937	558	S22	2310	22.7	39.9	40.0	20.1	38.3	38.4	40.0
R370	Existing	364908	4892724	897	S15	2310	22.7	35.6	35.8	20.0	33.7	33.8	40.0
R374	Existing	369808	4893889	1046	S28	7111		35.0	35.0		33.1	33.1	40.0
R375	Existing	357788	4889639	1387	S01	5671		32.1	32.1		29.9	29.9	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R378	Existing	364102	4892355	969	S06	1510	28.0	35.1	35.8	25.6	33.0	33.7	40.0
R379	Existing	364062	4892364	964	S06	1495	28.1	35.0	35.8	25.7	32.9	33.7	40.0
R380	Existing	362677	4891770	813	S31	897	34.2	36.6	38.6	32.3	34.6	36.6	40.0
R381	Existing	364083	4892222	839	S06	1390	28.9	35.9	36.7	26.6	33.9	34.6	40.0
R386	Existing	364270	4890005	947	S19	1480	21.1	38.8	38.9	20.0	36.7	36.8	40.0
R387	Existing	366670	4893402	591	S30	4109	10.2	38.7	38.7	9.3	37.1	37.1	40.0
R389	Vacant	361023	4891249	729	S22	2252	23.0	37.7	37.8	17.7	35.9	36.0	40.0
R390	Vacant	364033	4889676	743	S34	1612	20.2	39.5	39.5	19.3	37.4	37.4	40.0
R393	Vacant	368197	4894190	1388	S28	5819		33.8	33.8		31.7	31.7	40.0
R394	Existing	359641	4890604	699	S29	3661	11.9	38.3	38.3	11.0	36.5	36.5	40.0
R396	Existing	361426	4891626	970	S22	1918	25.1	36.0	36.3	19.6	34.0	34.1	40.0
R401	Vacant	366899	4893486	564	S30	4346	13.6	39.1	39.1	10.7	37.5	37.5	40.0
R402	Existing	363945	4892249	820	S06	1336	29.4	35.8	36.7	27.1	33.8	34.7	40.0
R403	Existing	364660	4892504	902	S15	1979	24.7	35.8	36.2	22.0	33.9	34.1	40.0
R404	Existing	365210	4893014	1067	S15	2729	20.5	34.6	34.8	17.7	32.5	32.7	40.0
R405	Existing	362809	4886297	1480	S11	4820	7.7	32.9	32.9	6.9	30.6	30.7	40.0
R407	Existing	360590	4891007	926	S22	2681	16.3	37.3	37.4	15.4	35.4	35.4	40.0
R408	Existing	364184	4892238	899	S06	1464	28.3	35.8	36.5	25.9	33.7	34.4	40.0
R409	Existing	364214	4892234	911	S06	1480	28.2	35.8	36.5	25.8	33.7	34.4	40.0
R411	Existing	362360	4892437	1408	S31	1620	27.1	32.4	33.5	24.7	30.2	31.3	40.0
R412	Existing	367587	4890848	855	S14	4325	9.4	38.9	38.9	4.1	37.0	37.0	40.0
R414	Existing	357207	4887086	1494	S17	7268		31.3	31.3		29.1	29.1	40.0
R415	Existing	360594	4891137	980	S22	2676	16.3	36.5	36.6	15.4	34.4	34.5	40.0
R416	Existing	362577	4891721	731	S31	933	33.8	37.1	38.8	31.7	35.2	36.8	40.0
R417	Existing	362565	4887449	956	S11	3713	11.6	37.7	37.7	10.7	35.6	35.6	40.0
R418	Existing	364078	4892326	934	S06	1472	28.2	35.3	36.0	25.9	33.2	33.9	40.0
R420	Existing	368977	4891757	770	S12	5746		38.5	38.5		36.7	36.7	40.0
R421	Existing	361093	4891340	770	S22	2189	18.9	37.3	37.3	18.0	35.4	35.5	40.0
R422	Existing	368133	4894055	1334	S28	5693		34.5	34.5		32.4	32.4	40.0
R425	Existing	369291	4893952	849	S28	6665		36.5	36.5		34.7	34.7	40.0
R428	Existing	364219	4892470	1121	S06	1670	26.8	34.6	35.3	24.3	32.5	33.1	40.0
R430	Vacant	359558	4890551	642	S29	3751	11.6	38.7	38.7	10.6	36.9	36.9	40.0
R431	Existing	366520	4893262	611	S30	3906	11.0	38.7	38.7	10.0	37.0	37.0	40.0
R433	Vacant	361494	4891408	754	S22	1803	25.8	37.9	38.1	23.3	36.0	36.3	40.0
R436	Existing	362930	4891822	893	S06	802	35.4	36.4	39.0	33.5	34.4	37.0	40.0
R439	Existing	365949	4889171	817	S37	3299	7.1	39.3	39.3	5.8	37.5	37.5	40.0
R440	Vacant	367787	4893861	1185	S30	5297		35.5	35.5		33.4	33.4	40.0
R442	Existing	364265	4892287	983	S06	1553	27.6	35.6	36.2	25.2	33.5	34.1	40.0
R443	Existing	364378	4892243	1012	S06	1595	27.3	35.9	36.5	24.9	33.8	34.4	40.0
R444	Existing	364258	4892501	1166	S06	1718	26.4	34.5	35.1	24.0	32.4	32.9	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R447	Existing	360700	4891163	903	S22	2570	16.8	36.8	36.8	15.9	34.5	34.6	40.0
R450	Existing	367116	4890118	676	S02	3969	7.3	38.8	38.8	6.4	37.0	37.0	40.0
R452	Existing	364340	4892217	968	S06	1550	27.6	36.0	36.6	25.2	33.9	34.4	40.0
R454	Existing	368019	4891231	644	S13	4752	4.7	39.5	39.5	1.7	37.7	37.7	40.0
R459	Existing	367339	4893889	995	S30	4936	7.4	34.5	34.5	6.6	32.8	32.8	40.0
R460	Existing	358748	4890166	747	S01	4616	8.4	37.5	37.5	7.7	35.7	35.7	40.0
R462	Vacant	360797	4891042	755	S22	2472	21.8	38.0	38.1	16.4	36.1	36.2	40.0
R464	Vacant	367916	4891122	726	S13	4647	8.3	39.0	39.1	2.7	37.2	37.2	40.0
R466	Existing	361721	4886415	794	S11	4930	7.4	37.8	37.8	6.6	35.9	35.9	40.0
R467	Existing	363656	4888940	822	S20	2190	17.6	39.7	39.8	16.7	37.7	37.8	40.0
R468	Existing	360663	4891152	928	S22	2607	16.7	36.7	36.7	15.8	34.5	34.5	40.0
R470	Vacant	366861	4893464	553	S30	4303	13.8	39.2	39.2	10.8	37.6	37.6	40.0
R473	Vacant	360111	4889023	1042	S29	3777	11.3	39.5	39.5	10.4	37.3	37.3	40.0
R474	Existing	359973	4890759	810	S04	3314	13.4	37.7	37.8	12.5	35.9	35.9	40.0
R476	Existing	362890	4887884	1021	S05	3234	13.4	37.8	37.8	12.6	35.7	35.7	40.0
R477	Existing	366920	4893657	726	S30	4460	13.2	37.2	37.3	8.1	35.4	35.4	40.0
R478	Existing	360615	4891158	972	S22	2655	16.4	36.5	36.5	15.4	34.3	34.4	40.0
R479	Existing	360802	4891262	885	S22	2473	17.4	36.5	36.6	16.5	34.4	34.5	40.0
R480	Existing	359029	4890238	626	S29	4326	9.4	39.2	39.2	8.6	37.5	37.5	40.0
R481	Existing	367777	4893927	1231	S30	5323		35.1	35.1		33.0	33.0	40.0
R483	Existing	360249	4889075	1014	S04	3634	11.8	39.5	39.5	10.9	37.3	37.4	40.0
R485	Existing	364070	4892182	798	S06	1350	29.3	36.2	37.0	26.9	34.2	35.0	40.0
R486	Existing	363949	4892360	929	S06	1436	28.5	35.0	35.9	26.2	32.9	33.8	40.0
R487	Existing	361390	4886229	978	S09	5217		36.9	36.9		34.9	34.9	40.0
R488	Existing	362754	4887614	1186	S11	3520	12.3	37.2	37.2	11.4	35.1	35.1	40.0
R489	Existing	364327	4892571	1217	S15	1816	25.7	34.3	34.9	23.2	32.2	32.7	40.0
R491	Existing	364510	4892291	931	S15	1723	26.4	36.1	36.6	23.7	34.1	34.5	40.0
R492	Existing	364093	4892417	1024	S06	1557	27.6	34.7	35.5	25.2	32.6	33.3	40.0
R493	Existing	363947	4889535	722	S34	1701	19.7	39.7	39.7	18.9	37.6	37.7	40.0
R494	Vacant	357735	4886184	1468	S17	7400		31.7	31.7		29.6	29.6	40.0
R498	Vacant	368372	4894049	1169	S28	5896		34.9	34.9		32.8	32.8	40.0
R502	Vacant	369943	4892403	728	S33	6800		38.2	38.2		36.5	36.5	40.0
R506	Vacant	365394	4892923	963	S15	2803	20.1	35.6	35.7	17.3	33.5	33.6	40.0
R507	Existing	362913	4891806	902	S06	795	35.5	36.5	39.0	33.6	34.4	37.1	40.0
R508	Vacant	367543	4893804	999	S30	5060		36.0	36.0		34.0	34.0	40.0
R509	Vacant	360379	4890888	812	S04	2898	15.2	37.6	37.7	14.3	35.8	35.8	40.0
R510	Existing	364094	4892193	818	S06	1373	29.1	36.1	36.9	26.7	34.1	34.8	40.0
R511	Existing	366940	4893673	739	S30	4486	13.1	37.1	37.1	8.1	35.3	35.3	40.0
R512	Existing	364183	4892505	1139	S06	1679	26.7	34.4	35.1	24.2	32.2	32.9	40.0
R514	Existing	361461	4886275	947	S11	5148		37.2	37.2		35.2	35.2	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R515	Existing	364434	4892293	1003	S15	1670	26.8	35.9	36.4	24.2	33.8	34.2	40.0
R516	Existing	364116	4889770	802	S34	1573	20.4	39.3	39.3	19.4	37.1	37.2	40.0
R517	Existing	368681	4894038	998	S28	6160		35.5	35.5		33.6	33.6	40.0
R518	Existing	359892	4890709	817	S04	3399	13.0	37.9	38.0	12.1	36.1	36.1	40.0
R519	Existing	367020	4890008	643	S02	3905	7.7	39.0	39.0	6.5	37.2	37.2	40.0
R520	Existing	359123	4885906	1279	S10	6642		34.2	34.2		32.1	32.1	40.0
R521	Existing	364824	4892666	898	S15	2210	23.3	35.6	35.9	20.6	33.7	33.9	40.0
R522	Existing	359403	4890491	603	S29	3913	10.9	38.9	38.9	10.1	37.2	37.2	40.0
R523	Existing	361324	4891465	818	S22	1980	24.7	37.0	37.2	22.1	35.1	35.3	40.0
R524	Existing	361123	4891395	807	S22	2167	19.1	36.9	36.9	18.2	35.0	35.1	40.0
R525	Existing	359206	4890382	592	S29	4125	10.1	39.1	39.1	9.3	37.4	37.4	40.0
R526	Existing	362022	4891479	553	S31	1305	29.6	39.1	39.6	24.4	37.5	37.7	40.0
R527	Existing	361306	4891547	902	S22	2014	20.0	36.3	36.4	19.1	34.3	34.4	40.0
R528	Existing	367900	4894004	1368	S30	5468		34.7	34.7		32.5	32.5	40.0
R529	Vacant	363907	4892083	650	S06	1176	30.8	37.3	38.2	28.6	35.5	36.3	40.0
R531	Vacant	358037	4889756	1153	S01	5400		33.4	33.4		31.3	31.3	40.0
R532	Vacant	366125	4889308	829	S37	3369	7.8	39.3	39.3	6.5	37.5	37.5	40.0
R533	Existing	359064	4890367	676	S29	4268	9.6	38.3	38.3	8.8	36.5	36.6	40.0
R538	Existing	360529	4890971	903	S04	2743	16.0	37.4	37.4	15.1	35.4	35.5	40.0
R540	Vacant	358752	4890104	694	S01	4624	8.4	37.9	37.9	7.6	36.2	36.2	40.0
R541	Existing	359436	4890475	580	S29	3883	11.1	39.2	39.2	10.2	37.5	37.5	40.0
R544	Vacant	364977	4892760	895	S15	2385	22.3	35.6	35.8	19.5	33.7	33.9	40.0
R545	Vacant	365229	4887408	1178	S36	4176	8.6	33.5	33.6	7.9	31.5	31.5	40.0
R547	Existing	360683	4891197	937	S22	2589	16.7	36.5	36.5	15.8	34.3	34.3	40.0
R548	Existing	364600	4892460	926	S15	1906	25.1	35.8	36.1	22.5	33.8	34.1	40.0
R549	Existing	360940	4891214	754	S22	2332	18.1	37.5	37.6	17.2	35.7	35.8	40.0
R550	Existing	364362	4892284	1035	S06	1614	27.2	35.7	36.3	24.6	33.6	34.1	40.0
R551	Existing	357981	4889730	1204	S01	5462		33.1	33.1		30.9	30.9	40.0
R552	Existing	359148	4888646	779	S32	4794	7.8	39.3	39.3	7.0	37.3	37.3	40.0
R553	Existing	364289	4892295	1002	S06	1574	27.5	35.5	36.2	25.0	33.4	34.0	40.0
R554	Existing	364070	4892343	946	S06	1482	28.2	35.1	35.9	25.8	33.1	33.8	40.0
R555	Existing	363019	4888085	870	S05	3020	14.3	38.4	38.4	13.4	36.4	36.5	40.0
R557	Existing	363796	4892015	563	S06	1060	32.0	38.3	39.2	29.8	36.7	37.5	40.0
R558	Existing	364246	4892246	938	S06	1510	28.0	35.7	36.4	25.6	33.7	34.3	40.0
R559	Existing	364319	4892230	965	S06	1545	27.7	35.9	36.5	25.3	33.8	34.4	40.0
R560	Existing	366733	4889671	743	S02	3745	9.9	38.6	38.6	9.1	36.7	36.8	40.0
R561	Existing	358595	4888104	807	S17	5549		39.0	39.0		37.2	37.2	40.0
R562	Existing	359240	4890437	618	S29	4082	10.3	38.7	38.7	9.5	37.0	37.0	40.0
R565	Existing	368500	4894374	1380	S28	6174		33.1	33.1		30.9	30.9	40.0
R567	Existing	365546	4893199	1250	S15	3100	18.7	34.3	34.4	13.4	32.2	32.2	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R568	Vacant	367503	4893727	913	S30	4985	11.4	36.6	36.6	8.5	34.6	34.6	40.0
R569	Vacant	358913	4890177	677	S01	4452	9.0	38.8	38.8	8.2	37.1	37.1	40.0
R570	Existing	367045	4893676	735	S30	4573	12.8	37.3	37.3	9.9	35.4	35.4	40.0
R571	Vacant	364037	4889790	721	S34	1514	20.7	39.4	39.5	19.9	37.3	37.4	40.0
R574	Vacant	361281	4891427	789	S22	2016	24.4	37.2	37.4	21.9	35.3	35.5	40.0
R576	Existing	361477	4891672	1017	S22	1882	25.3	35.7	36.1	22.8	33.7	34.1	40.0
R579	Vacant	357971	4887678	807	S17	6305		37.0	37.0		35.2	35.2	40.0
R581	Existing	357958	4889741	1229	S01	5482		32.9	32.9		30.8	30.8	40.0
R582	Existing	368198	4891377	603	S13	4937	4.3	39.7	39.7	3.1	37.9	38.0	40.0
R584	Existing	359512	4890469	563	S29	3809	11.3	39.5	39.5	10.4	37.8	37.9	40.0
R585	Existing	362088	4891716	733	S31	1334	24.9	36.8	37.1	24.1	34.7	35.1	40.0
R587	Existing	367153	4893734	801	S30	4696	12.4	36.8	36.8	7.4	34.9	34.9	40.0
R590	Existing	369626	4893805	864	S28	6910		36.6	36.6		34.9	34.9	40.0
R591	Existing	363953	4892194	769	S06	1295	29.7	36.2	37.1	27.5	34.3	35.1	40.0
R593	Existing	360756	4891210	885	S22	2515	17.1	36.7	36.7	16.3	34.5	34.6	40.0
R594	Existing	363983	4892268	848	S06	1372	29.1	35.6	36.5	26.8	33.7	34.5	40.0
R595	Existing	364229	4892241	924	S06	1494	28.1	35.8	36.5	25.7	33.7	34.3	40.0
R596	Existing	364036	4892426	1014	S06	1535	27.8	34.6	35.4	25.4	32.5	33.3	40.0
R597	Vacant	364783	4892608	881	S15	2140	23.7	35.8	36.1	21.0	33.9	34.1	40.0
R602	Existing	362078	4891512	552	S31	1262	30.0	39.0	39.5	24.7	37.4	37.6	40.0
R604	Vacant	359924	4888947	964	S01	3976	10.5	39.5	39.5	9.6	37.3	37.3	40.0
R607	Existing	364312	4889960	888	S19	1542	20.8	39.0	39.1	19.7	36.9	37.0	40.0
R608	Vacant	369253	4891943	656	S12	6044		39.5	39.5		37.8	37.8	40.0
R609	Vacant	369303	4891969	659	S12	6097		39.5	39.5		37.9	37.9	40.0
R610	Vacant	362241	4886993	637	S11	4230	9.7	39.0	39.0	8.9	37.2	37.2	40.0
R611	Vacant	363447	4891985	608	S06	907	29.3	37.7	38.3	28.7	36.0	36.8	40.0
R612	Existing	359317	4890473	614	S29	4001	10.6	38.7	38.7	9.8	37.0	37.0	40.0
R613	Existing	358798	4888273	793	S32	5287		39.2	39.2		37.4	37.4	40.0
R614	Vacant	366592	4889595	785	S02	3646	10.1	38.8	38.8	9.2	37.0	37.0	40.0
R615	Existing	366692	4889634	766	S02	3722	9.9	38.6	38.6	9.1	36.7	36.7	40.0
R616	Vacant	366974	4889878	693	S02	3900	9.7	38.5	38.5	7.4	36.7	36.7	40.0
R619	Existing	364846	4890591	986	S37	1655	21.3	38.5	38.6	20.2	36.5	36.6	40.0
R620	Existing	362854	4891844	962	S31	856	34.7	36.2	38.5	32.8	34.1	36.5	40.0
R621	Vacant	364097	4892045	689	S06	1260	30.0	37.2	38.0	27.8	35.3	36.0	40.0
R622	Vacant	366374	4893149	698	S30	3722	11.7	38.0	38.0	10.7	36.2	36.2	40.0
R623	Vacant	361623	4891448	811	S22	1683	26.7	37.8	38.1	24.2	35.9	36.2	40.0
R625	Existing	362841	4891878	984	S31	892	34.3	36.0	38.2	32.3	33.9	36.2	40.0
R626	Existing	362457	4891736	716	S31	1034	32.2	37.1	38.3	30.0	35.2	36.4	40.0
R627	Vacant	362715	4887724	1158	S05	3416	12.7	37.7	37.7	11.9	35.6	35.6	40.0
R628	Existing	364176	4892227	886	S06	1450	28.4	35.9	36.6	26.1	33.8	34.5	40.0

Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R631	Existing	364157	4892328	967	S06	1519	27.9	35.3	36.0	25.5	33.1	33.8	40.0
R632	Existing	367413	4893773	913	S30	4934	11.6	36.3	36.3	8.7	34.3	34.4	40.0
R633	Existing	362614	4891873	887	S31	1017	27.9	35.6	36.3	27.9	33.5	34.5	40.0
R636	Existing	360541	4891112	1014	S22	2728	16.0	36.5	36.6	15.1	34.4	34.5	40.0
R637	Existing	361463	4886045	1174	S11	5363		35.4	35.4		33.3	33.3	40.0
R638	Vacant	367596	4893832	1051	S30	5119		35.8	35.8		33.7	33.7	40.0
R641	Existing	361144	4891459	858	S22	2156	19.1	36.0	36.1	18.2	34.2	34.3	40.0
R642	Vacant	357783	4887487	921	S17	6567		35.7	35.7		33.8	33.8	40.0
R643	Existing	361178	4891489	875	S22	2127	19.3	36.0	36.1	18.4	34.1	34.2	40.0
R644	Vacant	357541	4887291	1144	S17	6876		33.7	33.7		31.7	31.7	40.0
R668	Vacant	364291	4892526	1203	S06	1758	26.1	34.5	35.1	23.6	32.3	32.9	40.0
R670	Existing	361834	4891347	600	S31	1457	28.4	39.4	39.7	26.0	37.6	37.9	40.0
R673	Existing	366974	4890051	582	S02	3849	9.6	39.6	39.6	6.7	37.9	37.9	40.0
R675	Vacant	364106	4892299	919	S06	1465	28.3	35.4	36.2	25.9	33.4	34.1	40.0
R676	Vacant	364056	4892399	995	S06	1522	27.9	34.8	35.6	25.5	32.7	33.4	40.0
R677	Existing	364118	4892402	1019	S06	1558	27.6	34.8	35.6	25.2	32.7	33.4	40.0
R686	Existing	357305	4887726	1443	S17	6850		32.0	32.0		29.8	29.8	40.0
R689	Vacant	357295	4887048	1413	S17	7216		31.8	31.8		29.6	29.6	40.0
R691	Existing	359074	4885854	1330	S10	6713		33.8	33.8		31.7	31.7	40.0
R693	Existing	361775	4886598	622	S11	4739	8.0	39.4	39.4	7.2	37.6	37.6	40.0
R694	Existing	358435	4889082	874	S01	5237		36.3	36.3		34.2	34.2	40.0
R695	Existing	359183	4890360	589	S29	4152	10.0	39.2	39.2	9.2	37.5	37.5	40.0
R696	Existing	359353	4890487	615	S29	3963	10.8	38.7	38.7	9.9	37.0	37.0	40.0
R697	Existing	359774	4890703	822	S29	3517	12.5	37.7	37.7	11.6	35.8	35.8	40.0
R698	Existing	360402	4890935	859	S04	2872	15.3	37.3	37.4	14.4	35.4	35.5	40.0
R699	Existing	362107	4891706	717	S31	1313	25.0	36.8	37.1	24.3	34.9	35.3	40.0
R700	Existing	362391	4892427	1399	S31	1595	27.3	32.5	33.7	24.9	30.3	31.4	40.0
R702	Existing	363925	4892260	826	S06	1337	29.4	35.7	36.6	27.1	33.7	34.6	40.0
R703	Existing	364024	4892195	792	S06	1334	29.4	36.1	37.0	27.1	34.2	35.0	40.0
R704	Existing	364126	4892157	800	S06	1364	29.1	36.3	37.1	26.9	34.3	35.0	40.0
R705	Existing	364195	4892263	927	S06	1491	28.1	35.6	36.3	25.7	33.6	34.2	40.0
R706	Vacant	364297	4892527	1207	S06	1762	26.1	34.5	35.1	23.6	32.3	32.9	40.0
R707	Existing	364963	4892327	555	S15	2094	24.0	39.2	39.3	21.2	37.7	37.8	40.0
R708	Existing	365565	4893159	1214	S15	3087	18.7	34.6	34.7	13.5	32.4	32.5	40.0
R709	Vacant	364932	4890605	942	S37	1734	20.8	38.8	38.9	19.7	36.8	36.8	40.0
R710	Existing	364665	4890379	928	S19	1568	21.4	38.7	38.8	20.3	36.7	36.8	40.0
R711	Vacant	362959	4888080	853	S05	3032	14.2	38.6	38.6	13.4	36.6	36.6	40.0
R712	Existing	362837	4886350	1471	S11	4765	7.9	33.0	33.0	7.1	30.7	30.8	40.0
R723	Existing	366870	4893610	690	S30	4392	13.4	37.6	37.6	8.3	35.8	35.8	40.0
R724	Existing	367973	4891218	643	S13	4705	4.7	39.6	39.6	1.5	37.8	37.8	40.0

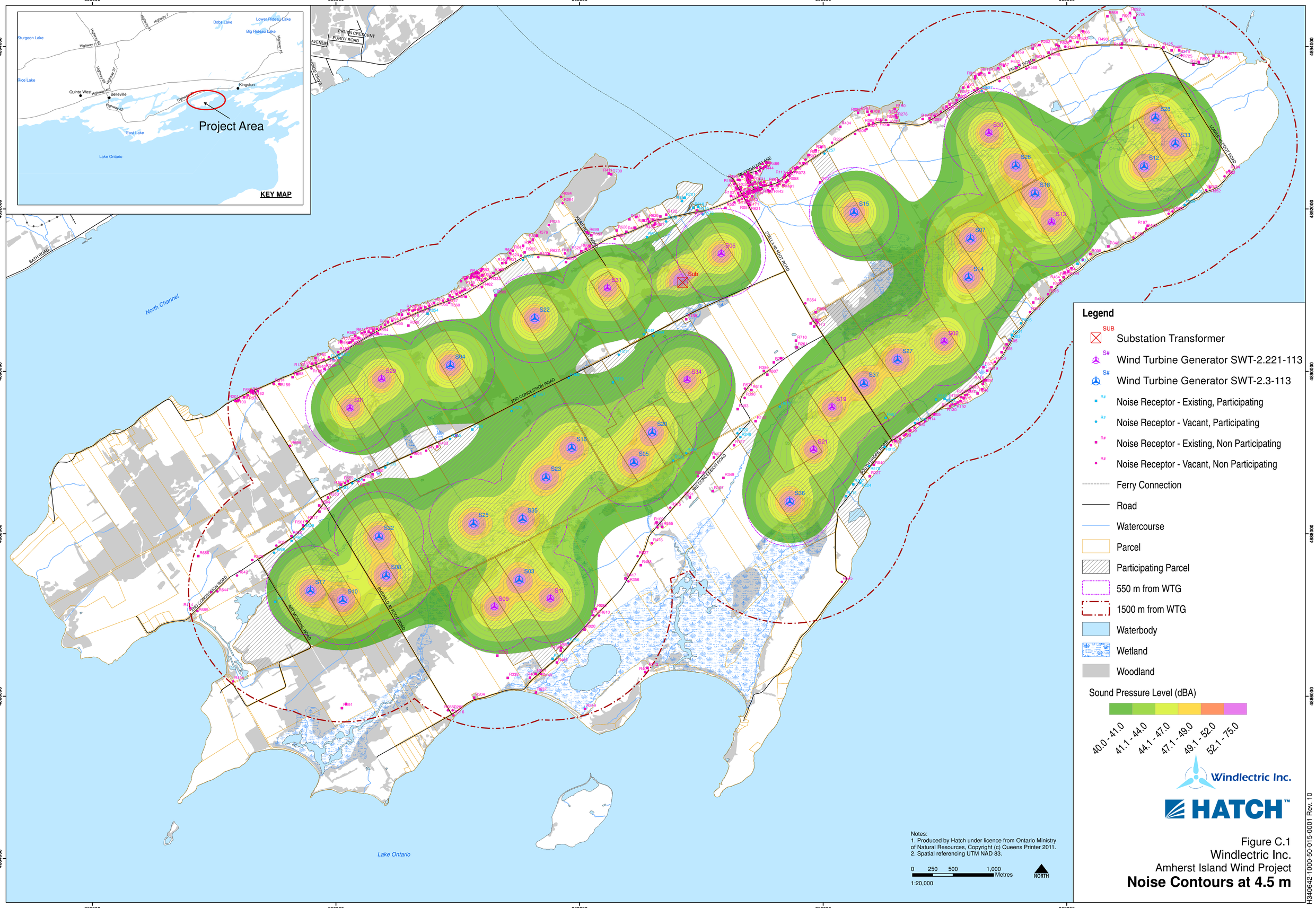
Noise Receptor ID	Description	UTM NAD 83, Zone 18		Nearest source distance [m]			Sound pressure [dBA]						
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m			
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total	Limit
R725	Vacant	369414	4893893	831	S28	6751		36.7	36.7		35.0	35.0	40.0
R726	Existing	368834	4894356	1255	S28	6450		33.4	33.4		31.3	31.3	40.0

Table C.2 Noise Impact Summary – Participating Project Noise Receptors (51 receptors)

The table is sorted by noise receptors ID; "Vacant" = vacant lot noise receptor, "Existing" = existing dwelling; "Total" = combined contribution from all sources (substation and WTGs); blank cells in "Sound pressure" columns = POR at more than 5000 m from source.

Noise Receptor ID	Description	UTM NAD 83, zone 18		Nearest source distance [m]			Sound pressure [dBA]					
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m		
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total
R015	Existing	365758	4889070	816	S19	3208	7.0	39.7	39.7	5.8	37.9	37.9
R039	Vacant	359608	4888818	853	S01	4312	9.4	39.6	39.6	8.5	37.5	37.5
R044	Vacant	362910	4890438	679	S34	749	28.4	39.8	40.1	27.2	37.7	38.1
R048	Vacant	362789	4890459	724	S31	797	28.4	39.7	40.0	27.4	37.6	38.0
R076	Vacant	361163	4889513	869	S16	2635	15.8	40.3	40.3	14.8	38.3	38.3
R086	Vacant	358239	4887766	644	S17	6032		39.1	39.1		37.4	37.4
R115	Vacant	365282	4888463	696	S36	3314	9.5	39.7	39.7	8.7	38.0	38.0
R134	Existing	367322	4890451	836	S02	4104	6.2	38.7	38.7	4.7	36.7	36.7
R140	Existing	363261	4892098	804	S06	1002	28.0	35.9	36.5	28.1	33.9	34.9
R156	Vacant	358969	4890147	630	S01	4403	9.2	39.5	39.5	8.4	37.9	37.9
R177	Existing	366495	4889660	712	S02	3531	10.3	39.8	39.8	9.4	38.1	38.1
R179	Vacant	366131	4889365	798	S37	3345	8.7	39.7	39.7	6.5	37.9	37.9
R183	Vacant	359023	4888530	757	S32	4962	7.2	39.2	39.2	6.5	37.3	37.3
R211	Vacant	362482	4890207	834	S31	1187	23.3	39.7	39.8	22.5	37.6	37.7
R224	Vacant	365458	4888627	710	S21	3300	9.6	39.2	39.2	8.8	37.4	37.4
R248	Vacant	363980	4889192	913	S21	2032	18.2	39.5	39.6	17.2	37.4	37.4
R250	Vacant	361864	4886650	599	S11	4662	8.3	39.4	39.4	7.5	37.7	37.8
R254	Existing	360129	4890712	694	S04	3163	14.0	38.6	38.6	13.1	36.8	36.8
R255	Vacant	360406	4889168	908	S04	3452	12.5	39.6	39.6	11.7	37.5	37.5
R257	Vacant	365016	4892682	808	S15	2360	22.4	36.4	36.5	19.7	34.5	34.6
R297	Existing	365371	4888610	651	S21	3255	9.6	39.8	39.8	8.8	38.0	38.0
R310	Existing	363457	4892030	643	S06	953	28.8	37.3	37.9	28.2	35.5	36.3
R328	Vacant	363066	4891848	783	S06	779	35.7	36.7	39.2	30.9	34.7	36.2
R329	Vacant	358599	4888058	761	S17	5571		39.4	39.4		37.6	37.6
R337	Existing	368133	4891327	605	S13	4869	4.7	39.7	39.7	3.0	37.9	38.0
R373	Existing	369538	4892176	661	S33	6361		40.1	40.1		38.6	38.6
R376	Existing	362412	4889866	783	S20	1499	21.6	40.6	40.6	20.6	38.6	38.7
R383	Existing	367296	4890391	807	S02	4088	6.5	38.6	38.6	4.3	36.7	36.7
R399	Vacant	369451	4892050	690	S12	6255		39.5	39.5		37.9	37.9
R427	Vacant	361304	4891372	730	S22	1984	24.6	37.7	37.9	22.1	36.0	36.1
R435	Vacant	363314	4888993	492	S20	2103	18.1	42.4	42.4	17.2	40.9	40.9
R441	Existing	361668	4886460	746	S11	4904	7.5	38.4	38.4	6.7	36.5	36.5
R457	Existing	365771	4889428	504	S37	3006	14.4	42.5	42.5	13.5	41.0	41.0
R463	Vacant	361867	4889920	848	S22	1830	19.5	40.1	40.1	18.4	38.0	38.1
R465	Vacant	359201	4888621	732	S32	4762	7.9	39.6	39.6	7.1	37.7	37.7
R469	Vacant	358454	4887914	654	S17	5771		39.6	39.6		37.9	37.9

Noise Receptor ID	Description	UTM NAD 83, zone 18		Nearest source distance [m]			Sound pressure [dBA]					
				WTG		Sub-station	POR at 4.5 m			POR at 1.5 within 30 m		
		X	Y	Distance	ID	Distance	Substation	WTGs	Total	Substation	WTGs	Total
R503	Vacant	363155	4888902	434	S20	2197	17.8	43.8	43.8	16.9	42.4	42.4
R505	Vacant	367435	4890592	857	S14	4196	9.8	38.6	38.6	5.0	36.6	36.6
R537	Vacant	366953	4893452	519	S30	4374	13.5	39.8	39.8	10.6	38.2	38.2
R556	Existing	366391	4889653	684	S27	3439	10.4	40.4	40.4	9.5	38.6	38.6
R573	Vacant	363517	4891934	531	S06	875	29.7	38.7	39.2	29.1	37.1	37.8
R577	Vacant	359041	4890166	581	S29	4329	9.4	40.0	40.0	8.6	38.4	38.4
R578	Vacant	365567	4888834	716	S21	3224	13.3	39.5	39.6	9.0	37.7	37.7
R598	Existing	360680	4889284	838	S04	3160	13.6	39.9	39.9	12.8	37.8	37.8
R600	Existing	362831	4891653	793	S31	709	36.7	37.3	40.0	34.4	35.2	37.8
R617	Existing	358252	4887163	455	S17	6375		41.4	41.4		40.1	40.1
R618	Existing	363401	4892017	659	S06	931	29.1	37.2	37.8	28.5	35.4	36.2
R667	Vacant	361446	4889693	781	S16	2300	17.3	40.3	40.4	16.3	38.3	38.4
R678	Vacant	364467	4889566	640	S19	1943	18.7	40.9	40.9	17.6	39.1	39.1
R701	Existing	363294	4892136	817	S06	1041	27.6	35.7	36.3	27.0	33.8	34.6
R720	Vacant	363943	4889237	907	S34	1977	18.5	39.5	39.6	17.5	37.4	37.4



Legend

- Substation Transformer
- Wind Turbine Generator SWT-2.221-113
- Wind Turbine Generator SWT-2.3-113
- Noise Receptor - Existing, Participating
- Noise Receptor - Vacant, Participating
- Noise Receptor - Existing, Non Participating
- Noise Receptor - Vacant, Non Participating
- Ferry Connection
- Road
- Watercourse
- Parcel
- Participating Parcel
- 550 m from WTG
- 1500 m from WTG
- Waterbody
- Wetland
- Woodland

Sound Pressure Level (dBA)

40.0 - 41.0 | 41.1 - 44.0 | 44.1 - 47.0 | 47.1 - 49.0 | 49.1 - 52.0 | 52.1 - 75.0

Notes:
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2. Spatial referencing UTM NAD 83.

0 250 500 1,000 Metres

1:20,000

NORTH

Windlectric Inc.

HATCH™

Figure C.1
Windlectric Inc.
Amherst Island Wind Project
Noise Contours at 4.5 m

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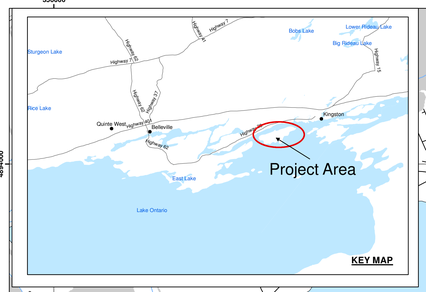

Legend

- Substation Transformer
- Wind Turbine Generator SWT-2.221-113
- Wind Turbine Generator SWT-2.3-113
- Noise Receptor - Existing, Participating — Sound Pressure (dBA) at 4.5 m
- Noise Receptor - Vacant, Participating — Sound Pressure (dBA) at 4.5 m
- Noise Receptor - Existing, Non Participating — Sound Pressure (dBA) at 4.5 m
- Noise Receptor - Vacant, Non Participating — Sound Pressure (dBA) at 4.5 m
- Ferry Connection
- Road
- Watercourse
- Parcel
- Participating Parcel
- 550 m from WTG
- 1500 m from WTG
- 40 dBA at 4.5 m Sound Pressure Contour
- Waterbody
- Wetland
- Woodland

Notes:
1. Produced by Hatch under licence from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2011.
2. Spatial referencing UTM NAD 83.

0 200 400 800 Metres
1:14,000
NORTH

Windlectric Inc.
HATCH™

Figure C.2
Windlectric Inc.
Amherst Island Wind Project

Noise Assessment Study Details as per MOE Request of August 28, 2013

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Appendix D

CADNA-A Sample Calculation and Verification

Calculation of Sound Pressure Levels from Wind Turbine using ISO 9613-2

Amherst Island Wind Project

Background

As requested by the Ministry of Environment in the Noise Guidelines for Wind Farms in Section 6.7 – Appendices (October 2008), a sample calculation should be included in the Noise Assessment Report. The sample calculation must include at least one detailed calculation for a source to point of reception "pair," preferably addressing the closest wind turbine unit, and it must represent all other "pairs".

For this project, a POR representing non-participating Noise Receptor R080 along with S11 turbine were chosen as a "pair".

The calculations are based on ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – General Method of Calculation. The ground attenuation coefficient was assumed as 0.7, as suggested by the MOE Guidelines (Section 6.4.10 – Specific Parameters). Ambient temperature and relative humidity were assumed at 10°C and 70%, respectively. The octave band data for the Siemens SWT-2.3-113 wind turbine generator were provided by the manufacturer and adjusted for wind shear. The octave band data used in this calculation is identical to that used in CADNA-A model.

