WHITE PINES WIND PROJECT
DESIGN AND OPERATIONS REPORT

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Prepared for:

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1.0 Introduction

1.1 PROJECT OVERVIEW

wpd Canada Corporation (wpd) is a renewable energy development company based in Mississauga, Ontario and is dedicated to providing renewable energy for Ontario. Further information can be found on the company website at http://www.canada.wpd.de. wpd is proposing to develop, construct and operate the White Pines Wind Project (the Project) in Prince Edward County, Ontario, in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province. The Project was awarded an Ontario Feed-In-Tariff (FIT) contract with the Ontario Power Authority (OPA) in May, 2010 (FIT Contract No. F-000675-WIN-130-601).

The wind turbine Study Area is generally bounded by i) Brummell Road/Bond Road to the North; ii) Lighthall Road to the West; iii) Gravelly Bay Road to the East; and iv) Lake Ontario to the South (**Figure 1, Appendix A**). The proposed Project Location includes all parts of the land in, on or over which the Project is proposed. The Project Location (**Figure 2, Appendix A**), including all Project infrastructure, is on privately owned land and municipal road right-of-way, where landowners have entered into a lease agreement with wpd. The legal descriptions of the parcels of land that will contain Project infrastructure is provided as an appendix to the Project Description Report.

The basic components of the Project include 29 REpower MM92-2.05 MW wind turbine generators with a total maximum installed nameplate capacity of 59.45 MW (FIT Contract maximum of 60 MW), step-up transformers located adjacent to each turbine, an electrical power line system, two transformer substations (substation), turbine access roads, and a fenced storage area. Temporary components during construction include work and storage areas at the turbine locations and along access roads and laydown areas (**Figure 2, Appendix A**). The collector system will transport the electricity generated from each turbine to a substation located near Turbine 7 (T07) off Royal Road east of Dainard Road.

An interconnection line will connect the substation near T07 to a substation to be built near the Picton Transformer Station (TS) on County Road 5. While the potential interconnection line's location is depicted on the maps in Appendix A, the actual location of the line is still under negotiation between wpd and Hydro One Networks Inc. (HONI). If HONI is responsible for construction and operation of the interconnection line to the County Road 5 substation, assessment of potential effects of the line will be outside the REA process and will be covered under HONI's own Class Environmental Assessment for Minor Transmission Facilities. It is known at this time that wpd will be responsible for construction and operation of portions of the interconnection line along May Road and Fry Road; those portions of the line will therefore be assessed as part of the current REA process.

wpd 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 *Environmental Protection Act* (O. Reg. 359/09). According to subsection 6.(3) of O. Reg. 359/09, the Project is classified as a Class 4 Wind Facility and will follow the requirements identified in O.Reg.359/09 for such a facility.

1.2 REPORT REQUIREMENTS

The purpose of the Design and Operations Report is to provide the public, Aboriginal communities, municipalities, and regulatory agencies with an understanding of the details of the design and operational stage of the proposed White Pines Wind Project, including any environmental effects that may result from engaging in the Project. Aspects of the Project outside of the design and operations phase, such as construction and decommissioning, are addressed within separate reports as part of the REA package.

The Design and Operations Report has been prepared in accordance with Item 4, Table 1 of O. Reg. 359/09 and the MOE's *Technical Guide to Renewable Energy Approvals* (2012).

Table 1.1 summarizes the documentation requirements as specified under O. Reg. 359/09, and indicates where this information is located in the Design and Operations Report.

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

Requirements	Completed	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	N/A
C. any things from which contaminants are discharged into the air,	N/A	N/A
D. any works for the collection, transmission, treatment and disposal of sewage,	N/A	N/A
E. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	N/A	N/A
F. the project location in relation to any of the following within 125 m: properties described in Column 1 of the Table to section 19, heritage resources, archaeological resources, 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	✓	2.0, Appendix A
G. any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility,	✓	2.0, Appendix A
ii. a description of each item diagrammed under subparagraph i, and	✓	3.0, 5.0

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

Requirements	Completed	Section Reference
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.	✓	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,	N/A	N/A
ii. any things from which contaminants are discharged into the air, and	N/A	N/A
iii. any systems, facilities and equipment for receiving, handling, storing and processing any waste, biomass, source separated organics, farm material and biogas.	N/A	N/A
3. Set out conceptual plans, specifications and descriptions related to the operation of the renewable energy generation facility, including,	N/A	N/A
i. in respect of any water takings,		
A. a description of the time period and duration of water takings expected to be associated with the operation of the facility,	N/A	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	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,	N/A	N/A
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,	N/A	N/A
iii. a description of any expected concentration of air contaminants discharged from the facility,	N/A	N/A
iv. in respect of any biomass, source separated organics and farm material at the facility		
A. the maximum daily quantity that will be accepted,	N/A	N/A
B. the estimated annual average quantity that will be accepted,	N/A	N/A
C. the estimated average time that it will remain at the facility, and	N/A	N/A
D. the estimated average rate at which it will be used, and	N/A	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,		

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

Requirements	Completed	Section Reference
A. the expected types of waste to be generated	✓	5.0
B. the estimated maximum daily quantity of waste to be generated, by type,	N/A	N/A
C. processes for the storage of waste, and	N/A	N/A
D. processes for final disposal of waste.	N/A	N/A
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,	✓	6.0
ii. mitigation measures to assist in achieving the performance objectives mentioned in subparagraph i,	✓	5.0, 6.0
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 mitigation measures fail.	✓	5.0, 6.0
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,	✓	8.0
ii. means by which persons responsible for engaging in the project may be contacted, and	✓	8.0
iii. means by which correspondence directed to the persons responsible for engaging in the project will be recorded and addressed.	✓	8.0
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	N/A
ii. how the project will be engaged in to,		
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	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	N/A

2.0 Site Plan

The Site Plan is provided in **Appendix A**, and is presented as a series of five maps:

- Figure 1 – Site Plan: Project Study Area
- Figure 2 – Site Plan: Project Location
- Figure 3 – Site Plan: Socio-Economic Features
- Figure 4 – Site Plan: Natural Heritage Features and Water Bodies
- Figure 5 – Site Plan: Noise Receptors

The Site Plan provides the information listed in the table below (**Table 2.1**).

Table 2.1: Site Plan Components

Site Plan Component	Additional Information and Site Plan Reference
Facility Components	
Buildings or structures	The following buildings or structures are shown on all Site Plan maps: • Wind turbines • Substations
Roads	Permanent access roads throughout the facility are shown on all Site Plan maps.
Electrical equipment	The following electrical equipment are shown on all Site Plan maps: • Electrical collector lines and May/Fry portions of interconnection line
Utility corridors, rights of way or easements	No utility corridors or easements are required for the Project. Electrical infrastructure within municipal road right-of-ways is shown on all Site Plan maps.
Temporary Construction Areas	Construction areas at the turbines and substations, crane laydown areas and construction-phase access road dimensions are shown on all Site Plan maps.
Other Facility Components: Key Process Features	
Water taking: ground water	No facility components involving groundwater takings are required for the Project.
Water taking: surface water	No facility components involving surface water takings are required for the Project.
Sewage Works	No sewage works are required for the Project.
Stormwater Management Measures	A passive system of equalization culverts across roads will be designed following a hydrological study conducted as part of the detailed design by the Construction Contractor.
Discharge of Contaminants to Air	Sources of localized emissions during operation are considered negligible under O. Reg. 419/05.

Waste Management Equipment	No waste management equipment is required for the Project.
Existing Features within 300 m of the Project Location	
Buildings or structures	Buildings as per base mapping obtained from the Land Inventory Ontario (LIO) database are shown on Figures 2 and 3.
Roads	Municipal roads are shown on all Site Plan maps.
Utility corridors, rights of way, and easements	An existing HONI transmission line and railway are shown on Figure 3.
Groundwater wells	Wells as mapped by the MOE well water records are shown on Figure 3.
Topographical land contours	Land contours are shown on Figures 2 and 3.
Surface water drainage	Drainage is depicted as per base mapping obtained from the LIO database on all Site Plan maps.
Land Use	Land uses, including natural heritage, agricultural, residential and business are shown on the aerial imagery used on Figure 2.
Provincial Policy Areas	The Project is not located within 300 m of the Oak Ridges Moraine Conservation Plan Area, Niagara Escarpment Plan Area, Greenbelt Plan Area (Protected Countryside), or Lake Simcoe Watershed.
Noise Considerations	
Noise receptors	Noise receptors are shown on Figure 5.
Transformers (nominal voltage 50 kV or more)	The main facility step-up transformers will be located within the substations, shown on all Site Plan maps. Distance to closest noise receptor is shown on Figure 5.
Demonstration of Compliance with Setbacks	
Project Location Boundary	The outer limit of all Project components, including temporary work areas during construction, is shown on Figure 2.
Protected properties	Protected Properties are shown on Figure 3.
Heritage resources	Heritage Resources are shown on Figure 3.
Archaeological resources	No archaeological resources have been identified.
Water bodies	Water bodies are shown on Figure 4.
Significant or provincially significant natural features	Significant natural features are shown on Figure 4.
Public road or railway rights of way	Municipal roads, and railways, are shown on Figure 3.
Land parcel boundaries	Land parcel boundaries are shown on Figure 2.
Noise receptors	Noise receptors are shown on Figure 5.

3.0 Facility Design Plan

The following provides a description of the key facility design components on the Site Plan (**Appendix A**).

3.1 FACILITY COMPONENTS OVERVIEW

The basic components of the Project include 29 REpower MM92-2.05 MW wind turbine generators with a total maximum installed nameplate capacity of 59.45 MW (FIT Contract maximum of 60 MW), step-up transformers located adjacent to each turbine, an electrical power line system, two substations, turbine access roads, and a fenced storage area. The collector system will transport the electricity generated from each turbine to a substation located near Turbine 7 (T07) off Royal Road east of Dainard Road.

An interconnection line will connect the substation near T07 to a substation to be built near the Picton Transformer Station (TS) on County Road 5. While the potential interconnection line's location is depicted on the maps in Appendix A, the actual location of the line is still under negotiation between wpd and Hydro One Networks Inc. (HONI). If HONI is responsible for construction and operation of the interconnection line to the County Road 5 substation, assessment of potential effects of the line will be outside the REA process and will be covered under HONI's own Class Environmental Assessment for Minor Transmission Facilities. It is known at this time that wpd will be responsible for construction and operation of portions of the interconnection line along May Road and Fry Road; those portions of the line will therefore be assessed as part of the current REA process.

No equipment will be required relating to water takings, sewage or stormwater management, air discharges and/or water and biomass management.

3.1.1 Wind Turbine Generators

The Project will include twenty-nine REpower MM92-2.05 MW wind turbines. Each wind turbine consists of the following key components:

- Concrete tower foundation;
- Five steel tower sections;
- Nacelle (comprised of gearbox, electrical generator and housing);
- Three rotor blades;
- Hub (the structure where the blades attach);
- Power convertor;
- Step-up transformer; and,

- Electrical wiring and grounding.

A summary of the basic specifications of the turbine model is provided in **Table 3.1**. Detailed specifications for the REpower MM92-2.05 MW turbine are provided in the Wind Turbine Specifications Report.

Table 3.1: REpower MM92 - Wind Turbine Specifications

Manufacturer	REpower
Model	MM92
Name plate capacity (MW)	2.05 MW
Hub height above grade	100 m
Blade length	45.2 m
Rotor diameter	92.5 m
Rotor sweep area	6,720 m^2
Nominal revolutions (rotational speed)	7.8-15.0 rpm
Frequency	60 Hz
Sound power	5 m/s – 101.7 dBA 6 m/s – 103.4 dBA 7 m/s – 104.2 dBA >8 m/s – 104.2 dBA

Each tower will be supported by a concrete foundation, approximately 3 m deep, depending upon subsurface conditions.

Turbine tower lighting will be in accordance to Transport Canada Regulations and Standards as described in **Section 5.7.4**.

3.1.2 Crane Pads

A gravel area (crane pad) surrounding each turbine will be approximately 30 m x 45 m to allow for crane redeployment should a major maintenance event occur.

3.1.3 Electrical Infrastructure

A step-up transformer, located adjacent to each turbine, is required to transform the electricity generated in the nacelle to a common collection system line voltage (i.e. 575 V to 34.5 kV). Each step-up transformer will be connected to the collection system via 34.5 kV collector lines. The collector lines and related fibre optic cables will be buried parallel to the access roads, where possible, to reduce the amount of land to be used by the Project and thus reduce potential effects. A transmission line system within the municipal road allowance will carry the electricity from the substation located near T07 to a substation to be built near the Picton TS. The substation yards will be approximately 70 m by 70 m.

3.1.4 Access Roads

Existing municipal roads will be used to transport Project-related components, equipment and personnel to the Study Area. The Project will be situated exclusively on privately owned land and municipal road allowances. Access to these lands will be required for installation and operation of the wind turbines. Access roads will be constructed as required and in consultation with landowners, to provide access to individual turbine sites. Permanent access roads will be approximately 5.0 m wide, with temporary turning radii of 30m off municipal roads reduced to an appropriate width during operations to account for routine maintenance vehicles.

3.1.5 Storage Area

A storage area will be constructed near T06 to contain a variety of materials required throughout the operation of the Project.

4.0 Facility Operations Plan

Operation activities include daily monitoring of wind turbines, function of the substations, maintenance activities, and monitoring of meteorological data.

4.1 SITE SUPERVISION AND STAFF TRAINING

wpd may hire a specialized Operations and Maintenance (O&M) Contractor for various on-going activities, including daily operation, associated with the Project. During pre-operational mobilization, wpd and/or the O&M Contractor will develop an operation and maintenance program designed to ensure compliance with any applicable municipal, provincial, and/or federal requirements. As appropriate, the program will cover staff training, predictive/preventive maintenance, routine maintenance, unscheduled maintenance (including appropriate environmental mitigation measures), annual overhauling, inspection of equipment and components, procurement of spare parts, and maintenance of optimum inventory levels in order to reduce inventory carrying costs and working capital costs. It will also include a schedule for regular inspections of the turbines and ancillary facilities.

4.2 PLANNED MAINTENANCE

The maintenance of the turbines will be the responsibility of REpower. Through the Supervisory Control and Data Acquisition (SCADA) system that is connected to the fibre optic cables installed with the collector lines, the maintenance staff will be able to monitor the performance of all turbines on-line in real time basis. The SCADA system will also identify any potential problems so that pro-active inspection and maintenance can be undertaken. Potentially damaged turbines will be shut down until maintenance staff can perform a site inspection. Regular maintenance of the equipment will be a key method of mitigating potential effects.

Scheduled maintenance will include the following:

- Visual inspection;
- Inspection of mechanical components;
- Inspection of electrical components; and,
- Greasing and general maintenance.

Initial visits for planned maintenance are more frequent, slowing to once every six months or more as the Project matures. Maintenance of each wind turbine usually takes one day to complete.

Oil changes will be completed in accordance with oil analysis recommendations. An oil change is not likely to occur until the findings of the annual oil analysis indicate that it is required, which could be after years of operation. The amount of oil and grease stored on site will depend on

availability, transportation schedules, and the service cycle. The maintenance team will be responsible for transport of used oil to a certified disposal/recycling site following maintenance.

4.3 UNSCHEDULED MAINTENANCE

REpower will also provide unscheduled maintenance for the turbine units when required. Maintenance and inspection related to the electrical collector system and substations will be sub-contracted.

Crane pads installed during construction are permanent, and will remain in place throughout operations and maintenance. If required, these crane pads will be used during unscheduled maintenance, and there will be no new impacts to the surrounding environment.

4.4 MONITORING METEOROLOGICAL DATA

Each turbine will have sensors to measure wind speed and direction. This data will be used to determine when the turbines are operating as well as to control the pitch of the blades and the orientation of the nacelle.

Monitoring of meteorological data will be completed using a met tower. The wind Project's SCADA system will use this data to:

- Provide additional parameters such as wind direction, air temperature, air pressure and wind shear to better manage the operational performance of the equipment; and,
- Provide a backup source of wind speed data should a wind turbines own sensors prove unreliable.

The Independent Electrical System Operator will require wpd to provide real-time weather data from the met tower, along with real-time generation data to provide input to their central generation forecasting model.

4.5 OTHER ACTIVITIES

No ground water or surface water supplies will be used and/or impacted as part of the operation of the facility and there is no potential for the Project to interfere with existing uses of water within or near the Study Area. No structures during operation of the Project will discharge contaminants into the air and no works are required associated with the collection, transmission, treatment and disposal of sewage during the operation of the Project. As such, no sediment control features and no storm water management facilities are required. There will be no sewage produced during the operation of the Project. In addition, there are no areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of during the operation of the Project.

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;
- One stand-by emergency diesel generator; and,
- Battery chargers.

Based on the guidance given in Table B-3 of *Procedure for Preparing an 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;
- Standby power generators firing liquid or gaseous fuels that are used for standby power only with periodic testing as per the Regulation;
- Exhaust of inert gases; and,
- Battery chargers.

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.

5.0 Potential Environmental Effects and Mitigation Measures

5.1 GENERAL METHODOLOGY

O. Reg. 359/09 requires that any adverse environmental effects that may result from operations activities be described within a 300 m radius of those activities (known as the Zone of Investigation). **Sections 5.2 to 5.9** describe the potential effects, mitigation measures (if required) and net effects that may result from operations activities within the Zone of Investigation. Mapping provided in **Appendix A** shows the 300 m boundary around the Project Location.

Descriptions of the existing natural heritage, water, archaeological and built heritage environments in the Study Area and/or Project Location can be found within the Natural Heritage Assessment & Environmental Impact Study (NHA/EIS), Water Assessment and Water Body Report (WA/WBR), Stage I Archaeological Assessment, Stage II Archaeological Assessment, Protected Properties Report, and Heritage Impact Assessment Report. These reports form part of the complete REA application.

A description of potential effects and mitigation measures for specific features located within the specified setbacks within O. Reg. 359/09 is provided in the NHA/EIS, WA/WBR, Protected Properties Report, Stage II Archaeological Assessment and Heritage Impact Assessment Report.

For some natural environment and socio-economic features, mitigation measures are anticipated to eliminate all effects. The need, assessment, and selection of protection and mitigation measures discussed in the following sections have been predicated on the hierarchical principles of:

- avoidance – the elimination of adverse environmental effects by siting, scheduling, and design considerations;
- minimization – reduction or control of adverse environmental effects through Project modifications or implementation of protection and mitigation measures; and
- compensation – enhancement or rehabilitation of affected areas.

The application of these principles has greatly reduced the potential for adverse environmental effects from the Project as demonstrated in the following subsections.

Where net effects remain, they are characterized as either positive or adverse. Positive net effects were not assessed. Adverse net effects were assessed in consideration of the following nine descriptors, as applicable:

- **Direction**: the degree to which an effect may be positive or adverse;
- **Duration**: the period of time until the element returns to baseline conditions;
- **Ecological/Social Context**: the nature of the area in which the effect may occur;
- **Frequency**: the number of times that an effect may occur;
- **Magnitude**: the degree to which an effect may occur;
- **Permanence**: the degree to which an effect will not return to baseline conditions;
- **Probability**: the likelihood that an effect may occur;
- **Reversibility**: the likelihood that an element will recover from an effect; and
- **Spatial Extent**: the area within which an effect may occur.

The key performance objective for each of the features discussed below 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 will assist in achieving this performance objective. Additional information related to specific performance objectives is provided in **Table 7.1**. A program for monitoring environmental effects is provided in **Section 6**.

5.2 CULTURAL HERITAGE AND ARCHAEOLOGICAL RESOURCES

5.2.1 Protected Properties and Cultural Heritage Resources

In accordance with O. Reg. 359/09, a Protected Properties Report and a Heritage Impact Assessment Report was undertaken for the Project. The reports will be submitted to the MOE as part of the complete REA application.

The Protected Properties Assessment determined that there are nine protected properties within the Study Area.

The Heritage Impact Assessment identified thirty significant built heritage resources and two significant cultural heritage landscapes within the Study Area.

Potential Effects

As operational and maintenance activities will not occur on properties containing protected properties and built heritage resources, no adverse effects are anticipated during operations. Operational and maintenance activities occurring in the cultural heritage landscape will have no permanent effect on the landscape. The wind turbines will be visible from different vantages around the Study Area; however, they will not obstruct the views of the properties.

Mitigation Measures

As no potential effects will occur as a result of Project operation on protected properties and cultural heritage resources, no mitigation measures are necessary and no net effects are anticipated.

5.2.2 Archaeological Resources

In accordance with O. Reg. 359/09, Stage 1 and Stage 2 Archaeological Assessments were completed for the Project and will be submitted to the MOE as part of the complete REA application package.

Based on the results of the Stage 1 assessment, a majority of the Study Area has been identified as having elevated potential for previously undiscovered archaeological resources. Give the elevated archaeological potential for both prehistoric and historic period resources, a Stage 2 Archaeological Assessment was recommended and site visits conducted on all lands with the potential to be directly impacted by the Project. No evidence of archaeological sites was encountered during the Stage 2 archaeological assessment.

Potential Effects

There are no areas that will be excavated during the operation phase that will not have been assessed by the Stage 2 Archaeology Assessment; therefore no potential effects are anticipated to archaeological resources.

Mitigation Measures

As no potential effects will occur, no mitigation measures are necessary and no net effects are anticipated.

5.3 NATURAL HERITAGE RESOURCES

In accordance with O. Reg. 359/09, an NHA/EIS was undertaken for the Project and will be included as part of the REA application. The following provides a summary of the potential effects and the associated mitigation measures as described in that report in relation to facility operation. In addition, potential effects and mitigation measures are identified for regulated features outside the setbacks, and unregulated natural features, which are therefore not considered in the NHA/EIS. Natural heritage resources are shown in **Figure 4, Appendix A**.

5.3.1 Wetlands

The South Bay Coastal Provincially Significant Wetland, and Bloomfield Creek Locally Significant Wetland, are located within 300 m of the Project Location. Field investigations identified an additional 8 unevaluated wetlands and 8 additional wetlands as occurring within 120m of the Project Location.

The 18 wetlands can be seen on **Figure 4, Appendix A**.

Potential Effects

As all components of the Project are sited outside the wetland boundaries, there will be no direct loss of wetland habitat or function as a result of the Project.

Indirect impacts resulting from maintenance activities, such as dust generation, sedimentation, and erosion, are expected to be short term, temporary in duration and can be mitigated through the use of standard site control measures. During maintenance activities there will be increased traffic and the potential for accidental spills. The magnitude of these impacts is expected to decrease with increasing distance from the wetland feature to the activities.

Indirect impacts during maintenance activities could also include disturbance or disruption to the wildlife function supported by the feature.

Mitigation Measures

The following mitigation measures will be implemented:

- No maintenance activities will be permitted within the wetland boundary.
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.
- All refueling activities will occur well away from wetlands. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Mitigation measures to be applied to each wetland feature are provided in Table 6.5, Appendix B of the Environmental Impact Study Report.

Net Effects

It is anticipated that with the implementation of the mitigation measures described above, that there will be no adverse net effects to wetlands during maintenance activities of the Project.

5.3.2 Areas of Natural and Scientific Interest

Within 300m of the Project Location, the following Areas of Natural and Scientific Interest (ANSI) are found (**Figure 4, Appendix A)**:

- Milford-Black Creek Valley Provincially Significant Earth Science ANSI - access roads have been sited within the ANSI boundary, and turbines, collector lines and access roads are also found within 50 m of the ANSI boundary.

- Prince Edward to Ostrander Point Candidate Life Science ANSI (non-provincially significant) - Project components have been sited within the boundaries of this candidate Life Science ANSI.
- Black Creek Valley Marshes and Forests Regionally Significant Life Science ANSI (non-provincially significant) – no Project components have been sited within the boundaries of this ANSI.

Potential Effects

Potential effects to the candidate Life Science ANSI are erosion leading to sedimentation of watercourses.

Mitigation Measures

Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.

Net Effects

The application of the above mitigation measures during maintenance activities will ensure that effects to surface water are minimized, and that any potential net effects are spatially and temporally limited.

5.3.3 Valleylands

The Black Creek Valleyland is located within 300 m of the Project Location (**Figure 4, Appendix A**). No Project components are located in the Valleyland.

Potential Effects

Potential effects to the Valleyland are erosion leading to sedimentation of watercourses found within the Valleyland system.

Mitigation Measures

Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.

Net Effects

The application of the above mitigation measures during maintenance activities will ensure that effects to surface water are minimized, and that any potential net effects are spatially and temporally limited.

5.3.4 Woodlands

The records review and site investigation confirmed that eighteen woodlands occur within 120 m of the Project Location (**Figure 4, Appendix A**). Aerial photography indicates that additional woodlands are located within 300 m of the Project Location.

Potential Effects

Project components will be located within six of the woodland habitats.

Indirect impacts resulting from maintenance activities, such as dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and can be mitigated through the use of standard site control measures where land based disturbance is proposed within 120 m of the Feature. During maintenance activities there will be increased traffic and the potential for accidental spills. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the feature.

Mitigation Measures

The following mitigation measures will be implemented:

- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.
- All refueling activities will occur well away from the woodlands. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Mitigation measures for waste are provided in **Section 5.8**. Mitigation measures by feature are provided in Table 6.6, Appendix B of the Environmental Impact Study Report.

Net Effects

The application of the above mitigation measures during maintenance activities will ensure that indirect effects to woodlands are minimized, and that any potential net effects are spatially and temporally limited.