Input parameters

POR height $h_r := 4.5m$

Noise source height $h_s := 99.5m$

Coordinates and elevation of R080 POR, Zr below included ground elevation and receptor height

$X_r := 362200.34m$ $Y_r := 4887074.70m$ $Z_r := 84.5m$

Coordinates and elevation of S11 noise source, Zr below included ground elevation and receptor height

$X_s := 361640.50m$ $Y_s := 4887205.50m$ $Z_s := 182.57m$

Ground absorption coefficient $G_a := 0.7$

Wind turbine (noise source) sound power emission

at 63 Hz $L_{w\_63} := 84.8dBA$

at 125 Hz $L_{w\_125} := 90.9dBA$

at 250 Hz $L_{w\_250} := 97.6dBA$

at 500 Hz $L_{w\_500} := 98.2dBA$

at 1000 Hz $L_{w\_1000} := 98.8dBA$

at 2000 Hz $L_{w\_2000} := 95.6dBA$

at 4000 Hz $L_{w\_4000} := 84.1dBA$

at 8000 Hz $L_{w\_8000} := 65.6dBA$

Distance from POR to source

$d := \sqrt{(X_r - X_s)^2 + (Y_r - Y_s)^2 + (Z_r - Z_s)^2} = 583.2 \cdot m$ 3D distance between the source and POR

$d_p := \sqrt{(X_r - X_s)^2 + (Y_r - Y_s)^2} = 574.9\,m$ Projected distance between the source and POR

Combined sound power level for the source

$$Total\_L_w := 10 \cdot \log\left(10^{\frac{L_{w\_63}}{10}} + 10^{\frac{L_{w\_125}}{10}} + 10^{\frac{L_{w\_250}}{10}} + 10^{\frac{L_{w\_500}}{10}} + 10^{\frac{L_{w\_1000}}{10}} \ldots + 10^{\frac{L_{w\_2000}}{10}} + 10^{\frac{L_{w\_4000}}{10}} + 10^{\frac{L_{w\_8000}}{10}}\right)$$

$Total\_L_w = 104 \cdot dBA$

Attenuation

Attenuation due to geometrical divergence

$$Att\_div := 20\cdot\log\left(\frac{d}{1m}\right) + 11 = 66.3\cdot dB$$

Attenuation due to atmospheric absorption at ambient temperature and relative humidity of 10℃ and 70%

at 63 Hz $\quad Att\_atm\_63 := 0.1\frac{dB}{km}\cdot d = 0.058\cdot dB$

at 125 Hz $\quad Att\_atm\_125 := 0.4\frac{dB}{km}\cdot d = 0.233\cdot dB$

at 250 Hz $\quad Att\_atm\_250 := 1.0\frac{dB}{km}\cdot d = 0.583\cdot dB$

at 500 Hz $\quad Att\_atm\_500 := 1.9\frac{dB}{km}\cdot d = 1.108\cdot dB$

at 1000 Hz $\quad Att\_atm\_1000 := 3.7\frac{dB}{km}\cdot d = 2.158\cdot dB$

at 2000 Hz $\quad Att\_atm\_2000 := 9.7\frac{dB}{km}\cdot d = 5.657\cdot dB$

at 4000 Hz $\quad Att\_atm\_4000 := 32.8\frac{dB}{km}\cdot d = 19.13\cdot dB$

at 8000 Hz $\quad Att\_atm\_8000 := 117.0\frac{dB}{km}\cdot d = 68.237\cdot dB$

Attenuation coefficients

$$a_1(h) := 1.5 + 3.0\cdot e^{-0.12\left(\frac{h}{m}-5\right)^2\cdot\left(1-e^{\frac{-d_p}{50\cdot m}}\right)} + 5.7\cdot e^{-0.09\cdot\frac{h^2}{m^2}\cdot\left(1-e^{-2.8\cdot10^{-6}\cdot\frac{d_p^2}{m^2}}\right)}$$

$$b_1(h) := 1.5 + 8.6\cdot e^{-0.09\cdot\frac{h^2}{m^2}\cdot\left(1-e^{\frac{-d_p}{50\cdot m}}\right)}$$

$$c_1(h) := 1.5 + 14.0\cdot e^{-0.46\cdot\frac{h^2}{m^2}\cdot\left(1-e^{\frac{-d_p}{50\cdot m}}\right)}$$

$$d_1(h) := 1.5 + 5.0\cdot e^{-0.9\cdot\frac{h^2}{m^2}\cdot\left(1-e^{\frac{-d_p}{50\cdot m}}\right)}$$

$$q := \begin{cases} 0 & \text{if } d_p \le 30\cdot\left(h_r + h_s\right) \\ 1 - \dfrac{30\cdot\left(h_r + h_s\right)}{d_p} & \text{otherwise} \end{cases}$$

Attenuation due to ground absorption - source

$a_1(h_s) = 1.5 \qquad b_1(h_s) = 1.5 \qquad c_1(h_s) = 1.5 \qquad d_1(h_s) = 1.5$

at 63 Hz $Att\_gr\_s\_63 := -1.5dB$

at 125 Hz $Att\_gr\_s\_125 := -1.5 + G_a \cdot a_1(h_s) = -0.45 \cdot dB$

at 250 Hz $Att\_gr\_s\_250 := -1.5 + G_a \cdot b_1(h_s) = -0.45 \cdot dB$

at 500 Hz $Att\_gr\_s\_500 := -1.5 + G_a \cdot c_1(h_s) = -0.45 \cdot dB$

at 1000 Hz $Att\_gr\_s\_1000 := -1.5 + G_a \cdot d_1(h_s) = -0.45 \cdot dB$

at 2000 Hz $Att\_gr\_s\_2000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

at 4000 Hz $Att\_gr\_s\_4000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

at 8000 Hz $Att\_gr\_s\_8000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

Attenuation due to ground absorption - middle

$q = 0$

at 63 Hz $Att\_gr\_m\_63 := -3 \cdot q^2 = 0 \cdot dB$

at 125 Hz $Att\_gr\_m\_125 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 250 Hz $Att\_gr\_m\_250 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 500 Hz $Att\_gr\_m\_500 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 1000 Hz $Att\_gr\_m\_1000 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 2000 Hz $Att\_gr\_m\_2000 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 4000 Hz $Att\_gr\_m\_4000 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

at 8000 Hz $Att\_gr\_m\_8000 := -3 \cdot q \cdot (1 - G_a) = 0 \cdot dB$

Attenuation due to ground absorption - POR

$a_1(h_r) = 4.967 \quad b_1(h_r) = 2.89 \quad c_1(h_r) = 1.501 \quad d_1(h_r) = 1.5$

at 63 Hz $Att\_gr\_r\_63 := -1.5dB$

at 125 Hz $Att\_gr\_r\_125 := -1.5 + G_a \cdot a_1(h_r) = 1.977 \cdot dB$

at 250 Hz $Att\_gr\_r\_250 := -1.5 + G_a \cdot b_1(h_r) = 0.523 \cdot dB$

at 500 Hz $Att\_gr\_r\_500 := -1.5 + G_a \cdot c_1(h_r) = -0.449 \cdot dB$

at 1000 Hz $Att\_gr\_r\_1000 := -1.5 + G_a \cdot d_1(h_r) = -0.45 \cdot dB$

at 2000 Hz $Att\_gr\_r\_2000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

at 4000 Hz $Att\_gr\_r\_4000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

at 8000 Hz $Att\_gr\_r\_8000 := -1.5 \cdot (1 - G_a) = -0.45 \cdot dB$

Total ground attenuation for each frequency

at 63 Hz $Att\_gr\_63 := Att\_gr\_s\_63 + Att\_gr\_m\_63 + Att\_gr\_r\_63 = -3 \cdot dB$

at 125 Hz $Att\_gr\_125 := Att\_gr\_s\_125 + Att\_gr\_m\_125 + Att\_gr\_r\_125 = 1.5 \cdot dB$

at 250 Hz $Att\_gr\_250 := Att\_gr\_s\_250 + Att\_gr\_m\_250 + Att\_gr\_r\_250 = 0.073 \cdot dB$

at 500 Hz $Att\_gr\_500 := Att\_gr\_s\_500 + Att\_gr\_m\_500 + Att\_gr\_r\_500 = -0.9 \cdot dB$

at 1000 Hz $Att\_gr\_1000 := Att\_gr\_s\_1000 + Att\_gr\_m\_1000 + Att\_gr\_r\_1000 = -0.9 \cdot dB$

at 2000 Hz $Att\_gr\_2000 := Att\_gr\_s\_2000 + Att\_gr\_m\_2000 + Att\_gr\_r\_2000 = -0.9 \cdot dB$

at 4000 Hz $Att\_gr\_4000 := Att\_gr\_s\_4000 + Att\_gr\_m\_4000 + Att\_gr\_r\_4000 = -0.9 \cdot dB$

at 8000 Hz $Att\_gr\_8000 := Att\_gr\_s\_8000 + Att\_gr\_m\_8000 + Att\_gr\_r\_8000 = -0.9 \cdot dB$

Total attenuation for each frequency

at 63 Hz $Att\_63 := Att\_div + Att\_atm\_63 + Att\_gr\_63 = 63.375 \cdot dB$

at 125 Hz $Att\_125 := Att\_div + Att\_atm\_125 + Att\_gr\_125 = 68.077 \cdot dB$

at 250 Hz $Att\_250 := Att\_div + Att\_atm\_250 + Att\_gr\_250 = 66.973 \cdot dB$

at 500 Hz $Att\_500 := Att\_div + Att\_atm\_500 + Att\_gr\_500 = 66.526 \cdot dB$

at 1000 Hz $Att\_1000 := Att\_div + Att\_atm\_1000 + Att\_gr\_1000 = 67.575 \cdot dB$

at 2000 Hz $Att\_2000 := Att\_div + Att\_atm\_2000 + Att\_gr\_2000 = 71.074 \cdot dB$

at 4000 Hz $Att\_4000 := Att\_div + Att\_atm\_4000 + Att\_gr\_4000 = 84.546 \cdot dB$

at 8000 Hz $Att\_8000 := Att\_div + Att\_atm\_8000 + Att\_gr\_8000 = 133.654 \cdot dB$

Sound pressure levels at the POR

at 63 Hz $L_{p\_63} := L_{w\_63} - Att\_63 = 21.4 \cdot dBA$

at 125 Hz $L_{p\_125} := L_{w\_125} - Att\_125 = 22.8 \cdot dBA$

at 250 Hz $L_{p\_250} := L_{w\_250} - Att\_250 = 30.6 \cdot dBA$

at 500 Hz $L_{p\_500} := L_{w\_500} - Att\_500 = 31.7 \cdot dBA$

at 1000 Hz $L_{p\_1000} := L_{w\_1000} - Att\_1000 = 31.2 \cdot dBA$

at 2000 Hz $L_{p\_2000} := L_{w\_2000} - Att\_2000 = 24.5 \cdot dBA$

at 4000 Hz $L_{p\_4000} := L_{w\_4000} - Att\_4000 = -0.4 \cdot dBA$

at 8000 Hz $L_{p\_8000} := L_{w\_8000} - Att\_8000 = -68.1 \cdot dBA$

$$Total\_L_p := 10 \cdot \log\left(10^{\frac{L_{p\_63}}{10}} + 10^{\frac{L_{p\_125}}{10}} + 10^{\frac{L_{p\_250}}{10}} + 10^{\frac{L_{p\_500}}{10}} + 10^{\frac{L_{p\_1000}}{10}} + 10^{\frac{L_{p\_2000}}{10}} + 10^{\frac{L_{p\_4000}}{10}} + 10^{\frac{L_{p\_8000}}{10}} + \ldots\right)$$

$Total\_L_p = 36.6 \cdot dBA$

Impact of S11 on R080 POR as calculated by CADNA-A

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	Total
Sound pressure [dBA]		21.4	22.8	30.6	31.7	31.3	24.5	-0.4	-68.0	36.6

Conclusion

Based on the calculation procedure provided in ISO 9613-2 and the parameters suggested by the Ministry of Environment in the Noise Guidelines for Wind Farms, Section 6.4.10 (October 2008), the estimated sound pressure level at the point of reception R080 produced by the noise source (wind turbine generator) S11 is 36.6 dBA, which is equal to the prediction of CADNA-A for the same POR (36.6 dBA).

It is important to note that POR R080 receives sound contributions from several sources, and the level shown above (36.6 dBA) corresponds only to the contribution from S11. The total sound pressure level at this POR was estimated by CADNA-A at 39.7 dBA.

Both the air and ground attenuation components were included and calculated based on ISO 9613-2 assuming 10℃ ambient temperature and 70% relative humidity.

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	5000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.70
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03)	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver
Name: Existing
ID: R080
X: 362200.34
Y: 4887074.70
Z: 84.50

Point Source, ISO 9613, Name: "Substation", ID: "Subs"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363269.13	4891095.48	94.00	0	32	60.6	60.6	0.0	0.0	83.4	0.1	-5.8	0.0	0.0	4.8	0.0	-0.0	-21.9	-21.9
2	363269.13	4891095.48	94.00	0	63	77.8	77.8	0.0	0.0	83.4	0.5	-5.8	0.0	0.0	4.8	0.0	-0.0	-5.0	-5.0
3	363269.13	4891095.48	94.00	0	125	90.9	90.9	0.0	0.0	83.4	1.7	3.8	0.0	0.0	1.0	0.0	-0.0	1.0	1.0
4	363269.13	4891095.48	94.00	0	250	96.4	96.4	0.0	0.0	83.4	4.3	0.7	0.0	0.0	4.1	0.0	-0.0	3.9	3.9
5	363269.13	4891095.48	94.00	0	500	101.8	101.8	0.0	0.0	83.4	8.0	-1.7	0.0	0.0	4.8	0.0	-0.0	7.3	7.3
6	363269.13	4891095.48	94.00	0	1000	99.0	99.0	0.0	0.0	83.4	15.2	-1.7	0.0	0.0	4.9	0.0	-0.0	-2.7	-2.7
7	363269.13	4891095.48	94.00	0	2000	95.2	95.2	0.0	0.0	83.4	40.2	-1.7	0.0	0.0	5.0	0.0	-0.0	-31.7	-31.7
8	363269.13	4891095.48	94.00	0	4000	90.0	90.0	0.0	0.0	83.4	136.3	-1.7	0.0	0.0	5.2	0.0	-0.0	-133.2	-133.2
9	363269.13	4891095.48	94.00	0	8000	79.9	79.9	0.0	0.0	83.4	486.3	-1.7	0.0	0.0	5.6	0.0	-0.0	-493.7	-493.7

Point Source, ISO 9613, Name: "(untitled)", ID: "S01"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	359172.10	4889551.06	184.50	0	63	84.8	84.8	0.0	0.0	82.8	0.5	-3.6	0.0	0.0	0.0	0.0	-0.0	5.1	5.1
2	359172.10	4889551.06	184.50	0	125	90.9	90.9	0.0	0.0	82.8	1.6	1.6	0.0	0.0	0.0	0.0	-0.0	4.8	4.8
3	359172.10	4889551.06	184.50	0	250	97.6	97.6	0.0	0.0	82.8	4.1	-0.1	0.0	0.0	0.0	0.0	-0.0	10.8	10.8
4	359172.10	4889551.06	184.50	0	500	98.2	98.2	0.0	0.0	82.8	7.5	-1.1	0.0	0.0	0.0	0.0	-0.0	8.9	8.9
5	359172.10	4889551.06	184.50	0	1000	98.8	98.8	0.0	0.0	82.8	14.3	-1.1	0.0	0.0	0.0	0.0	-0.0	2.7	2.7
6	359172.10	4889551.06	184.50	0	2000	95.6	95.6	0.0	0.0	82.8	37.8	-1.1	0.0	0.0	0.0	0.0	-0.0	-24.0	-24.0
7	359172.10	4889551.06	184.50	0	4000	84.1	84.1	0.0	0.0	82.8	128.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-125.9	-125.9
8	359172.10	4889551.06	184.50	0	8000	65.6	65.6	0.0	0.0	82.8	457.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-473.5	-473.5

Point Source, ISO 9613, Name: "(untitled)", ID: "S03"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361257.04	4887433.92	183.20	0	63	84.6	84.6	0.0	0.0	71.1	0.1	-3.0	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
2	361257.04	4887433.92	183.20	0	125	92.4	92.4	0.0	0.0	71.1	0.4	1.8	0.0	0.0	0.0	0.0	-0.0	19.1	19.1
3	361257.04	4887433.92	183.20	0	250	97.6	97.6	0.0	0.0	71.1	1.1	0.1	0.0	0.0	0.0	0.0	-0.0	25.4	25.4
4	361257.04	4887433.92	183.20	0	500	99.4	99.4	0.0	0.0	71.1	2.0	-0.9	0.0	0.0	0.0	0.0	-0.0	27.2	27.2
5	361257.04	4887433.92	183.20	0	1000	100.3	100.3	0.0	0.0	71.1	3.7	-0.9	0.0	0.0	0.0	0.0	-0.0	26.4	26.4
6	361257.04	4887433.92	183.20	0	2000	95.9	95.9	0.0	0.0	71.1	9.8	-0.9	0.0	0.0	0.0	0.0	-0.0	15.9	15.9
7	361257.04	4887433.92	183.20	0	4000	86.1	86.1	0.0	0.0	71.1	33.2	-0.9	0.0	0.0	0.0	0.0	-0.0	-17.4	-17.4
8	361257.04	4887433.92	183.20	0	8000	68.1	68.1	0.0	0.0	71.1	118.5	-0.9	0.0	0.0	0.0	0.0	-0.0	-120.7	-120.7

Point Source, ISO 9613, Name: "(untitled)", ID: "S04"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	360408.29	4890076.32	184.50	0	63	84.6	84.6	0.0	0.0	81.9	0.4	-3.3	0.0	0.0	0.0	0.0	-0.0	5.6	5.6
2	360408.29	4890076.32	184.50	0	125	92.4	92.4	0.0	0.0	81.9	1.4	1.7	0.0	0.0	0.0	0.0	-0.0	7.4	7.4
3	360408.29	4890076.32	184.50	0	250	97.6	97.6	0.0	0.0	81.9	3.6	-0.0	0.0	0.0	0.0	0.0	-0.0	12.1	12.1
4	360408.29	4890076.32	184.50	0	500	99.4	99.4	0.0	0.0	81.9	6.7	-1.0	0.0	0.0	0.0	0.0	-0.0	11.8	11.8
5	360408.29	4890076.32	184.50	0	1000	100.3	100.3	0.0	0.0	81.9	12.8	-1.0	0.0	0.0	0.0	0.0	-0.0	6.6	6.6
6	360408.29	4890076.32	184.50	0	2000	95.9	95.9	0.0	0.0	81.9	33.8	-1.0	0.0	0.0	0.0	0.0	-0.0	-18.8	-18.8
7	360408.29	4890076.32	184.50	0	4000	86.1	86.1	0.0	0.0	81.9	114.6	-1.0	0.0	0.0	0.0	0.0	-0.0	-109.4	-109.4
8	360408.29	4890076.32	184.50	0	8000	68.1	68.1	0.0	0.0	81.9	408.8	-1.0	0.0	0.0	0.0	0.0	-0.0	-421.6	-421.6

Point Source, ISO 9613, Name: "(untitled)", ID: "S05"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	362668.00	4888881.21	179.50	0	63	84.6	84.6	0.0	0.0	76.4	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	10.9	10.9
2	362668.00	4888881.21	179.50	0	125	92.4	92.4	0.0	0.0	76.4	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	13.4	13.4
3	362668.00	4888881.21	179.50	0	250	97.6	97.6	0.0	0.0	76.4	2.0	0.1	0.0	0.0	0.0	0.0	-0.0	19.2	19.2
4	362668.00	4888881.21	179.50	0	500	99.4	99.4	0.0	0.0	76.4	3.6	-0.9	0.0	0.0	0.0	0.0	-0.0	20.3	20.3

Point Source, ISO 9613, Name: "(untitled)", ID: "S05"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
5	362668.00	4888881.21	179.50	0	1000	100.3	100.3	0.0	0.0	76.4	6.8	-0.9	0.0	0.0	0.0	0.0	-0.0	17.9	17.9
6	362668.00	4888881.21	179.50	0	2000	95.9	95.9	0.0	0.0	76.4	18.1	-0.9	0.0	0.0	0.0	0.0	-0.0	2.3	2.3
7	362668.00	4888881.21	179.50	0	4000	86.1	86.1	0.0	0.0	76.4	61.2	-0.9	0.0	0.0	0.0	0.0	-0.0	-50.7	-50.7
8	362668.00	4888881.21	179.50	0	8000	68.1	68.1	0.0	0.0	76.4	218.4	-0.9	0.0	0.0	0.0	0.0	-0.0	-225.8	-225.8

Point Source, ISO 9613, Name: "(untitled)", ID: "S06"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363743.45	4891454.22	184.50	0	63	84.8	84.8	0.0	0.0	84.3	0.6	-4.0	0.0	0.0	0.0	0.0	-0.0	3.9	3.9
2	363743.45	4891454.22	184.50	0	125	90.9	90.9	0.0	0.0	84.3	1.9	1.5	0.0	0.0	0.0	0.0	-0.0	3.2	3.2
3	363743.45	4891454.22	184.50	0	250	97.6	97.6	0.0	0.0	84.3	4.8	-0.2	0.0	0.0	0.0	0.0	-0.0	8.6	8.6
4	363743.45	4891454.22	184.50	0	500	98.2	98.2	0.0	0.0	84.3	9.0	-1.2	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
5	363743.45	4891454.22	184.50	0	1000	98.8	98.8	0.0	0.0	84.3	17.0	-1.2	0.0	0.0	0.0	0.0	-0.0	-1.3	-1.3
6	363743.45	4891454.22	184.50	0	2000	95.6	95.6	0.0	0.0	84.3	44.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-32.4	-32.4
7	363743.45	4891454.22	184.50	0	4000	84.1	84.1	0.0	0.0	84.3	152.2	-1.2	0.0	0.0	0.0	0.0	-0.0	-151.2	-151.2
8	363743.45	4891454.22	184.50	0	8000	65.6	65.6	0.0	0.0	84.3	542.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-560.4	-560.4

Point Source, ISO 9613, Name: "(untitled)", ID: "S08"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	359618.44	4887487.31	179.50	0	63	84.6	84.6	0.0	0.0	79.3	0.3	-3.0	0.0	0.0	0.0	0.0	-0.0	7.9	7.9
2	359618.44	4887487.31	179.50	0	125	92.4	92.4	0.0	0.0	79.3	1.1	1.8	0.0	0.0	0.0	0.0	-0.0	10.2	10.2
3	359618.44	4887487.31	179.50	0	250	97.6	97.6	0.0	0.0	79.3	2.7	0.1	0.0	0.0	0.0	0.0	-0.0	15.4	15.4
4	359618.44	4887487.31	179.50	0	500	99.4	99.4	0.0	0.0	79.3	5.0	-0.9	0.0	0.0	0.0	0.0	-0.0	15.9	15.9
5	359618.44	4887487.31	179.50	0	1000	100.3	100.3	0.0	0.0	79.3	9.6	-0.9	0.0	0.0	0.0	0.0	-0.0	12.3	12.3
6	359618.44	4887487.31	179.50	0	2000	95.9	95.9	0.0	0.0	79.3	25.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-7.8	-7.8
7	359618.44	4887487.31	179.50	0	4000	86.1	86.1	0.0	0.0	79.3	85.7	-0.9	0.0	0.0	0.0	0.0	-0.0	-78.1	-78.1
8	359618.44	4887487.31	179.50	0	8000	68.1	68.1	0.0	0.0	79.3	305.8	-0.9	0.0	0.0	0.0	0.0	-0.0	-316.2	-316.2