5.3.5 Provincial Parks and Conservation Reserves

The Study Area does not contain any provincial parks or conservation reserves. As no provincial parks or conservations reserves are present, no potential effects will occur and no mitigation measures are necessary.

5.3.6 Other Designated Natural Areas

Two other designated natural areas are located within 300 m of the Project Location: Prince Edward County South Shore Important Bird Area (IBA), and the Point Petre Provincial Wildlife Management Area (**Figure 4, Appendix A**). The IBA extends along the shore of Lake Ontario from the tip of the Prince Edward Point peninsula to the Wildlife Management Area.

A variety of Project components are located within the IBA, and no components are located within the Wildlife Management Area.

Potential Effects

Potential impacts to natural heritage and recreational values of the two designated natural areas are outlined in **Sections 5.3.7 and 5.6.6**, respectively.

Mitigation Measures

Mitigation measures related to operational and maintenance impacts on natural heritage and recreational values of the two designated natural areas are outlined in **Sections 5.3.7 and 5.6.6**, respectively.

Net Effects

A review of net effects on natural heritage and recreational values of the two designated natural areas are outlined in **Sections 5.3.7 and 5.6.6**, respectively.

5.3.7 Significant Wildlife and Wildlife Habitat

Potential Effects

Significant Wildlife

Within the context of O. Reg. 359/09, endangered and threatened species are addressed as part of Ministry of Natural Resources (MNR's) *Approval and Permitting Requirements Document for Renewable Energy Projects* (APRD) requirements (September 2009). Information required as part of these requirements has been submitted to MNR. Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and its permitting process. Prior to construction, all applicable permits and approvals would be obtained, and all conditions contained within permits and approvals would be implemented, including those that may occur during operation.

Significant Wildlife Habitat

Significant wildlife habitat within the Study Area includes four generalized significant wildlife habitat areas, two migratory landbird stopover and staging areas, four amphibian breeding areas and seven shrub/successional breeding bird areas (**Figure 4, Appendix A**).

A portion of the Fry Road interconnection line may be located within a generalized significant wildlife habitat area, depending on detailed design of the line. Potential effects of operation and maintenance are indirect through dust, sedimentation and erosion, accidental spills and traffic.

Project components will be located in the two migratory landbird stopover and staging areas. During operation, direct mortality from collision with wind turbines is a potential effect. The mortality rates observed at operational facilities in Ontario are considered low, with no evidence of large scale fatality events or significant population impacts. The potential for turbines to act as a barrier to movement has not been proven to significantly impact on the fitness of bird populations, but is not yet fully understood and has not been well studied.

No Project components will be located in amphibian breeding areas. During operation there may be occasional system maintenance, but regular impacts from the current use of the road system and maintenance activities associated with the roads are expected to have higher impacts. Direct mortality of amphibians is a potential risk due to vehicles using the access roads for turbine maintenance activities. Given the short-term and temporary nature of the maintenance activity, access roads will experience very little traffic on a daily basis and mortality effects are expected to be negligible. Existing auditory signal masking from traffic noise and direct mortality effects are likely greater from daily vehicle traffic and maintenance of the roadway than from facility operation. Some materials such as lubricating oils and other fluids associated with turbine maintenance have the potential for discharge to the on-site environment through accidental spills resulting in a potential impact to amphibian habitat through ground or surface water contamination.

Project components will be located in six of the shrub/successional breeding bird areas. During operation there may be occasional maintenance of the collector lines but noise and disturbance from these activities is expected to be lower impact than the regular disturbance impacts from day to day use of the road system. Direct mortality of birds may occur from collisions with turbines. The mortality rates observed at operational facilities in Ontario are considered low, with no evidence of large scale fatality events or significant population impacts. Noise levels during operations might also result in disturbance effects to breeding birds.

Mitigation Measures

Based on research indicating migrants may concentrate within riparian areas located within 400 m from shorelines and information estimating bird mortality could be significantly reduced if turbines were not placed in the “nearshore” area (i.e. within 250 m), wpd incorporated a minimum turbine setback of 400 m to the Lake Ontario shoreline during siting.

Based on known bird mortality rates from operational wind projects, MNR has set a threshold for bird mortality. If mortality levels are maintained below the threshold, the Project would not be considered to have significant impacts to populations of migratory landbirds. An Environmental Effects Monitoring Plan will be developed for the Project and included in the Design and Operations Report. In the event that the threshold for bird mortality is exceeded, a contingency

and adaptive management plan will be implemented to reduce bird mortality and ensure that the mortality rates are maintained below the threshold level.

For areas of generalized significant wildlife habitat, migratory landbird stopover and staging areas, and shrub/successional breeding bird areas, the following mitigation measures will be implemented:

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- To the extent possible, no steady burning lights/floodlights will be used at the facility.
- Post construction mortality monitoring for birds will be conducted twice weekly (3-4 day intervals) at ten turbines from May 1 to October 31, and weekly monitoring for raptors during November, for a period of three years. Searcher efficiency and scavenger trials will be conducted each year according to current guidance documents (to be detailed in the Environmental Effects Monitoring Plan, White Pines Wind Project Design and Operations Report).
- Post-construction monitoring for disturbance will be conducted for a period of three years, using the same protocols as the pre-construction surveys.
- The Environmental Effects Monitoring Plan will identify performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met.
- All refueling activities will occur well away from the areas. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

For amphibian breeding areas, the following mitigation measures will be implemented:

- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report; and
- All refueling activities will occur well away from the areas. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

Net Effects

With the implementation of the above mitigation measures, operational effects to significant wildlife habitat will be minimized.

5.3.8 Other Wildlife and Wildlife Habitat

Potential Effects

Over the course of the site investigation program 154 bird, nine amphibian, six reptile, two butterfly, three odonata and six mammal species were observed within the Study Area. The majority of wildlife species observed in the Study Area native to Ontario are ranked S5 (secure; common and widespread) or S4 (apparently secure; uncommon but not rare).

Direct loss of species habitat is addressed in **Sections 5.3.1, 5.3.4, 5.3.7, 5.3.9 and 5.3.10**. Maintenance activities have the potential for accidental mortality to wildlife.

Maintenance activities such as increased traffic, dust or noise also has the potential to indirectly disturb wildlife and their habitats. Disturbance may occur as a result of increased on-site human activities.

Mitigation Measures

Accidental mortality of wildlife during maintenance activities will be reported to wpd and the O&M Contractor. wpd will review all instances of mortality with the MNR to determine where it is feasible for maintenance details such as employee training, traffic speed and location to be adjusted.

Mitigation measures for traffic, dust and noise are outlined in **Sections 5.6.7, 5.5.2** and **5.5.3**, respectively.

Net Effects

With the implementation of the above mitigation measures, impacts to wildlife and wildlife habitat will be minimized.

5.3.9 Significant Flora and Vegetation Communities

One Butternut tree (Juglans cinerea), classified as S3 vulnerable in Ontario, was identified more than 120 m from the Project Location. Due to the distance of the tree from the Project Location no potential effects will occur. The location of the tree has been submitted to the MNR.

Open, shrub and treed alvar-like vegetation communities are located throughout the Study Area, and can be seen on **Figure 4, Appendix A**.

Potential Effects

During operation there may be occasional system maintenance, but regular impacts from day to day use of the road system and maintenance activities associated with the roads are expected to have higher impacts.

Mitigation Measures

Specific mitigation strategies for alvar-like communities are summarized as follows:

- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.
- All refueling activities will occur well away from alvar communities. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Mitigation measures for each alvar-like community feature are provided in Table 6.7, Appendix B of the Environmental Impact Study Report.

Post-construction monitoring will be conducted to confirm the accuracy of predicted effects and adapt the management plan as necessary. The Environmental Effects Monitoring Plan details the monitoring program methods, identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met. The EEMP will be provided in the White Pines Design and Operations Report (separate cover).

Net Effects

The application of the above mitigation measures during maintenance activities will ensure that indirect effects to vegetation communities are minimized, and that any potential net effects are spatially and temporally limited.

5.3.10 Other Flora and Vegetation Communities

Of the native vascular plant species identified during field investigations, 216 are ranked as S5 (common, widespread, and abundant in Ontario) and 27 are ranked as S4 (uncommon but not rare).

Vegetation communities present in the Study Area are forest, cultural, swamp and marsh.

Potential Effects

Indirect impacts resulting from maintenance activities, such as dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and can be mitigated through

the use of standard site control measures where land based disturbance is proposed within 120 m of the Feature. During maintenance activities there will be increased traffic and the potential for accidental spills.

Mitigation Measures

The following mitigation measures will be implemented:

- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2 of the Environmental Impact Study Report.
- All refuelling activities will occur well away from the woodlands. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Net Effects

The application of the above mitigation measures during maintenance activities will ensure that indirect effects to vegetation communities are minimized, and that any potential net effects are spatially and temporally limited.

5.4 WATER BODIES AND AQUATIC RESOURCES

5.4.1 Groundwater

Potential Effects

It is not anticipated that operation of the Project will adversely affect groundwater quality, quantity or movement. Some materials, such as fuel, lubricating oils and other fluids associated with turbine maintenance, have the potential for discharge to the on-site environment through accidental spills.

Mitigation Measures

Mitigation measures for accidental spills are listed in **Section 5.8.2**.

Net Effects

Accidental spills will be spatially limited and of short duration and protocols to minimize their impact will be provided in the Emergency Response Plan (**Section 6.4.5**).

5.4.2 Surface Water, Fish and Fish Habitat

Potential Effects

The potential for effects on watercourses exists from soil erosion resulting from maintenance activities. Erosion can cause downstream sediment transport and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. In addition, some materials, such as fuel, lubricating oils and other fluids associated with turbine maintenance have the potential for release to the environment in the event of accidental spills.

Mitigation Measures

Erosion and sediment control measures during maintenance activities will follow those outlined in **Section 3.4.2** of the Construction Plan Report. Mitigation measures for accidental spills are listed in **Section 5.8.2**.

Net Effects

The application of the above mitigation measures as necessary during maintenance activities will ensure that effects to surface water are minimized, and that any potential net effects are spatially and temporally limited.

5.5 AIR QUALITY AND ENVIRONMENTAL NOISE

5.5.1 Air Emissions

Potential Effects

During operations minor localized air emissions will occur from the periodic use of maintenance equipment to repair the wind turbines over the life of the Project and from vehicles travelling to and from the substation properties during regular business hours.

Mitigation Measures

To reduce emissions from equipment and vehicles, several mitigation measures will be employed:

- Multi-passenger vehicles will be utilized to the extent practical;
- Company and construction personnel will avoid idling of vehicles when not necessary for operational activities;
- Equipment and vehicles will be turned off when not in use unless required for operational activities and/or effective operation;
- Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available;
- All vehicles will be fitted with catalytic converters as required by applicable legislation;

- All operational equipment and vehicles will meet the emissions requirements of the MOE and/or MTO;
- As appropriate, records of vehicle maintenance will be retained and made available for periodic review by the O&M Contractor and wpd; and
- All vehicles identified through the monitoring program that fail to meet the minimum emission standards will be repaired immediately or replaced as soon as practicable.

Net Effects

The application of the recommended mitigation measures during operations will limit air emissions to the work areas and limit the magnitude of combustion emissions. As a result, any adverse net effects to air quality from air emissions during operation of the Project are anticipated to be short-term in duration and highly localized.

5.5.2 Dust and Odour Emissions

Potential Effects

Operations related traffic and maintenance activities have the potential to create nuisance dust effects in the immediate vicinity of the Project. Unpaved road surfaces exposed to wind can also be a source of fugitive dust emissions.

No odour emissions are anticipated during operation of the Project. Therefore, no mitigation measures are required.

Mitigation Measures

To protect adjacent receptors from potential off-site dust concerns, the O&M Contractor and/or wpd will implement good site practices during operations which may include:

- Maintaining equipment in good running condition and in compliance with regulatory requirements;
- Dust suppression (e.g. water) of source areas as necessary; and
- Covering loads of friable materials during transport.

Net Effects

The application of the recommended mitigation measures during operations will limit fugitive dust emissions to the work areas. As a result, any adverse net effects to air quality from dust emissions during operation of the facility are anticipated to be short-term in duration and highly localized.

5.5.3 Environmental Noise

The Environmental Noise Impact Assessment (ENIA) undertaken by HGC Engineering under the MOE's "Noise Guidelines for Wind Farms", (October 2008) and O. Reg. 359/09 concluded that the Project is in compliance in that all turbines are a minimum of 550m from non-participating receptors, and is below 40dBA noise levels at all non-participating noise receptors **(Appendix B).**

Potential Effects

During operations, sound will be generated by the periodic use of maintenance equipment to repair the wind turbines over the life of the Project. In addition, vehicles will travel to and from the turbine and substation properties during regular business hours. The audible sound at receptors beyond the turbine siting areas and substation properties is expected to be a minor, short term disruption.

Mechanical and aerodynamic sound will be emitted from the wind turbines. All turbines proposed as part of the Project are located at a distance of at least 550 m from the nearest non-participating noise receptor.

Based upon the Project design, the analysis carried out in the ENIA indicates that sound produced by the Project was found to be within the acceptable limits established by the MOE at all noise receptors.

Mitigation Measures

The Project will be required to operate according to the terms and conditions of the Renewable Energy Approval (REA). In the event the Project does not operate according to the terms and conditions of the REA, the non-compliant turbine(s) may be shut down until the problem is resolved. A regular maintenance program will largely mitigate potential effects related to noise from damaged turbines. Routine facility maintenance to ensure infrastructure is operating properly and efficiently will be performed as required.

To minimize inconvenience brought on by noise of vehicles during operations, all engines will be equipped with mufflers and/or silencers in accordance with MOE and/or MTO guidelines and regulations. Maintenance equipment noise levels will also be compliant with sound levels established by the MOE.

To the greatest extent possible, operations activities that could create excessive noise will be restricted to regular business hours, and adhere to the Prince Edward County Noise/Nuisance By-law No. 900-2002 and Amending By-Law No. 2819-2011. If maintenance activities that cause excessive noise must be carried out outside of these time frames, adjacent residents will be notified in advance and by-law conformity will occur, as required.

Net Effects

Application of the recommended mitigation measures during operations will limit noise emissions to the general vicinity of the turbine locations and substation properties. Given that the facility must comply with the requirements of the REA process and applicable MOE environmental noise guidelines, no significant net effects are anticipated.

Intermittent noise will increase during regular business hours at the turbine locations and substation properties. Any adverse net effects due to noise during operation of the Project are anticipated to be short-term in duration and intermittent.

5.6 LAND-USE AND SOCIO-ECONOMIC RESOURCES

5.6.1 Areas Protected Under Provincial Plans and Policies

No areas protected under specified Provincial Plans and Policies, such as the Greenbelt Plan, Niagara Escarpment Plan, and the *Oak Ridges Moraine Act*, are located within the Study Area. As such no potential effects will occur and therefore no mitigation measures are necessary.

5.6.2 Existing Land Uses

Potential Effects

During the operation phase of the Project, the lands which are occupied by facility components will be removed from their present land-use; however, existing surrounding land uses will remain unchanged.

During operations there will be a temporary increase in noise and dust around the work and haul areas used by maintenance and personnel vehicles, resulting in a potential effect to adjacent land uses.

There is potential for a minor increase in traffic during operations on roadways within the Study Area due to the commuting workforce and maintenance vehicles. No adverse effects on existing land uses, including local residents and businesses, are anticipated from increased traffic during operations of the Project. Therefore, no mitigation measures are required.

No local businesses will be displaced as a result of operations of the Project.

Mitigation Measures

Siting of Project components is completed with the approval of the participating landowner. Participating landowners will be compensated by wpd for land that will be utilized during the lifespan of the Project through the land lease agreements.

Mitigation measures have been identified for noise and dust in **Sections 5.5.3 and 5.5.2**, respectively.

Net Effects

Although some disturbance to adjacent land uses from noise and dust is unavoidable, it is expected to be short-term in duration, temporary, highly localized, and minimized through the implementation of good site practices, transportation planning, and communication with the community. No significant adverse net effects are anticipated to existing land uses during operation of the Project.

5.6.3 Recreation Areas and Cultural Features

Potential Effects

The Project Study Area contains a variety of recreation areas and cultural features, as outlined in **Section 3.6.3** of the Construction Plan Report. Operations and maintenance activities will be limited to private land and municipal road allowances, and therefore, is not expected to directly affect recreation areas or cultural features. There is, however, the possibility that increased noise, dust and traffic volumes during operations may interfere with nearby recreation uses.

Mitigation Measures

Mitigation measures related to noise, dust, and traffic are identified in **Sections 5.5.3, 5.5.2, and 5.6.7 and 5.7.1**, respectively.

Net Effects

With the application of the recommended mitigation measures during operations, any adverse net effects to recreation areas and cultural features from noise, dust and traffic are anticipated to be short term and intermittent.

5.6.4 Agricultural Lands and Operations

Potential effects to the agricultural lands used for the turbines, access roads, collector lines and substations are related to the change in use from agricultural to renewable energy development. However, where lands are being used for Project infrastructure, landowners are being financially compensated for the lease of the private lands, thus offsetting the effect of removing the land from agricultural production.

No impacts to livestock from operation of the Project are anticipated, and therefore no mitigation measures are required. .

Dust emissions from operations activities are associated with vehicular traffic from maintenance and personnel vehicles. Dust emissions are expected to be short-term in duration and highly localized. No potential physical effects are anticipated on agricultural lands and operations from dust during operations of the Project, and therefore no mitigation measures are required.

5.6.5 Mineral, Aggregate and Petroleum Resources

Lands designated as aggregate resource extraction are present in the Study Area, as are three abandoned petroleum wells. As no potential effects will occur during the operation of the Project on these resources, no mitigation measures are necessary.

5.6.6 Game and Fisheries Resources

Potential Effects

Investigations by the German Institute for Wild Animal Research (Institute für Wildtierforschung) show that no permanent adverse effects from wind turbine operation can be determined for game animals (Austrian Wind Power, 2007). A three-year study by the Institut für Wildtierforschung at the Veterinary University of Hanover showed that no adverse effects by wind turbines could be determined on the occurrence and behaviour of animals such as common hares, deer, red foxes, partridges and carrion crows. A survey conducted in parallel of the owners of hunting shoots in Lower-Saxony showed that the majority of hunters did not view the wind turbines as a source of disturbance for smaller game animals (Austrian Wind Power, 2007). Sixty-six percent of hunters stated that the game did not stay away from the immediate vicinity of the wind plants. Almost 60 percent of the interviewees were of the opinion that all species in their corresponding territories became accustomed to the presence and operation of the turbines, whereby the periods required for this varied from one month to five years. This study demonstrates the tolerance of various wildlife populations to the presence of wind turbines (Austrian Wind Power, 2007).

Noise during the operations phase may result in sensory disturbance to game species. A certain level of sensory disturbance to wildlife in the Study Area already exists from ongoing agricultural, rural and domestic activities.

From the few studies that are available, mammals were able to adapt to various noises. Noise and its effects on wildlife appear to be habitat and species specific. If species are able to adapt easily to human-modified habitats, generally they do not seem to be adversely affected by noise.

Mitigation Measures

Masking of auditory environmental signals, such as mammal warning cries or amphibian calls, may be significant immediately underneath the turbine (Rabin et al., 2006), but the effects rapidly decline with distance from the turbine. A study of low frequency noise and vibration at a modern wind farm determined that vibration is 1/5th to 1/100th of the limit of human perception within 25 m of the turbine base (Legerton et al., 1996). While other mammals and amphibians may be more perceptive of vibration, vibration magnitude drops off significantly as distance increases (K. Smith, Aercoustics, pers. comm.).

Net Effects

Once the Project is operating human activity around the facilities will decrease, thus allowing local wildlife movement patterns to quickly re-establish.

Considering the periodic nature of maintenance activities, it is likely that resident game species will adapt to the Project quickly. Consequently, no net adverse effects are anticipated during the Project to game and fishery resources.

5.6.7 Local Traffic

Potential Effects

There is potential for an increase in traffic during operations on roadways within the Study Area due to the commuting workforce and maintenance vehicles. The number of vehicles required during operation will be minimal. A small number of light trucks will be required for typical maintenance activities, however occasionally larger vehicles will be required to transport turbine and substation components. The increase in traffic may result in short-term, localized disturbance to traffic patterns or increases in traffic volume, and/or create potential traffic safety hazards. Project related traffic will be limited to a small, defined workforce.

Mitigation Measures

There may be instances during maintenance activities where excess loads (e.g. turbine and substation components) will require special traffic planning. In addition, widening turning radii and road widths and the creation of new ingress/egress nodes from the work areas may be required. As appropriate, permits will be obtained to implement these activities. As appropriate, for public safety all non-conventional loads will have front and rear escort or “pilot” vehicles accompany the truck movement on public roads.

Although there are no requirements for formal public notification of wind turbine component load movements, wpd may provide notification of non-conventional load movements that may interfere with local traffic, including postings on the Project website. This notification will be provided in the interest of public safety, minimization of disruption of other road users, and good community relations.

Net Effects

Road safety is not expected to be an issue during operations; however, the potential for accidents along the haul routes and on-site cannot be totally disqualified. Truck traffic will increase on some roads during maintenance activities and from personnel vehicles; however this traffic will be short-term in duration and intermittent.

The effect of operating the wind project is anticipated to have a limited effect on traffic.

5.6.8 Local Economy

Potential Effects

Operation of the White Pines Wind Project is expected to continue for a minimum of approximately 20 years. wpd may hire a specialized O&M Contractor for specific tasks, and, to the extent possible, local hiring will be maximized during operations, providing work for existing tradespersons and labourers. Trades that could be provided locally may include pipefitters, electricians, ironworkers, millwrights, truck drivers, and carpenters. Since it is likely that the majority of the labour force will be supplied through local and neighbouring communities, no special housing, healthcare, or food facilities will be required as part of the Project operation activities.

The operation and maintenance of the Project will result in direct, indirect and induced benefits in terms of business income and employment. Local economic benefits will also include a minimum of 20 years of land lease payments to participating landowners in addition to municipal taxes to be paid by wpd.

Mitigation Measures

wpd will make all reasonable efforts, to the extent possible, to source required services and materials from local suppliers where these items are available in sufficient quantity and quality and at competitive prices.

Net Effects

The Project provides positive benefits to the local area, including Prince Edward County through ongoing property tax income with no increased demands for municipal services that cannot readily be met.

5.6.9 Viewscape

Potential Effects

Siting of the facility will alter the visual landscape. However, visibility of the facility will vary from receptor to receptor based upon the following factors:

- Surficial patterns: landform – largely determined by physiography and tree cover;
- Topography: slope – the greater the slope the greater the visibility of the turbines and other project infrastructure from more vantage points;
- Observer position: viewing – distance from the facility reduces scale and the apparent size of a project is directly related to the angle between the viewer's line-of-sight and the slope upon which the project is to take place;
- Atmospheric conditions: clarity – air pollution, natural haze, fogging, and snow affect daytime and nighttime visibility; and,

- Turbine marking: lighting – primarily affecting nighttime visibility.

Mitigation Measures

Any specific issues that may arise regarding visual impact will be addressed on a case by case basis, and any mitigation will be determined in consultation with the stakeholder. wpd continues to consider opportunities to minimize visual effects that may be seen as unappealing to the community, such as tree planting and working with Transport Canada for alternative turbine lighting.

Landscaping at the substation properties and storage area may include planting trees and shrubs where appropriate, while still ensuring that site visibility and building security are maintained.

There are limited opportunities for potential mitigation strategies given the height of the wind turbines, and the landscape patterns.

Net Effects

Some disturbance to the viewscape is unavoidable due to the height of the turbines. The changed visual landscape will be present during the life of the facility.

5.7 EXISTING LOCAL INFRASTRUCTURE

5.7.1 Provincial and Municipal Infrastructure

Potential Effects

No potential effects are anticipated during operation of the Project on provincial or municipal infrastructure other than to roadways. There may be instances during maintenance activities where excess loads (e.g. turbine and substation components) will require special traffic planning and the loads may have potential to damage County roads.

Potential effects to traffic during the operation of the Project are discussed in **Section 5.6.7**.

Mitigation Measures

Permits from the MTO may be required to facilitate the transportation of components used for maintenance (e.g. cranes) on provincial highways, and from Prince Edward County for transportation on County roads. As appropriate, for public safety all non-conventional loads will have front and rear escort or “pilot” vehicles accompany the truck movement on public roads.

Although there are no requirements for formal public notification of wind turbine component load movements, wpd may provide notification of non-conventional load movements, including postings on the Project website. This notification will be provided in the interest of public safety, minimization of disruption of other road users, and good community relations.

Net Effects

No net effects are anticipated to provincial or municipal infrastructure during operation of the Project.

Net effects from traffic during the operation of the Project are discussed in **Section 5.6.7**.

5.7.2 Navigable Waters

No navigable waters are located within the Project Location. As such, no potential effects will occur and no mitigation measures are necessary.

5.7.3 Telecommunication and Radar Systems

Potential Effects

Wind turbines have the potential to interfere with telecommunication and radar systems, including:

- Cable distribution off-air (over-the-air, OTA) receiver systems (Head-ends);
- Satellite uplinks and receiver systems;
- Direct-to-home (DTH) receiver systems;
- Radar (weather, defence and air traffic);
- Airport communications and guidance systems;
- Broadcasting – radio (AM, FM) and TV (analog and digital);
- Coast Guard communications and vessel traffic radar systems;
- Point-to-point radiocommunication systems;
- Point-to-multipoint radiocommunication systems; and,
- Cellular and land mobile networks.

Wind turbines can affect radiocommunication and radar signals in a number of ways including shadowing, mirror-type reflections, clutter or signal scattering (RABC, 2005).

Mitigation Measures

wpd has consulted with relevant agencies and licensed providers to identify any likely effects to telecommunication and radar systems. Although no effects are anticipated, in the unlikely event that signal disruption is experienced, mitigation measures are available to alleviate the impact. This may include replacing the receiving antenna with one that has a better discrimination to the unwanted signals, relocating either the transmitter or receiver, or switching to an alternate means of receiving the information (fibre optic or other means). wpd will review potential incidents of telecommunications or radar system interference on a case by case basis.

Net Effects

Any interference with telecommunication or radar systems will be limited and of short term duration.

5.7.4 Aeronautical Systems

Potential Effects

The presence of wind turbines presents a potential hazard to low flying aircraft. Aviation safety lighting and marking of the turbines is required by Transport Canada's Aerodrome Safety Branch as specified in the Canada Aviation Regulations and Standards. Aviation safety lights, which serve to increase night-time visibility of the turbines to aviators, are required at the top of turbines as part of the lighting requirements. These safety lights may also brighten the night sky. Transport Canada standards state that wind farms require a red obstruction lighting system consisting of fading on and off aviation red beacons. These are used for night marking of wind turbines between the heights of 90 m and 150 m (including blade length) above ground level and spaced approximately 900 m apart. Final aviation lighting requirements will be in accordance with Transport Canada Regulations and Standards and will be confirmed prior to construction.

There are no known private or public airstrips located within the Study Area.

Mitigation Measures

As part of the REA consultation process, wpd has obtained a complete Aeronautical Obstruction Clearance and lighting from Transport Canada. NAV Canada completed a land use assessment and had no objections for the White Pines Wind Project. Confirmation has been received from the Department of National Defence (DND) that the White Pines Wind Project will not interfere with any DND radar systems. DND airports and NAVAIDS also had no objections with the Project.

Specifically with respect to local aviation concerns, Transport Canada and NAV Canada's approval of the White Pines Wind Project is based on an assessment of the potential impacts on, or risks to, local aviation, including potential interference with air navigation systems and flight paths in the area. These assessments include a review of the proposed locations of each of the White Pines Wind Project's turbines.

According to Transport Canada's Aerodrome Safety Branch guidelines, a wind turbine more than 900 m from another wind turbine with a light requires its own lighting. Turbine lighting must conform to Transport Canada standards. In order to reduce rural light pollution, lights will be selected with the minimal allowable flash duration, narrow beam, and will be synchronized.

It should be pointed out that turbine marking and lighting are secondary safety measures for aircraft. The turbines are below the minimum flight floor of 500 feet (152.4 m) above ground level. It is illegal for aircraft to fly below 500 feet (152.4 m) unless they have been granted a

special clearance for a low level flight. 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. NAV Canada will be responsible for updating all aeronautical charts with the turbine locations.

Routine maintenance of the turbines will include replacing safety lightning in the event of a malfunction.

Net Effects

With the application of the above mitigation measures, no adverse net effects on aeronautical activities are anticipated during operation of the facility.

5.8 WASTE MANAGEMENT AND CONTAMINATED LANDS

5.8.1 Waste Generation

Potential Effects

Lubricating and hydraulic oils associated with turbine maintenance and operation will 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), will be generated during standard operation and maintenance activities.

Waste materials will be temporarily stored at the substations and will require reuse, recycling, and/or disposal at an appropriate off-site facility. Improper disposal of waste material generated during operations may result in contamination to soil, groundwater, and/or surface water resources on and off the Project sites. Litter generated during operations may also become a nuisance to nearby residences if not appropriately contained and allowed to blow off site. There will be no on-site disposal of waste during the operation of the Project. Used oil will be removed from the site by a certified contractor with the appropriate manifests in place.

Mitigation Measures

During operations, wpd and/or the O&M Contractor will implement a site-specific waste collection and disposal management plan, which will include good site practices such as:

- systematic collection and separation of waste materials within on-site weather-protected storage areas;
- contractors will be required to remove all waste materials from the turbine siting areas and substations during maintenance activities;
- all waste materials and recycling will be transported off-site by private waste collection contractors licensed with a Certificate of Approval – Waste Management System;
- labelling and proper storage of liquid wastes (e.g. used oil, drained hydraulic fluid, and used solvents) in a secure area that will 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 will be reported to the MOE's Spills Action Centre;

- as appropriate, spill kits (e.g. containing absorbent cloths and disposal containers) will be provided on-site during maintenance activities;
- dumping or burying wastes within the Project sites will 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 will 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.

Net Effects

With the application of the mitigation measures outlined above, no net effects from waste material disposal will occur on-site during operation. However, as with all wastes, it is possible that disposal will have a minor incremental effect on soil, groundwater, and surface water at the waste disposal site(s) depending on municipal on-site containment practices and quality of the landfill protection mechanisms (e.g. use of geotextiles to contain leachate). It is assumed that licensed waste disposal sites are legally compliant.

5.8.2 Spills

Potential Effects

Some materials, such as fuel, lubricating oils and other fluids associated with turbine maintenance have the potential for discharge to the on-site environment through accidental spills.

Mitigation Measures

In terms of accidental spills or releases to the environment, standard containment facilities and emergency response materials will be maintained on-site as required. Refuelling, equipment maintenance, and other potentially contaminating activities will occur in designated areas. 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 will be reported to the MOE's Spills Action Centre.

An Emergency Response Plan (**Section 8.0**) will be developed by wpd and/or the O&M Contractor and will include protocols for the proper handling of material spills and associated procedures to be undertaken in the event of a spill.

Net Effects

With the application of the mitigation measures outlined above, no net effects from accidental spills or releases to the environment are anticipated.

5.9 PUBLIC HEALTH AND SAFETY

5.9.1 Turbine Blade and Structural Failure

Potential Effects

The potential exists for full or partial blade detachment from the turbine structure, 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). There has been widespread introduction of turbine design certification and approval that certifies compliance with standards and requires a dynamic test that simulates the complete life loading on the blade (Garrad Hassan Canada, 2007). The certification body also performs a quality audit of the blade manufacturing facilities and performs strength testing of construction materials. This approach has effectively eliminated blade design as a root cause of failures (Garrad Hassan Canada, 2007).

The reported main causes of blade failure include:

- Human interference with the control system;
- A lightning strike; and
- A manufacturing defect in the blade.

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. A review of available literature, conducted by the Chatham-Kent

Public Health Unit (2008), revealed only four documented turbine failure issues in Ontario due to lightning strikes that required the turbine to be shut down for repair.

The occurrence of structural manufacturing defects in rotor blades has also diminished significantly due to experience and improved quality control in the industry. Design practice has evolved to improve structural margins against any manufacturing deficiencies. 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 will be located at least the minimum regulated setback distance from any residence, in the event of a failure, the structure will likely not fall beyond the setback distance and will, therefore, not affect public health and safety.

Mitigation Measures

Modern wind turbines must meet strict international engineering standards. Standards include the ability to withstand the forces of a Level 2 tornado (i.e. wind speeds of approximately 55 m/s), and structures must be built to meet earthquake loads as per the Ontario Building Code. The structural integrity of the turbines is designed to withstand wind speeds of approximately 55 m/s. However, during high wind events (i.e. greater than 24 m/s) the turbines are designed to cease operation. Turbine braking is accomplished by aerodynamic (blade pitch) control and friction brakes. The wind turbines will be designed, installed, operated and maintained according to applicable industry standards/certifications.

Some safety measures specific to REpower Systems include:

- The safety chain is a hard-wired circuit in which all contacts for triggering an emergency stop are connected in series. If the safety chain is interrupted, the turbine will stop immediately. A reset can only be done when the cause of the interruption has been rectified (except for emergency stops due to grid loss). There are several safety chain contacts that can trigger an emergency stop.
- The brake system consists of the primary aerodynamic brake system and of the secondary mechanical brake system. The aerodynamic brake system includes the three blades of the turbine, each equipped with individual controllers, pitch drives and emergency power supplies. Aerodynamic braking is carried out by adjusting the rotor blades in the feathering position. This is done dynamically with the possibility of using different pitch speeds thus avoiding possible load peaks. Each of the three pitch systems on the rotor blade can also operate independently. In the event of grid loss the pitch systems are supplied via their respective individual emergency power supply. The brake force of a single blade is enough to bring the turbine into a safe speed range. This leads to an increased safety system.

- The mechanical rotor holding brake system is installed at the high-speed shaft as an active system. It is activated if the primary safety system fails partially or totally and stops the rotor in conjunction with the blade adjustment system.
- The braking system is designed for a "fail-safe" function. This means that in case of a malfunction of failure of one component within the braking system, the turbine immediately switches to a safe status.
- The entire turbine switches off automatically via suitable sensors as soon as one of the electrical or mechanical components indicates that temperatures are too high.

wpd and the O&M Contractor will aim to minimize accidents and malfunctions with proper training and education of staff operating the control system. In addition, the turbines will be equipped with lightning protection systems and located at least the minimum regulated setback distance from receptors.

Net Effects

As a result of the structural integrity and design features of the turbines, no adverse net effects from structural failure of the turbines are anticipated during operation of the facility.

5.9.2 Ice Fall and Shed

Potential Effects

Another potential public health and safety issue could result from the accumulation of ice on the turbine blades under specific temperature and humidity conditions. This condition is not unique to wind turbines and has the potential to occur on any structure that is exposed to the elements. In Ontario, this condition is most likely to occur in the winter months in extreme weather events. Under these conditions the turbines may be subject to ice coating from freezing rain or interception of low clouds containing super-cooled rain.

There are two potential hazards associated with ice accumulation on wind turbines:

- The danger of falling ice that may accumulate on the turbine as a result of freeze-thaw of snow and ice; and
- The throwing of ice from the moving turbine blades.

Falling ice from an immobile turbine does not differ from other tall structures like telecommunication towers, power lines, and antenna masts. The potential ground area affected by falling ice from wind turbines depends to a large extent on the blade position and the prevailing wind speed and direction. Garrad Hassan Canada (2007) estimated that only very high winds may cause ice fragments of any significant mass to be blown beyond 50 m of the base of a modern, stationary 2 MW turbine. Operating staff and landowners are briefed on this situation; therefore the risk is considered minimal (Garrad Hassan Canada, 2007).

Wind turbines typically operate when the wind speed is within the range of 4 m/s to 25 m/s; when turbines are in operation they can accumulate ice on the rotor blades. Ice fragments which detach from the rotor blades can be thrown from the wind turbine; any fragments would land in the plane of the wind turbine rotor or downwind (Garrad Hassan Canada, 2007). Throwing distance varies depending upon the rotor azimuth, rotor speed, local radius, and wind speed. Also, the geometry of the ice fragments and its mass would affect the flight trajectory.

Observations have shown that the ice fragments do not maintain their shape and immediately break into smaller fragments upon detaching from a blade. This would decrease drag and potentially allow the ice fragment to be thrown greater distances. For human injury to result from ice shed, several conditions would have to exist simultaneously:

- Sustained weather condition conducive to icing;
- Ice dislodging from the turbine blade;
- Ice pieces large enough to remain intact through the air;
- Ice traveling in a particular direction past setback guidelines; and,
- A person in the path of the ice as it lands (Garrad Hassan Canada, 2007).

A risk assessment methodology was developed by Garrad Hassan Canada and Partners, in conjunction with the Finnish Meteorological Institute and Deutsches Windenergie-Institut, as part of a research Project on the implementation of Wind Energy in Cold Climates (WECO). Guidelines produced in the WECO Project were based on a combination of numerical modelling and observations. The WECO database of observed ice fragments determined that recorded ice fragments are typically thrown to distances less than 125 m from the base of the turbine (Seifert et al., 2003).

Garrad Hassan Canada developed an Ontario-specific risk assessment methodology for ice shed based on the findings of the WECO Project. Modelling was undertaken to determine the probability of an ice fragment landing within one square metre of ground area, as a function of distance from the turbine. The model result determined that the critical ice shed distance would be approximately 220 m from a turbine. At distances greater than 220 m, the probability of ice shed reaching ground level at a mass that would cause injury decreases rapidly. The critical distance can effectively be regarded as a “safe” distance, beyond which there is a negligible risk of injury from ice shed (Garrad Hassan Canada, 2007).

Example calculations were presented in the Garrad Hassan Canada (2007) report, using data representative of a typical wind farm Project in rural southern Ontario. Risk to a fixed dwelling, vehicle travelling on a road, and individual person from being struck by an ice fragment thrown from an operating wind turbine were modelled, with the following results:

- Fixed dwelling: equivalent to 1 strike per 500,000 years;
- Vehicle travelling on a road: equivalent to 1 strike per 260,000 years; and

- Individual person: equivalent to 1 strike in 137,500,000 years.

These predictions seem markedly low; however, it is due to the fact that icing events are limited to only a few days per year. For example, Vestas Canada, which maintains turbines across Canada, has experienced no incidents related to falling ice in Canada (Jacques Whitford, 2006).

Mitigation Measures

Unlike telecommunication towers, the wind turbines proposed to be used for this Project will have a solid conical tower. This design reduces the potential for ice build-up on the tower itself since there is no lattice or crevices where ice can accumulate.

In terms of ice shed, several control mitigation strategies are available to turbine operators. For example, when the rotor becomes unbalanced due to a change in blade weighting (e.g. caused by ice buildup), the turbine brake is automatically applied to stop the blades from turning (i.e. it shuts itself off). The blades will not restart their movement until the imbalance is removed (e.g. the majority of ice is removed). This design feature greatly reduces the potential ice shed from the turbines on the few days per year when icing is possible.

Net Effects

Considering the design features of the turbines which act to reduce or eliminate the potential for ice accumulation, and that the nearest receptors are located at minimum required setbacks from the turbines, no adverse net effects are expected due to ice fall and shed from turbines during operation of the Project. Consequently, no additional mitigation measures have been identified.

5.9.3 Extreme Events

Potential Effects

Extreme weather events that could occur during operation of the Project include fire, flood, temperature extremes, heavy snow, rain, hail, ice storms, tornadoes, earthquakes, and lightning strikes.

The likelihood of a fire during operation is low. If a fire were to happen, it would likely occur in the fields at the base of the turbine. Fire could damage the turbine tower paint but it is unlikely that a fire would damage the turbine components within the tower.

Since there are no major waterways near the Study Area, it is unlikely that a flood will occur.

Temperature extremes, to the extent that they are outside the turbine's operating range, are not expected.

No adverse effect is anticipated to the operation of the turbines from heavy snow, except to prevent access to the turbines during an emergency.

In the case of an extreme hail event, the nacelle could suffer cosmetic damage. However, the operation of the turbine would not be affected. It is unlikely that the nacelle cover would suffer structural damage. An extreme hail event may also damage the turbine's meteorological sensors.

Climatic fluctuations in temperature and/or humidity are unlikely to have a significant effect on the Project. A change in the annual average air temperature or relative humidity could (slightly) affect the energy production of the Project as higher density air (corresponding to lower temperatures and lower humidity) will result in higher production since the wind power density is a linear function of the air density.

Climatic variations in rainfall or snowfall are unlikely to affect the Project. Variations in freezing precipitation (but not extreme events) could change the overall energy production through inefficiencies caused by the modification of the aerodynamic profile of the turbine blade. However, such events occur for such a limited fraction of the time that it is very unlikely that there would be a significant impact on energy production.

A change in the wind climate is the likeliest cause for significant impact on the Project's energy production. This results from the very high sensitivity (the cube) of wind power density to the wind speed (i.e., small changes in wind speed can result in relatively large changes in kinetic energy available for conversion to electrical energy). It is not unusual for the average wind speed to fluctuate from year to year by up to +/- 10%. This maximum would, typically, translate into Project energy fluctuations of +/- 20 to 25%.

Mitigation Measures

Project components have been designed to withstand the effects from extreme weather events as follows:

- Rain – surficial drainage patterns will remain intact and continue to convey rain water;
- Hail – the turbine blades, nacelle, and tower are constructed of materials able to withstand damage from the impact of hail;
- Ice storms/freezing rain – the turbines are designed to automatically shut down when ice load on the blades exceeds a predetermined threshold;
- Tornadoes – the blades will stop moving at wind speeds greater than 25 m/s, and generally, the structural integrity of turbines is designed to withstand gusts of greater than 59 m/s;
- Earthquakes – structures will be designed to meet the earthquake loads as per the Ontario Building Code; and
- Lightning – turbines are equipped with sophisticated lightning protection; Lightning strikes are safely absorbed by lightning conductors and the current is conducted via a spark gap and cables into the ground surrounding the foundation.

The wind turbines and substations will be designed, installed, operated and maintained according to applicable industry standards/certifications.

Net Effects

Considering the design features of the facility components, which act to reduce or eliminate the potential for damage from extreme weather events, no adverse net effects from extreme weather events are anticipated during operation of the facility.

5.9.4 Third Party Damage

The possibility exists for accidental collision from off-road and maintenance vehicles with Project components. Although possible, it is highly unlikely that this equipment will significantly damage the towers or substations given their structural integrity (e.g. the rolled steel in the turbine towers is over an inch thick, supporting foundations, surrounding gravel pad, and surrounding substation fence). As such no potential effects will occur and therefore no mitigation measures are necessary.

6.0 Environmental Effects Monitoring Plan

The environmental effects monitoring plan for the Project 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.

Environmental monitoring, which started with the collection of primary background data, will continue with appropriate follow-up activities during the operation of the Project. Monitoring will provide data on key functions of natural and socio-economic features that may be affected during construction or operation of the Project, and on the effectiveness of mitigation measures implemented as part of the Project. The monitoring procedures noted herein are linked to the potential effects and protection and mitigation measures discussed throughout **Section 5.0**.

6.1 GOALS AND OBJECTIVES

The goals of the monitoring plan are:

- Minimize environmental effects from the Project during the operation phase;
- Minimize conflicts in the communities affected by the Project according to legal terms and to wpd's policies;
- Avoid accidents and malfunctions;
- Minimize environmental effects on natural habitats, flora and fauna;
- Avoid levies or sanctions from the relevant government agencies for negligent environmental performance;
- Comply with environmental quality standards set by law; and,
- Establish measures that enhance occupational safety.

6.2 GUIDING PRINCIPLES

The following guiding principles were considered in preparation of the monitoring plan:

- Focus upon environmental, health, and safety risk prevention;
- Conform to relevant standards, codes, and practices considered in the application of safe technologies;
- Perform all activities in a safe and effective manner, by trained personnel;
- Maintain all equipment in good operating condition for protection of worker health and safety, conservation of the environment, and protection of property;
- Implement all necessary precautions to control, remove, or otherwise correct any health and safety hazards; and,

- Meet all relevant municipal, provincial, and federal standards that collectively ensure sufficient technical levels of safety during operation of the Project.

Building upon the above methodology, goals and objectives, and guiding principles, the monitoring plan is composed of three components: environmental management systems; programs, plans, and procedures; and monitoring and contingency requirements. Each component is discussed below.

6.3 ENVIRONMENTAL MANAGEMENT SYSTEMS

As part of the environmental monitoring objectives outlined above, several programs, plans, and procedures will be developed by wpd, the turbine manufacturer, and/or the operation and maintenance contractor. They will guide the operation of the Project to optimize its environmental performance. However, for the programs, plans, and procedures to be effective, appropriate management structures and contract documents must be firmly established.

6.3.1 Management Structures

wpd, REpower, and/or the O&M Contractor will take steps to ensure that they have appropriately skilled personnel to carry out the environmental responsibilities as defined in this document. All organizations associated with Project development and operational activities will develop responsive reporting systems that clearly assign responsibility and accountability. As appropriate, wpd and/or the O&M Contractor will review these reporting documents.

6.3.2 Contract Documents

wpd is committed to operating the Project in an environmentally responsible manner and in compliance with all applicable environmental laws, regulations, and guidelines. All of wpds' contractors and subcontractors will be accountable for actions that have an adverse effect on the environment. As such, any contract documents executed by wpd and/or the O&M Contractor will incorporate appropriate provisions from documents prepared for the REA application.

Additionally, all contractors, subcontractors, and other associates of the Project will follow the guiding principles of the monitoring program and will also comply with all relevant municipal, provincial, and federal legislation.

6.3.3 Change Management

During the operation of the Project, changes to operational plans may be required to address unforeseen or unexpected conditions or situations. wpd and/or the O&M Contractor will be responsible for ensuring environmental and safety issues are addressed for any such changes. wpd will undertake any significant changes to the Project programs, procedures and plans

throughout the operation of the Project with the goal of avoiding or minimizing environmental effects.

6.4 PROGRAMS, PLANS, AND PROCEDURES

As appropriate, wpd, REpower, and/or the O&M Contractor will implement the programs, plans, and procedures discussed below.

6.4.1 Operation and Maintenance Program

The operation and maintenance program, including turbine maintenance, is described in **Section 4.0**.

6.4.2 Environmental Procedures

wpd and/or the O&M Contractor will be responsible for implementing environmental procedures during the operation phase of the Project. Individual employee responsibilities will be assigned as necessary to support the full and effective implementation of the environmental procedures. As appropriate the environmental procedures will address the following issues to prevent environmental contamination and injury to personnel:

- *Environmental calendar:* to establish the specific dates and times for environmental inspections of turbine facilities, 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, storage, handling, transport, and disposal of hazardous waste. In addition, the procedures will outline specific requirements for personnel training, emergency response, product review and approval, and record keeping; and,
- *Non-hazardous waste management:* to establish alternative procedures for the management and disposal of used lubricants, used drums, and general waste.

These procedures will ensure internal and external risks are fully evaluated and the information communicated to personnel in advance of any accident or malfunction.

6.4.3 Occupational Health and Safety Procedures

wpd and/or the O&M Contractor will ensure employee health and safety is maintained throughout their employment term and will also implement the following safety procedures and protocols as appropriate in an effort to ensure employee safety is addressed throughout operation and maintenance activities:

- Personal protective equipment (PPE), including non-slip footwear, eye protection, clothing, and hardhats, will be worn by operations and maintenance personnel when on duty;
- Elevated platforms, walkways, and ladders will be equipped with handrails, toe boards, and non-slip surfaces; and,
- Electrical equipment will be insulated and grounded in compliance with the appropriate electrical code.

Incidents in the work place have the potential to cause personal injury and property damage. As appropriate, the O&M Contractor will maintain a master Incident Report that documents illnesses and accidents. Incident reporting will follow the requirements of the *Occupational Health and Safety Act*.

6.4.4 Training Program

As appropriate, wpd and/or the O&M Contractor will develop or have an existing operations training program to ensure personnel receive appropriate training in relation to operation and maintenance programs, environmental, health, and safety procedures, and the emergency response plan. Training may cover the following issues:

Facility Safety

- Accident reporting;
- Chemical and hazardous materials handling;
- Fall and arrest protection;
- Eye, ear, head, hands, feet, and body protective equipment;
- First aid training and equipment;
- Equipment operation and hazards;
- Fire prevention and response;
- Lockout and tag out procedures; and,
- Scaffolds and ladders.

Emergency Preparedness

- Fire preparedness and response;
- Natural disasters (i.e. extreme weather events);
- Hazardous materials and spill response;
- Medical emergencies; and,
- Rescue procedures.

6.4.5 Emergency Response Plan

A description of the emergency response plan for the Project is described in **Section 8.0**.

6.4.6 Measurement of Performance

Once performance standards have been established and personnel have been trained (and are functional in procedural operations), the next step will be to monitor the performance of the facility and individuals relative to the performance standards and programs.

Specific internal audits (e.g. management team and/or process team), and external audits against the plans, safety and environmental procedures, and other policies and procedures are all part of establishing performance standards necessary to minimize risks on a continuing basis.

As appropriate a formal audit program for the Project, with regard to loss control programs (i.e. health, safety, environment, and security) will be performed regularly.

6.5 MONITORING REQUIREMENTS AND CONTINGENCY PLANS

Building upon the environmental management measures recommended to minimize potentially adverse effects, while enhancing the positive effects associated with the operation of the Project (**Section 5.2**), the following operations monitoring and contingency planning program has been developed. The monitoring program is designed to allow wpd and/or the O&M Contractor to monitor and assess the effectiveness of the proposed management measures/mitigation measures and to verify compliance of the Project with O. Reg. 359/09.

wpd and/or the O&M Contractor will be the primary organization responsible for the implementation of the operational monitoring and contingency planning measures. Implementation of the measures will be undertaken consistent with wpds' and/or the O&M Contractor standard environmental and engineering practices.

6.5.1 Terrestrial Habitats and Significant Natural Features

A detailed Environmental Effects Monitoring Plan will be provided in **Appendix D**. The Plan will include details on bird and bat mortality monitoring, and on disturbance monitoring. Details of the Plan are under development in consultation with the MNR.

The post-construction monitoring program developed for birds and bats will be consistent with guidelines provided by regulatory agencies at the time of writing. The plan will give consideration to adaptive management and operational control options.

Elements of the post-construction monitoring program will include:

- Bird mortality monitoring at all wind turbines will be conducted twice-weekly between May 1 and October 31 for a period of three years following start of operations. A weekly mortality survey will be conducted at all turbines in November to assess raptor mortality.
- Bat mortality monitoring at all turbines will be conducted twice-weekly between May 1 and September 30 for a three-year period following start of operations in accordance with MNR guidelines.
- Searcher efficiency trials will be conducted seasonally and carcass removal trials will be conducted monthly between May 1 and September 30. Searcher efficiency and carcass removal rates are known to be more variable for bats than for birds throughout the year and depending on habitat (in part due to the relative size of the species).
- Regular reporting that includes analysis and submission of results to MNR and Environment Canada.