Point Source, ISO 9613, Name: "(untitled)", ID: "S09"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	360950.66	4887103.68	179.50	0	63	84.8	84.8	0.0	0.0	73.0	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	14.7	14.7
2	360950.66	4887103.68	179.50	0	125	90.9	90.9	0.0	0.0	73.0	0.5	1.8	0.0	0.0	0.0	0.0	-0.0	15.7	15.7
3	360950.66	4887103.68	179.50	0	250	97.6	97.6	0.0	0.0	73.0	1.3	0.1	0.0	0.0	0.0	0.0	-0.0	23.3	23.3
4	360950.66	4887103.68	179.50	0	500	98.2	98.2	0.0	0.0	73.0	2.4	-0.9	0.0	0.0	0.0	0.0	-0.0	23.7	23.7
5	360950.66	4887103.68	179.50	0	1000	98.8	98.8	0.0	0.0	73.0	4.6	-0.9	0.0	0.0	0.0	0.0	-0.0	22.2	22.2
6	360950.66	4887103.68	179.50	0	2000	95.6	95.6	0.0	0.0	73.0	12.1	-0.9	0.0	0.0	0.0	0.0	-0.0	11.4	11.4
7	360950.66	4887103.68	179.50	0	4000	84.1	84.1	0.0	0.0	73.0	41.1	-0.9	0.0	0.0	0.0	0.0	-0.0	-29.0	-29.0
8	360950.66	4887103.68	179.50	0	8000	65.6	65.6	0.0	0.0	73.0	146.5	-0.9	0.0	0.0	0.0	0.0	-0.0	-153.0	-153.0

Point Source, ISO 9613, Name: "(untitled)", ID: "S10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	359083.40	4887184.13	183.07	0	63	84.6	84.6	0.0	0.0	80.9	0.4	-3.0	0.0	0.0	0.0	0.0	-0.0	6.3	6.3
2	359083.40	4887184.13	183.07	0	125	92.4	92.4	0.0	0.0	80.9	1.3	1.8	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
3	359083.40	4887184.13	183.07	0	250	97.6	97.6	0.0	0.0	80.9	3.3	0.1	0.0	0.0	0.0	0.0	-0.0	13.4	13.4
4	359083.40	4887184.13	183.07	0	500	99.4	99.4	0.0	0.0	80.9	6.0	-0.9	0.0	0.0	0.0	0.0	-0.0	13.4	13.4
5	359083.40	4887184.13	183.07	0	1000	100.3	100.3	0.0	0.0	80.9	11.4	-0.9	0.0	0.0	0.0	0.0	-0.0	8.9	8.9
6	359083.40	4887184.13	183.07	0	2000	95.9	95.9	0.0	0.0	80.9	30.2	-0.9	0.0	0.0	0.0	0.0	-0.0	-14.2	-14.2
7	359083.40	4887184.13	183.07	0	4000	86.1	86.1	0.0	0.0	80.9	102.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-96.1	-96.1
8	359083.40	4887184.13	183.07	0	8000	68.1	68.1	0.0	0.0	80.9	364.7	-0.9	0.0	0.0	0.0	0.0	-0.0	-376.6	-376.6

Point Source, ISO 9613, Name: "(untitled)", ID: "S11"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361640.50	4887205.50	182.57	0	63	84.8	84.8	0.0	0.0	66.3	0.1	-3.0	0.0	0.0	0.0	0.0	-0.0	21.4	21.4
2	361640.50	4887205.50	182.57	0	125	90.9	90.9	0.0	0.0	66.3	0.2	1.5	0.0	0.0	0.0	0.0	-0.0	22.8	22.8
3	361640.50	4887205.50	182.57	0	250	97.6	97.6	0.0	0.0	66.3	0.6	0.1	0.0	0.0	0.0	0.0	-0.0	30.6	30.6
4	361640.50	4887205.50	182.57	0	500	98.2	98.2	0.0	0.0	66.3	1.1	-0.9	0.0	0.0	0.0	0.0	-0.0	31.7	31.7
5	361640.50	4887205.50	182.57	0	1000	98.8	98.8	0.0	0.0	66.3	2.1	-0.9	0.0	0.0	0.0	0.0	-0.0	31.3	31.3
6	361640.50	4887205.50	182.57	0	2000	95.6	95.6	0.0	0.0	66.3	5.6	-0.9	0.0	0.0	0.0	0.0	-0.0	24.6	24.6
7	361640.50	4887205.50	182.57	0	4000	84.1	84.1	0.0	0.0	66.3	19.1	-0.9	0.0	0.0	0.0	0.0	-0.0	-0.4	-0.4
8	361640.50	4887205.50	182.57	0	8000	65.6	65.6	0.0	0.0	66.3	68.2	-0.9	0.0	0.0	0.0	0.0	-0.0	-68.0	-68.0

Point Source, ISO 9613, Name: "(untitled)", ID: "S16"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361904.36	4889060.36	181.21	0	63	84.6	84.6	0.0	0.0	77.1	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	10.3	10.3
2	361904.36	4889060.36	181.21	0	125	92.4	92.4	0.0	0.0	77.1	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	12.7	12.7
3	361904.36	4889060.36	181.21	0	250	97.6	97.6	0.0	0.0	77.1	2.1	0.1	0.0	0.0	0.0	0.0	-0.0	18.4	18.4
4	361904.36	4889060.36	181.21	0	500	99.4	99.4	0.0	0.0	77.1	3.9	-0.9	0.0	0.0	0.0	0.0	-0.0	19.4	19.4
5	361904.36	4889060.36	181.21	0	1000	100.3	100.3	0.0	0.0	77.1	7.3	-0.9	0.0	0.0	0.0	0.0	-0.0	16.8	16.8
6	361904.36	4889060.36	181.21	0	2000	95.9	95.9	0.0	0.0	77.1	19.4	-0.9	0.0	0.0	0.0	0.0	-0.0	0.3	0.3
7	361904.36	4889060.36	181.21	0	4000	86.1	86.1	0.0	0.0	77.1	65.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-55.9	-55.9
8	361904.36	4889060.36	181.21	0	8000	68.1	68.1	0.0	0.0	77.1	234.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-243.0	-243.0

Point Source, ISO 9613, Name: "(untitled)", ID: "S17"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	358685.05	4887301.99	179.50	0	63	84.6	84.6	0.0	0.0	81.9	0.4	-3.3	0.0	0.0	0.0	0.0	-0.0	5.6	5.6
2	358685.05	4887301.99	179.50	0	125	92.4	92.4	0.0	0.0	81.9	1.5	1.7	0.0	0.0	0.0	0.0	-0.0	7.3	7.3
3	358685.05	4887301.99	179.50	0	250	97.6	97.6	0.0	0.0	81.9	3.7	-0.0	0.0	0.0	0.0	0.0	-0.0	12.0	12.0
4	358685.05	4887301.99	179.50	0	500	99.4	99.4	0.0	0.0	81.9	6.8	-1.0	0.0	0.0	0.0	0.0	-0.0	11.7	11.7
5	358685.05	4887301.99	179.50	0	1000	100.3	100.3	0.0	0.0	81.9	12.9	-1.0	0.0	0.0	0.0	0.0	-0.0	6.5	6.5
6	358685.05	4887301.99	179.50	0	2000	95.9	95.9	0.0	0.0	81.9	34.0	-1.0	0.0	0.0	0.0	0.0	-0.0	-19.1	-19.1
7	358685.05	4887301.99	179.50	0	4000	86.1	86.1	0.0	0.0	81.9	115.5	-1.0	0.0	0.0	0.0	0.0	-0.0	-110.3	-110.3
8	358685.05	4887301.99	179.50	0	8000	68.1	68.1	0.0	0.0	81.9	411.9	-1.0	0.0	0.0	0.0	0.0	-0.0	-424.7	-424.7

Point Source, ISO 9613, Name: "(untitled)", ID: "S19"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	365107.18	4889563.44	184.50	0	63	84.8	84.8	0.0	0.0	82.7	0.5	-3.5	0.0	0.0	0.0	0.0	-0.0	5.2	5.2
2	365107.18	4889563.44	184.50	0	125	90.9	90.9	0.0	0.0	82.7	1.6	1.6	0.0	0.0	0.0	0.0	-0.0	5.0	5.0
3	365107.18	4889563.44	184.50	0	250	97.6	97.6	0.0	0.0	82.7	4.0	-0.1	0.0	0.0	0.0	0.0	-0.0	11.0	11.0
4	365107.18	4889563.44	184.50	0	500	98.2	98.2	0.0	0.0	82.7	7.4	-1.1	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
5	365107.18	4889563.44	184.50	0	1000	98.8	98.8	0.0	0.0	82.7	14.0	-1.1	0.0	0.0	0.0	0.0	-0.0	3.2	3.2
6	365107.18	4889563.44	184.50	0	2000	95.6	95.6	0.0	0.0	82.7	37.0	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.0	-23.0
7	365107.18	4889563.44	184.50	0	4000	84.1	84.1	0.0	0.0	82.7	125.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-122.9	-122.9
8	365107.18	4889563.44	184.50	0	8000	65.6	65.6	0.0	0.0	82.7	447.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-463.4	-463.4

Point Source, ISO 9613, Name: "(untitled)", ID: "S20"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	362894.06	4889249.14	183.86	0	63	84.6	84.6	0.0	0.0	78.2	0.3	-3.0	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
2	362894.06	4889249.14	183.86	0	125	92.4	92.4	0.0	0.0	78.2	0.9	1.8	0.0	0.0	0.0	0.0	-0.0	11.5	11.5
3	362894.06	4889249.14	183.86	0	250	97.6	97.6	0.0	0.0	78.2	2.4	0.1	0.0	0.0	0.0	0.0	-0.0	17.0	17.0
4	362894.06	4889249.14	183.86	0	500	99.4	99.4	0.0	0.0	78.2	4.4	-0.9	0.0	0.0	0.0	0.0	-0.0	17.7	17.7
5	362894.06	4889249.14	183.86	0	1000	100.3	100.3	0.0	0.0	78.2	8.4	-0.9	0.0	0.0	0.0	0.0	-0.0	14.7	14.7
6	362894.06	4889249.14	183.86	0	2000	95.9	95.9	0.0	0.0	78.2	22.1	-0.9	0.0	0.0	0.0	0.0	-0.0	-3.4	-3.4
7	362894.06	4889249.14	183.86	0	4000	86.1	86.1	0.0	0.0	78.2	74.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-66.0	-66.0
8	362894.06	4889249.14	183.86	0	8000	68.1	68.1	0.0	0.0	78.2	267.0	-0.9	0.0	0.0	0.0	0.0	-0.0	-276.2	-276.2

Point Source, ISO 9613, Name: "(untitled)", ID: "S21"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	364880.81	4889038.86	180.18	0	63	84.8	84.8	0.0	0.0	81.4	0.4	-3.2	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
2	364880.81	4889038.86	180.18	0	125	90.9	90.9	0.0	0.0	81.4	1.4	1.7	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
3	364880.81	4889038.86	180.18	0	250	97.6	97.6	0.0	0.0	81.4	3.5	0.0	0.0	0.0	0.0	0.0	-0.0	12.7	12.7
4	364880.81	4889038.86	180.18	0	500	98.2	98.2	0.0	0.0	81.4	6.4	-1.0	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
5	364880.81	4889038.86	180.18	0	1000	98.8	98.8	0.0	0.0	81.4	12.2	-1.0	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
6	364880.81	4889038.86	180.18	0	2000	95.6	95.6	0.0	0.0	81.4	32.1	-1.0	0.0	0.0	0.0	0.0	-0.0	-17.0	-17.0
7	364880.81	4889038.86	180.18	0	4000	84.1	84.1	0.0	0.0	81.4	108.9	-1.0	0.0	0.0	0.0	0.0	-0.0	-105.3	-105.3
8	364880.81	4889038.86	180.18	0	8000	65.6	65.6	0.0	0.0	81.4	388.6	-1.0	0.0	0.0	0.0	0.0	-0.0	-403.4	-403.4

Point Source, ISO 9613, Name: "(untitled)", ID: "S22"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361447.08	4890656.10	189.50	0	63	84.6	84.6	0.0	0.0	82.3	0.5	-3.4	0.0	0.0	0.0	0.0	-0.0	5.3	5.3
2	361447.08	4890656.10	189.50	0	125	92.4	92.4	0.0	0.0	82.3	1.5	1.7	0.0	0.0	0.0	0.0	-0.0	7.0	7.0
3	361447.08	4890656.10	189.50	0	250	97.6	97.6	0.0	0.0	82.3	3.8	-0.1	0.0	0.0	0.0	0.0	-0.0	11.6	11.6
4	361447.08	4890656.10	189.50	0	500	99.4	99.4	0.0	0.0	82.3	7.1	-1.0	0.0	0.0	0.0	0.0	-0.0	11.1	11.1

Point Source, ISO 9613, Name: "(untitled)", ID: "S22"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
5	361447.08	4890656.10	189.50	0	1000	100.3	100.3	0.0	0.0	82.3	13.4	-1.0	0.0	0.0	0.0	0.0	-0.0	5.7	5.7
6	361447.08	4890656.10	189.50	0	2000	95.9	95.9	0.0	0.0	82.3	35.4	-1.0	0.0	0.0	0.0	0.0	-0.0	-20.7	-20.7
7	361447.08	4890656.10	189.50	0	4000	86.1	86.1	0.0	0.0	82.3	120.0	-1.0	0.0	0.0	0.0	0.0	-0.0	-115.1	-115.1
8	361447.08	4890656.10	189.50	0	8000	68.1	68.1	0.0	0.0	82.3	427.9	-1.0	0.0	0.0	0.0	0.0	-0.0	-441.1	-441.1

Point Source, ISO 9613, Name: "(untitled)", ID: "S23"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361586.36	4888695.72	179.50	0	63	84.6	84.6	0.0	0.0	75.8	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	11.6	11.6
2	361586.36	4888695.72	179.50	0	125	92.4	92.4	0.0	0.0	75.8	0.7	1.8	0.0	0.0	0.0	0.0	-0.0	14.1	14.1
3	361586.36	4888695.72	179.50	0	250	97.6	97.6	0.0	0.0	75.8	1.8	0.1	0.0	0.0	0.0	0.0	-0.0	19.9	19.9
4	361586.36	4888695.72	179.50	0	500	99.4	99.4	0.0	0.0	75.8	3.3	-0.9	0.0	0.0	0.0	0.0	-0.0	21.2	21.2
5	361586.36	4888695.72	179.50	0	1000	100.3	100.3	0.0	0.0	75.8	6.3	-0.9	0.0	0.0	0.0	0.0	-0.0	19.1	19.1
6	361586.36	4888695.72	179.50	0	2000	95.9	95.9	0.0	0.0	75.8	16.8	-0.9	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
7	361586.36	4888695.72	179.50	0	4000	86.1	86.1	0.0	0.0	75.8	56.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-45.7	-45.7
8	361586.36	4888695.72	179.50	0	8000	68.1	68.1	0.0	0.0	75.8	202.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-209.7	-209.7

Point Source, ISO 9613, Name: "(untitled)", ID: "S25"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	360694.00	4888127.50	179.50	0	63	84.6	84.6	0.0	0.0	76.3	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	11.1	11.1
2	360694.00	4888127.50	179.50	0	125	92.4	92.4	0.0	0.0	76.3	0.8	1.8	0.0	0.0	0.0	0.0	-0.0	13.6	13.6
3	360694.00	4888127.50	179.50	0	250	97.6	97.6	0.0	0.0	76.3	1.9	0.1	0.0	0.0	0.0	0.0	-0.0	19.3	19.3
4	360694.00	4888127.50	179.50	0	500	99.4	99.4	0.0	0.0	76.3	3.5	-0.9	0.0	0.0	0.0	0.0	-0.0	20.4	20.4
5	360694.00	4888127.50	179.50	0	1000	100.3	100.3	0.0	0.0	76.3	6.7	-0.9	0.0	0.0	0.0	0.0	-0.0	18.2	18.2
6	360694.00	4888127.50	179.50	0	2000	95.9	95.9	0.0	0.0	76.3	17.8	-0.9	0.0	0.0	0.0	0.0	-0.0	2.7	2.7
7	360694.00	4888127.50	179.50	0	4000	86.1	86.1	0.0	0.0	76.3	60.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-49.6	-49.6
8	360694.00	4888127.50	179.50	0	8000	68.1	68.1	0.0	0.0	76.3	215.1	-0.9	0.0	0.0	0.0	0.0	-0.0	-222.4	-222.4

Point Source, ISO 9613, Name: "(untitled)", ID: "S27"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	365916.00	4890146.00	185.29	0	63	84.6	84.6	0.0	0.0	84.7	0.6	-4.1	0.0	0.0	0.0	0.0	-0.0	3.4	3.4
2	365916.00	4890146.00	185.29	0	125	92.4	92.4	0.0	0.0	84.7	2.0	1.5	0.0	0.0	0.0	0.0	-0.0	4.3	4.3
3	365916.00	4890146.00	185.29	0	250	97.6	97.6	0.0	0.0	84.7	5.0	-0.2	0.0	0.0	0.0	0.0	-0.0	8.2	8.2
4	365916.00	4890146.00	185.29	0	500	99.4	99.4	0.0	0.0	84.7	9.3	-1.2	0.0	0.0	0.0	0.0	-0.0	6.7	6.7
5	365916.00	4890146.00	185.29	0	1000	100.3	100.3	0.0	0.0	84.7	17.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-0.8	-0.8
6	365916.00	4890146.00	185.29	0	2000	95.9	95.9	0.0	0.0	84.7	46.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-34.1	-34.1
7	365916.00	4890146.00	185.29	0	4000	86.1	86.1	0.0	0.0	84.7	158.0	-1.2	0.0	0.0	0.0	0.0	-0.0	-155.4	-155.4
8	365916.00	4890146.00	185.29	0	8000	68.1	68.1	0.0	0.0	84.7	563.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-578.9	-578.9

Point Source, ISO 9613, Name: "(untitled)", ID: "S29"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	359561.75	4889909.18	182.65	0	63	84.8	84.8	0.0	0.0	82.8	0.5	-3.6	0.0	0.0	0.0	0.0	-0.0	5.1	5.1
2	359561.75	4889909.18	182.65	0	125	90.9	90.9	0.0	0.0	82.8	1.6	1.6	0.0	0.0	0.0	0.0	-0.0	4.9	4.9
3	359561.75	4889909.18	182.65	0	250	97.6	97.6	0.0	0.0	82.8	4.0	-0.1	0.0	0.0	0.0	0.0	-0.0	10.9	10.9
4	359561.75	4889909.18	182.65	0	500	98.2	98.2	0.0	0.0	82.8	7.5	-1.1	0.0	0.0	0.0	0.0	-0.0	9.0	9.0
5	359561.75	4889909.18	182.65	0	1000	98.8	98.8	0.0	0.0	82.8	14.2	-1.1	0.0	0.0	0.0	0.0	-0.0	2.9	2.9
6	359561.75	4889909.18	182.65	0	2000	95.6	95.6	0.0	0.0	82.8	37.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.5	-23.5
7	359561.75	4889909.18	182.65	0	4000	84.1	84.1	0.0	0.0	82.8	126.9	-1.1	0.0	0.0	0.0	0.0	-0.0	-124.5	-124.5
8	359561.75	4889909.18	182.65	0	8000	65.6	65.6	0.0	0.0	82.8	452.8	-1.1	0.0	0.0	0.0	0.0	-0.0	-468.9	-468.9