Mitigation techniques may include (but not limited to) operational controls, such as periodic shut-down and/or blade feathering. Results will be reviewed by wpd, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation are required.

6.5.2 Surface Water Features and Aquatic Habitat

Operational activities that have the potential to affect aquatic habitat include accidental spills and/or leaks. Proper storage of materials (e.g. maintenance fluids) at off-site storage containers will greatly reduce the potential for accidental spills and/or leaks. 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 will be based on the severity of the spill/leak and may be discussed with the MOE (Spills Action Centre) and MNR. Environmental inspection following spring run-off the year after construction (first year of operation) may be considered to review the effectiveness of the bank and slope revegetation (if required), to check bank and slope stability, and to ensure surface drainage has been maintained. In the event that adverse effects are noted, appropriate remedial measures will be completed as necessary (i.e. site rehabilitation and re-vegetation) and additional follow-up monitoring conducted as appropriate, under the direction of an environmental advisor.

6.5.3 Environmental Noise and Public Health and Safety

The *Environmental Protection Act* (EPA) requires that noise emissions for any new project must not have adverse effects on the natural environment. The REA process is the mechanism through which the controls are administered under the EPA. Noise monitoring (if required) will be conducted in accordance with the REA for the Project. In the event of a malfunctioning turbine resulting in noise emissions that are above MOE requirements, wpd will contact the MOE to determine the best path forward for resolving the issue. The resolution of the issue could include shutting down the non-compliant turbine(s) until the problem is resolved. Routine turbine maintenance and monitoring will also help minimize the likelihood of malfunctioning turbines resulting in excessive noise emissions.

wpd will conduct all monitoring required under provincial regulation. Specifically with regards to addressing noise complaints by residents, should there be any complaints, wpd will follow its Communications and Complaint Response Protocol. All reasonable commercial efforts will be made to take appropriate action as a result of concerns as soon as practicable, and following all provincial requirements.

The White Pines Wind Project will follow the guidelines put in place by the Ministry of the Environment regarding sound levels and minimum distances for wind projects in Ontario. The key consideration is the sound level. The requirements, supported by information from the Ontario Chief Medical Officer of Health, Health Canada and The World Health Organization (WHO) Europe and upheld by Ontario courts, ensure a project must be sited at least 550 metres from non-participating receptors (dwellings) provided a cumulative sound level does not exceed 40 dBA. wpd's turbine manufacturer, REpower has guaranteed the maximum sound power level from the turbines. This level has been used in calculations to ensure the sound level at non-participating receptors (dwellings) meets the requirements of the regulations.

Turbines will be monitored electronically twenty-four hours a day, seven days a week, to allow operational changes to be noted and assessed quickly. Turbine shut down will occur automatically upon detection of extreme weather. Inspections of turbines will occur after extreme weather events

6.5.4 Local Expenditures

As was the case during the construction phase, wpd will continue to encourage the use and procurement of local goods and services where they are available in sufficient quantities and qualities and at competitive pricing.

6.5.5 Community Relations

A Communications and Complaint Response Protocol (**Section 8.3**) has been developed to address any stakeholder concerns during operation of the Project.

7.0 Summary of Environmental Effects Monitoring Plan

Table 7.1 summarizes the potential negative effects, performance objectives, mitigation strategies and the monitoring/contingency plan measures of the operational stage of the Project.

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
Cultural Heritage and Archaeological Resources					
Protected Properties and Cultural Heritage Resources	• Disturbance to viewscape.	• Minimize potential for visual disturbance.	• See 'Viewscape'.	• See 'Viewscape'.	5.2.1 5.6.9
Archaeological Resources	• None	• N/A	• N/A	• N/A	5.2.2
Natural Heritage Resources					
Wetlands	• Contamination through sedimentation and accidental spills. • Dust emissions during operation and maintenance.	• No sedimentation or spills. • Minimize duration and magnitude of dust emissions.	• See 'Surface Water, Fish, and Fish Habitat'. •	• See 'Accidental Spills' • See 'Dust and Odour Emissions'	5.3.1 5.4.2 5.5.2 5.8.2
Areas of Natural and Scientific Interest	• Contamination through sedimentation	• No sedimentation.	• See 'Surface Water, Fish, and Fish Habitat'.	• See 'Surface Water, Fish, and Fish Habitat'.	5.3.2 5.4.2
Valleylands	• Contamination through sedimentation	• No sedimentation.	• See 'Surface Water, Fish, and Fish Habitat'.	• See 'Surface Water, Fish, and Fish Habitat'.	5.3.3 5.4.2
Significant Woodlands	• Contamination through sedimentation and accidental spills. • Dust emissions during operation and maintenance. • Improper disposal of waste.	• No sedimentation or spills. • Minimize duration and magnitude of emissions. • No improper disposal of waste.	• See 'Surface Water, Fish, and Fish Habitat'. • See ''Accidental Spills'. • See 'Dust and Odour Emissions'. • See 'Waste Generation'.	• See 'Surface Water, Fish, and Fish Habitat'. • See 'Accidental Spills' • See 'Dust and Odour Emissions'	5.3.4 5.4.2 5.5.2 5.8.2
Provincial Parks and Conservation Reserves	• None	• N/A	• N/A	• N/A	5.3.5
Other Designated Natural Areas	• Disturbance and direct mortality to breeding	• Minimize Disturbance.	• See 'Significant Wildlife and Wildlife Habitat'.	• See 'Significant Wildlife and Wildlife Habitat'.	5.3.6

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
	bird populations.				
Significant Wildlife and Wildlife Habitat	• Disturbance and direct mortality to migratory birds, amphibians and breeding birds.	• Minimize disturbance and mortality.	• Turbine lighting will conform to Transport Canada standards. • Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred. • To the extent possible, no steady burning lights/floodlights will be used. • All refuelling will occur away from significant wildlife habitat, and spills will be reported as required. • Fuel storage will occur in protected/sealed areas. For amphibian breeding areas: • Speed limit of 30 km/hr. • Sediment and erosion control will follow the Environmental Impact Study Report.	• Post-construction monitoring of bird carcass searches twice-weekly at all turbines, May 1- October 31, and raptor mortality surveys once-weekly, November 1- 30 for three years. • Post-construction monitoring for disturbance for three years. • Regular reporting that includes analysis and submission of results to MNR. • The Environmental Effects Monitoring Plan will identify performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met. • Mitigation may include additional scoped mortality and effects monitoring and operational controls, such as periodic shut-down on select turbines or blade feathering at specific times of the year, depending on the species affected.	5.3.7

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
Other Wildlife and Wildlife Habitat	• Disturbance and direct mortality to wildlife	• Minimize disturbance and mortality	• See 'Local Traffic'. • See 'Dust and Odour Emissions'. • See 'Environmental Noise'.	• Direct mortality will be reviewed with the MNR to determine where it is feasible to maintenance details to be adjusted.	5.3.8 5.6.7 5.5.2 5.5.3
Significant Flora and Vegetation Communities	• Contamination through sedimentation and accidental spills.	• No sedimentation or spills. •	• See 'Surface Water, Fish, and Fish Habitat'. •	• See 'Surface Water, Fish, and Fish Habitat'. •	5.3.9 5.4.2
Other Flora and Vegetation Communities	• Contamination through sedimentation and accidental spills.	• No sedimentation or spills. •	• See 'Surface Water, Fish, and Fish Habitat'.	• See 'Surface Water, Fish, and Fish Habitat'.	5.3.10 5.4.2
Water Bodies and Aquatic Resources					
Groundwater	• Potential contamination from accidental spills.	• No spills.	• See 'Accidental Spills'.	• See 'Accidental Spills'.	5.4.1 5.8.2
Surface Water, Fish, and Fish Habitat	• Potential sedimentation from erosion. • Potential contamination from accidental spills	• No sedimentation or spills.	• See 'Accidental Spills'. • See Section 3.4.2 of the Construction Plan Report	• See 'Accidental Spills'. • See Section 3.4.2 of the Construction Plan Report	5.4.2 5.8.2
Air Quality and Environmental Noise					
Air Emissions	• Emissions from operation and maintenance activities, including equipment and vehicles.	• Minimize duration and magnitude of emissions.	• Operations staff will operate vehicles in a manner that reduces air emissions to the extent practical, including: o Using multi-passenger vehicles as possible; and o Avoid idling vehicles. • Equipment and vehicles will be maintained in a manner that reduces air emissions, including: o Using mufflers and emission control systems as available; o Using catalytic converters as	• Adherence to Complaint Response Protocol.	5.5.1 8.0

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			required; o Meet the emissions requirements of the MOE and/or MTO; o As appropriate, records of vehicle maintenance will be retained and made available for periodic review by wpd and/or the O&M Contractor o All vehicles identified through the monitoring program that fail to meet the minimum emission standards will be repaired immediately or replaced as soon as practicable.		
Dust & Odour Emissions	• Dust emissions from operation and maintenance vehicles.	• Minimize duration and magnitude of emissions.	• 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.	5.5.2 8.0
Environmental Noise	• Noise emitted from a turbine. • Noise emitted from traffic and/or vehicles.	• Noise at all non-participating receptors to meet MOE Guidelines.	• Adherence to all noise setback requirements. • All engines associated with maintenance equipment will be equipped with mufflers and/or silencers in accordance with MOE and/or MTO guidelines and regulations. • Noise levels arising from maintenance equipment will also be compliant with sound levels established by the MOE.	• Noise monitoring (if required), will be conducted in accordance with the REA for the Project. • Turbine shutdown as appropriate in the event of a malfunctioning turbine or extreme weather event. • Turbine maintenance to ensure turbines are running properly and efficiently. • Adherence to Complaint	5.5.3 8.0

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			• Routine Project maintenance to ensure infrastructure is operating properly and efficiently. • To the greatest extent possible, operations activities that could create excessive noise will be restricted to regular business hours, when residents are less sensitive to noise, and adhere to any local noise by-laws.	Response Protocol.	
Land Use and Socio-Economic Resources					
Areas Protected Under Provincial Plans and Policies	• None	• N/A	• N/A	• N/A	5.6.1
Existing Land Uses	• Temporary increase in noise and dust levels. • Minor increase in traffic.	• Minimize disturbance to existing land uses, including local residents and businesses.	• See 'Environmental Noise'. • See 'Dust and Odour Emissions'.	• Adherence to Complaint Response Protocol.	5.6.2 5.5.3 5.5.2
Recreation Areas	• Interference with recreation uses from increased noise, dust and traffic volumes	• Minimize disturbance to recreation uses	• See 'Environmental Noise'. • See 'Dust and Odour Emissions'. • See 'Local Traffic'.	• Adherence to Complaint Response Protocol.	5.6.3 5.5.3 5.5.2 5.6.7
Agricultural Lands and Operations	• Inconvenience to operations from traffic and dust.	• Minimize disturbance to agricultural lands and operations.	• See 'Dust and Odour Emissions'	• Adherence to Complaint Response Protocol.	5.6.4 5.5.2 8.0
Mineral, Aggregate, and Petroleum Resources	• None	• N/A	• N/A	• N/A	5.6.5
Game And Fishery Resources	• Disturbance to game species from noise.	• Minimize disturbance to game and fishery	• Turbines will be placed within REA setback requirements.	• None required.	5.6.6

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
		resources.			
Local Traffic	• Negligible increase in traffic.	• Minimize disturbance to local traffic.	• There may be instances where excess loads (e.g. turbine components) will require special traffic planning, widening turning radii and road widths and the creation of new ingress/egress nodes. • Necessary permits will be obtained. • As appropriate, for public safety all non-conventional loads will have front and rear escort or "pilot" vehicles accompany the truck movement on public roads. May provide notification of non-conventional load movements.	• Adherence to Complaint Response Protocol.	5.6.7 8.0
Local Economy	• Increase in direct, indirect and induced employment over the operations period. • Local economic benefits from land lease payments, municipal taxes, etc.	• Create positive effects on local economy.	• To the extent possible wpd and/or the O&M Contractor will source required goods and services from qualified local suppliers.	• None required.	5.6.8
Viewscape	• Disruption to viewscape from siting of project infrastructure.	• Minimize potential for visual disturbance.	• Landscaping at the substation properties and storage area.	• Adherence to Complaint Response Protocol.	5.6.9 8.0
Existing Infrastructure					
Provincial and municipal infrastructure	• Negligible increase in traffic.	• Minimize disturbance to roads.	• Consultation with MTO regarding any necessary agreements related to wear on roads from transportation of Project materials in addition to obtaining the required permits for use of	• None required	5.7.1

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			provincial highways. • Consultation with the County regarding excess loads with potential to damage County roads.		
Navigable Waters	• None	• N/A	• N/A	• N/A	5.7.2
Telecommunication and Radar Systems	• Potential to interfere with telecommunication and radar systems	• Minimize interference with telecommunication and radar systems	• wpd 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.	• Adherence to Complaint Response Protocol. • wpd will review potential incidents of telecommunications interference on a case by case basis.	5.7.3 8.0
Aeronautical Systems	• Aeronautical obstruction.	• Minimize potential hazard to low flying aircraft.	• Turbine lighting must conform to Transport Canada standards. Turbine lighting will be selected with the minimal allowable flash duration, narrow beam, and will be synchronized. • NAV Canada will be responsible for updating all aeronautical charts with the turbine locations.	• Routine maintenance of the turbines and replacement of safety lighting in the event of malfunction.	5.7.4
Waste Management and Contaminated Lands					
Waste Generation	• Improper disposal of	• Ensure proper	• Systematic collection and	• See ‘Accidental Spills’.	5.8.1

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
	waste material may result in contamination to soil, groundwater, and/or surface water resources on and off the Project sites. • Litter may become a nuisance to nearby residences if not appropriately contained and allowed to blow off the site.	disposal of waste.	separation of waste materials within on-site storage areas in weather-protected areas. • Contractors will be required to remove all waste materials from the turbine siting areas during maintenance activities. • All waste materials and recycling will be transported off-site by private waste material collection contractors licensed with a Certificate of Approval – Waste Management System. • Dumping or burying wastes within the Project sites will be prohibited. • labelling and proper storage of liquid wastes (e.g. used oil, drained hydraulic fluid, and used solvents) in a secure area that will 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 will be reported to the MOE's Spills Action Centre. • Disposal of non-hazardous waste at a registered waste disposal site(s). • If waste is classified as waste other than solid non-hazardous, a		5.8.2

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			Generator Registration Number is required from the MOE and the generator will have obligations regarding manifesting of waste. • Implementation of an on-going waste management program consisting of reduction, reuse, and recycling of materials. • See 'Accidental Spills'		
Accidental Spills	• Potential contamination from accidental spills.	• No spills.	• Labeling and proper storage of liquid wastes (e.g. used oil, drained hydraulic fluid, and used solvents) in a secure area that will 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 will be reported to the MOE's Spills Action Centre. • As appropriate, spill kits (e.g. containing absorbent cloths and disposal containers) will be provided on-site during maintenance activities. • Standard containment facilities and emergency response materials will be maintained on-site as required. • Refuelling, equipment maintenance, and other potentially contaminating activities	• Monitoring will be required following the unlikely event of contamination from an accidental spill or leak (method for monitoring may be developed in consultation with the Spills Action Centre of the MOE). • Contaminated soils will be removed and replaced as appropriate.	5.8.2

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			will occur in designated areas. • Spills will be reported immediately to the MOE Spills Action Centre, as applicable.		
Public Health and Safety					
Turbine blade and Structural failure	• Public Health and Safety.	• No structural failure of the turbines or ancillary equipment.	• Adherence to required setbacks. • Design, install, operate, and maintain turbines according to applicable industry standards/certifications. • Use of lightning protection systems. • Proper training and education of staff.	• Inspections of turbines will occur after extreme events and contingency measures such as turbine shutdown will be implemented in the event of structural damage. • Turbine maintenance to ensure turbines are running properly and efficiently.	5.9.1
Ice fall and shed	• Public Health and Safety.	• Limit potential for ice throw/shed to impact pedestrians.	• Adherence to required setbacks. • Design of turbine tower reduces ice accumulation. • Automatic turbine shutdown due to weight imbalances.	• Inspections of turbines will occur after extreme events and contingency measures such as turbine shutdown will be implemented in the event of structural damage and/or icing to a turbine(s). • Turbine maintenance to ensure turbines are running properly and efficiently.	5.9.2
Extreme Weather Events	• Potential damage to project infrastructure from extreme weather events.	• No structural failure of the turbines or Project equipment.	• Project components have been designed to withstand the effects from extreme events. • Design, install, operate, and maintain turbines according to applicable industry standards/certifications. • Failsafe devices are capable of shutting down the turbine blades in the event of excessive wind	• See 'Turbine Blade and Structural Failure'.	5.9.3

Table 7.1: Summary of the Potential Environmental Effects and the Environmental Effects Monitoring Plan during Operations

Environmental Feature	Potential Adverse Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures	Section Reference
			conditions, imbalance, or malfunction of other turbine components.		
Third Party Damage	• None.	• N/A	• N/A	• N/A	5.9.4

8.0 Emergency Response and Communications Plan

The following sets out a description of the actions to be taken during the operation of the Project to inform the public, Aboriginal communities, and Prince Edward County regarding activities occurring at the Project site (including emergencies), means by which stakeholders can contact the O&M Contractor and/or wpd, and means by which correspondence sent to the O&M Contractor and/or wpd will be recorded and addressed.

As appropriate, wpd and/or the Contractor will review the Emergency Response and Communications Plan prior to and during each phase of the Project. Notification of any changes to the Emergency Response and Communications Plan will be provided to stakeholders.

8.1 COMMUNICATION PLAN FOR EMERGENCIES

wpd and/or the O&M Contractor will finalize a detailed Emergency Response Plan for each Project phase in collaboration with local Emergency Services Departments.

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

The plan will include key contact information for emergency service providers, a description of the chain of communications and how information will be disseminated between wpd and/or the O&M Contractor and the relevant responders. The plan will also indicate how wpd and/or the O&M Contractor will directly contact Project stakeholders who may be directly impacted by an emergency so that the appropriate actions can be taken to protect stakeholders health and safety.

8.2 PROJECT UPDATES AND ACTIVITIES

wpd and/or the O&M Contractor will continue contact with Project stakeholders (public, ministries, Aboriginal communities, and the County) 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://canada.wpd.de/projects/in-canada/white-pines.html). As a long-term presence in the County, wpd will continue to develop contacts and to develop local relationships and channels of communication, which could benefit the local area.

8.3 COMMUNICATIONS AND COMPLAINT RESPONSE PROTOCOL

The following has been developed for the operations phase to address any concern from the public and will be implemented by wpd and/or the O&M Contractor.

A telephone number for contacting wpd and/or the O&M Contractor along with the mailing/email address will be posted on the Project website (http://canada.wpd.de/projects/in-canada/white-pines.html) and provided directly to Prince Edward County and MOE prior to operation of the Project. These will be the direct contact points for wpd and/or the O&M Firm during the operation of the Project. This information will also be provided on-site near the substations and storage area.

The telephone number inquiries and concerns will be equipped with a voice message system used to record the name, address, and telephone number of the complainant along with details of the complaint. All messages will be recorded in a Communications Response Document, and wpd and/or the O&M Contractor will endeavour to respond to messages within 48 hours. All reasonable commercial efforts will be made to take appropriate action as a result of concerns as soon as practicable. The actions taken to remediate the cause of the issue and the proposed actions to be taken to prevent reoccurrences in the future will also be recorded within the Communications Response Document. If appropriate, the MOE Spills Action Centre will be contacted to notify them of the issue. Correspondence will be shared with other stakeholders, such as the MOE, as required and/or as deemed appropriate.

Ongoing stakeholder communication will allow wpd and the O&M Contractor to receive and respond to community issues on an ongoing basis.

8.4 PUBLIC SAFETY PLAN

In addition to the Public Safety Plan that will be developed by the Construction Contractor for the protection of public safety during the construction and decommissioning phases, wpd and/or the O&M Contractor will prepare and implement a Public Safety Plan for operation of the Project. As previously noted and as appropriate, wpd and/or the O&M Contractor will develop or have an existing operations training program to ensure personnel receive appropriate training in relation to operation and maintenance programs, environmental, health and safety procedures, and the emergency response plan. Proper training will ensure operational safety for Project personnel.

Operational safety to minimize potential risks to the public will include:

- Signage throughout the Project area;
- Site access restrictions (with the exception of maintenance and emergency personnel);
- Development of an Emergency Response Plan; and,
- Turbine design and adherence to construction standards.

Signage may include but will not be limited to signs associated with potential risks at the Project site such as the location of buried cables, high voltage equipment, and the presence of maintenance vehicles along the access roads.

Access restrictions will include “No Trespassing” signs on turbine access roads and turbine tower sites or within the substations and storage area. In addition, fencing will be placed around the substations to restrict unauthorized access. Access roads will not have restricted access (e.g. gates), thus allowing emergency vehicles to access the Project site and all turbine locations in the event of an emergency.

As previously noted, during pre-operational mobilization wpd and/or the O&M Contractor will finalize an Emergency Response Plan for the operational activities in collaboration with emergency service providers within Prince Edward County. The development of and proper execution of the Emergency Response Plan will help ensure public safety is maintained throughout the operation of the facility.

Potential risk to public safety as a result of accidents/malfunctions or extreme events such as fire, lightning, and tornadoes were addressed in **Section 5.9.3**. The turbines have been designed with various protective measures to address extreme events and accidents/malfunctions to reduce the potential risk to public safety. The turbines will adhere to marking and lighting requirements of the Aerodrome Safety Branch of Transport Canada. In addition, construction of the turbines is completed according to stringent national and international codes.

9.0 Conclusion and Signatures

This Design and Operations Report for the White Pines Wind Project has been prepared by Stantec for wpd in accordance with Item 4, Table 1 of Ontario Regulation 359/09 and the MOE's *Technical Guide to Renewable Energy Approvals* (2012).

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

STANTEC CONSULTING LTD.

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Project Manager

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Senior Project Manager

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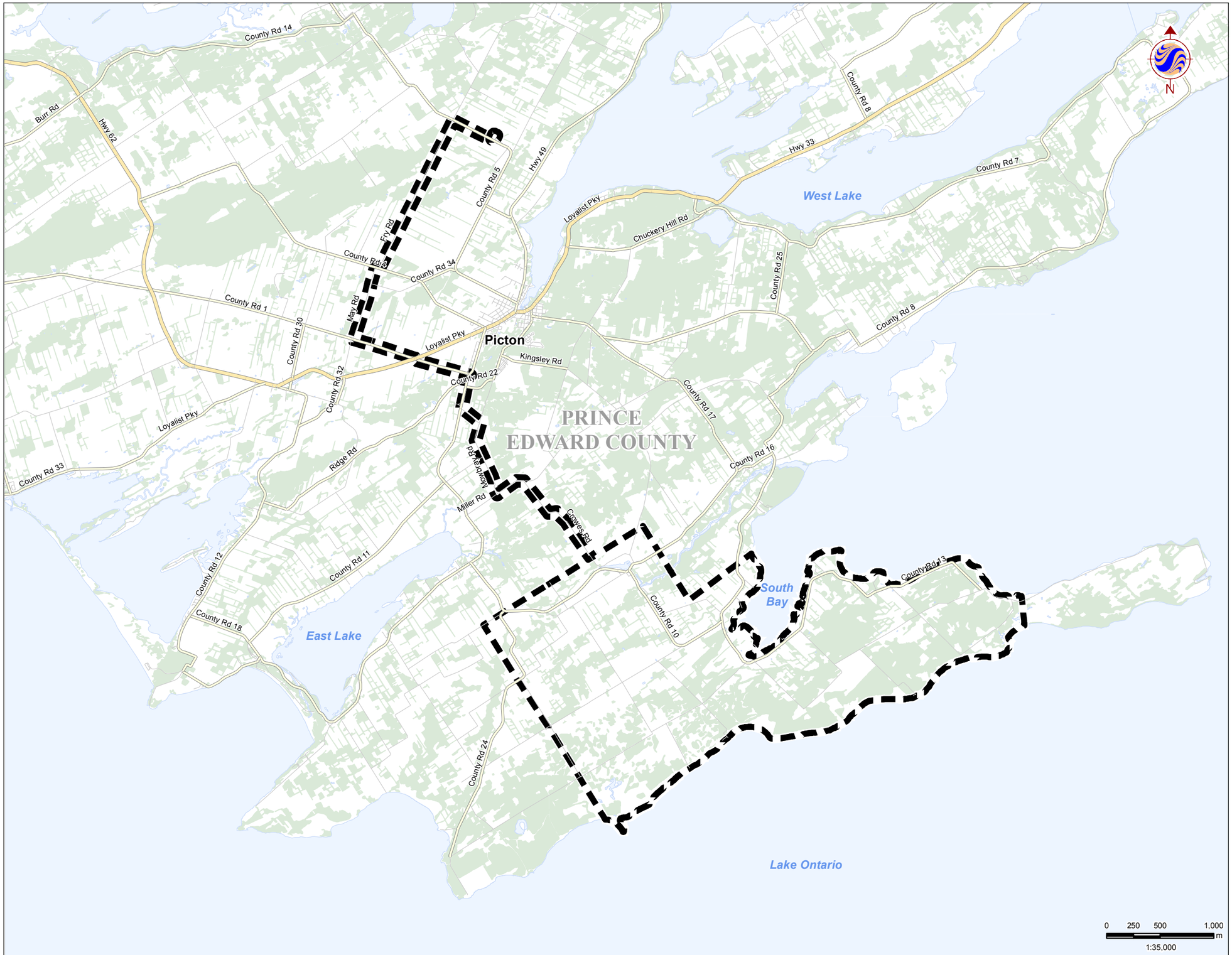
Appendix A

Site Plan



Legend

- Project Study Area
- Highway
- Major Road
- Local Road
- Waterbody (MNR)
- Woodland (MNR)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2011.