Point Source, ISO 9613, Name: "(untitled)", ID: "S31"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	362343.14	4891028.43	189.50	0	63	84.8	84.8	0.0	0.0	83.0	0.5	-3.6	0.0	0.0	0.0	0.0	-0.0	5.0	5.0
2	362343.14	4891028.43	189.50	0	125	90.9	90.9	0.0	0.0	83.0	1.6	1.6	0.0	0.0	0.0	0.0	-0.0	4.7	4.7
3	362343.14	4891028.43	189.50	0	250	97.6	97.6	0.0	0.0	83.0	4.1	-0.1	0.0	0.0	0.0	0.0	-0.0	10.6	10.6
4	362343.14	4891028.43	189.50	0	500	98.2	98.2	0.0	0.0	83.0	7.6	-1.1	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
5	362343.14	4891028.43	189.50	0	1000	98.8	98.8	0.0	0.0	83.0	14.5	-1.1	0.0	0.0	0.0	0.0	-0.0	2.5	2.5
6	362343.14	4891028.43	189.50	0	2000	95.6	95.6	0.0	0.0	83.0	38.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-24.5	-24.5
7	362343.14	4891028.43	189.50	0	4000	84.1	84.1	0.0	0.0	83.0	129.7	-1.1	0.0	0.0	0.0	0.0	-0.0	-127.5	-127.5
8	362343.14	4891028.43	189.50	0	8000	65.6	65.6	0.0	0.0	83.0	462.6	-1.1	0.0	0.0	0.0	0.0	-0.0	-478.8	-478.8

Point Source, ISO 9613, Name: "(untitled)", ID: "S32"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	359529.83	4887967.14	179.50	0	63	84.6	84.6	0.0	0.0	80.0	0.3	-3.0	0.0	0.0	0.0	0.0	-0.0	7.3	7.3
2	359529.83	4887967.14	179.50	0	125	92.4	92.4	0.0	0.0	80.0	1.2	1.8	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
3	359529.83	4887967.14	179.50	0	250	97.6	97.6	0.0	0.0	80.0	2.9	0.1	0.0	0.0	0.0	0.0	-0.0	14.6	14.6
4	359529.83	4887967.14	179.50	0	500	99.4	99.4	0.0	0.0	80.0	5.4	-0.9	0.0	0.0	0.0	0.0	-0.0	14.9	14.9
5	359529.83	4887967.14	179.50	0	1000	100.3	100.3	0.0	0.0	80.0	10.3	-0.9	0.0	0.0	0.0	0.0	-0.0	10.9	10.9
6	359529.83	4887967.14	179.50	0	2000	95.9	95.9	0.0	0.0	80.0	27.2	-0.9	0.0	0.0	0.0	0.0	-0.0	-10.4	-10.4
7	359529.83	4887967.14	179.50	0	4000	86.1	86.1	0.0	0.0	80.0	92.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-85.3	-85.3
8	359529.83	4887967.14	179.50	0	8000	68.1	68.1	0.0	0.0	80.0	329.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-340.3	-340.3

Point Source, ISO 9613, Name: "(untitled)", ID: "S34"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363323.99	4889900.50	179.50	0	63	84.8	84.8	0.0	0.0	80.7	0.4	-3.0	0.0	0.0	0.0	0.0	-0.0	6.8	6.8
2	363323.99	4889900.50	179.50	0	125	90.9	90.9	0.0	0.0	80.7	1.3	1.8	0.0	0.0	0.0	0.0	-0.0	7.2	7.2
3	363323.99	4889900.50	179.50	0	250	97.6	97.6	0.0	0.0	80.7	3.2	0.1	0.0	0.0	0.0	0.0	-0.0	13.7	13.7
4	363323.99	4889900.50	179.50	0	500	98.2	98.2	0.0	0.0	80.7	5.9	-0.9	0.0	0.0	0.0	0.0	-0.0	12.6	12.6
5	363323.99	4889900.50	179.50	0	1000	98.8	98.8	0.0	0.0	80.7	11.1	-0.9	0.0	0.0	0.0	0.0	-0.0	7.9	7.9
6	363323.99	4889900.50	179.50	0	2000	95.6	95.6	0.0	0.0	80.7	29.4	-0.9	0.0	0.0	0.0	0.0	-0.0	-13.6	-13.6
7	363323.99	4889900.50	179.50	0	4000	84.1	84.1	0.0	0.0	80.7	99.7	-0.9	0.0	0.0	0.0	0.0	-0.0	-95.4	-95.4
8	363323.99	4889900.50	179.50	0	8000	65.6	65.6	0.0	0.0	80.7	355.6	-0.9	0.0	0.0	0.0	0.0	-0.0	-369.8	-369.8

Point Source, ISO 9613, Name: "(untitled)", ID: "S35"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	361299.03	4888182.65	179.50	0	63	84.6	84.6	0.0	0.0	74.1	0.2	-3.0	0.0	0.0	0.0	0.0	-0.0	13.3	13.3
2	361299.03	4888182.65	179.50	0	125	92.4	92.4	0.0	0.0	74.1	0.6	1.8	0.0	0.0	0.0	0.0	-0.0	15.9	15.9
3	361299.03	4888182.65	179.50	0	250	97.6	97.6	0.0	0.0	74.1	1.5	0.1	0.0	0.0	0.0	0.0	-0.0	21.9	21.9
4	361299.03	4888182.65	179.50	0	500	99.4	99.4	0.0	0.0	74.1	2.8	-0.9	0.0	0.0	0.0	0.0	-0.0	23.4	23.4
5	361299.03	4888182.65	179.50	0	1000	100.3	100.3	0.0	0.0	74.1	5.2	-0.9	0.0	0.0	0.0	0.0	-0.0	21.9	21.9
6	361299.03	4888182.65	179.50	0	2000	95.9	95.9	0.0	0.0	74.1	13.8	-0.9	0.0	0.0	0.0	0.0	-0.0	8.9	8.9
7	361299.03	4888182.65	179.50	0	4000	86.1	86.1	0.0	0.0	74.1	46.9	-0.9	0.0	0.0	0.0	0.0	-0.0	-34.0	-34.0
8	361299.03	4888182.65	179.50	0	8000	68.1	68.1	0.0	0.0	74.1	167.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-172.4	-172.4

Point Source, ISO 9613, Name: "(untitled)", ID: "S36"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	364588.58	4888397.36	178.68	0	63	84.6	84.6	0.0	0.0	79.7	0.3	-3.0	0.0	0.0	0.0	0.0	-0.0	7.5	7.5
2	364588.58	4888397.36	178.68	0	125	92.4	92.4	0.0	0.0	79.7	1.1	1.8	0.0	0.0	0.0	0.0	-0.0	9.8	9.8
3	364588.58	4888397.36	178.68	0	250	97.6	97.6	0.0	0.0	79.7	2.8	0.1	0.0	0.0	0.0	0.0	-0.0	15.0	15.0
4	364588.58	4888397.36	178.68	0	500	99.4	99.4	0.0	0.0	79.7	5.3	-0.9	0.0	0.0	0.0	0.0	-0.0	15.3	15.3
5	364588.58	4888397.36	178.68	0	1000	100.3	100.3	0.0	0.0	79.7	10.0	-0.9	0.0	0.0	0.0	0.0	-0.0	11.5	11.5
6	364588.58	4888397.36	178.68	0	2000	95.9	95.9	0.0	0.0	79.7	26.4	-0.9	0.0	0.0	0.0	0.0	-0.0	-9.3	-9.3
7	364588.58	4888397.36	178.68	0	4000	86.1	86.1	0.0	0.0	79.7	89.5	-0.9	0.0	0.0	0.0	0.0	-0.0	-82.3	-82.3
8	364588.58	4888397.36	178.68	0	8000	68.1	68.1	0.0	0.0	79.7	319.3	-0.9	0.0	0.0	0.0	0.0	-0.0	-330.0	-330.0

Point Source, ISO 9613, Name: "(untitled)", ID: "S37"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	365500.96	4889854.04	185.85	0	63	84.6	84.6	0.0	0.0	83.7	0.5	-3.8	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
2	365500.96	4889854.04	185.85	0	125	92.4	92.4	0.0	0.0	83.7	1.8	1.5	0.0	0.0	0.0	0.0	-0.0	5.4	5.4
3	365500.96	4889854.04	185.85	0	250	97.6	97.6	0.0	0.0	83.7	4.5	-0.2	0.0	0.0	0.0	0.0	-0.0	9.6	9.6
4	365500.96	4889854.04	185.85	0	500	99.4	99.4	0.0	0.0	83.7	8.3	-1.2	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
5	365500.96	4889854.04	185.85	0	1000	100.3	100.3	0.0	0.0	83.7	15.8	-1.2	0.0	0.0	0.0	0.0	-0.0	2.0	2.0
6	365500.96	4889854.04	185.85	0	2000	95.9	95.9	0.0	0.0	83.7	41.7	-1.2	0.0	0.0	0.0	0.0	-0.0	-28.4	-28.4
7	365500.96	4889854.04	185.85	0	4000	86.1	86.1	0.0	0.0	83.7	141.4	-1.2	0.0	0.0	0.0	0.0	-0.0	-137.9	-137.9
8	365500.96	4889854.04	185.85	0	8000	68.1	68.1	0.0	0.0	83.7	504.5	-1.2	0.0	0.0	0.0	0.0	-0.0	-518.9	-518.9

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Appendix C

Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
Heritage and Archaeological Resources					
Protected Properties and Heritage Resources	• Disturbance to viewscape.	• Minimize potential for viusal disturbance	• See 'Viewscape' • Use of appropriate landscape design.	• Minimal.	• See 'Viewscape'
Archaeological Resources	• There are no areas that would be excavated during the operation phase that would not have been previously assessed prior to construction; therefore no effects are anticipated to archaeological resources during operation.	• None	• None	• None	• None
Natural Heritage Resources					
Significant Wetlands	• Accidental chemical and/or fuel spills and contamination. • Infrequent day to day use of the access roads and maintenance activities resulting in dust generation.	• Manage the risk of accidental spills. • Minimize disturbance to wetlands.	• Mitigation measures for spills include: o Standard containment facilities and emergency response materials (spill kits) will be maintained on-site as required. o Refuelling, equipment maintenance, and other potentially contaminating activities will occur in designated areas. o In the event of a potential discharge of fluids associated with Project operation, the operation and maintenance contractor will immediately stop work and rectify the accidental spill. o 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. o The Emergency Response Plan will contain procedures for spill contingency and response plans, spill response training, notification procedures, and necessary cleanup materials and equipment. o 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. • Other indirect effects to wetlands as a result of maintenance vehicle traffic and turbine operation are expected to be negligible and as a result, no mitigation is required.	• Detailed mitigation measures for the Project as provided in the *NHA/EIS* • An Emergency Response and Communications Plan would be developed by Windlectric and/or the operation 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.	• Minimized or avoided during operation.
Areas of Natural and Scientific Interest	• Accidental spills and contamination. • Infrequent day to day use of the access roads and maintenance activities resulting in dust generation.	• Manage the risk of accidental spills. • Minimize disturbance to Areas of Natural and Scientific Interest (ANSI).	• See mitigation measures for spills under 'Significant Wetlands' • Other indirect effects to ANSI as a result of maintenance vehicle traffic and turbine operation are expected to be negligible and as a result, no mitigation is required.	• Detailed mitigation measures for the Project as provided in the *NHA/EIS* • An Emergency Response and Communications Plan would be developed by Windlectric and/or the operation and maintenance contractor and would include protocols for the proper handling	• Minimized or avoided during operation.

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
				of material spills and associated procedures to be undertaken in the event of a spill.	
Valleylands	• As no valleylands were identified, there are no anticipated impacts.	• N/A	• N/A	• N/A	• None
Significant Woodlands	• Accidental spills and contamination. • Infrequent day to day use of the access roads and maintenance activities resulting in dust generation.	• Manage the risk of accidental spills. • Minimize disturbance to woodlands.	• See mitigation measures for spills under 'Significant Wetlands' • Other indirect effects to ANSI as a result of maintenance vehicle traffic and turbine operation are expected to be negligible and as a result, no mitigation is required.	• See mitigation measures for spills under 'Significant Wetlands'	• See mitigation measures for spills under 'Significant Wetlands'
Provincial Parks and Conservation Reserves	• As no Provincial Parks and Conservation Reserves were identified, there are no anticipated impacts.	• N/A	• N/A	• N/A	• None
Significant Wildlife and Wildlife Habitat (includes birds, bats, amphibians and other wildlife)	• Possible avoidance or displacement of wildlife. • Direct mortality of wildlife • Sensory disturbance to wildlife. • Accidental spills and contamination. • Infrequent day to day use of the access roads and maintenance activities resulting in dust generation.	• Minimize disturbance to wildlife and wildlife habitat.	• Minimize maintenance vehicle traffic and human presence on access roads during grassland breeding bird season (May 1 to July 31). • Turbine lighting must conform to Transport Canada standards. • See mitigation measures for spills under 'Significant Wetlands' • Other indirect effects to Significant Wildlife and Wildlife Habitat as a result of maintenance vehicle traffic and turbine operation are expected to be negligible and as a result, no mitigation is required.	• Post-construction monitoring in significant wildlife habitat and for mortality, as detailed in the Environmental Effects Monitoring Plan (**Appendix D**). • Post-construction monitoring for disturbance will be conducted in all significant open country breeding habitat for a period of three years. • An Emergency Response and Communications Plan would be developed by Windlectric and/or the Operation 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.	• Minimized or avoided during operation.
Water Bodies and Aquatic Resources					
Groundwater	• Accidental spills and contamination. • No groundwater or surface water supplies are anticipated to be used for the facility.	• Manage the risk of accidental spills. • No interference to surrounding private water wells or surface infrastructure.	• See mitigation measures for spills under 'Significant Wetlands' • Above-ground potable and non-potable water tanks would service the operations and maintenance building, no water takings are required from local water sources.	• An Emergency Response and Communications Plan would be developed by Windlectric and/or the Operation 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.	• Minimized or avoided during operation. • No net effects are anticipated for water well usage (if one is required).
Surface Water, Fish, and Fish Habitat	• Accidental spills and/or leaks. • Erosion and sedimentation during maintenance activities. • Submarine cables producing a weak magnetic field source.	• Manage the risk of accidental spills. • Minimize the risk of erosion, and sediment transport.	• Any stockpiled materials should be stored and stabilized away from the water; • Refuelling and maintenance of construction equipment should occur a minimum of 100 m from a water body; • As appropriate, spills should be reported to the MOE Spills Action Centre; • Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water; and • Only clean material, free of fine particulate matter should be placed in the water. • Silt fencing and/or barriers should be used along all construction areas adjacent to natural areas; • No equipment should be permitted to enter any natural areas beyond the silt fencing during	• Environmental monitoring following spring run-off the first year of operations. • An Emergency Response and Communications Plan would be developed by Windlectric and/or the operation 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. • Appropriate remedial measures may be completed as necessary and additional follow-up monitoring conducted as appropriate in the event of an accidental spill and/or leak. • The level of monitoring and reporting should be based on the severity of the spill/leak and may be discussed with the MOE (Spills Action Centre) and MNR.	• Effects to surface water and water bodies would be both spatially and temporally limited to the maintenance activity. • No significant negative effects are anticipated to surface water, water bodies and fish and fish habitat.

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
			construction; • All sediment and erosion control measures should be inspected at least weekly and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and/or upgraded as required; • Topsoil stockpiles should be sufficiently distant from watercourses to preclude sediment inputs due to erosion of stored soil materials; • If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed; • All disturbed areas of the construction site should be stabilized immediately and re-vegetated as soon as conditions allow; and • Sediment and erosion control measures should be left in place until all areas of the construction site have been stabilized. • While a number of species are reported to be capable of detecting changes in the Earth's magnetic field, the narrow linear feature of the field around the cable makes it unlikely that long distance navigation, migration, or major behavioural patterns of those species would be affected.	• If *Fisheries Act* approvals are required from DFO, some monitoring may be required including photographic records during construction and for two years after the completion of construction. To ensure survival of plantings and overall function of the installations.	
Air Quality and Environmental Noise					
Air Emissions	• Emissions from operation and maintenance activities, including equipment and vehicles.	• Minimize duration and magnitude of emissions.	• Operation staff would operate vehicles in a manner that reduces air emissions to the extent practical, including: o Using multi-passenger vehicles to the extent practical o Avoid idling vehicles • Equipment and vehicles would be maintained in a manner that reduces air emissions, including: o Using mufflers and emission control systems as available; o Meet the emissions requirements of the MOE and/or MTO;	• Adherence to Complaint Response Protocol. • All vehicles identified through the monitoring program that fail to meet the minimum emission standards would be repaired immediately or replaced as soon as practical.	• Any net effects are expected to be short-term in duration and highly localized.
Dust & Odour Emissions	• Dust emissions from operation and maintenance vehicles and unpaved road surfaces exposed to wind.	• Minimize duration and magnitude of emissions. • Minimize disturbance to existing land uses.	• Maintaining equipment in good running condition and in compliance with regulatory requirements. • Dust suppression (e.g. water) of source areas as necessary. • Covering loads of friable materials during transport.	• Adherence to Complaint Response Protocol.	• Any net effects are expected to be short-term in duration and highly localized.
Environmental Noise	• Noise emitted from a turbine and/or transformers. • Noise emitted from traffic and /or vehicles during maintenance activities.	• Noise at all non-participating receptors to meet MOE Noise Guidelines.	• Adherence to all noise setback requirements. • All engines on vehicles associated with maintenance equipment would be equipped with mufflers and/or silencers in accordance with MOE and/or MTO guidelines and regulations. • Noise levels arising from maintenance equipment would also be compliant with sound	• Routine facility maintenance to ensure infrastructure is operating properly and efficiently would be performed as required • Adherence to Complaint Response Protocol.	• Application of the recommended mitigation measures during operations would limit noise emissions to the general vicinity of the turbine locations and substation property.

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
			levels established by the MOE. • Routine maintenance to ensure Project infrastructure is operating properly and effectively. • To the greatest extent possible, operations activities that could create excessive noise would be restricted to operation business hours. If maintenance activities that cause excessive noise must be carried out outside of these time frames, discussion and authorization from the Township will be required. • A sound attenuation wall will also be constructed around three sides of the substation transformer to further attenuate noise produced by the Project.		• Given that the facility must comply with MOE environmental noise requirements, no significant net effects are anticipated. • Any adverse net effects due to noise during maintenance activities are anticipated to be short-term in duration and intermittent.
Land Use and Socio-Economic Resources					
Existing Land Uses	• Lands occupied by Project components would be removed from their present land-use. • Minimal impacts to livestock are anticipated. • Temporary limited increase in noise and dust levels during maintenance activities. • Potential for minor increase in traffic during maintenance activities.	• Minimize disturbance to existing land uses. • Minimize land required for the Project. • Eliminate potential stray voltage.	• Operational and maintenance activities would be restricted to areas where Project components are located. • Siting of turbines will comply with MOE guidelines. • Landowners are being financially compensated for the lease of the private lands and thus offset the effect of removing the land from agricultural production. • Siting of turbines and access roads is completed in consultation with the participating landowners. • Siting of turbines, access roads, collector lines, and the transmission line in such a way as to minimize disturbances to existing agricultural operations. • All electrical collector lines would be installed to meet the Ontario Electrical Safety Code and be certified by the Electrical Safety Authority. • See ‘Environmental Noise’, ‘Dust and Odour Emissions’, and ‘Local Traffic’.	• See ‘Environmental Noise’, ‘Dust and Odour Emissions’, and ‘Local Traffic’. • Adherence to Complaint Response Protocol.	• Short-term in duration, temporary, and highly localized • Minimized through the implementation of good site practices, transportation planning, and communication with the community.
Mineral, Aggregate, and Petroleum Resources	• None	• N/A	• N/A	• N/A	• None
Game And Fishery Resources	• Sensory disturbance to game species from limited noise. • Possible barriers to fish passage from improperly installed culverts.	• Minimize disturbance to game and fishery resources.	• Siting the Project outside of wetlands and naturally vegetated areas has largely precluded disturbance to local flora, small mammals and amphibians, natural habitat, and corridor functions. • Routine maintenance to ensure equipment is operating properly and efficiently, thus limiting potential disturbance to game resources. • Current agricultural, recreational and hunting activities provide some disturbance. It is anticipated, similar to other wind projects, that game resources will adapt to the presence of operational turbines. • Hunting and other recreational uses will be	• None required.	• None

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
			permitted on lands occupied and adjacent to the Project (not withstanding private property restrictions). • Culverts would be designed and installed such that there is no restriction of flows through the culvert.		
Provincial Plans, Policies, and Recreation Areas	• Possible interference with nearby recreational uses from traffic, dust and noise.	• Minimize disturbance to recreational activities.	• Mitigation measures related to noise are outlined in '*Environmental Noise'*. • Mitigation measures related to dust are outlined in '*Dust and Odour Emissions'*. • Mitigation measures related to traffic are outlined in '*Local Traffic*'.	• Adherence to Complaint Response Protocol.	• Any adverse effects are anticipated to be short term and intermittent.
Local Traffic	• Short-term, localized disturbance to traffic patterns, increases in traffic volume, and/or creation of potential traffic safety hazards.	• Minimize disturbance to local traffic.	• As appropriate, the Proponent would obtain relevant permits related to traffic planning. • Follow the Traffic Management Plan used during Construction, as required during maintenance activities.	• Adherence to Complaint Response Protocol. • Communication with Township and community.	• Temporary and intermittent.
Local Economy	• Small increase in direct, indirect and induced employment over the operations period. • Local economic benefits from land lease payments, local expenditures, municipal taxes, etc.	• Create positive effects on local economy.	• To the extent practicable required goods and services would be sourced from qualified local suppliers where these items are available in sufficient quantity and quality and at competitive prices.	• Adherence to the Complaint Response Protocol.	• A positive net effect is anticipated on the local economy during operation of the Project. • Participating landowners would receive land payments based on agreements with the Proponent. • Township has been offered a draft Community Vibrancy Agreement (which is currently being review by the Township). • Existing businesses in the local communities could benefit from the demands of the Project workforce during operations.
Viewscape	• Disruption to viewscape from siting of Project infrastructure.	• Minimize potential for visual disturbance.	• The operation and maintenance building construction and finishes would be chosen to be compatible with the rural setting of the General Project Area and other buildings in the locale. • The substation and switching station may be surrounded by berms to mitigate the visual impact of the site. • Consideration of fewer lights and exploration of lighting technologies, however the Project must remain compliant with Transport Canada requirements. • Limited opportunities for potential mitigation strategies given the height of the wind turbines	• Adherence to Complaint Response Protocol.	• The changed visual landscape would be present during the life of the facility. • Will be a net effect (either positive or negative based on perceptions) due to the change in viewscape of the surrounding area.

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
			and met towers, and the landscape patterns.		
Existing Infrastructure					
Provincial and Municipal Infrastructure	• May be instances during maintenance activities where excess loads would require special traffic planning. • See 'Local Traffic'.	• Minimize disturbance to provincial, municipal, and other major infrastructure.	• Necessary permits would be obtained. • Consultation with Township regarding excess loads required during operation that have potential to damage municipal roads.	• See 'Local Traffic' • Adherence to Complaint Response Protocol.	• Potential for damage due to excess loads required for maintenance activities cannot be totally disqualified. • Limited, short-term effect on infrastructure.
Navigable Waters	• Temporary activity due to crossings during maintenance activities.	• Avoid navigable waterways. • Minimize length of disturbance to navigable waterways.	• Consultation with Transport Canada and permits (if required) will be obtained prior to construction.	• To be identified as part of any permits (if required).	• None
Telecommunication and Radar Systems	• Potential to interfere with telecommunication and radar systems	• Minimize interference with radio, TV, or internet signals. • Minimize interference with cellular telephone networks	• The Proponent has consulted with relevant agencies and licensed providers to identify any likely effects to telecommunication and radar systems. • In the unlikely event that signal disruption is experienced, mitigation measures may include: o Replacing the receiving antenna with one that has a better discrimination to the unwanted signals, o Relocating either the transmitter or receiver, or o Switching to an alternate means of receiving the information.	• The Proponent would review potential incidents of telecommunications interference on a case by case basis. • Adherence to Complaint Response Protocol.	• Limited and short-term in duration.
Aeronautical Systems	• Aeronautical obstruction.	• Minimize potential hazard to low flying aircraft.	• Turbine lighting must conform to Transport Canada standards. In order to reduce rural light pollution, lights would be selected with the minimal allowable flash duration, narrow beam, and would be synchronized. • NAV Canada would be responsible for updating all aeronautical charts with the turbine locations promptly after Project approval. • Low-level aircraft such as ultra-lights and crop dusters are to be familiar with the area they are flying over and are prohibited from night-time flights.	• Adherence to marking and lighting requirements of the Aerodrome Safety Branch of Transport Canada. • Adherence to Complaint Response Protocol.	• No anticipated significant effects to aeronautical systems. • Low-level aircrafts may need to re-route their flight paths or consult with Windlectric when spraying is to occur.
Public Health and Safety					
Public Health and Safety	• Potential traffic safety hazards. • Turbine Blade and Structural Failure • Ice fall and shed • Extreme Weather Events	• No structural failure of the turbines or ancillary equipment. • Limit potential for ice throw/shed to impact pedestrians • No structural failure of the turbines or Project equipment.	• Implementation of an Emergency Response Plan. • Follow the Traffic Management Plan used during Construction, as required during maintenance activities. • Design, install, operate, and maintain turbines according to current applicable industry standards/certifications. • 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.	• Adherence to Complaint Response Protocol. • Failsafe devices are capable of shutting down the turbine blades in the event of excessive wind conditions, imbalance or malfunction of other turbine components. • Turbines would be monitored electronically twenty-four hours a day, seven-days a week, to allow operational changes to be noted and assessed quickly. • Turbine maintenance to ensure turbines are running properly and efficiently.	• With adherence to safety policies and procedures, there is minimal increased or new risk to public health and safety

Appendix C Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operation

Environmental Feature	Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Net Effects
			• 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. • Training and education of staff operating the control system. • Adherence to required setbacks. • Design of turbine tower reduces ice accumulation. • Automatic turbine shutdown due to weight imbalances. • Project components have been designed to withstand the effects from extreme events. • Design, install, operate, and maintain turbines according to applicable industry standards/certifications. • Turbines are designed to automatically shut down in the event of excessive wind conditions, imbalance, or malfunction of other turbine components.	• Inspections of turbines would occur after extreme weather events.	

Appendix D

Environmental Effects Monitoring Plan for Wildlife

AMHERST ISLAND WIND ENERGY PROJECT

ENVIRONMENTAL EFFECTS MONITORING PLAN FOR WILDLIFE

File No. 160960595
April 2013

Prepared for:

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1.0 Introduction

1.1 PROJECT OVERVIEW

A Feed In Tariff (FIT) contract was awarded to Windlectric Inc. by the Ontario Power Authority (OPA) for the construction of the Amherst Island Wind Energy Project. This project has a nameplate capacity of 75 MW and is considered a Class 4 wind project under the REA regulation. The project is proposed to be developed on private land at the following location(s):

Upper-tier Municipality:	Lennox and Addington County
Lower-tier Municipality:	Loyalist Township
Geographic Township:	Amherst Island
Lot(s) and Concession(s):	Amherst Island and the mainland shoreline

The project will consist of the following permanent infrastructure as mapped in Figure 1:

- 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 REA. The layout includes 24 Siemens SWT-2.3-113 2300 kW and 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 un-serviced 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.

The project will consist of the following temporary infrastructure as mapped in Figure 1:

- Temporary components during construction may include staging areas for the turbines, access roads, met tower(s), collector lines and transmission line as well as crane paths, a temporary dock, site office(s), batch plant, central staging areas, and associated watercourse crossings.

1.2 PURPOSE OF THE ENVIRONMENTAL EFFECTS MONITORING PLAN

An Environmental Effects Monitoring Plan (EEMP) must be prepared to address negative environmental effects that may result from engaging in the renewable energy project. The EEMP must set out:

- Performance objectives in respect of the negative environmental effects; and
- Mitigation measures to assist in achieving the performance objectives.

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 mitigation measures fail.

Furthermore, all Class 3 and 4 wind facilities must prepare an EEMP in respect of birds and bats in accordance with the following publications of the Ministry of Natural Resources:

- *Bats and Bat Habitats: Guidelines for Wind Power Projects (OMNR 2011a)*
- *Birds and Bird Habitats: Guidelines for Wind Power Projects (OMNR 2011b)*

This post-construction monitoring plan is one component of the EEMP submitted to the Ministry of the Environment as part of the REA Application for the Project. This document has been prepared in accordance with O. Reg. 359/09, MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (July 2011) and MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (December 2011).

2.0 Post-Construction Monitoring for Significant Natural Features

As indicated in the Environmental Impact Study (EIS), prepared in accordance with section 38(2) of the Renewable Energy Approvals Regulation (O.Reg 359/09), the following confirmed significant and provincially significant natural features will receive post-construction monitoring:

- Raptor Wintering Area (RWA1, RWA2, RWA3, RWA4, RWA5, RWA6, RWA7, RWA8);
- Landbird Migratory Stopover Area (ML1, ML2, ML3, ML4, ML5);
- Woodland Area-Sensitive Breeding Bird Habitat (ABB1);
- Open Country Breeding Bird and Short-eared Owl Breeding Habitat (OCB1, OCB2, OCB3, OCB4, OCB5, OCB6, OCB7, OCB8, OCB9); and
- Shrub/early Successional Bird Breeding Habitat (SBB4, SBB5).

The location of each significant or provincially significant natural feature is shown in Figure 1. The potential negative environmental effects, performance objectives, mitigation strategy, environmental effects monitoring plan along with contingency measures are described in Table 1. All information in this report related to wildlife habitat is also assessed in the Natural Heritage Assessment and Environmental Impact Statement for Amherst Wind Energy Project (Stantec 2012). The environmental effects monitoring plan for each feature includes the post-construction survey methods, monitoring locations, frequency and duration of sample collection, technical and statistical value of the date, and reporting requirements.

2.1 CONTINGENCY MEASURES

Where mitigation measures are found to not be effective, the contingency measure identified in Table 1 will be implemented immediately. If contingency measures need to be implemented MOE and other relevant agencies (where required, or upon the request of the approval holder) will be notified immediately, and if required, MOE and other relevant agencies will be consulted to determine appropriate contingency measures.

2.2 REPORTING REQUIREMENTS

The Ministry of Environment (MOE) will be provided with a report that summarizes the results of the EEMP for all aspects of the project. The Ministry of Natural Resources (MNR) will be provided with a Copy of the annual report that summarizes the results of the monitoring described in this report.

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
CONSTRUCTION AND DECOMISSIONING									
Significant Woodlands (1, 2, 3, 4, 7, 9, 10, 15, 18, 20, 21, 23, 28,32, and 36)	Loss of woodland habitat Accidental damage to root zones Accidental damage to trees or damage to limbs Dust generation, sedimentation and erosion during construction Contamination through accidental spills during construction	Remove minimal amount of woodland Prevent damage to the root zones Prevent accidental damage to trees or damage to limbs Minimize dust generation, prevent sedimentation and erosion Manage the risk of accidental spills	Mitigation during construction and decommissioning	Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of trees and root zones. Workers will be advised not to trespass beyond the boundary of the marked area.	-check silt fencing along the periphery of significant woodlands	-daily when construction activities occur within the immediate vicinity of significant woodlands and when inclement weather is anticipated (i.e. rain events)	Prevent potential negative environmental effects	None	Any tree limbs or root zones that are accidentally damaged by construction activities will be pruned using proper arboricultural techniques
				The boundaries of the limit of construction within Woodland 9 will be delineated and flagged / staked in the field by a qualified ecologist prior to construction to assist with the demarcation of the construction area, to ensure construction activities do not encroach beyond the limited construction area.	-check silt fencing along limits of construction through Woodland 9	-daily when construction activities occur within the immediate vicinity of Woodland 9	Prevent potential negative environmental effects	None	Any tree limbs or root zones that are accidentally damaged by construction activities will be pruned using proper arboricultural techniques
				Erect silt fencing to prevent sedimentation within critical root zones Implement a sedimentation and erosion control plan. Any issues should be resolved in a timely fashion.	-check silt fencing along the periphery of significant woodlands to make sure it is fully functional	-daily when construction activities occur within the immediate vicinity of significant woodlands and when inclement weather is anticipated (i.e. rain events)	Prevent potential negative environmental effects	None	Any build up of sediment beyond the silt fence will be cleaned up and removed to avoid risk of further spread of sediment.
				Implement dust suppression (i.e. watering) on access roads as required.	- access roads within 30m of significant woodlands	-ongoing when construction activities occur within the immediate vicinity of woodlands	Prevent potential negative environmental effects	None	Increase frequency of dust suppression measures
				Re-vegetate disturbed areas as soon as construction activity within the disturbed areas is complete.	-check that seed grows in areas of disturbance within one growing season	-once after seeding area	Prevent potential negative environmental effects	None	Replant areas where seed does not grow to ensure vegetation establishes within the growing season
				All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from	Not required	Not required	Prevent potential negative environmental effects		Keep emergency spill kits on site Implement MOE spill action plan if necessary

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
				significant woodlands.					Dispose of waste material by authorized and approved offsite vendors
				Implement infiltration (i.e. minimize paved surfaces and design roads to promote infiltration) techniques to the maximum extent possible to avoid changes in soil moisture and compaction.	Not required	Not required	Prevent potential negative environmental effects	None	Not required
Significant Wetlands (all except 6 and 7)	Degradation of wetland through dust, erosion and/or sedimentation Changes in surface water flow patterns which impacts vegetation growth. Contamination through accidental spills during construction. New edge creation by vegetation removal close to wetlands.	Minimize dust generation, prevent erosion and sedimentation Maintain existing surface water flow patterns Manage the risk of accidental spills Avoid encroachment into significant wetlands	Mitigation during construction and decommissioning	Absolutely no encroachment into the wetland is permitted. The boundaries of all wetlands within 30 m of the proposed construction area will be flagged / staked in the field by a qualified ecologist prior to construction to assist with the demarcation of the construction area, to ensure construction activities avoid these sensitive areas, and to assist with the proper field installation of E&S controls. Workers will be advised not to trespass beyond the boundary of the marked area.	-check silt fencing along the periphery of significant wetlands	-daily when construction activities occur within the immediate vicinity of wetlands and when inclement weather is anticipated (i.e. rain events)	Prevent potential negative environmental effects	None	Restoration of damaged or degraded wetland habitat, which may involve reseeding with a native wetland seed mix.
				Erect silt fencing to prevent sedimentation within critical root zones. Implement a sedimentation and erosion control plan. Any issues should be resolved in a timely fashion.	-check silt fencing along the periphery of each wetland to make sure it is fully functional	-daily when construction activities occur within the immediate vicinity of wetlands and when inclement weather is anticipated (i.e. rain events)	Prevent potential negative environmental effects	None	Any build-up of sediment beyond the silt fence will be cleaned up and removed to avoid risk of further spread of sediment into the wetland.
				Implement dust suppression (i.e. watering) as required.	- access roads within 30m of significant wetlands	-ongoing when construction activities occur within the immediate vicinity of wetlands	Prevent potential negative environmental effects	None	Increase frequency of dust suppression measures
				Re-vegetate disturbed areas as soon as construction activity within the disturbed areas is complete.	-check that seed grows in areas of disturbance within one growing	-once after seeding area	Prevent potential negative environmental effects	None	Replant areas where seed does not grow to ensure vegetation establishes within the growing season

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
					season				
				All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from wetlands.	Not required	Not required	Prevent potential negative environmental effects	None	Keep emergency spill kits on site Implement MOE spill action plan if necessary Dispose of waste material by authorized and approved offsite vendors
				Where possible, and as appropriate, access roads will be constructed at or near existing grade to maintain surface flow contributions to wetlands. Limit changes in land contours to ensure natural drainage patterns are maintained.	-upon completion of grading and after rain event ensure that surface water drainage patterns consistent with drainage patterns that occurred before grading	-once post-grading activity and after rain event	Prevent potential negative environmental effects	None	Adjust grading to achieve natural drainage patterns
				Where new access roads cross existing drainage features, design will include culverts or other appropriate structures of sufficient size to accommodate flow.	-upon installation of culverts and after rain event ensure that surface water drainage patterns consistent with drainage patterns that occurred before grading	-once post-grading activity and after rain event	Prevent potential negative environmental effects	None	Adjust grading to achieve natural drainage patterns
Raptor Wintering Areas (RWA1, RWA2, RWA3, RWA4, RWA5, RWA6, RWA7, RWA8)	Loss of habitat Disturbance due to increased traffic and noise Dust generation, sedimentation and erosion during construction.	Habitat compensation measures Prevent habitat avoidance/disturbance of caused by noise and dust generation	Mitigation during construction and decommissioning	Development of a management strategy with agencies, interested landowners and other interested parties to implement some of the recommendations provided in the Owl Woods Management Plan (Ecological Services 2011).	As will be outlined in the management strategy.	As will be outlined in the management strategy.	Prevent potential negative environmental effects	None	Not required.
				The boundaries of the limit of construction within grassland habitat will be delineated and flagged / staked in the field by a qualified ecologist prior to construction to assist with the demarcation of the construction area, to ensure construction activities do not encroach beyond the limited	-check limits of construction through significant grassland habitat is respected.	-daily when construction activities are ongoing in grassland habitat.	Prevent potential negative environmental effects	None	Immediately restore disturbed areas by reseeding.

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
				construction area.					
				Limit tree clearing in hedgerows to maintain perch and roost sites.	Not required	Not required	Prevent potential negative environmental effects	None	Not required
				Implement dust suppression (i.e. watering) on access roads as required.	- all access roads	-ongoing during construction	Prevent potential negative environmental effects	None	Increase frequency of dust suppression measures
Turtle Overwintering Area (TO1)**	Wetland degradation due to dust, siltation or accidental spill	Minimize dust generation, prevent sedimentation and erosion Manage the risk of accidental spills	Mitigation during construction and decommissioning	Turtle overwintering area is contained within the Long Point Marsh Provincially Significant Wetland. Implementation of mitigation measures for significant wetlands outlined above, will limit disturbance to stopover habitat.	Monitoring as outlined in significant wetlands (above)	Monitoring as outlined in significant wetland (above)	Prevent potential negative environmental effects	None	Contingency Plan as outlined in significant wetlands (above)
Migratory Landbird Stopover Area (ML1, ML2, ML3, ML4, ML5)	Disturbance due to increased traffic, noise, or dust	Minimize disturbance to wildlife Minimize dust generation	Mitigation during construction and decommissioning	Each of the migratory landbird stopover areas occurs within significant woodlands. Implementation of mitigation measures for significant woodlands outlined above, will limit disturbance to stopover habitat.	Monitoring as outlined in significant woodland (above)	Monitoring as outlined in significant woodland (above)	Prevent potential negative environmental effects	None	Contingency Plan as outlined in significant woodlands (above)
Old Growth Forest (OGF1, OGF2, OGF3)	Woodland degradation due to dust or siltation.	Minimize dust generation and siltation.	Mitigation during construction and decommissioning	Each of the old growth forest habitats occur within significant woodlands. Implementation of mitigation measures for Significant Woodlands outlined above, will limit disturbance to stopover habitat.	Monitoring as outlined in significant woodland (above)	Monitoring as outlined in significant woodland (above)	Prevent potential negative environmental effects	None	Contingency Plan as outlined in significant woodlands (above)
Amphibian Breeding (Woodland and Wetland) (ABWO2, ABWO3, ABWE1, ABWE2)	Wetland degradation due to dust, siltation or accidental spill	Minimize dust generation, prevent sedimentation and erosion Manage the risk of accidental spills	Mitigation during construction and decommissioning	Amphibian breeding habitat is contained within provincially significant wetlands. Implementation of mitigation measures for significant wetlands outlined above, will limit disturbance to stopover habitat.	Monitoring as outlined in significant wetlands (above)	Monitoring as outlined in significant wetland (above)	Prevent potential negative environmental effects	None	Contingency Plan as outlined in significant wetlands (above)
OPERATION									
Raptor Wintering Area (RWA1, RWA2, RWA3, RWA4, RWA5, RWA6, RWA7,	Disturbance to wintering raptors during operation within the Study Area	The number of species and the number of individual wintering raptors within the Study Area will be monitored and compared to pre-construction conditions.	Post-construction Disturbance Monitoring Program	Area searches by vehicle and by foot using pre-construction methods (see NHA Section 4.1.3).	Within features RWA1, RWA2, RWA3, RWA4, RWA5, RWA6, RWA7 and RWA8	Twice monthly surveys in November through March for three years.	Compare numbers of species and individuals between years.	Annually	Should performance objectives not be met: 1. Compare declines to population trends noted