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September, 2012
160960594

Client/Project

WPD CANADA CORP
WHITE PINES WIND PROJECT

Figure No.

1.0

Title

Project Study Area

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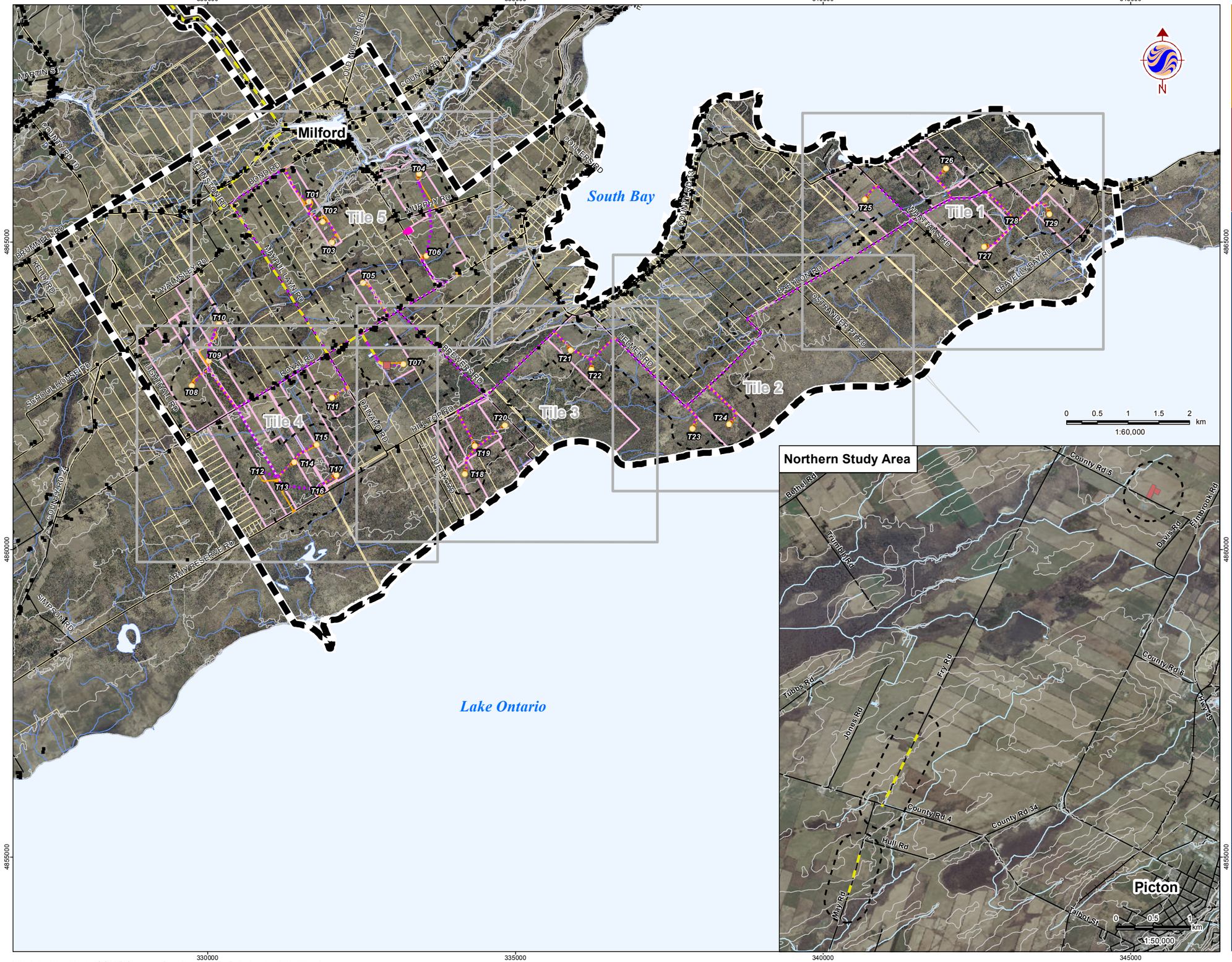
Revised: 2012-09-11 By: dharvey



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.0

Title

Project Location

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Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Buildable Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Setbacks

- Road Setback- Blade Tips Plus 10m (55.2m)
- Property Line Setback (100m)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.1

Title

Project Location
Tile 1

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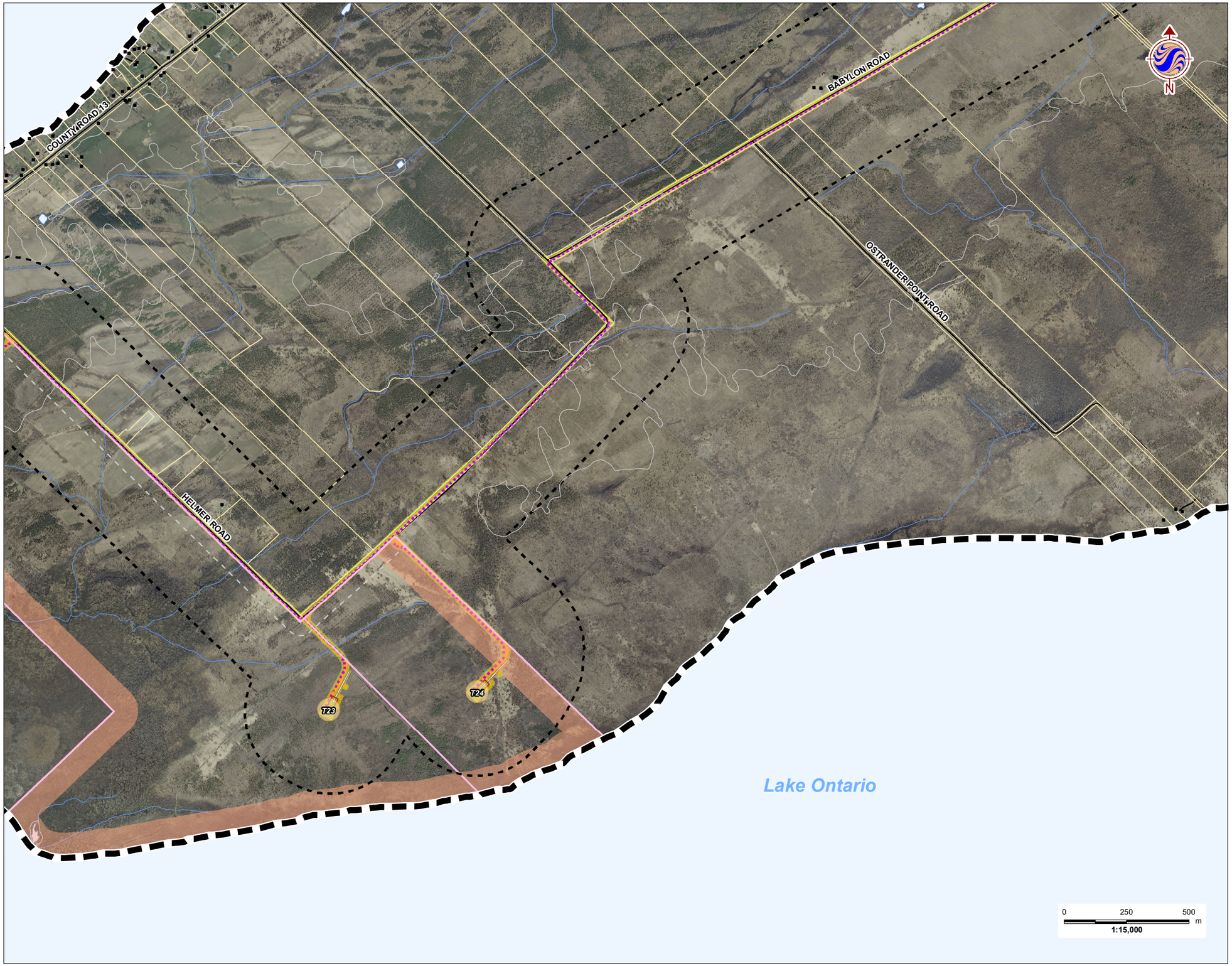
Revised: 2012-09-11 By: dharvey



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Buildable Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Setbacks

- Road Setback- Blade Tips Plus 10m (55.2m)
- Property Line Setback (100m)

Notes

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2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
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   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.2

Title

Project Location
Tile 2

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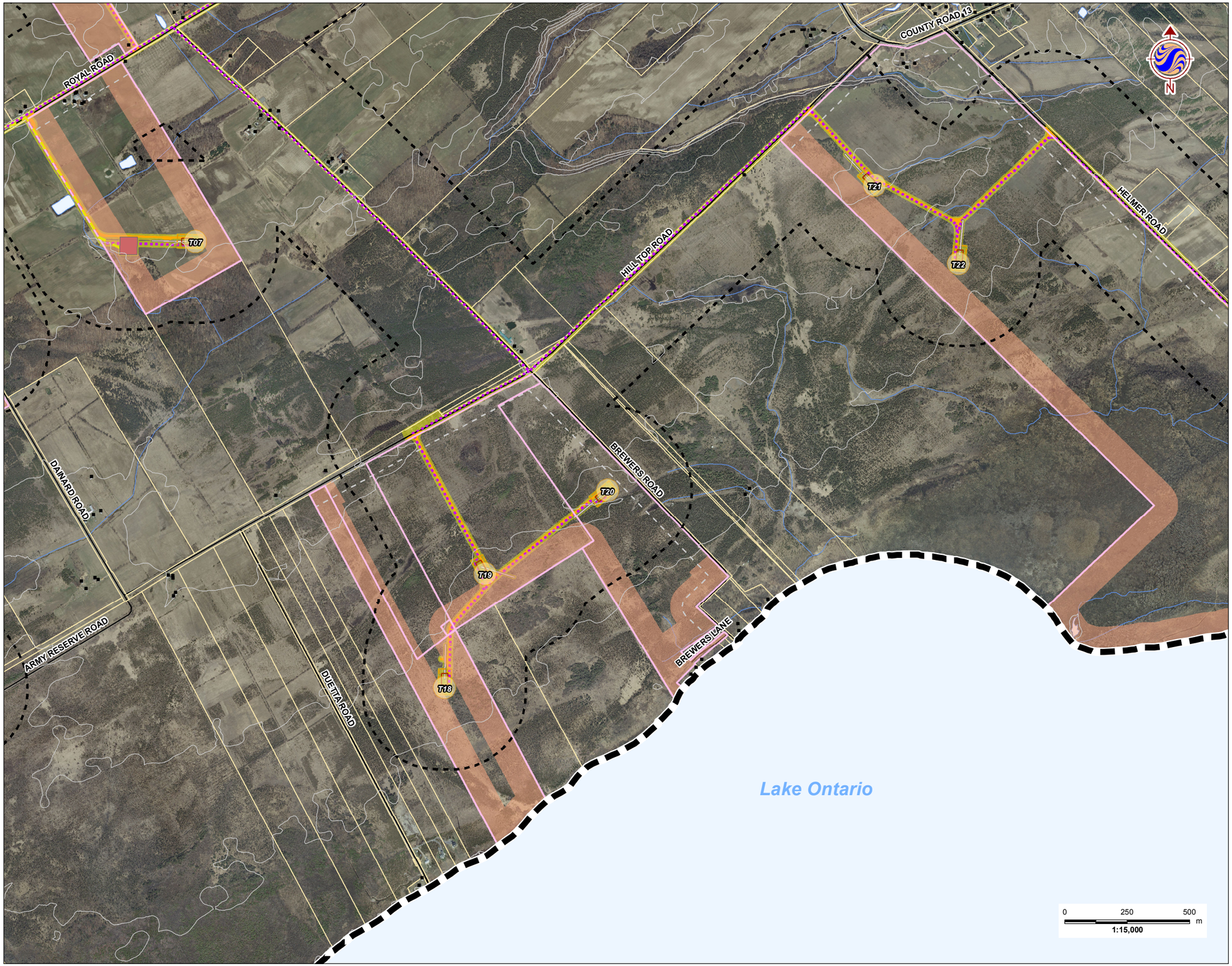
Revised: 2012-09-11 By: dharvey



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Buildable Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Setbacks

- Road Setback- Blade Tips Plus 10m (55.2m)
- Property Line Setback (100m)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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160960594

Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.3

Title

Project Location
Tile 3

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig2_ProjectLocationMapBook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Buildable Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Setbacks

- Road Setback- Blade Tips Plus 10m (55.2m)
- Property Line Setback (100m)

Notes

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2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.4

Title

Project Location
Tile 4

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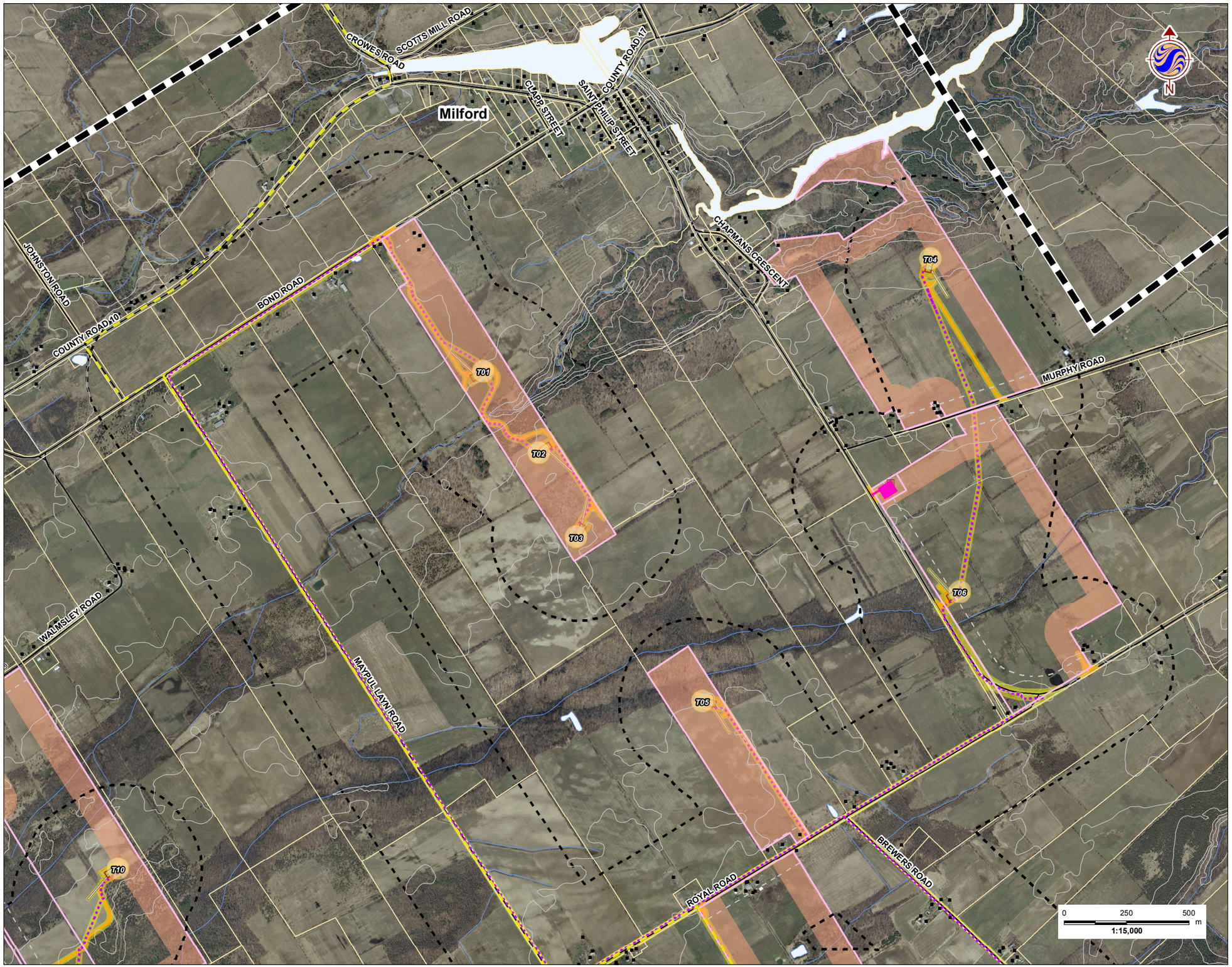

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area
- Buildable Area
- Optioned Properties

Existing Features

- Road
- Railway
- Contour Line (5 meter intervals)
- Property Line
- Building
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Setbacks

- Road Setback- Blade Tips Plus 10m (55.2m)
- Property Line Setback (100m)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

2.5

Title

Project Location
Tile 5

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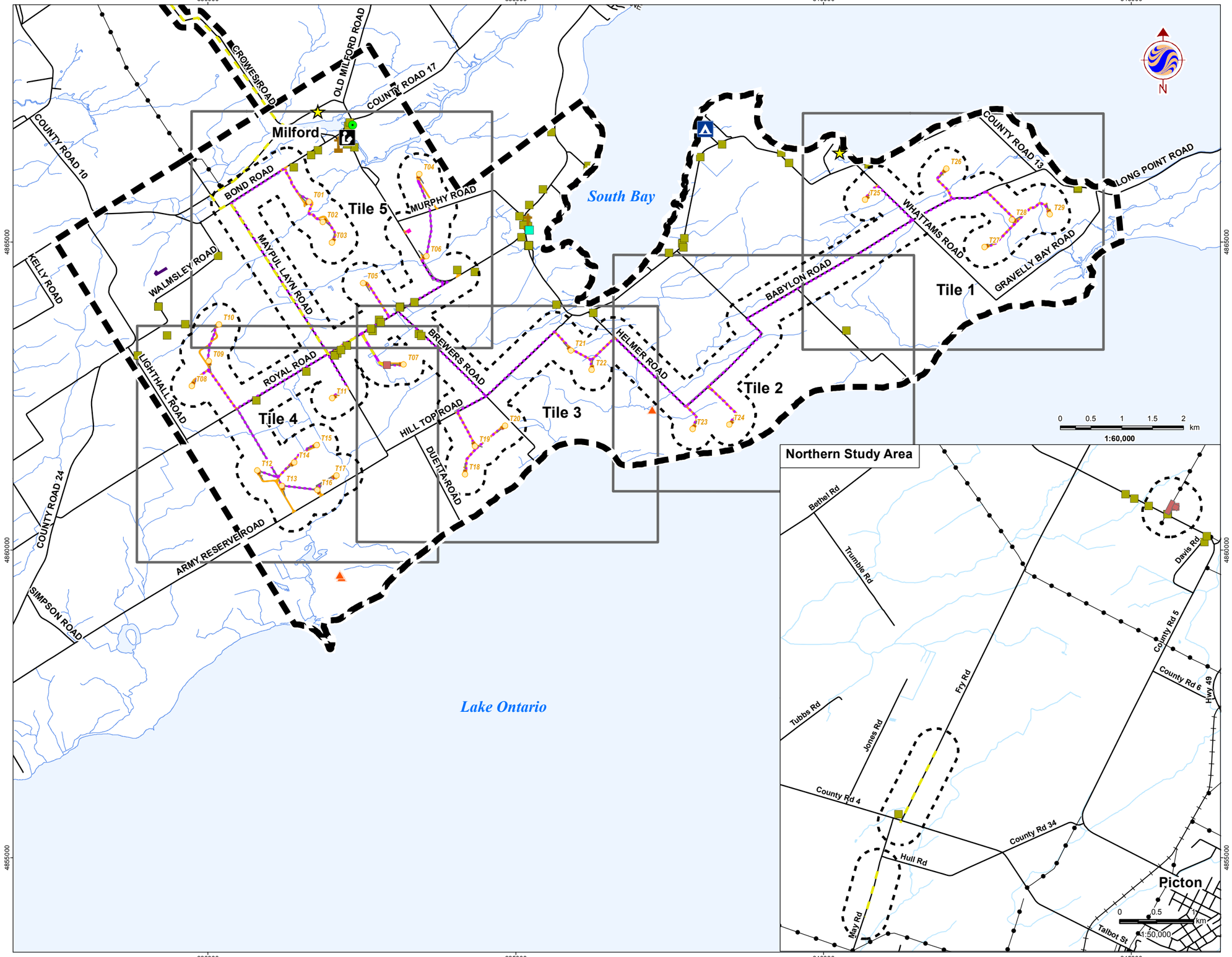

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Petroleum Well (Abandoned)
- Conservation Area
- Church
- Fairgrounds
- Library
- Museum
- RV Park
- Heritage and Protected Properties
- Contaminated Site
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011. Ontario Ministry of Environment © Queens Printer Ontario, 2012

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.0

Title

Socio-Economic Features

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Revised: 2012-09-11 By: dharvey

340000

4865000

T25 T26 T27 T28 T29

WHATTAM'S RD

GRAVELLY BAY RD

OSTRANDER PT RD

0 250 500 m

1:15,000

340000

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig3_SocioEC_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Building
- Petroleum Well (Abandoned)
- Conservation Area
- Water Well Records (MOE)
- Church
- Fairgrounds
- Library
- RV Park
- Heritage and Protected Properties
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.1

Title

Socio-Economic Features
Tile 1

340000

BABYLON RD

OSTRANDER PT RD

HELMER RD

T23

T24

N

0 250 500 m

1:15,000

340000

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig3_SocioEC_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Building
- Petroleum Well (Abandoned)
- Conservation Area
- Water Well Records (MOE)
- Church
- Fairgrounds
- Library
- RV Park
- Heritage and Protected Properties
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.2

Title

Socio-Economic Features
Tile 2

335000

335000

0 250 500 m
1:15,000

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Building
- Petroleum Well (Abandoned)
- Conservation Area
- Water Well Records (MOE)
- Church
- Fairgrounds
- Library
- RV Park
- Heritage and Protected Properties
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.3

Title

Socio-Economic Features
Tile 3

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig3_SocioEC_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

330000

T09
T08
T07
T11
T15
T14
T12
T13
T17
T16

LIGHTHALL RD
ROPAL RD
DAINARD RD
HILL TOP
8

0 250 500 m
1:15,000

4860000

330000

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig3_SocioEC_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Building
- Petroleum Well (Abandoned)
- Conservation Area
- Water Well Records (MOE)
- Church
- Fairgrounds
- Library
- RV Park
- Heritage and Protected Properties
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.4

Title

Socio-Economic Features
Tile 4

330000

4865000

Milford

BOND RD

JOHNSTON RD

MAYFIELD RD

MURPHY RD

T01

T02

T03

T04

T05

T06

T10

N

0 250 500 m

1:15,000

330000

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig3_SocioEC_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Transmission Line
- Building
- Petroleum Well (Abandoned)
- Conservation Area
- Water Well Records (MOE)
- Church
- Fairgrounds
- Library
- RV Park
- Heritage and Protected Properties
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.
3. Imagery Source: © First Base Solutions, 2012
   Imagery Date: 2008

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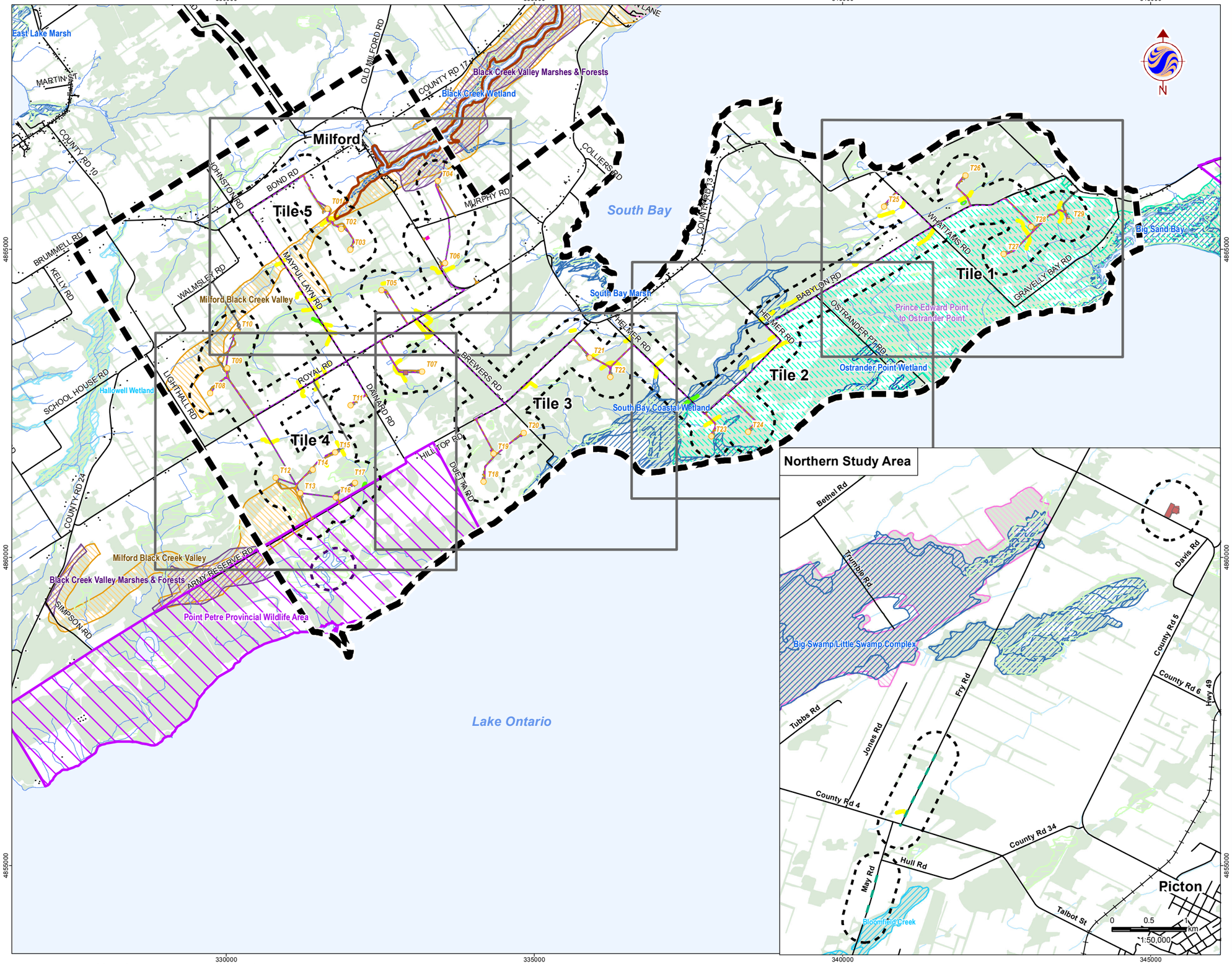
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

3.5

Title

Socio-Economic Features
Tile 5



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Building
- Waterbody (as per MNR base mapping)
- Unevaluated Wetland
- REA Water Body
- Not a REA Water Body

Natural Features- Records Review

- Black Creek Valleyland
- Provincially Significant Wetland
- Non-Provincially Significant Wetland
- Wildlife Area
- Great Blue Heron Colony/ Osprey Nest 300m Buffer

Area of Natural and Scientific Interest (ANSI)

- Earth Science, Provincially Significant
- Earth Science, Regionally Significant
- Life Science, Provincially Significant
- Life Science, Regionally Significant
- Candidate Life Science, Provincially Significant

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011; © Natural Resources Canada, 2011; © WPD Canada, 2011; © Prince Edward County, 2011.

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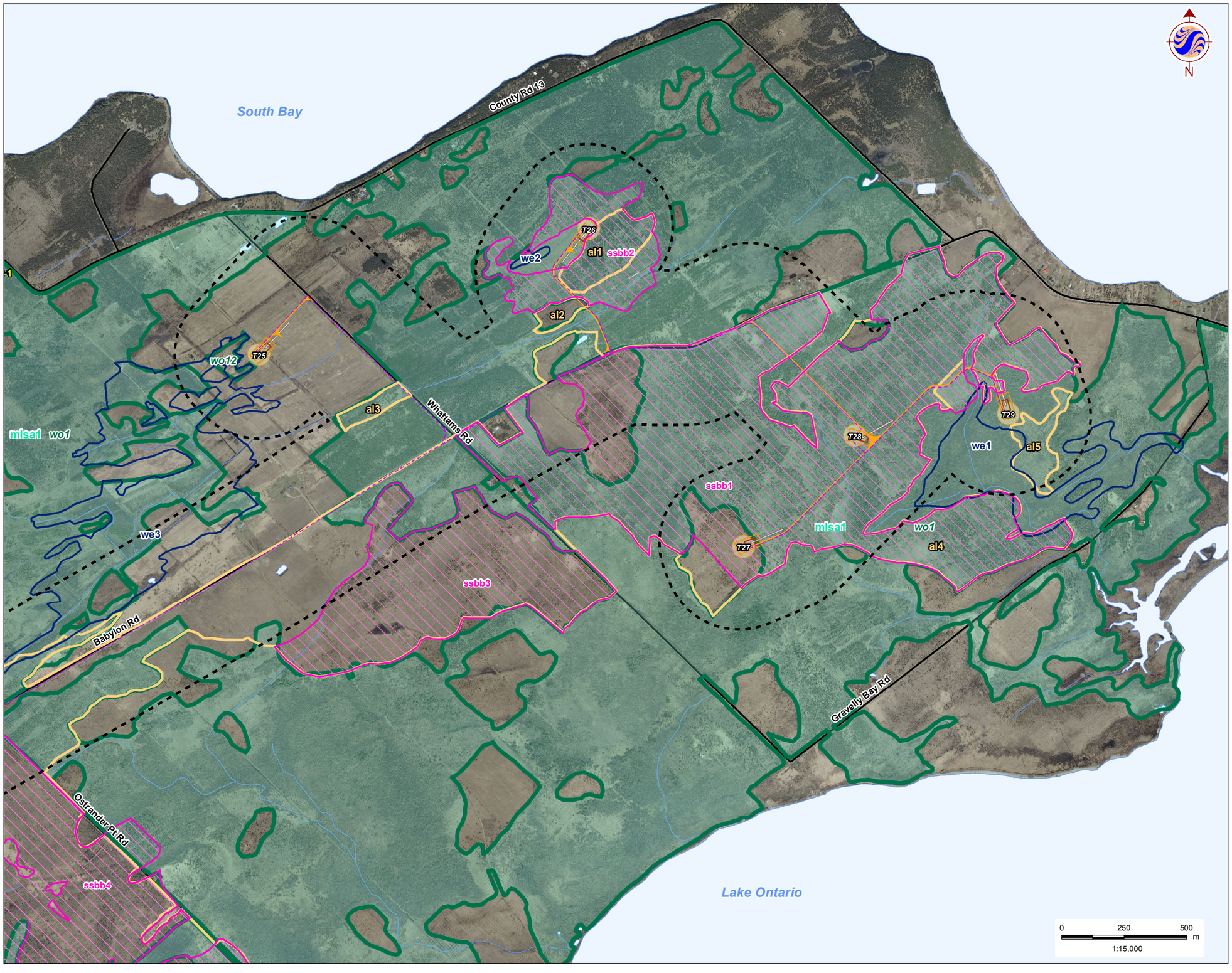
Client/Project
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.0

Title
Natural Heritage Features and Water Bodies

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig4_NaturalFeaturesandWaterBodies20120911.mxd
Revised: 2012-09-11 By: dharvey



Legend

- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Proposed Collector Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Waterbody (as per MNR base mapping)

Natural Features

- Wetland Feature (we)
- Woodland Feature (wo)

Significant Wildlife Habitat

- Migratory Landbird Stopover Area (mlsa)
- Alvar Features (al)
- Amphibian Breeding Habitat (ah)

Species of Conservation Concern

- Shrub/ Successional Breeding Birds (ssbb)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009; © Natural Resources Canada, 2009; © WPD Canada, 2010; © Prince Edward County, 2004.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

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Client/Project
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.1

Title
Natural Heritage Features
Tile 1 of 6

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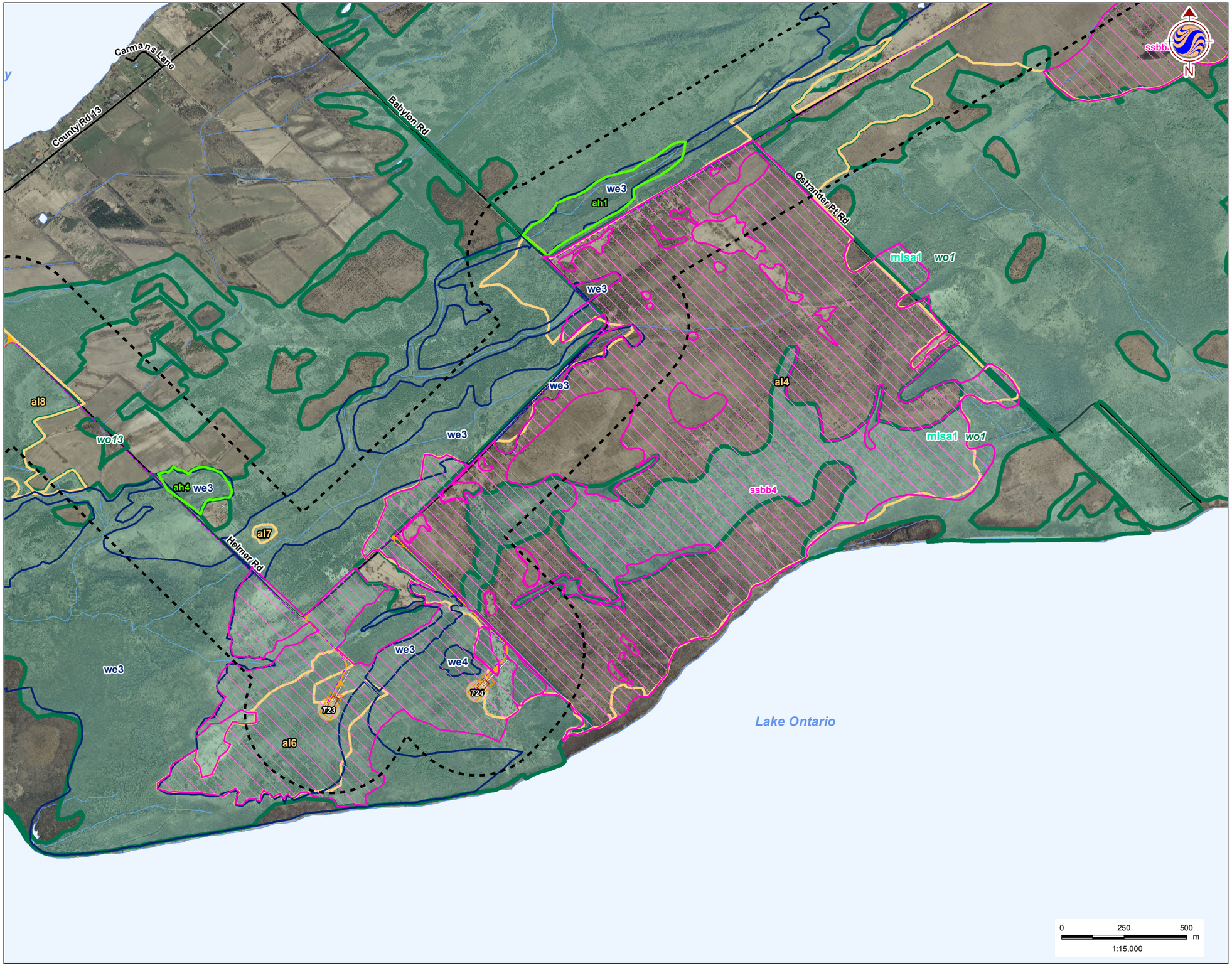
Revised: 2012-09-11 By: dharvey



Legend

- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Proposed Collector Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Waterbody (as per MNR base mapping)

Natural Features

- Wetland Feature (we)
- Woodland Feature (wo)

Significant Wildlife Habitat

- Migratory Landbird Stopover Area (mlsa)
- Alvar Features (al)
- Amphibian Breeding Habitat (ah)

Species of Conservation Concern

- Shrub/ Successional Breeding Birds (ssbb)

Notes

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2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009; © Natural Resources Canada, 2009; © WPD Canada, 2010; © Prince Edward County, 2004.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

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Client/Project
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.2

Title
Natural Heritage Features
Tile 2 of 6

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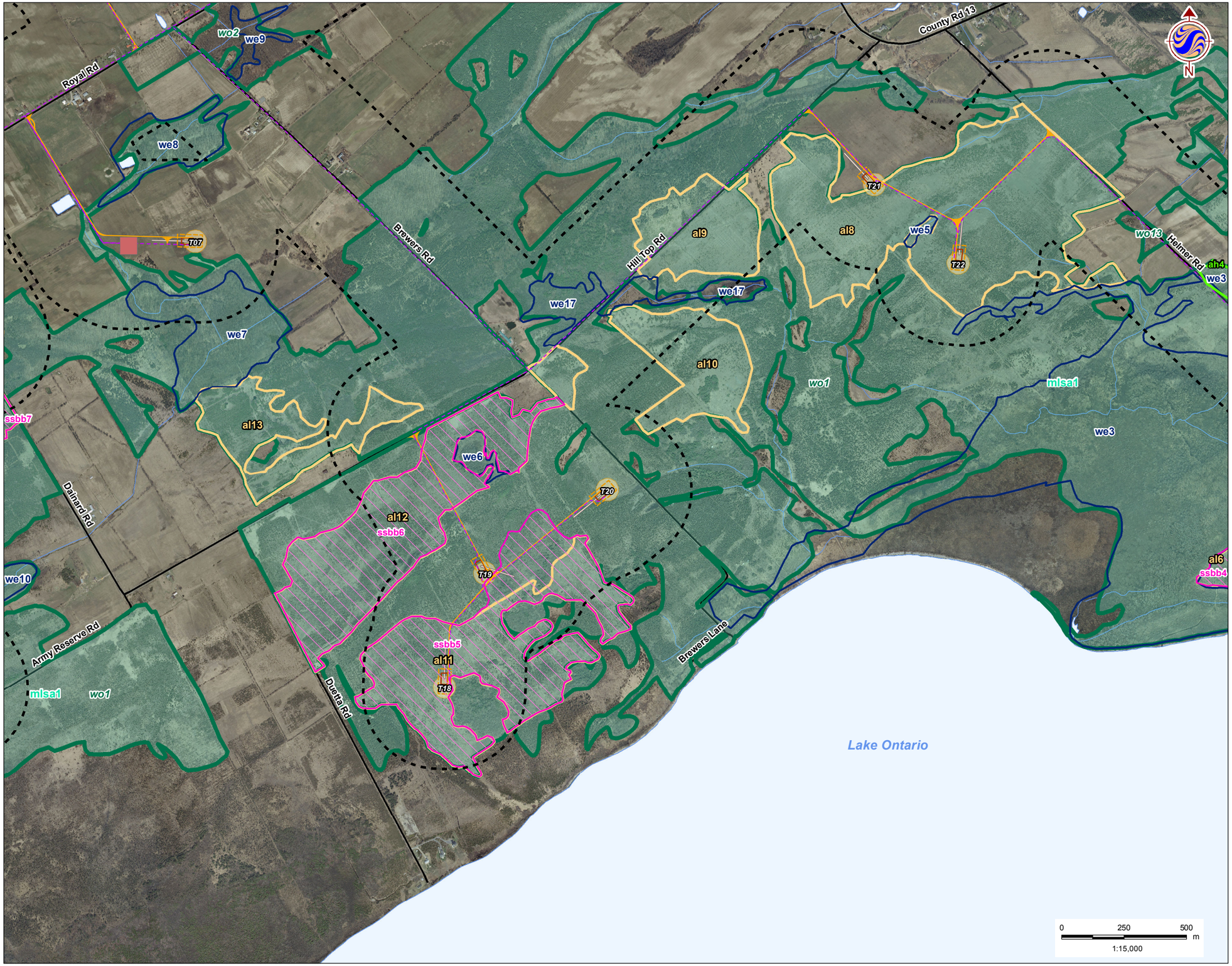

Legend

- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Proposed Collector Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Waterbody (as per MNR base mapping)

Natural Features

- Wetland Feature (we)
- Woodland Feature (wo)

Significant Wildlife Habitat

- Migratory Landbird Stopover Area (mlsa)
- Alvar Features (al)
- Amphibian Breeding Habitat (ah)

Species of Conservation Concern

- Shrub/ Successional Breeding Birds (ssbb)

Notes

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2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009; © Natural Resources Canada, 2009; © WPD Canada, 2010; © Prince Edward County, 2004.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

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Client/Project
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.3

Title
Natural Heritage Features
Tile 3 of 6

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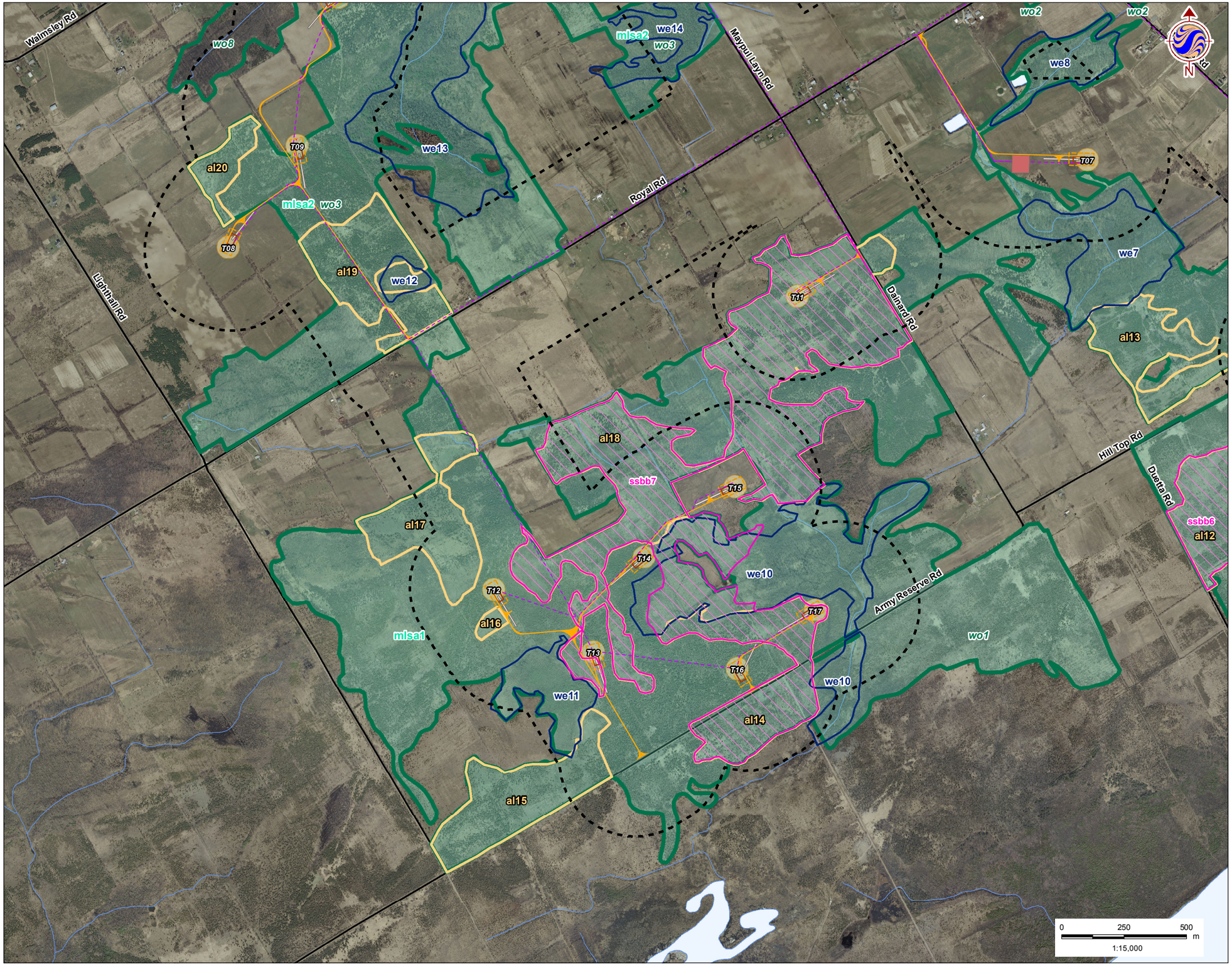

Legend

- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Proposed Collector Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Waterbody (as per MNR base mapping)

Natural Features

- Wetland Feature (we)
- Woodland Feature (wo)

Significant Wildlife Habitat

- Migratory Landbird Stopover Area (mlsa)
- Alvar Features (al)
- Amphibian Breeding Habitat (ah)

Species of Conservation Concern

- Shrub/ Successional Breeding Birds (ssbb)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009; © Natural Resources Canada, 2009; © WPD Canada, 2010; © Prince Edward County, 2004.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

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WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.4

Title
Natural Heritage Features
Tile 4 of 6

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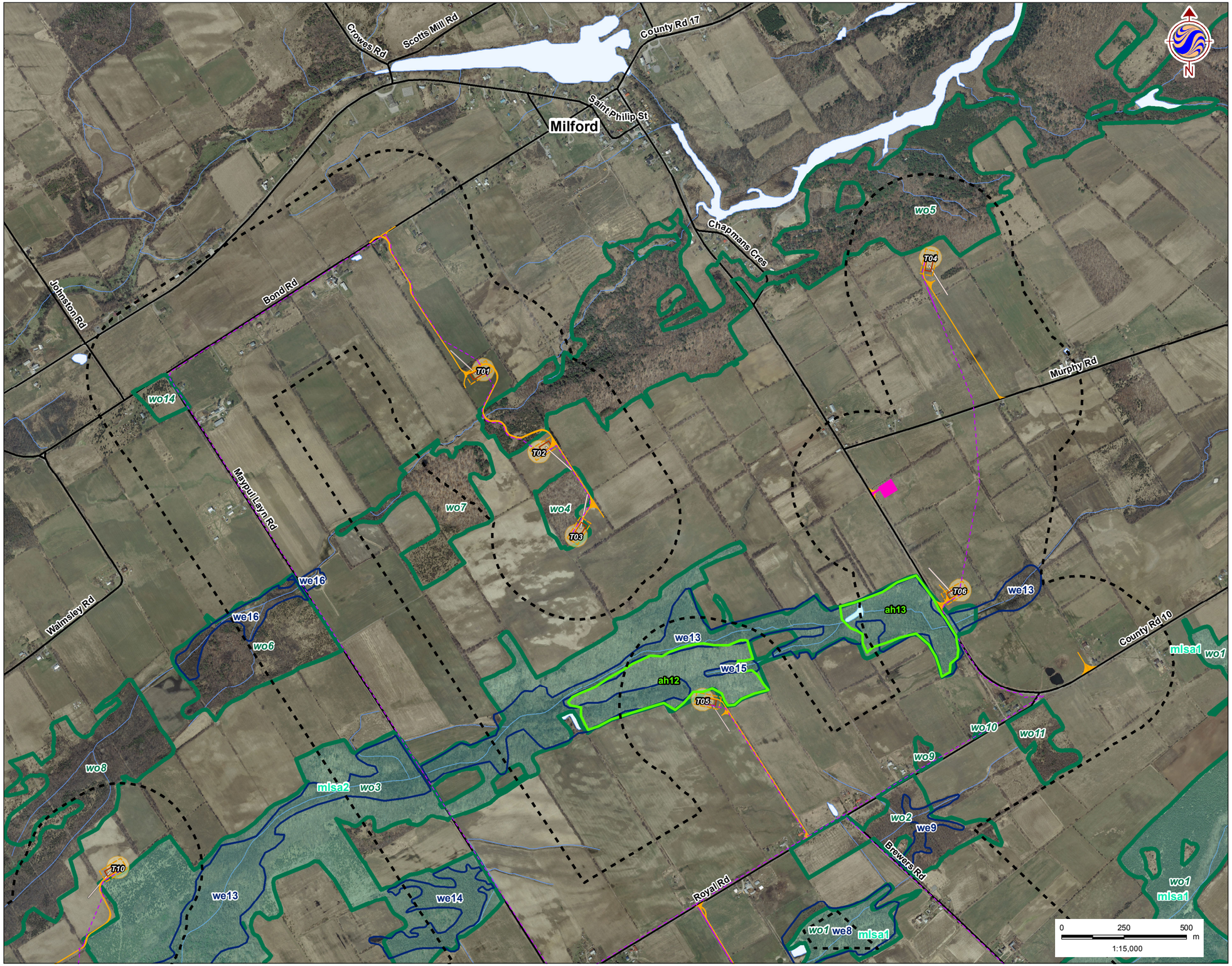

Legend

- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Proposed Collector Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Highway / Expressway
- Road
- Railway
- Watercourse (as per MNR base mapping)
- Waterbody (as per MNR base mapping)

Natural Features

- Wetland Feature (we)
- Woodland Feature (wo)

Significant Wildlife Habitat

- Migratory Landbird Stopover Area (mlsa)
- Alvar Features (al)
- Amphibian Breeding Habitat (ah)

Species of Conservation Concern

- Shrub/ Successional Breeding Birds (ssbb)

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2009; © Natural Resources Canada, 2009; © WPD Canada, 2010; © Prince Edward County, 2004.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

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WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.5

Title
Natural Heritage Features
Tile 5 of 6

W:\active\60960594\drawing\GIS\MXD\ConstructionReport\60960594_Fig4_NaturalFeatures_Mapbook_20120911.mxd
Revised: 2012-09-11 By: dharvey

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2012.
3. Image Sources: © First Base Solutions, 2011 - Imagery Date 2008.