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
RWA8)		MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to wintering raptors is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.							through province or continent-wide breeding bird surveys 2. Compare annual fluctuations to local and provincial trends (Christmas Bird Counts) 3. Develop additional studies to determine extent of disturbance effect 4. Investigate habitat management means to increase breeding density Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with wintering raptors. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering as per MNR's Bird and Bird Habitat Guidelines (2011). Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.
	Avoidance by wintering raptors in proximity to operating wind turbines	Measure the potential degree of disturbance effects to hunting raptors (particularly Short-eared Owls) in proximity to operating wind turbines.	Post-construction Disturbance Monitoring Program	Behavioral studies in proximity to operations wind turbines.	Within features RWA1, RWA2, RWA3, RWA4, RWA5, RWA6, RWA7 and RWA8	Twice monthly surveys in November through March for three years.	Evaluate extend of potential disturbance by wind turbines.	Annually	
Landbird Migratory Stopover Area (ML1, ML2, ML3, ML4, ML5)	Disturbance to migrating landbirds during operation	The number of species and the number of individual migratory landbirds will be monitored and compared to pre-construction conditions MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to migratory landbirds is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	Post-construction Disturbance Monitoring Program	Transect survey using pre-construction methods (see NHA Section 4.1.3).	Within features ML1, ML2, ML3, ML4	Weekly surveys in May and in September through October, for three years.	Ability to directly compare numbers of species and individuals between years	Annually	Should performance objectives not be met: 1. Compare declines to population trends noted through local or province-wide migration monitoring 2. Develop additional control/impact studies to assess whether decline is due to turbine disturbance, and determine extent of disturbance effect Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
		For monitoring and comparison purposes, the list of species should be refined to only include migratory landbirds.							associated with landbird migration stopover habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering as per MNR's Bird and Bird Habitat Guidelines (2011). Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.
Woodland Area-Sensitive Breeding Bird Habitat (ABB1)	Disturbance to woodland area sensitive breeding birds during operation	The breeding woodland area-sensitive species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions. MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to woodland area-sensitive breeding birds is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	Post-construction Disturbance Monitoring Program	Area searches using pre-construction methods (see NHA Section 4.1.3).	Within feature ABB1	Three rounds of surveys annually for 3 years.	Breeding diversity can be compared among years or between control/impact sites	Annually	Should performance objectives not be met: 1. Compare declines to population trends noted through province or continent-wide breeding bird surveys 2. Develop additional studies to determine extent of disturbance effect 3. Investigate habitat management means to increase breeding density Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with woodland area-sensitive breeding bird habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering as per MNR's Bird and Bird Habitat Guidelines (2011). Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
Open Country Breeding Bird and Short-eared Owl Breeding Habitat (OCB1, OCB2, OCB3, OCB4, OCB5, OCB6, OCB7, OCB8, OCB9)	Disturbance to open country breeding birds, including Short-eared Owls, during operation.	The breeding density of open country breeding birds and sensitive species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions. MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to open country breeding birds, including Short-eared Owls, is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	Post-construction Disturbance Monitoring Program	Point count survey and area searches using pre-construction methods (see NHA Section 4.1.3).	Within features OCB1, OCB2, OCB3, OCB4, OCB5, OCB6, OCB7, OCB8 and OCB9	Three rounds of surveys annually for 3 years.	Breeding pair density is a standard measure that can be compared among years or between control/impact sites	Annually	Should performance objectives not be met: 1. Compare declines to population trends noted through province or continent-wide breeding bird surveys 2. Develop additional studies to determine extent of disturbance effect 3. Investigate habitat management means to increase breeding density Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with open country breeding bird and Short-eared Owl habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering as per MNR's Bird and Bird Habitat Guidelines (2011). Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.
	Avoidance from open country breeding birds, including Short-eared Owls in proximity to operational wind turbines.	The breeding density of open country breeding birds and sensitive species will be monitored and compared at different distance regimes from operating wind turbines. MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to open country breeding birds, including Short-eared Owls, is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	Post-construction Disturbance Monitoring Program	Paired point counts extending from the base of wind turbine generators located in grassland habitat with an equal number of paired point counts located more than 120 m from wind turbine generators in grassland	Within features OCB1, OCB2, OCB3, OCB4, OCB5, OCB6, OCB7, OCB8 and OCB9	Three rounds of surveys annually for 3 years.	Breeding pair density is a standard measure that can be compared between distance regimes.	Annually	
Shrub/early Successional Bird Breeding Habitat (SBB4, SBB5)	Disturbance to shrub/early successional bird breeding habitat, during operation.	The breeding density of shrub/early successional breeding birds, within the habitat, will be monitored and compared to pre-construction conditions. MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant	Post-construction Disturbance Monitoring Program	Area searches using pre-construction methods (see NHA Section 4.1.3).	Within features SBB4 and SBB5.	Three rounds of surveys annually for 3 years.	Breeding diversity can be compared among years or between control/impact sites	Annually	Should performance objectives not be met: 1. Compare declines to population trends noted through province or continent-wide breeding bird surveys 2. Develop additional studies to determine extent of disturbance effect 3. Investigate habitat

Table 1: Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within 120 m of the Amherst Island Wind Energy Project where an operational impact has the potential to occur during construction, operation, and/or decommissioning.

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methods	Monitoring Locations	Frequency and Duration of Sample Collection	Rationale	Reporting Requirements	
		disturbance/avoidance effect to shrub/early successional, is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.							management means to increase breeding density Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with shrub/early successional breeding bird habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering as per MNR's Bird and Bird Habitat Guidelines (2011). Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.

3.0 Post-Construction Monitoring for Bat and Bird Mortality

Post-construction mortality surveys are required for all Class 3 and 4 wind power projects. This Post-Construction Monitoring Plan is one component of the EEMP of the REA Application for the Project, and has been prepared in accordance with MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (July 2011) and MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (December 2011).

3.1 MORTALITY THRESHOLDS

A threshold approach will be used to identify and mitigate significant bat and bird mortality resulting from the operation of wind turbines.

3.1.1 Bats

Bat mortality is considered to be significant when a threshold of annual bat mortality (averaged across the site) exceeds:

- 10 bats / turbine / year

This threshold has been determined based on bat mortality reported at wind power projects in Ontario and comparison with jurisdictions across North America.

3.1.2 Birds

Bird mortality is considered to be significant when a threshold of annual bird mortality exceeds:

- 14 birds / year at individual turbines or turbine groups
- 0.2 raptors / turbine / year (all raptors) across a wind power project; or
- 0.1 raptors / turbine / year (provincially tracked raptors) across a wind power project

Provincially tracked raptors are defined as raptors of provincial conservation concern by MNR's Natural Heritage Information Centre (NHIC).

3.2 POST-CONSTRUCTION MONITORING METHODS

Post construction bat and bird mortality surveys estimate bird and bat mortality from wind turbines and may identify species and specific periods of high mortality. This knowledge can be used to evaluate the success of mitigation measures, establish protocols for operational mitigation, and inform adaptive management.

Bat and bird mortality surveys identify the number of bats or birds killed per turbine over a known period of time (expressed as bats/turbine/year or birds/turbine/year). This value represents an estimate of bat and bird mortality adjusted for carcass removal rates, searcher efficiency, and percent area searched. Standard methods for mortality surveys are identified below. Typically, a monitoring year is typically considered to be from May 1 – October 31, and

continues until November 30 specifically for raptor monitoring. However, at the Amherst Island Wind Energy Project, monitoring is proposed for the full year (12 months) due to the presence of significant wildlife habitat for wintering raptors.

Post-construction monitoring is required for 3 years at all Class 3 and 4 wind power projects. Post-construction monitoring will consist of:

- Regular bat/bird mortality surveys around specific wind turbines
- Monitoring of bat/bird carcass removal rate by scavengers (or other means)
- Monitoring of bird/bat searcher efficiency (i.e. number of bat/bird fatalities present that are actually detected by surveyors)
- Avoidance-disturbance effects monitoring (where a project is located within 120 m of bat/bird Significant Wildlife Habitat (SWH))
- For birds, subsequent 2 years of scoped mortality and cause and effects monitoring at individual turbines (and unmonitored turbines in near proximity), following any given year where an annual post-construction morality report identifies significant bird or raptor mortality; and
- For bird/bats, an additional 3 years of effectiveness monitoring where mitigation is applied

All searchers will have updated rabies pre-exposure vaccinations.

3.2.1 Effort and Timing for Bird and Bat Mortality Monitoring

Requirements for post-construction mortality monitoring at the Amherst Island Wind Energy Project include:

- Post-construction monitoring (including mortality surveys, carcass removal and searcher efficiency trials) will be conducted during the core season when bats are active, and in coordination of bird mortality monitoring (May 1 – October 31) for the first 3 years of wind turbine operation.
- Mortality surveys will be conducted at each monitored turbine twice per week (3 and 4 day intervals) from May 1 – October 31; surveys for raptor mortality will be continued once per week from November 1 – April 30.
- Bat and bird mortality surveys will occur at a sub-sample of at least 30% of turbines (minimum 10 turbines) will be selected to cover representative areas throughout the project location.
- For birds, all turbines within the project location will be monitored once a month during the May 1-October 31 survey period for evidence of raptor mortalities.
- Should significant annual bird mortality is identified, subsequent scoped mortality and cause effects monitoring will be conducted for 2 years at individual turbines (and unmonitored turbines in near proximity).
- Should significant bat or bird mortality be observed, and operational mitigation implemented, post-construction monitoring will be conducted for an additional 3 years from the implementation of operational mitigation to evaluate the effectiveness of the mitigation.

A total of 10 turbines (30% of the 33 turbines that will be constructed) will be selected to cover representative areas throughout the project location. The start date of the post-construction monitoring will be dependent on the commercial operation date of the facility. If full project commissioning is delayed, post-construction monitoring of a partially completed project will not be delayed for longer than 1 year.

3.2.2 Carcass Searches

Carcass removal by scavengers can be variable among sites (varying by vegetation cover, terrain and season) and must be considered when estimating total bat and bird mortality. Carcass searches will consider the following:

- The sub-sample of wind turbines that are monitored will include all habitat types and avian significant wildlife habitat present at the site, and will cover the spatial distribution of the wind turbines. Wind turbines will be selected through a scientifically defensible system (e.g. stratification).
- The time required to search each turbine will vary depending on the surrounding habitat (e.g. open field vs. forest, etc.) and individual searchers, but searchers will aim for a consistent search time for all surveyed turbines (e.g. 20 minutes per turbine).
- Each surveyed turbine will have a search area that has a 50 m radius.
- Within this 50 m radius, the search area will be examined using transects 5.0-6.0 m apart allowing for a visual search of 2.5-3.0 m on each side. The search area may be rectangular, square or circular depending on turbine locations and arrangements and surrounding terrain.
- The search area of each turbine will be mapped into visibility classes according to the following table. Where the majority of the search area would not be searchable due to vegetation cover or other impediments (e.g. Visibility Class 4) these turbines will not be included in the sub-sample of monitored turbines.

%Vegetation Cover	Vegetation Height	Visibility Class
≥90% bare ground	≤15cm tall	Class 1 (Easy)
≥25% bare ground	≤15cm tall	Class 2 (Moderate)
≤25% bare ground	≤25% > 30cm tall	Class 3 (Difficult)
Little or no bare ground	≥25% > 30cm tall	Class 4 (Very Difficult)

- All carcasses found will be photographed and recorded/labeled with species, sex (if possible), date, time, location (UTM coordinate), carcass condition, searcher, injuries, ground cover, and distance and direction to nearest turbine.
- Weather conditions including wind speed and precipitation will be included as part of the data collection.

- The estimated number of days since death, and condition of each carcass collected will be recorded in one of the following categories:
    - Fresh
    - Early decomposition
    - Moderate decomposition
    - Advanced decomposition
    - Complete decomposition
    - Scavenged

- Bird carcasses found during mortality monitoring will be collected and stored in a freezer and used in carcass removal or searcher efficiency trials, assuming they are in reasonable condition.
- Carcasses of the following species found during bat mortality searches will be stored in a freezer and used in carcass removal or searcher efficiency trials, assuming they are in reasonable condition:
    - *Lasionycteris noctivagans* (Silver-haired Bat)
    - *Lasiurus cinereus* (Hoary Bat)
    - *Lasiurus borealis* (Eastern Red Bat)

- Because of white-nose syndrome contamination risks, the following species will not be used in carcass removal or searcher efficiency trials (carcasses of these species may be sent to the Canadian Cooperative Wildlife Health Centre for analysis of white-nose syndrome):
    - *Myotis septentrionalis* (Northern Long-eared Bat)
    - *Myotis lucifugus* (Little Brown Bat)
    - *Myotis leibii* (Eastern Small-footed Bat)
    - *Perimyotis subflavus* (Tricolored Bat)
    - *Eptesicus fuscus* (Big Brown Bat)

3.2.3 Carcass Removal Trials

The level of carcass scavenging must be determined through carcass removal trials. In these trials carcasses are placed around the wind turbines and monitored until they disappear. The average carcass removal time is a factor in determining the estimated bat or bird mortality. As carcass removal rates vary considerably from one site to another and seasonally, removal trials will be conducted at every wind power project for every year of monitoring.

Below are some important considerations for conducting carcass removal rate trials:

- Carcass removal trials will be conducted at least once a season (spring, summer, fall and winter) during the same period as the mortality surveys. Trials will be conducted

once per month if vegetation changes occur during the season (e.g. crops grow, harvest, etc.).

- A minimum of 10 carcasses will be used for each trial with no more than 5 trial carcasses placed at any one time.
- Carcasses will be monitored every 3-4 days (or weekly in winter) in conjunction with carcass searches.
- Carcass removal trials will be conducted in a variety of weather conditions. Weather conditions will be recorded.
- Carcasses will be distributed across the range of different substrates/habitats and visibility classes of turbines being searched
- To the extent possible, carcass removal trials will be conducted at turbines that are not part of the carcass search sub-sample
- Carcasses will be placed before dusk using gloves and boots to avoid imparting human smell that might bias trial results (e.g. attract scavengers, etc)
- Trials will continue until all carcasses are removed or have completely decomposed (generally 2 weeks)
- To avoid confusion with turbine related fatalities, trial carcasses will be discretely marked (e.g. clipping of ear, wing, fur; hole punching ear; etc.) with a unique identification so they can be identified as trial carcasses
- Carcasses used will be as fresh as possible since frozen or decomposed carcasses are less attractive to scavengers. If frozen carcasses are used, they will be thawed prior to beginning carcass removal trials.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise another third of the trial carcasses. Trials using other small brown mammal or bird carcasses (e.g. mice, brown chicks) may also be used when bird and bat carcasses are not available.
- To the extent possible, raptor carcasses will be used to determine scavenging rates of raptors.
- Scavenging rates may change over time as scavengers become aware of and develop search images for new sources of food beneath turbines
- Scavenging will be determined on a site-specific basis and rates will not be assumed to be similar between sites or used in calculations for other projects.

3.2.4 Searcher Efficiency Trials

Searcher efficiency is another important factor in creating an estimate of total bat and bird mortality. Searcher efficiency trials require a known number of discretely marked carcasses to be placed around a wind turbine. Searchers examine the wind turbine area, and the number of carcasses that they find is compared to the number of carcasses placed. Searcher efficiency can vary considerably for each searcher and from one site to another (varying by vegetation cover, terrain and season), and will be conducted as part of post-construction monitoring at every wind power project for every year of monitoring.

Below are some important considerations for conducting searcher efficiency trials:

- Searcher efficiency trials will be conducted at least once a season (spring, summer and fall) during the same period as the bat mortality surveys. Trials will be conducted once per month if vegetation changes occur during the season (e.g. crops grow, harvest, etc.)
- A 'tester' will control the trials and return to collect marked trial carcasses at the completion of the trials to determine the number of carcasses remaining and if any carcasses were scavenged or removed during the trial.
- Searcher efficiency trials are to be conducted for each individual searcher or team involved in searching for carcasses. The searcher will not be notified when they are participating in an efficiency trail to avoid potential search biases.
- A minimum of 10 carcasses per searcher per season in all applicable visibility classes (see table above) are to be used. The average per searcher across all visibility classes will be used for calculations.
- Trial carcasses will be spread out over the trial period (month or season) and conducted with the mortality surveys. A maximum of 3 trial carcasses will be placed at any one time to avoid bias and flooding the area with carcasses.
- Trial carcasses are placed for one search period only and then removed and recorded by the 'tester'.
- Trial carcasses will be randomly placed within the search area and location recorded so that they can be retrieved if they are not found during the trial.
- Trial carcasses will be discreetly marked (e.g. clipping of ear, wing, leg, fur; hole-punching ear; etc.) with a unique identification so that they can be identified as a trial carcass by the tester.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise another third of the trial carcasses. Trials using other small brown mammal or bird carcasses (e.g. mice, brown chicks) may also be used when bird and bat carcasses are not available.
- If frozen carcasses are used, they will be thawed prior to beginning searcher efficiency trials.
- All observers will overlook some carcasses. This percentage will vary depending on the observer, the habitat and the area being searched, etc.

3.2.5 Proportion Area Searched

Based on OMNR guidelines and on industry standards, the search area will be a minimum 50 m (with consideration for searching in a 10m wide search area (i.e. 50-60m from turbine base with corresponding analysis of the results) given a 55m blade length) from a wind turbine base. Since it may not always be possible to search the entire 50 m radius because of the presence of thick or tall vegetation, steep slopes, active cultivation, etc. the actual area searched during the mortality surveys will be calculated at each turbine, using a GPS. A map of the actual search

area for each turbine searched, and a description of areas deemed to be unsearchable (e.g. vegetation height, type, slope, etc.), will be provided in the mortality report.

3.2.6 Calculations

Scavenger Correction Factor
The following formula will be used to calculate the overall scavenger correction (S_c) factors based on the proportion of carcasses remaining after each search interval are pooled:

$$S_c = \frac{n_{visit1} + n_{visit2} + n_{visit3}}{n_{visit0} + n_{visit1} + n_{visit2}}$$

Where,

S_c	is the proportion of carcasses not removed by scavengers over the search period
n_{visit0}	is the total number of carcasses placed
n_{visit1} - n_{visit3}…	are the numbers of carcasses on visits 1 through 3

Searcher Efficiency
Searcher efficiency (S_e) will be calculated for each searcher as follows:

$$S_e = \frac{\text{number of test carcasses found}}{\text{Number of test carcasses placed – number of carcasses scavenged}}$$

The number of turbines that each individual searches will vary so it will be necessary to calculate a weighted average that reflects the proportion of turbines each searcher searched. The weighted average or overall searcher efficiency will be calculated as follows:

$$S_{eo} = S_{e1}(n_1/T) + S_{e2}(n_2/T) + S_{e3}(n_3/T)\ldots$$

Where,

S_{eo}	is the overall searcher efficiency
S_{e1} and $_2$ and $_3$…	are individual searcher efficiency ratings
N_1 and $_2$ and $_3$…	are number of turbines searched by each searcher
T	is the total number of turbines searched by all searchers

Proportion Area Searched
Proportion area searched (P_s) is calculated as follows:

$$P_s = \frac{\text{actual area searched}}{\pi r^2}$$

Where r = 50 m

Corrected Mortality Estimates
The estimated bat and bird mortality (C) is calculated as follows:

$$C = c / (S_{e0} \times S_c \times P_s)$$

Where,
C is the corrected number of fatalities
c is the number of carcasses found
S_{e0} is the weighted proportion of carcasses expected to be found by searchers (overall searcher efficiency)
S_c is the proportion of carcasses not removed by scavengers over the search period
P_s is the proportion of the area searched

3.2.7 Other Considerations

- The above calculations will be presented in corrected number of bats/turbine/year and birds/turbine/year. For this project, the year will include a full 12 months.
- A separate calculation for raptor mortality will use the searcher efficiency and carcass removal results relevant to raptors.
- Carcasses may be discovered incidental to formal searches. These carcasses will be processed (i.e. collected and recorded, etc.) and fatality data will be included with the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately.
- Tissue samples from bat and bird carcasses may be used in a number of DNA analyses to provide insight into population size and structure, as well as the geographic origin of migrants. The local MNR office may be contacted prior to disposing bat and bird carcasses, to determine if this type of research is occurring in the area.

3.3 POST-CONSTRUCTION MITIGATION

3.3.1 Bats

Post-construction mitigation will be required where post-construction monitoring identifies disturbance effects associated with bat SWH. Operational mitigation is required if post-construction monitoring shows that a wind power project is causing significant bat mortality. Bat mortality is considered significant when mortality levels at a project location exceed 10 bats / turbine / year.

Operational mitigation refers to adjustments made to the operation of wind turbines to help mitigate potential negative environmental effects on bats (i.e. significant bat mortality). Operational mitigation for bat mortality consists of changing the wind turbine cut-in speed to 5.5 m/s (measured at hub height), or feathering of wind turbine blades when wind speeds are below 5.5 m/s.

The majority of bat mortalities from wind turbine operations occur during fall migration. Across North America, it is estimated that 90% of bat fatalities occur from mid-July through September. Where a post-construction monitoring annual report indicates the annual bat mortality threshold of 10 bats/turbine/year has been exceeded, operational monitoring will be implemented across the wind power project (i.e. at all turbines) from sunset to sunrise, from July 15 to September 30. This mitigation will continue for the duration of the project. Should site-specific monitoring indicate a shifted peak mortality period, operational mitigation may be shifted to match the peak mortality, with mitigation maintained for a minimum 10 weeks. Any shift in the operational mitigation period to match peak mortality should be determined in coordination with and confirmed by MOE and other relevant agencies.