N

323400 323700 324000 324300 324600 324900

4877400 4877100 4876800 4876500 4876200 4875900 4875600 4875300 4875000

Jones Rd
Fitz Rd
May Rd
County Rd 4
Hull Rd
Bloomfield Creek

0 100 200 m
1:7,500

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Revised: 2012-09-11 By: dharvey

September 2012
160960594

Stantec

Legend

- 120m Zone of Investigation
- Proposed Interconnection Line
- Buildable Area
- Road
- Watercourse
- Waterbody

Site Investigation: Natural Features

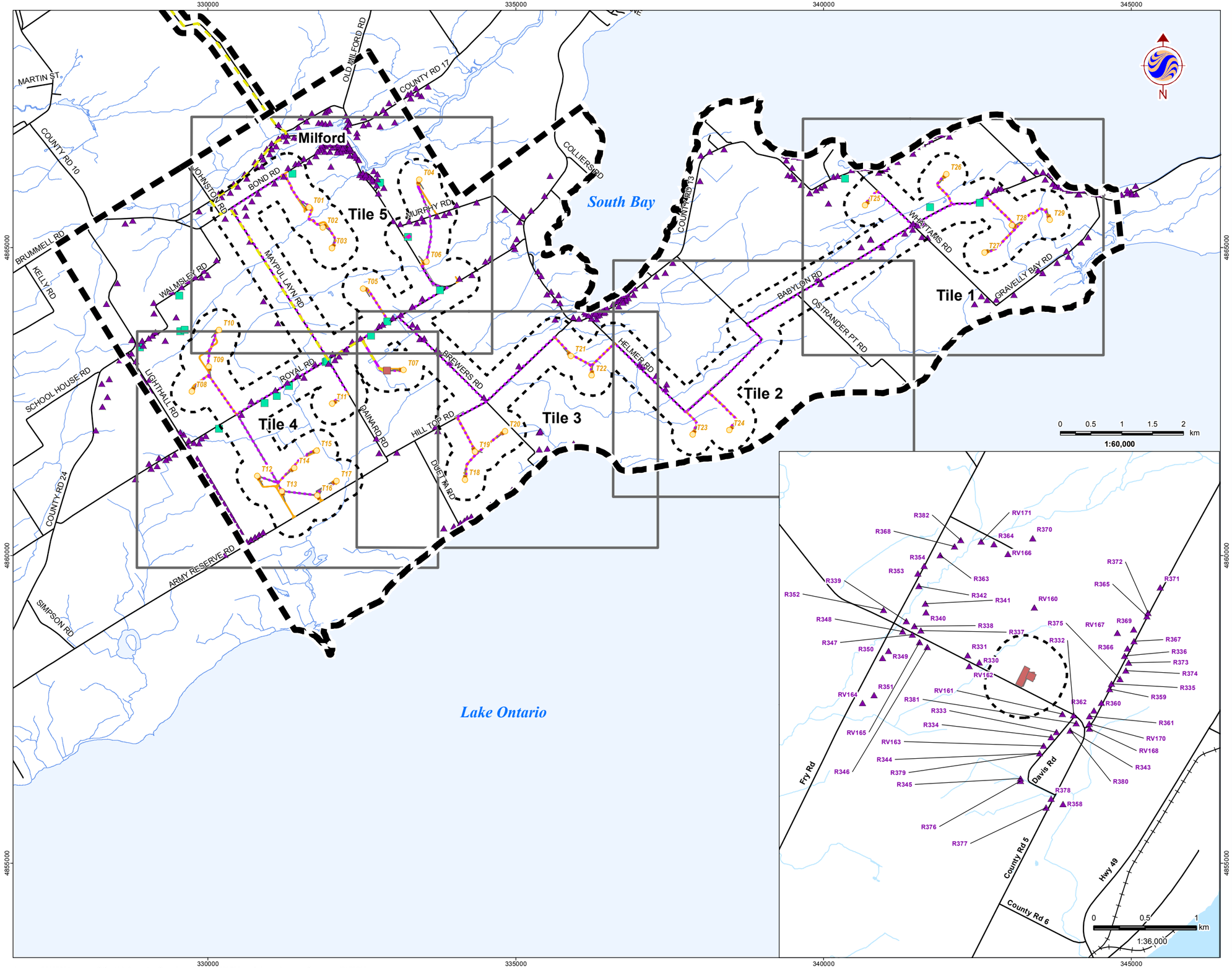
- Woodland (Stantec)
- Generalized Wildlife Habitat (Stantec)
- Wetland (Stantec)

Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.
4.6

Title
Natural Heritage Features



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources
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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.0

Title

Noise Receptors Overview

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340000

4865000

R003 R073 R071 R327 R072 R103 R102 R101 R075 R074 R076 R300 R077 R078 R079 R080 R081 R082 R150 RV099 RV100 RV027 R004 RV011 RV010 RV023 PR07 RV109 R286 RV083 RV082 RV110 RV146 T25 T26 PR15 PR13 RV004 R100 R160 RV084 RV028 RV030 RV008 RV029 RV151 RV002 RV098 R299 R085 R086 R087 R298 RV113 RV097 R092 R005 RV096 R151 R083 R287 R084 R088 R089 R094 R093 R090 RV095 R152 R091 T28 T29 T27 R056 RV150 R099 RV147 R012 R096 R006 R326 R007 RV024 WHATTAMS RD R097 R155 R093 RV092 R094 RV026 RV091 RV022 GRAVELLY BAY RD RV025 RV148 RV090 RV089 R096 R132 R095 R101 RV031 ON RD OSTRANDER PT RD

N

0 250 500 m

1:15,000

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2012; © WPD Canada, 2011; © Prince Edward County, 2011.

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September 2012
160960594

Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.1

Title

Noise Receptors
Tile 1

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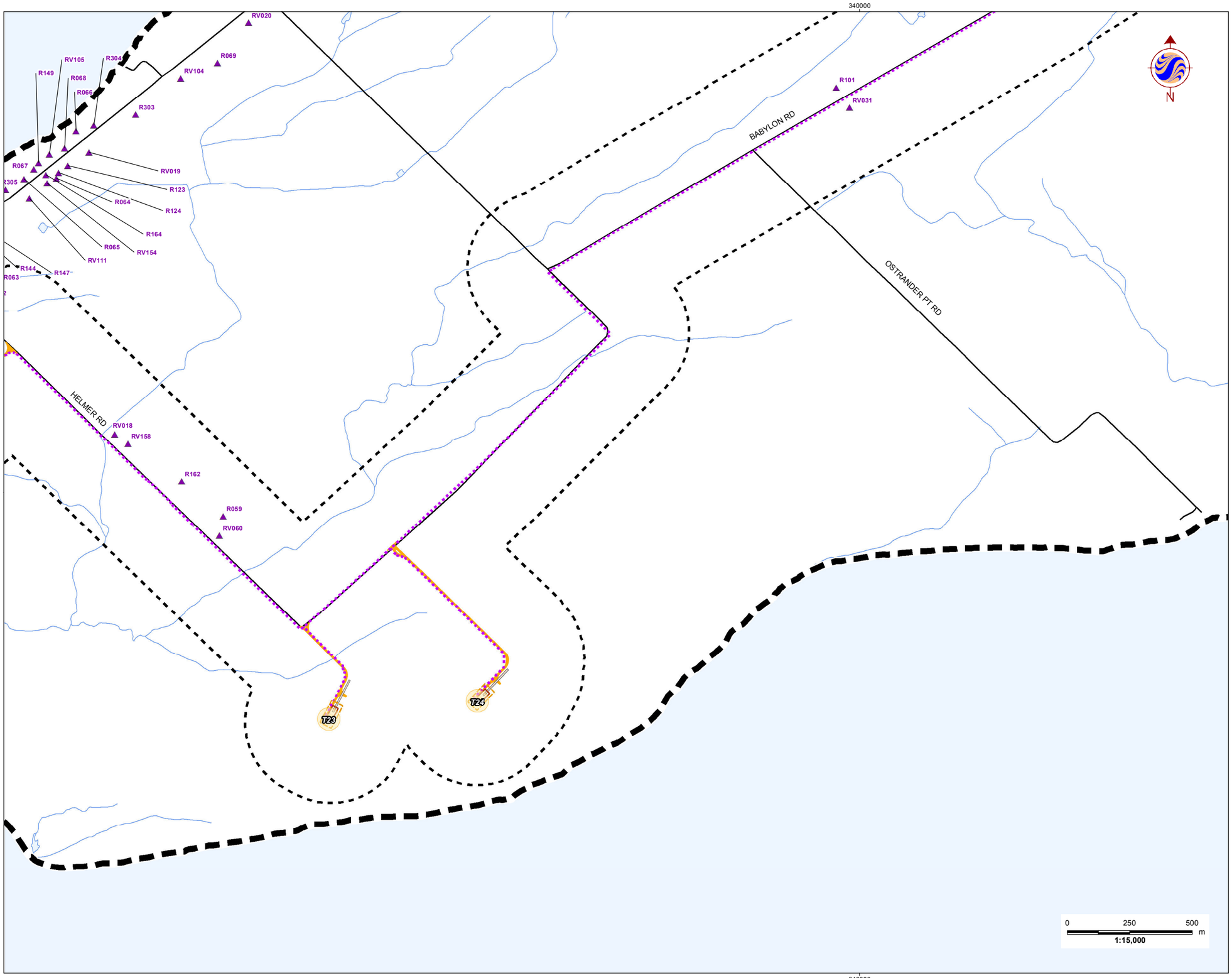
Revised: 2012-09-13 By: dharvey



Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2012; © WPD Canada, 2011; © Prince Edward County, 2011.

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.2

Title

Noise Receptors
Tile 2

W:\active\60960594\drawing\GIS\MXD\DesignAndOperationsReport\60960594_Fig5_NoiseReceptors_20120913.mxd
Revised: 2012-09-13 By: dharvey

335000

R029 R022 PR06 R020 R314 R038 PR04 R018 R315 R009 R033 RV122 T07 BREWERS RD R016 R001 RV086 DAINARD RD R002 HILL TOP RD R034 R015 T20 T19 T18 DUETTA RD R136 RV015 R134 R135 R139 R138 R137 RV087 RV088 R102 RV003 R383 RV021 RV108 RV017 R103 RV016 R141 R140 R105 R104 RV124 R057 R142 RV145 R056 RV155 R060 RV106 R058 R063 R144 R147 R062 R061 R065 RV111 R164 RV154 N T21 T22 HELMER RD RV018 RV158

0 250 500 m
1:15,000

335000

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Revised: 2012-09-13 By: dharvey

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2012; © WPD Canada, 2011; © Prince Edward County, 2011.

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.3

Title

Noise Receptors
Tile 3

330000

4860000

ROYAL RD

LIGHTHALL RD

DAINARD RD

HILL TOP RD

ARMY RESERVE RD

N

0 250 500 m

1:15,000

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2012; © WPD Canada, 2011; © Prince Edward County, 2011.

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.4

Title

Noise Receptors

Tile 4

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Revised: 2012-09-13 By: dharvey

330000

4865000

Milford

BOND RD

JOHNSTON RD

MAYPUL LAYN RD

MURPHY RD

T01 T02 T03 T04 T05 T06 T10

PR09 PR10 PR19 PR03 PR08 PR04

0 250 500 m

1:15,000

N

Legend

- Study Area
- 300m Zone of Investigation

Proposed Project Components

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Interconnection Line
- Construction Area
- Turbine Laydown Area
- Crane Laydown Area
- Substation
- Storage Area

Existing Features

- Road
- Railway
- Waterbody (as per MNR base mapping)
- Watercourse (as per MNR base mapping)

Noise Receptors

- Participating
- Non-Participating

Notes

1. Coordinate System: UTM NAD 83 - Zone 18 (N).
2. Data Sources: Ontario Ministry of Natural Resources © Queens Printer Ontario, 2012; © Natural Resources Canada, 2012; © WPD Canada, 2011; © Prince Edward County, 2011.

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

5.5

Title

Noise Receptors
Tile 5

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Revised: 2012-09-13 By: dharvey

Appendix B

Environmental Noise Impact Assessment

HGC ENGINEERING
noise · vibration · acoustics

HOWE GASTMEIER CHAPNIK LIMITED
2000 Argentia Road
Plaza 1, Suite 203
Mississauga, ON
L5N 1P7 Canada

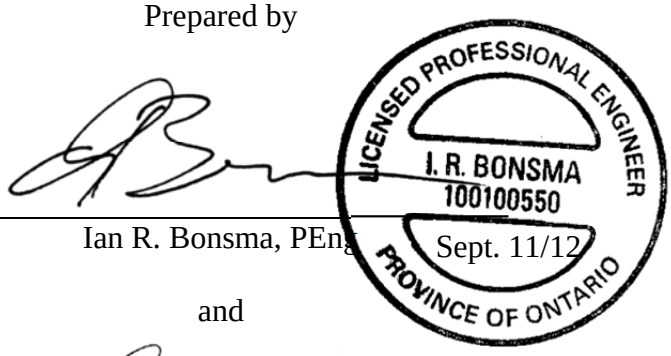
Tel: (905) 826-4044
Fax: (905) 826-4940

Acoustic Assessment Report
White Pines Wind Project
Prince Edward County, Ontario

Prepared for

wpd Canada Corp.
2233 Argentia Road Suite 102
Mississauga, Ontario
L5N 2X7

Prepared by



Ian R. Bonsma, PEng

and

Brian Howe, MEng, MBA, PEng

September 11, 2012

VERSION CONTROL

White Pines Wind Project, Prince Edward County, Ontario

Ver.	Date	Version Description	Prepared By
1	May 25, 2012	Original Acoustic Assessment Report supporting a Renewable Energy Application.	I. Bonsma
2	Sept 11, 2012	Updated Acoustic Assessment Report in support of an application for a Renewable Energy Approval (revised receptor descriptions and locations. See Table 1)	I. Bonsma

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by wpd Canada Corp. to assess the acoustic impact of the proposed White Pines Wind Project. The proposed wind project site is located in the wards of South Marysburgh and Athol in Prince Edward County, Ontario. This assessment considers twenty-nine REpower MM92 wind turbine generators, each rated at 2.05 MW. HGC Engineering has assessed the acoustic impact against the acoustic criteria of the Ontario Ministry of the Environment ("MOE"). This report comprises a summary of our assessment and is intended as supporting documentation for an application for a Renewable Energy Approval.

There are a number of residences located in the vicinity of the project. From an acoustic perspective, the area is a rural environment, with relatively low ambient sound levels. The criteria of MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* are thus relevant. Supplementary guidance is also provided by MOE publication *Interpretation for Applying MOE NPC Technical Publications to Wind Power Generation Facilities*.

The sound power data for the REpower wind turbine generators has been obtained through wpd Canada. This data has been used in a computer model to predict the sound level impact at the closest residential receptors. The results of the modelling demonstrate compliance with the MOE guidelines when all 29 turbines are operating over their entire speed range, at all but three receptor locations. These receptor locations have entered into lease agreements with the proponent.

Details of our assessment are provided in the main body of this report. The report is structured around the report format suggested by the MOE for Renewable Energy Approval applications for wind power projects, with the required summary tables included as Appendix A.

Ministry of the Environment | Ministère de l'Environnement

Ontario

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: wpd Canada Corp.

Company Address: 2233 Argentia Road Suite 102

Mississauga, Ontario, L5N 2X7

Location of Facility: Prince Edward County, Ontario

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document "Information to be Submitted for Approval of Stationary Source of Sound" (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:

Name: Kevin R. Surette

Title: Manager, Communications

Phone Number: 905-813-8400 Ext 118

Signature:

Date: 11 Sept 2012

Technical Contact:

Name: Ian Bonsma

Representing: HGC Engineering

Phone Number: 905-826-4044

Signature:

Date: September 11, 2012

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

	Required Information		
		Submitted	Explanation/Reference
1.0	**Introduction** (Project Background and Overview)	☒ Yes	Section 1
2.0	**Facility Description**		
	2.1 Operating hours of facility and significant Noise Sources	☒ Yes	
	2.2 Site Plan identifying all significant Noise Sources	☒ Yes	Figure 2
3.0	**Noise Source Summary**		
	3.1 ***Noise Source Summary Table***	☒ Yes	Appendix A
	3.2 Source noise emissions specifications	☒ Yes	Appendix D
	3.3 Source power/capacity ratings	☒ Yes	Appendix D
	3.4 Noise control equipment description and acoustical specifications	☐ No	N/A
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 ***Point of Reception Noise Impact Table***	☒ Yes	Appendix A
	4.2 Point(s) of Reception (POR) list and description	☒ Yes	Tables A3 & A4
	4.3 Land-use Zoning Plan	☒ Yes	Appendix B
	4.4 Scaled Area Location Plan	☒ Yes	Figure 1
	4.5 Procedure used to assess noise impacts at each POR	☒ Yes	Section 8, Appendix E
	4.6 List of parameters/assumptions used in calculations	☒ Yes	Section 8, Appendix E
5.0	**Acoustic Assessment Summary**		
	5.1 ***Acoustic Assessment Summary Table***	☒ Yes	Appendix A
	5.2 Rationale for selecting applicable noise guideline limits	☒ Yes	Section 7
	5.3 Predictable Worst Case Impacts Operating Scenario	☒ Yes	Figure 5, Table A5 – A10
6.0	**Conclusions**		
	6.1 Statement of compliance with selected noise performance limits	☒ Yes	
7.0	**Appendices** (provide details such as)	☒ Yes	
	Listing of Insignificant Noise Sources	☒ Yes	
	Manufacturer's Noise Specifications	☒ Yes	Appendix D
	Calculations	☒ Yes	Appendix E
	Instrumentation	☒ Yes	
	Meteorology during Sound Level Measurements	☒ Yes	
	Raw Data from Measurements	☐ No	N/A
	Drawings (Facility / Equipment)	☒ Yes	Appendix C

1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by wpd Canada Corporation ("wpd Canada") to assess the acoustic impact of the proposed White Pines Wind Project. The purpose of the report is to determine the acceptability of the predicted sound levels at the nearby residential receptors resulting from the operation of twenty-nine, 100 meter hub height, REpower MM92 wind turbine generators, rated at 2.05 MW, in relation to the guidelines of the Ontario Ministry of the Environment ("MOE"). This report is intended as supporting documentation for a Renewable Energy Approval application for the facility.

UPDATES ADDRESSED IN THIS ASSESSMENT REPORT

This update has been prepared to address minor comments from the MOE, and the relocation/renaming of 33 receptors. Table 1 provides a comparison of the receptor coordinates.

Table 1: Receptor Coordinate changes

Receptor ID	Original UTM Coordinates		Revised UTM Coordinates		Difference between Original and Revised UTM Coordinates (m)	Comments
	Easting	Northing	Easting	Northing		
PR01	330187	4862048	330181	4862054	8	
PR04	332704	4863586	332653	4863572	53	
PR08	331373	4862713	331320	4862752	66	
PR15	341742	4865662	341735	4865660	7	
R002	332774	4861912	332739	4861901	37	
R004	341042	4866309	341035	4866310	7	
R009	333741	4863337	333725	4863339	16	
R016	334466	4862576	334485	4862571	20	
R026	333471	4865480	333473	4865488	8	
R052	335360	4864607	335364	4864618	12	
R085	343858	4865986	343849	4865987	9	
R107	334415	4862625	Remove Coordinate		-	Duplicate
R112	334952	4865028	334961	4865034	11	
R115	333001	4865403	333010	4865406	9	
R133	330157	4864805	330142	4864801	16	
R156	333044	4865500	333123	4865382	142	New ID = RV172
R167	332048	4866665	332049	4866674	9	
R179	332336	4866578	332332	4866590	13	
R181	332277	4866673	332301	4866626	53	

Table 1 Cont'd – Receptor Coordinate Changes

Receptor ID	Original UTM Coordinates		Revised UTM Coordinates		Difference between Original and Revised UTM Coordinates (m)	Comments
	Easting	Northing	Easting	Northing		
R218	331226	4866156	331231	4866158	5	
R263	333485	4867478	333468	4867466	21	
R264	333585	4867611	333573	4867620	15	
R267	330243	4865927	330225	4865902	31	
R280	328576	4863265	328590	4863254	18	
R295	344849	4865860	344842	4865859	7	
R312	328466	4863931	328350	4864086	194	
R326	340805	4865155	340769	4865132	43	
R328	345023	4865868	345018	4865869	5	
R329	331223	4862868	331290	4862807	91	
R330	327366	4880841	327366	4880826	15	
R343	328251	4880166	Remove Coordinate		-	Duplicate
R344	327954	4879939	Remove Coordinate		-	Duplicate
R383	-	-	335382	4861998	-	Additional

2 GENERAL DESCRIPTION OF WIND TURBINE INSTALLATION SITE AND SURROUNDING ENVIRONMENT

The wind power project consists of twenty-nine wind turbine generators to be located in the wards of South Marysburgh and Athol, within Prince Edward County, as shown in Figure 1. The eastern portion of the wind power project is bound by Regional Road 13 to the north and east, Gravelly Bay Road to the south and Ostrander Point Road to the west. The western portion of the wind project is bound by Regional Road 17 and Bond Road to the north, Helmer Road to the east, Lake Ontario to the south and Lighthall Road to the west.

The area is rural in nature, both acoustically and in general character, with agricultural land uses widely in evidence, including scattered dwellings near the major roadways. Zoning maps obtained from Prince Edward County are included as Appendix B, which illustrate that the project site areas are zoned for Rural use, and that small residential parcels, generally with Rural Residential zoning, exist around the lands.

The Ostrander Point Wind Energy Park is located between the two portions of the White Pines Wind Project as shown in Figure 1. The Ostrander Point Wind Energy Park consists of one transformer and nine GE 2.5xl 2.5MW wind turbines with 100 meter rotor diameters and 85 meter hub heights. Due to the proximity of the Ostrander Point wind project, cumulative sound levels are considered in this assessment.

3 DESCRIPTION OF SOUND SOURCES

Twenty-nine 2.05 MW REpower MM92 wind turbine generators are proposed for the site. They are three bladed, upwind, horizontal axis wind turbines with a rotor diameter of 92.5 metes. The turbine rotor and nacelle are mounted on top of a 100 meter high tubular tower. The turbines are anticipated to operate continuously whenever wind conditions allow. Additional details are contained in Appendix C, with acoustic information contained in Appendix D. Electronic topography mapping for the area suggests that the turbines will generally be based at an elevation of between 70 and 105 meters.

Table 2 provides the UTM coordinates (Zone 18) of the twenty-nine wind turbine generators and the two proposed transformers.

Table 2: Locations of Wind Turbine Generators (WTG)

Source ID	Easting [m]	Northing [m]	Source ID	Easting [m]	Northing [m]
WTG01	331642	4865658	WTG17	332089	4861211
WTG02	331865	4865330	WTG18	334176	4861229
WTG03	332014	4864994	WTG19	334338	4861685
WTG04	333433	4866108	WTG20	334828	4862019
WTG05	332520	4864336	WTG21	335897	4863241
WTG06	333551	4864775	WTG22	336233	4862927
WTG07	333178	4863015	WTG23	337875	4861966
WTG08	329738	4862665	WTG24	338470	4862038
WTG09	330014	4863071	WTG25	340676	4865691
WTG10	330179	4863665	WTG26	341997	4866196
WTG11	332017	4862468	WTG27	342616	4864922
WTG12	330801	4861293	WTG28	343062	4865366
WTG13	331200	4861043	WTG29	343677	4865454
WTG14	331403	4861423	TS1	327857	4880706
WTG15	331767	4861704	TS2	332911	4862998
WTG16	331776	4860976			

Smaller transformers will be installed at each of the wind turbine generator locations however these are acoustically insignificant in comparison to the wind turbine generator sound power levels. Two large step-up transformers will be installed as part of the project. Additional details regarding the larger step-up transformers are provided in Section 5, below.

4 WIND TURBINE NOISE EMISSION RATINGS

Overall sound power data for the REpower MM92 wind turbines as determined in accordance with IEC 61400-11:2002 [1], are provided by REpower Systems in the document *Power Curve & Sound Power Level REpower MM92 [2050 kW]* [2] (herein called the "*Acoustic Report*") included in Appendix D. Additionally, a test report completed by windtest, *Acoustic report for a wind turbine type REpower MM92 at Chemin d'Ablis / France, operation mode 2050 kW* [3], is also included under Appendix D. The overall A-weighted sound power levels as a function of 10 meter height wind speed are shown in Table 3.

Table 3: 10 Meter Height Wind Speed vs Turbine Sound Power Level, Based on IEC Sound Power Determination Methodology and Wind Shear of 0.2

10 Meter Height Wind Speed [m/s]	6	7	8	9	10
Wind Turbine Sound Power Level [dBA]	103.4	104.2	104.2	104.2	104.2

Sound power level data determined under IEC 61400-11:2002 is normalized to a standard "roughness length" value of 0.05 m. The roughness length concept is used to take into account the effect of friction at the ground, which results in lower wind speeds near the ground than at higher elevations. The wind shear exponent quantifies the same concept by describing the rate of change of wind speed with elevation. A roughness length of 0.05 meters is generally held to be equivalent to a wind shear value of about 0.2. Meteorological data near the proposed wind project provided by wpd Canada indicates that the wind shear coefficient during a summer night may reach 0.49 (Appendix F). This means that a 10 meter height wind speed of 2.3 m/s can occur simultaneously with a 7 m/s wind speed at the hub height of 100 meters, indicating that maximum sound power output may occur during relatively low 10 meter level wind speeds. Consequently the maximum sound power level for the wind turbine (corresponding to a hub height wind speed of 7 m/s) has been used in this analysis.

Table 4 presents the typical octave band spectrum for various 10 meter height wind speeds received from REpower, also included in Appendix D. The spectral shape shown for the 10 meter height 7 m/s wind speed has been used in the analysis.