Where post-construction monitoring is applied, an additional 3 years of effectiveness monitoring is required. Monitoring the effectiveness of any post-construction mitigation techniques will help to evaluate the success of this mitigation.

3.3.2 Birds

Post-construction mitigation or additional scoped monitoring will be required at individual turbines or groups of turbines where post-construction monitoring identifies significant annual bird mortality, disturbance effects associated with bird SWH, or significant bird mortality events.

For turbines located outside 120 m of bird SWH, 2 years of subsequent scoped mortality and cause and effects monitoring is required where a significant annual mortality threshold has been exceeded. Following scoped monitoring, post-construction monitoring (e.g. operational mitigation) and effectiveness monitoring may be required at individual turbines where a mortality effect has been identified or significant annual mortality persists.

For turbines located within 120 m of bird SWH, immediate post-construction mitigation (including operational mitigation), as identified in the Environmental Impact Study, and 3 years of effectiveness monitoring will be required where monitoring identifies significant annual bird mortality or disturbance effects associated with bird SWH.

Operational mitigation techniques may include periodic shut-down of select turbines and/or blade feathering at specific times of the year when mortality risks to the affected bird species is particularly high (e.g. migration). Emerging and new technologies will be considered that may reduce bird fatalities.

3.4 CONTINGENCY PLANS

A contingency plan addresses immediate actions necessary in case of a significant bat or bird mortality event, or if mitigation actions fail. A contingency plan allows additional mitigation measures to be implemented in the event that unanticipated negative environmental effects are observed during a single mortality monitoring survey.

3.4.1 Bats

Should cut-in speed mitigation be implemented and the bat mortality threshold continue to be exceeded, additional mitigation and scoped monitoring requirements will be determined in consultation with MOE and other relevant agencies.

3.4.2 Birds

A significant bird mortality event is defined to have occurred when bird mortality during a single mortality monitoring survey (as observed in the field on a single day) exceeds:

- 10 or more birds at any one turbine; or
- 33 or more birds (including raptors) at multiple turbines

NOTE: These numbers are actual carcasses found (not corrected numbers)

MOE and other relevant agencies (where required, or upon the request of the approval holder) will be notified within 48 hours if one of the thresholds above is exceeded during a single mortality monitoring survey. MOE and other relevant agencies will be consulted to determine appropriate contingency plans should a significant bird mortality event occur or if mitigation actions fail.

4.0 Reporting Requirements

Data collected during post-construction monitoring will be submitted in accordance with MNR data standards and templates. Post-construction reports will be prepared and submitted as per within 3 months of the end of each monitoring year. This post-construction monitoring plan will be reviewed and updated when changes to guidelines occur, including changes methods and/or thresholds.

All bat and bird monitoring data and associated reports will be submitted to the MOE and MNR, consistent with MNR's procedures and protocols, and satisfy the data standards and requirements of the Wind Energy Bird and Bat Monitoring Database. Bat survey data submitted will be entered into the database, analyzed, reported and used to address knowledge gaps and create public data summaries. Standardized templates available online through the Wind Energy Bird and Bat Monitoring Database found at http://www.bsc-eoc.org/birdmon/wind/wind_templates.jsp will be used to record and report all field data.

Reports will also include maps of areas searched for each surveyed turbine and raw data for all carcass searches, searcher efficiency trials and carcass removal trials will be required as part of the annual report. A data sheet sample will also be provided with the mortality report.

A summary of when information about a particular mortality event or threshold is reported to Ministry of Natural Resources is included in Table 2.

Table 2: Timeline for reporting mortality to Ministry of Natural Resources

Mortality Threshold	How mortality is calculated	Reporting Timeline for Results
10 bats / turbine / year	Based on calculation described in section 3.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MOE as outlined in Table 2.
14 birds / turbine / year	Based on annual calculation described in section 3.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MOE as outlined in Table 2.
10 birds / turbine	Single event as observed in the field during monitoring	Mortality event to be reported to MOE within 48 hours of detection
33 birds (including raptors) at any multiple turbines	Single event as observed in the field during monitoring	Mortality event to be reported to MOE within 48 hours of detection
0.2 raptors / turbine / year (all raptors) across a wind power project	Based on annual calculation described in section 3.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MOE within 3 months of completing mortality monitoring for birds and bats.
0.1 raptors / turbine / year (provincially tracked raptors) across a wind power project	Based on annual calculation described in section 3.2.6 and applying the following formula $C = c / (S_{e0} \times S_c \times P_s)$	Results to be submitted annually to MOE within 3 months of completing mortality monitoring for birds and bats.
Endangered and Threatened Species	Single event as observed in the field during monitoring	Mortality event to be reported to MOE within 48 hours of detection.

5.0 Closure

This Environmental Effects Monitoring Plan for the Amherst Island Wind Energy Project has been prepared in accordance with O. Reg. 359/09, s. 23.1, the MNR's *Approval and Permitting Requirements Document for Renewable Energy Projects* (September 2009), the *MOE's Technical Guide to Renewable Energy Approvals*, MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (July 2011) and MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (December 2011).

Stantec Consulting Ltd. prepared this Environmental Effects Monitoring Plan for Windlectric Inc. Inc. for the Amherst Island Wind Power Project. Windlectric Inc. is committed to implementing the appropriate protection and mitigation measures as they apply to the construction and operation of the proposed Project.

STANTEC CONSULTING LTD

Katherine St. James

Katherine St. James
Ecologist

Andrew Taylor

Andrew Taylor
Senior Project Manager

6.0 References

OMNR. 2011a. *Bats and Bat Habitats: Guidelines for Wind Power Projects*. First Edition. Queen's Printer for Ontario, Canada.

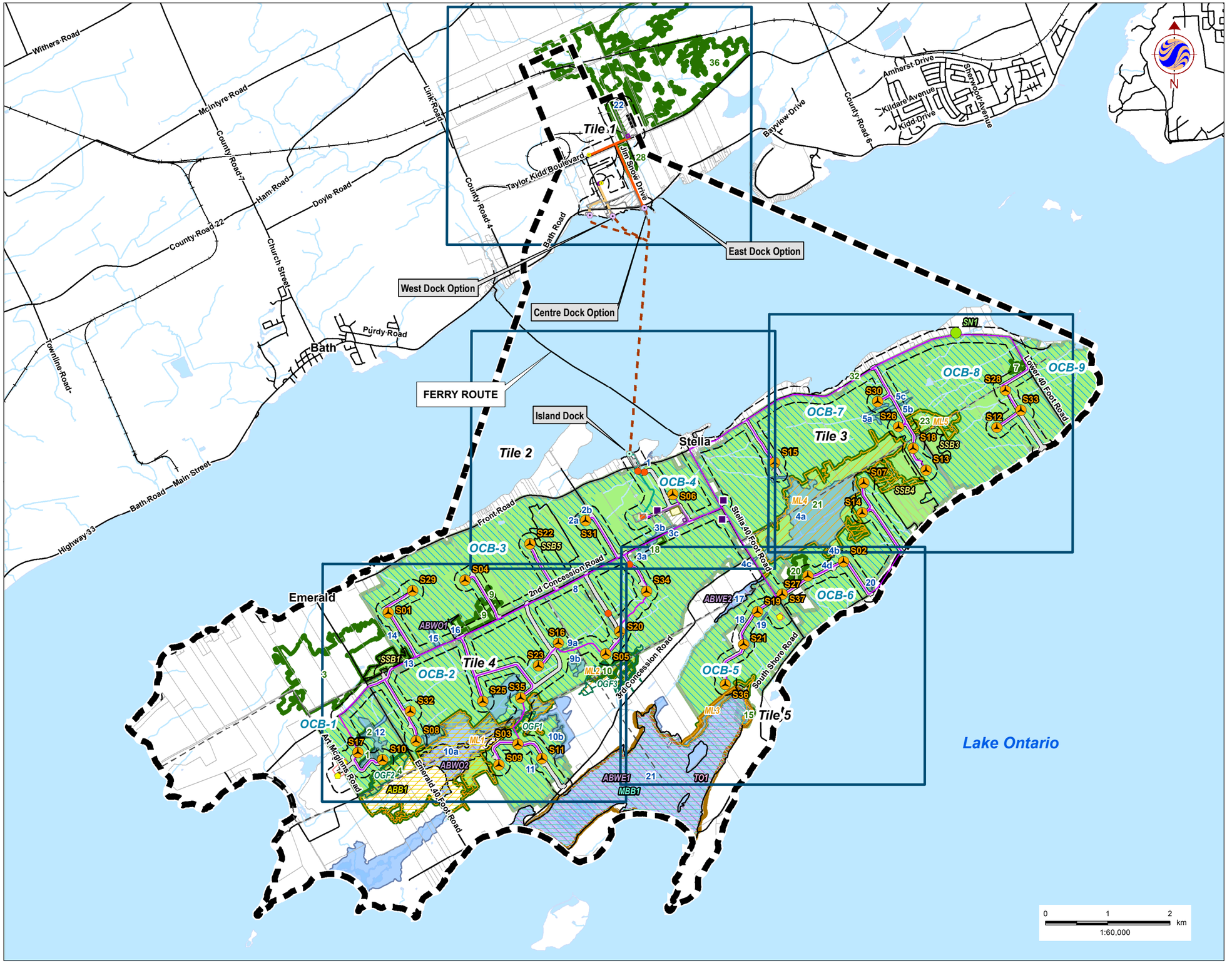
OMNR. 2011b. Birds *and Bird Habitats: Guidelines for Wind Power Projects*. First Edition. Queen's Printer for Ontario, Canada.

OMNR. September 2009. *Approval and Permitting Requirements Document for Renewable Energy Projects*. First Edition. Queen's Printer for Ontario, Canada.

Stantec Consulting Inc. 2012. Amherst Island Wind Energy Project: Natural Heritage Assessment and Environmental Impact Study.

Appendix A

Figures



Legend

- Project Study Area
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Waterbody
- Amherst Bay Life Science ANSI
- Property Boundary

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
- Area-Sensitive Breeding Bird (ABB)
- Marsh Breeding Bird (MBB)
- Shrub/Early Successional Bird Breeding (SSB)
- Turtle Overwintering (TO)
- Landbird Migratory Stopover Area (ML)
- Waterfowl Stopover & Staging - Terrestrial (WT)
- Old Growth Forest (OGF)
- Significant Woodland
- Significant Wetland
- Open Country Breeding Bird Area (OCB)
- Raptor Wintering Area (RWA)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
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AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1.0

Title

Significant Natural Features & Wildlife Habitat - Overview

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Revised: 2013-04-03 By: pworsell

Legend

- Study Area
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Laydown Area and Crane Path
- Submarine Cable Path
- Operation and Maintenance Building (Potential Location)
- Storage Shed
- Turbine Blade Tips
- Substation (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Amherst Bay Life Science ANSI
- Property Line

Significant Wildlife Habitat Features

- Snake Hibernacula (SN)
- Amphibian Breeding (ABWO & ABWE)
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- Raptor Wintering Area (RWA)

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* Distances shown between project components and habitats are provided in detail in Table 3.9 in the main report.

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Figure No.

1.1

Title

Significant Natural Features & Wildlife Habitat

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Revised: 2013-04-03 By: pworsell

Legend

- Study Area
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
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- Submarine Cable Path
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- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Existing Features

- Road
- Unopened Road Allowance
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- Property Line

Significant Wildlife Habitat Features

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Figure No.

1.2

Title

Significant Natural Features & Wildlife Habitat

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Revised: 2013-04-03 By: pworsell

Legend

- Study Area
- 120m Zone of Investigation

Project Components

- Turbine
- Met Tower (Potential Location)
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Figure No.

1.3

Title

Significant Natural Features & Wildlife Habitat

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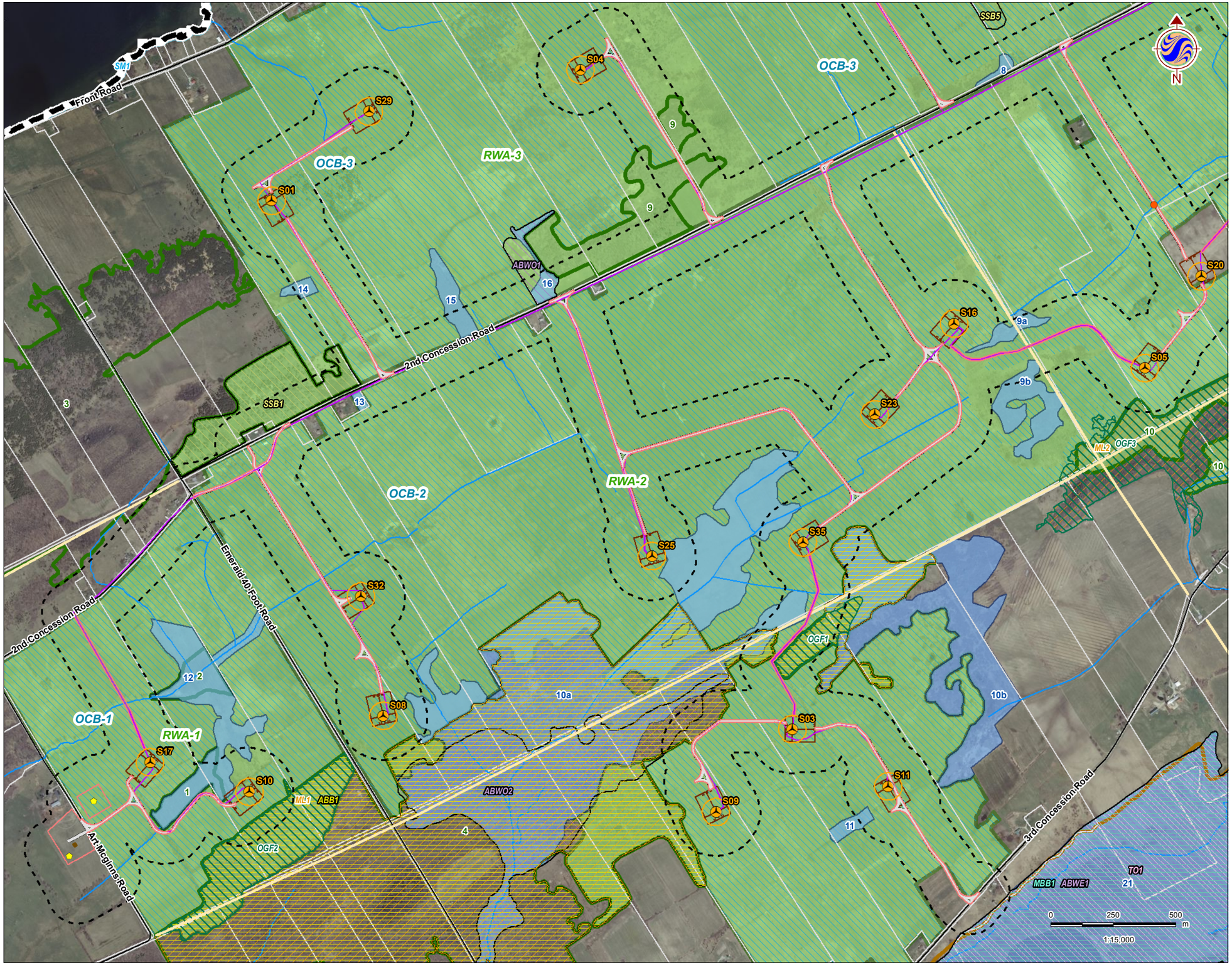
Revised: 2013-04-03 By: pworsell



Legend

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Figure No.

1.4

Title

Significant Natural Features & Wildlife Habitat

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Revised: 2013-04-03 By: pworsell

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Revised: 2013-04-03 By: pworsell

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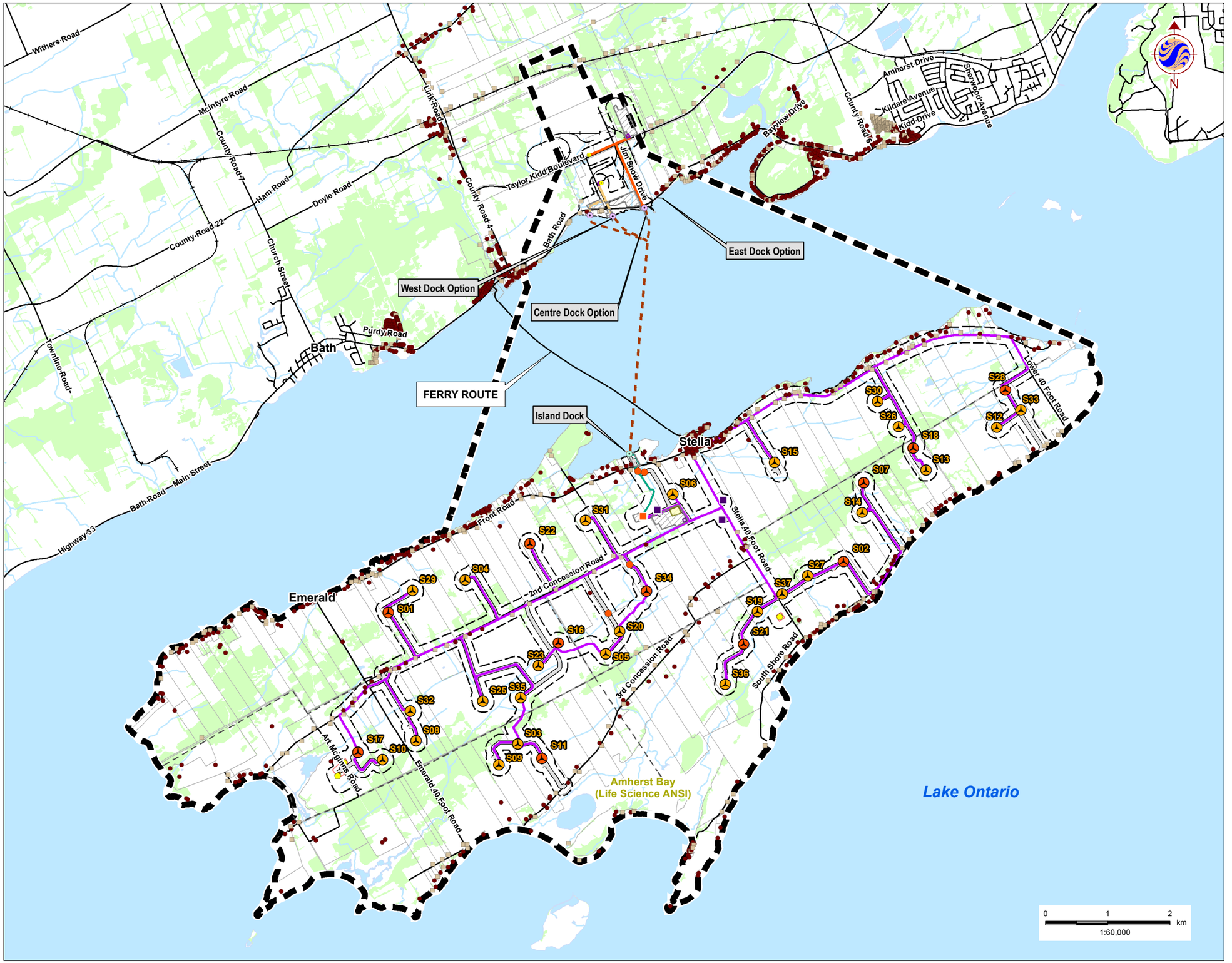
WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.

1.5

Title

Significant Natural Features & Wildlife Habitat



Legend

- Project Study Area
- 120m Zone of Investigation

Project Components

- Turbine
- Turbine — *Subset of turbines selected for post-construction mortality monitoring*
- Met Tower (Potential Location)
- Substation (Potential Location)
- Access Road
- Collector Lines
- Submarine Cable Path
- Operation and Maintenance Building (Potential Location)
- Potential Culvert Location
- Point of Common Coupling
- Mainland Cable Vault (Potential Location)
- Island Cable Vault
- Constructible Area
- Mainland Dock (Potential Location)
- Island Dock
- Batch Plant (Potential Location)
- Site Office (Potential Location)
- Storage Shed

Transmission Lines

- Mainland Option1
- Mainland Option 2
- Island Transmission Line

Land Use

- Central Staging Area
- Switching Station (Potential Location)

Noise Receptors

- Existing
- Vacant

Existing Features

- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Waterbody
- Wooded Area
- Property Boundary

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2012.

Stantec

April 2013
160960595

Client/Project

WINDLECTRIC INC.
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Figure No.

2.0

Title

Post-construction Mortality Monitoring Locations

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Revised: 2013-04-03 By: pworsell