Table 4: Wind Turbine Acoustic Emissions Summary

Make and Model:	REpower, MM92									
Electrical Rating:	2050 kW									
Hub Height (m):	100 m									
Wind Shear Coefficient:	0.5									
	Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					**Adjusted Emission Level**				
Wind Speed [m/s]	**6**	**7**	**8**	**9**	**10**	**6**	**7**	**8**	**9**	**10**
Frequency [Hz]										
63	109.0	110.5	111.0	110.8	111.8	110.5	110.5	110.5	110.5	110.5
125	107.7	108.4	108.3	107.9	106.6	108.4	108.4	108.4	108.4	108.4
250	106.0	106.5	105.7	105.3	103.4	106.5	106.5	106.5	106.5	106.5
500	102.1	102.9	102.6	102.3	101.5	102.9	102.9	102.9	102.9	102.9
1000	97.1	98.1	98.7	99.0	99.3	98.1	98.1	98.1	98.1	98.1
2000	90.4	91.3	92.2	92.8	95.3	91.3	91.3	91.3	91.3	91.3
4000	82.8	83.8	85.1	86.2	91.7	83.8	83.8	83.8	83.8	83.8
8000	74.2	75.7	78.5	79.5	82.3	75.7	75.7	75.7	75.7	75.7
Overall A-Weighted	103.4	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2

The *Acoustic Report* indicates REpower warrants that there is no tonal audibility greater than 0 dB. A tonal penalty has not been applied in this assessment. Additionally, the *Acoustic Report* indicates that the maximum sound power level of 104.2 dBA includes a measurement uncertainty of approximately 1 dB. The sound level predictions herein are subject to the degree of uncertainty related to the sound power of the turbine, in addition to the uncertainty related to the fluctuations of atmospheric conditions and the accuracy and limitations inherent in the modelling methodology.

5 TRANSFORMER SOUND POWER ESTIMATION

The project proposes to utilize two 65 MVA transformers. One transformer (TS1) will be located approximately 15 km north of the project, north of the Town of Picton. The other transformer, the south transformer (TS2) will be located approximately 270 meters west of WTG07. Both transformers have been included under this Acoustic Assessment. The south transformer is

proposed to include a 20 meter long, 5 meter high acoustic barrier on the north and east sides (10 meters in each direction). The proposed barrier is shown in Figure 3.

While the model of the transformers are not yet known, the proponent has indicated that the transformers will meet Canadian Standards Association ("CSA") certification and that the transformers will have a National Electrical Manufacturers Association ("NEMA") standard sound pressure level measured in accordance with IEEE Standard C57.12.90, "IEEE Standard Test Code for Liquid-Immersed Distribution, Power and Regulating Transformers" [4] of not more than 77 dBA. Drawings for the proposed transformers were not available at the time of this report therefore sound levels from the transformers were predicted utilizing standard engineering texts [5]. The NEMA sound rating and the estimated measurement surface area were used to compute the overall sound power level of approximately 96 dBA re 10^{-12} W [5]. Under MOE guidelines tonal noises, such as the hum typically produced by electrical transformers, are penalized 5 dB to account for the increased potential for annoyance that such sounds tend to have [6]. Thus, the 96 dBA sound power level becomes 101 dBA.

6 POINT OF RECEPTION SUMMARY

As shown in Figures 2a through 2h, there are a number of residences in the vicinity of the project, generally sited along the major roadways. A table of UTM co-ordinates for 572 receptors, including vacant lots, located near the proposed wind turbine generators was received from wpd Canada. The existing receptors and vacant lots, together with their coordinates are listed in Tables A3 and A4. Under NPC-232, receptor locations in a rural area are taken to be anywhere within 30 meters of the exterior walls of a dwelling. For the purposes of this report, each of the 572 receptors was represented by a discrete sound prediction location at the dwelling coordinate, with an assumed height of 4.5 meters above the local grade, to represent existing or potential future second-story windows. Where vacant lots were identified, the assumed future location of the dwelling was selected to be consistent with the typical building pattern in the area. wpd Canada has indicated all receptors within the study area are two storey's or less.

A number of the receptors identified have agreements with the wind power project developer. These receptors are identified as participating receptors by the MOE. According to the MOE publication *Noise Guidelines for Wind Farms Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities* ("*Interpretation*") [7], a participating receptor "means a property that is associated with the Wind Farm by means of a legal agreement with the property owner for the installation and operation of wind turbines or related equipment located on that property."

Figure 4 shows the wind project infrastructure on the various participating lots. Table A3 includes non-participating receptors while Table A4 includes the details of the participating receptors.

7 ASSESSMENT CRITERIA

The MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* [8] indicates that the applicable sound level limit for a stationary source of sound is the background sound level. However, where background sound levels are low, exclusionary minimum criteria apply, with an exclusionary limit of 40 dBA specified for quiet night time periods, and 45 dBA specified for quiet daytime periods. To determine if the minimum criteria should apply, the site was visited during the afternoon on July 21, 2011 and short-duration sound levels were recorded. At the eastern limit of the wind power project site, the noise was dominated by natural sources. Average sound levels (L_{EQ}) were recorded to be 39 dBA with ninetieth percentile sound levels (L_{90}) as low as 35 dBA. These sound levels indicate that the area is acoustically rural, and that the minimum limits apply.

Because wind turbines generate more sound as the wind speeds increase, and because increasing wind speeds tend to cause greater background sound levels, wind turbine generators have been identified by the MOE as a unique case, and the MOE has provided supplementary guidance for the assessment of wind turbine noise in *Interpretation* [7]. This publication provides criteria for the combined impact of all turbines in an area as a function of 10 meter height wind speed. The criteria are presented in A-weighted decibels, as follows.

Table 5: Wind Turbine Noise Criteria [dBA]

10 Meter Height Wind Speed [m/s]	4	5	6	7	8	9	10
Wind Turbine Noise Criteria, NPC-232 [dBA]	40	40	40	43	45	49	51

It should be noted that the MOE guidelines, including NPC-232 and *Interpretation* do not require or imply that a noise source should be inaudible at a point of reception, and inaudibility should not be expected. In fact, even when the sound levels from a source are less than the numeric guideline limits, spectral and temporal characteristics of a sound regularly result in audibility at points of reception. To be clear, wind turbines will be audible at many residences even when sound levels are below MOE noise criteria guidelines.

In the case of this assessment, the sound power output is assumed to be constant at the maximum value of 104.2 dBA over the full range of 10 meter height wind speeds due to the summer nighttime wind shear exponent, which means that strong hub height winds and the maximum sound power level can occur at the same time as low 10 meter height winds and low background sound. Thus, this assessment is based on the minimum criteria of 40 dBA and the maximum wind turbine sound power level.

8 IMPACT ASSESSMENT

An acoustic model of the site was created on a computer using Cadna/A (version 4.2.141), a commercial acoustic modeling system. Cadna/A uses the computational procedures of ISO 9613-2, *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* [9], which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This is the standard that is specified by *Interpretation* to be used in the assessment of wind power project noise.

Topographical data for the site and surrounding area was provided by wpd Canada. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be

0.7 globally. The temperature and relative humidity were assumed to be 10° C and 70%, respectively. Stands of foliage were not modelled. For each receptor the predictions include the sound emissions of known wind turbines within a 5 km radius as stipulated in the 2008 MOE *Interpretation*.

Details for the Gilead Power Ostrander Point Wind Energy Park were obtained from the *Design and Operations Report*, dated May 2011 [10] and the *Noise Impact Assessment*, dated July 2010 [11]. The wind turbine and transformer locations, as well as their sound power levels were obtained from the above reports and are included under Appendix A of this report.

All the White Pines wind turbine generators were modeled as point sources at a height of 100 meters above grade and the Ostrander Point wind turbine generators as point sources at a height of 85 meters above grade. Figures 2a through 2h present the acoustic model, with the source and receptor locations shown. Figures 5a through 5d show the noise contours of the area surrounding the facility, as produced by Cadna/A, based on the octave band sound power levels of each wind turbine. The required summary tables are contained in Appendix A of this report.

Tables A5 through A10 list the sound pressure levels calculated at each of the identified receptor locations. In general, sound levels are predicted to be at or below the 40.0 dBA minimum criterion at all but three participating receptor locations. At these participating receptors sound levels of up to 40.8 dBA are predicted. The owners of these properties have entered into lease agreements with the proponent and include a wind turbine or related infrastructure on the properties. These receptors are considered herein to be part of the project (ie. participating receptors) and not sensitive receptors for the purposes of sound level impact. Details of the calculations are provided in Appendix E. The Cadna/A computer model can be provided upon request.

In accordance with the 2008 MOE Interpretation, sound level predictions for receptors within 1500 meters of the sound sources are presented in Tables A5 though A10. Receptors greater than 1500 meters from the sound sources have the sound level noted as “NA”. Tables A5 and A6 show the sound level predictions for the cumulative assessment scenario, tables A7 and A8 show the

sound level predictions solely for the White Pines Wind Project and tables A9 and A10 show the sound level predictions solely for the transformers related to both projects.

When conducting an acoustic audit of a conventional stationary industrial sound source, the MOE guidelines direct that periods of high wind be excluded. Typically, the noise output of industrial sound sources is independent of wind speed. However, this is not the case for wind plants and there is an intrinsic relationship between wind speed (and therefore ambient noise) and increased sound power levels associated with the wind turbine generators. Complicating matters, there is a large degree of variability related to environmental factors within the wind plant area including, among others, local ground level wind speeds, wind speeds affecting the wind turbine generator blades, the associated wind shear, and the sound power of the wind turbine generators, all of which affect the measured sound levels. Thus, it is not realistic to expect that in practice a single repeatable sound level can or will be measured for a given wind speed at a given setback distance; a simple comparison of single numbers is not sufficient or possible.

9 CONCLUSIONS

The analysis, performed in accordance with the methods prescribed by the Ontario Ministry of the Environment in publication *Interpretation for Applying MOE NPC Technical Publications to Wind Power Generation Facilities*, October 2008, indicates that the operation of the proposed wind power project will comply with the requirements of the MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* for all identified non-participating receptor locations.

REFERENCES

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2. *Power Curve & Sound Power Level REpower MM92 [2050kW]*. REpower Systems AG, 2010.
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5. Crocker, Malcolm, J., Sound *Power Level Predictions for Industrial Machinery*, In Encyclopedia of Acoustics (Vol. 2, pp. 1049 - 1057), John Wiley & Sons, Inc., 1997.
6. Ontario Ministry of the Environment Publication NPC-104, *Sound Level Adjustments,* August, 1978.
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10. Stantec Consulting Ltd., *Ostrander Point Wind Energy Park Design and Operations Report,* May 2011.
11. Helimax Energy Inc., *Noise Impact Assessment Ostrander Point Wind Energy Park*, July 2010.
12. Google Maps Aerial Imagery, Internet Application: *maps.google.com*

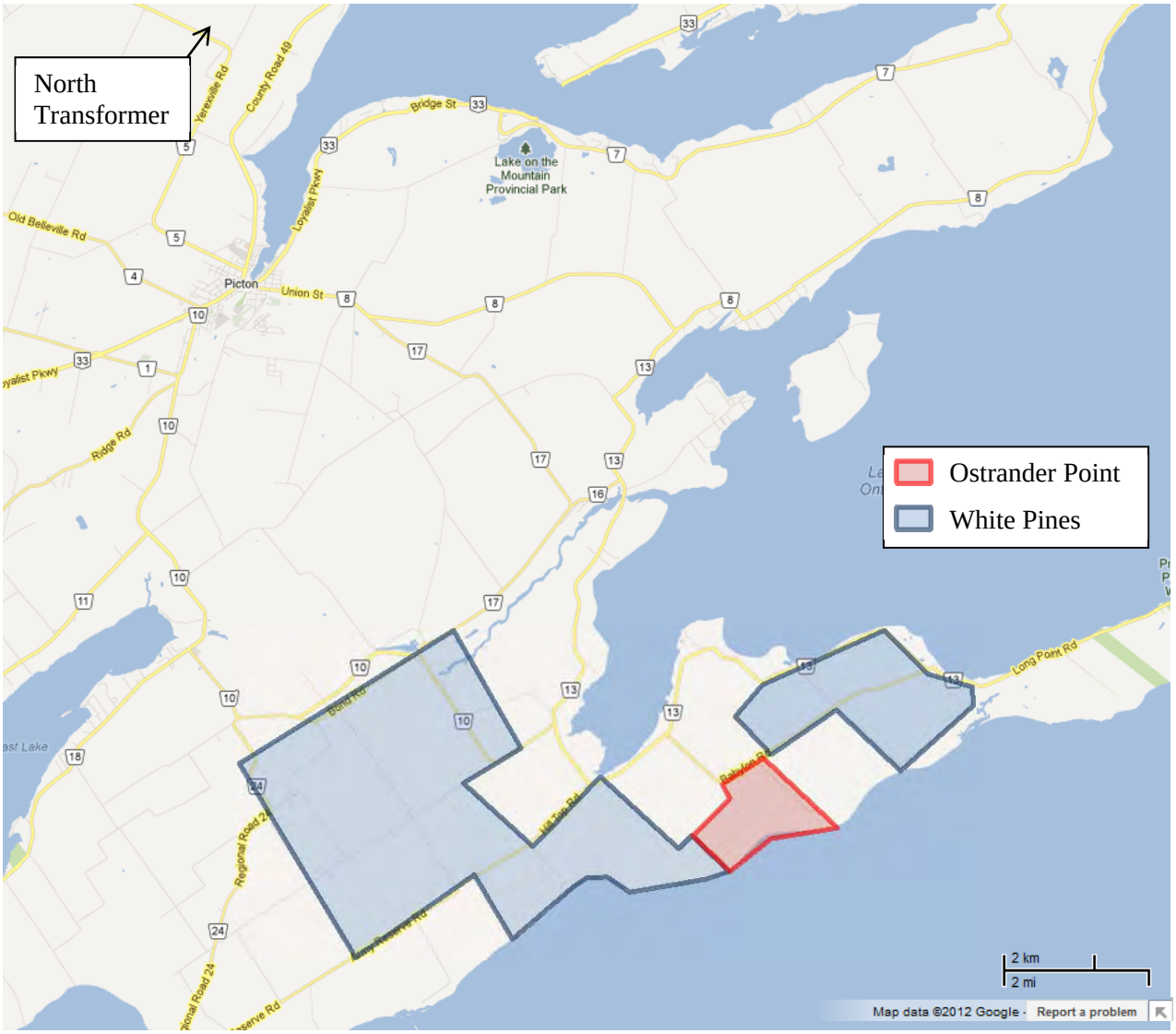

Figure 1: White Pines and Ostrander Point Wind Project Site Locations

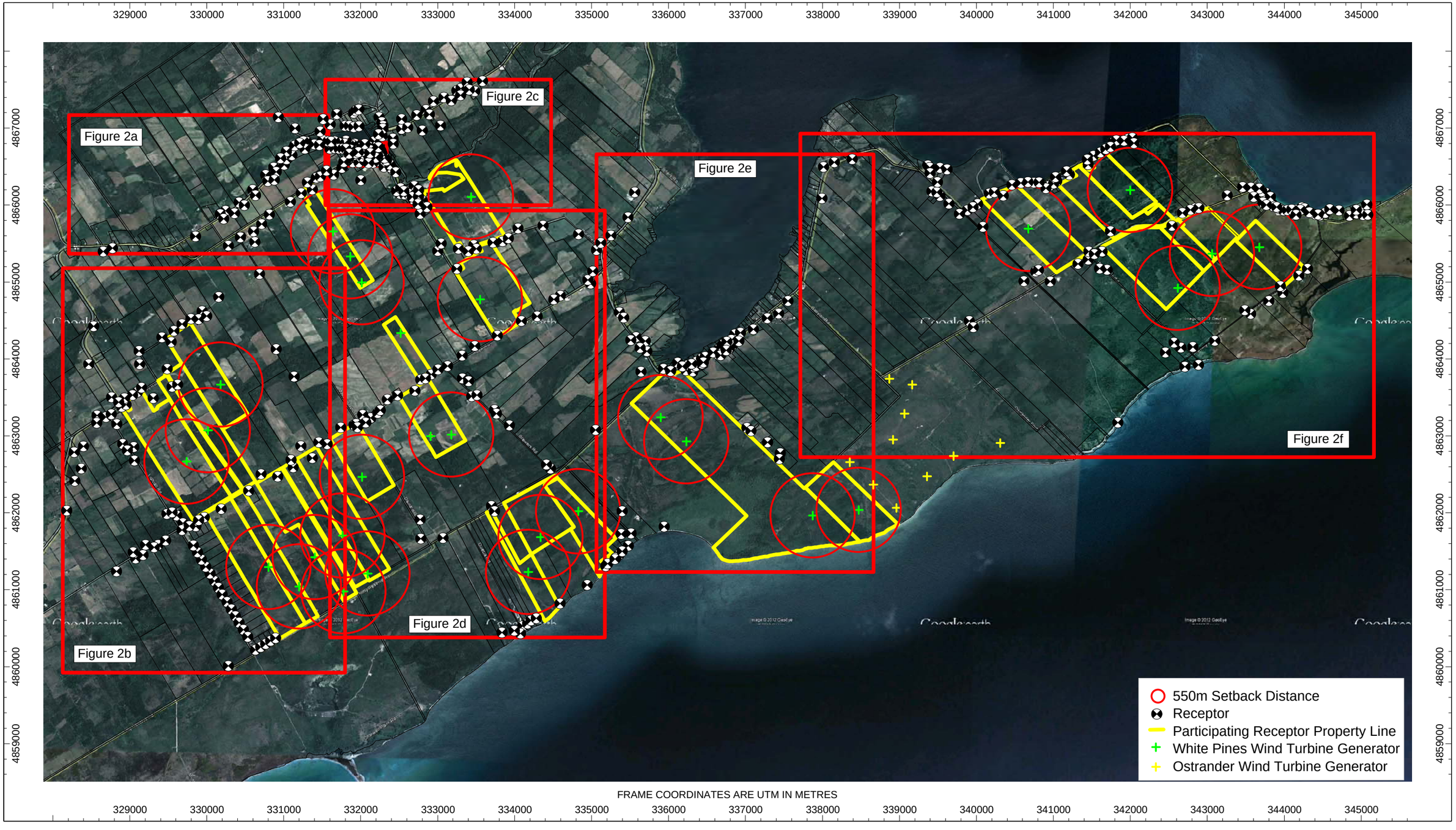

Figure 2: Proposed Wind Turbine Generator and Receptor Locations, Overall
wpd Canada Corp.- White Pines Wind Project, County of Prince Edward

Figure 2a: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

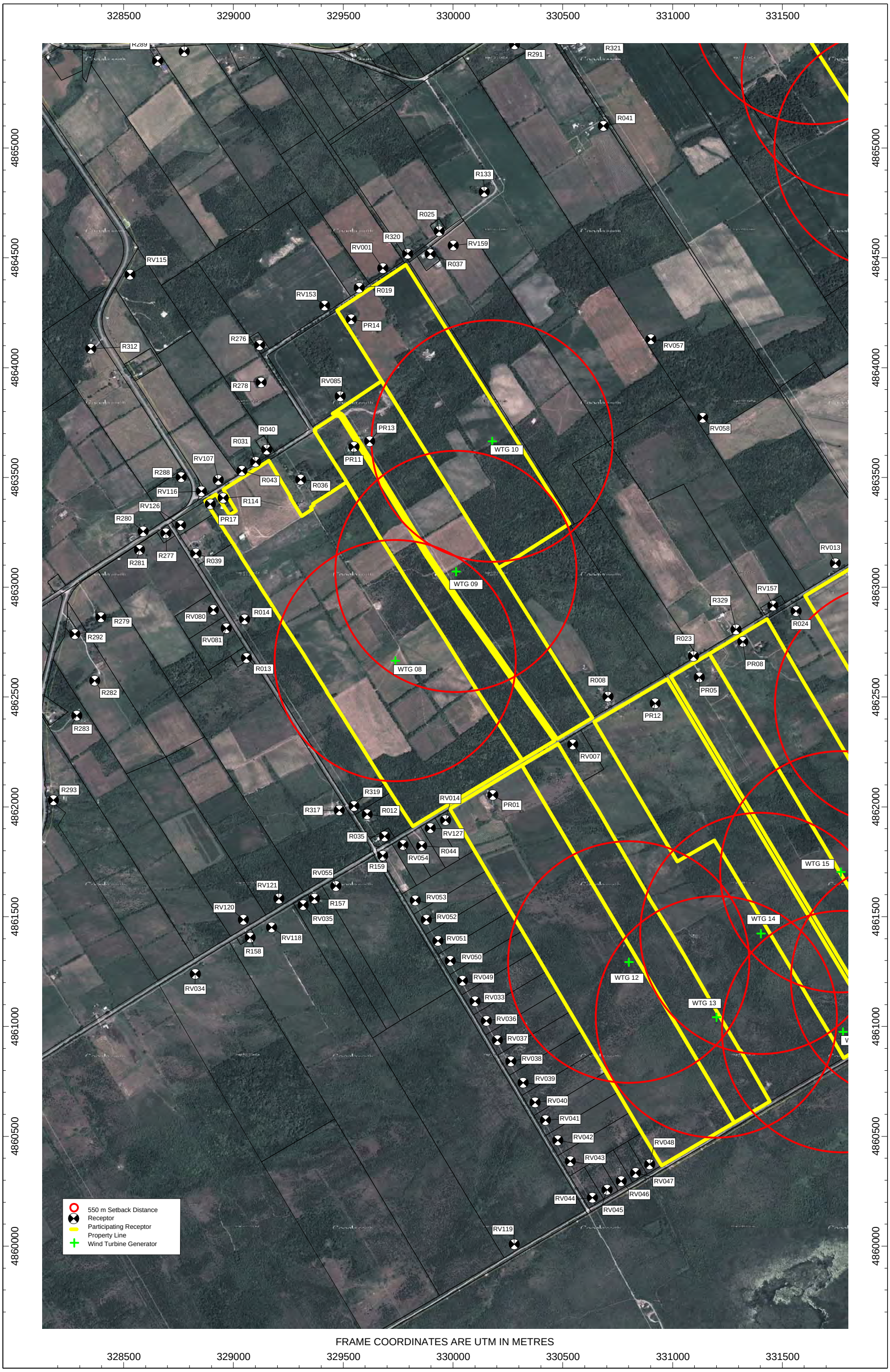

Figure 2b: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

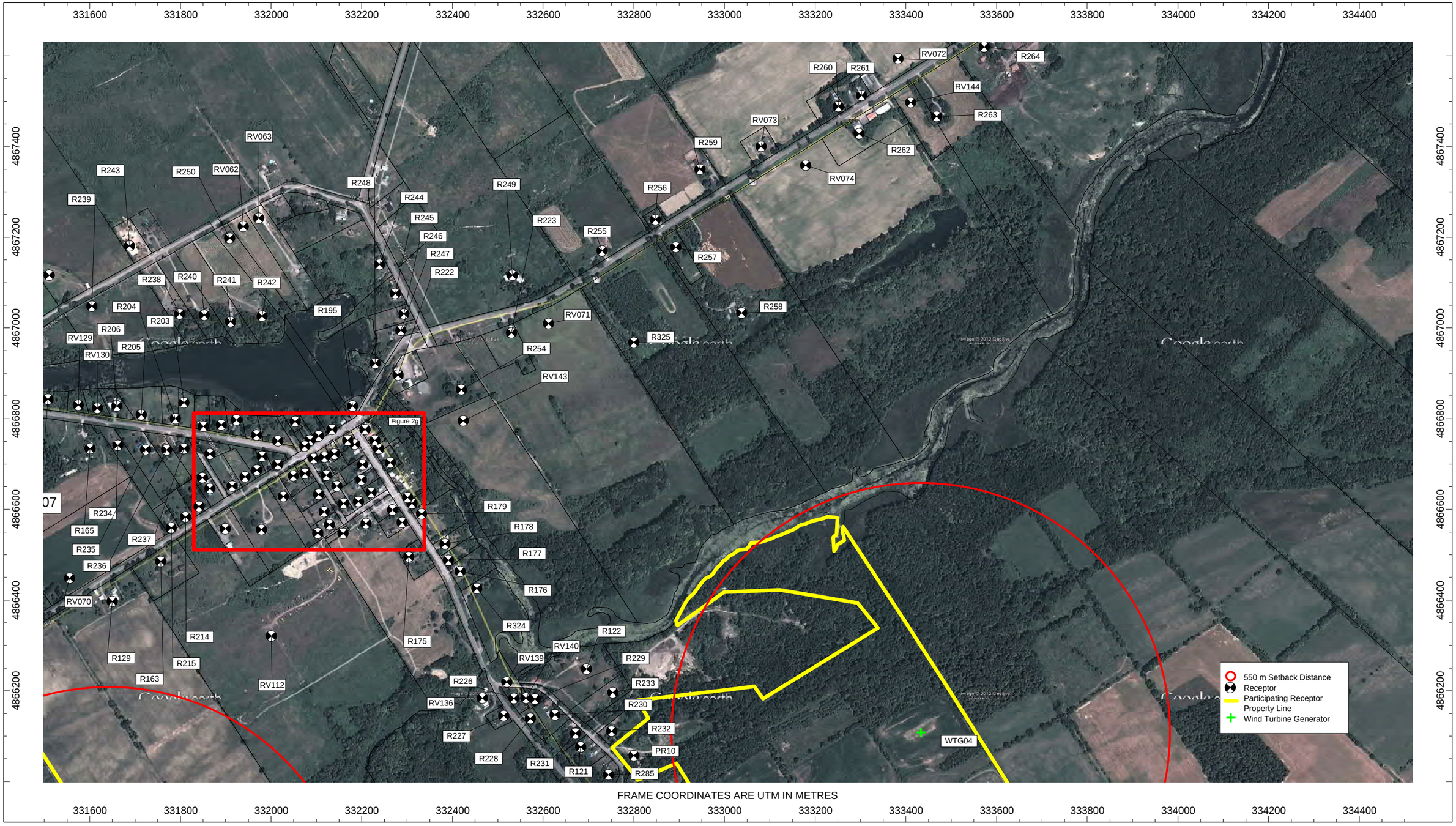

Figure 2c: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

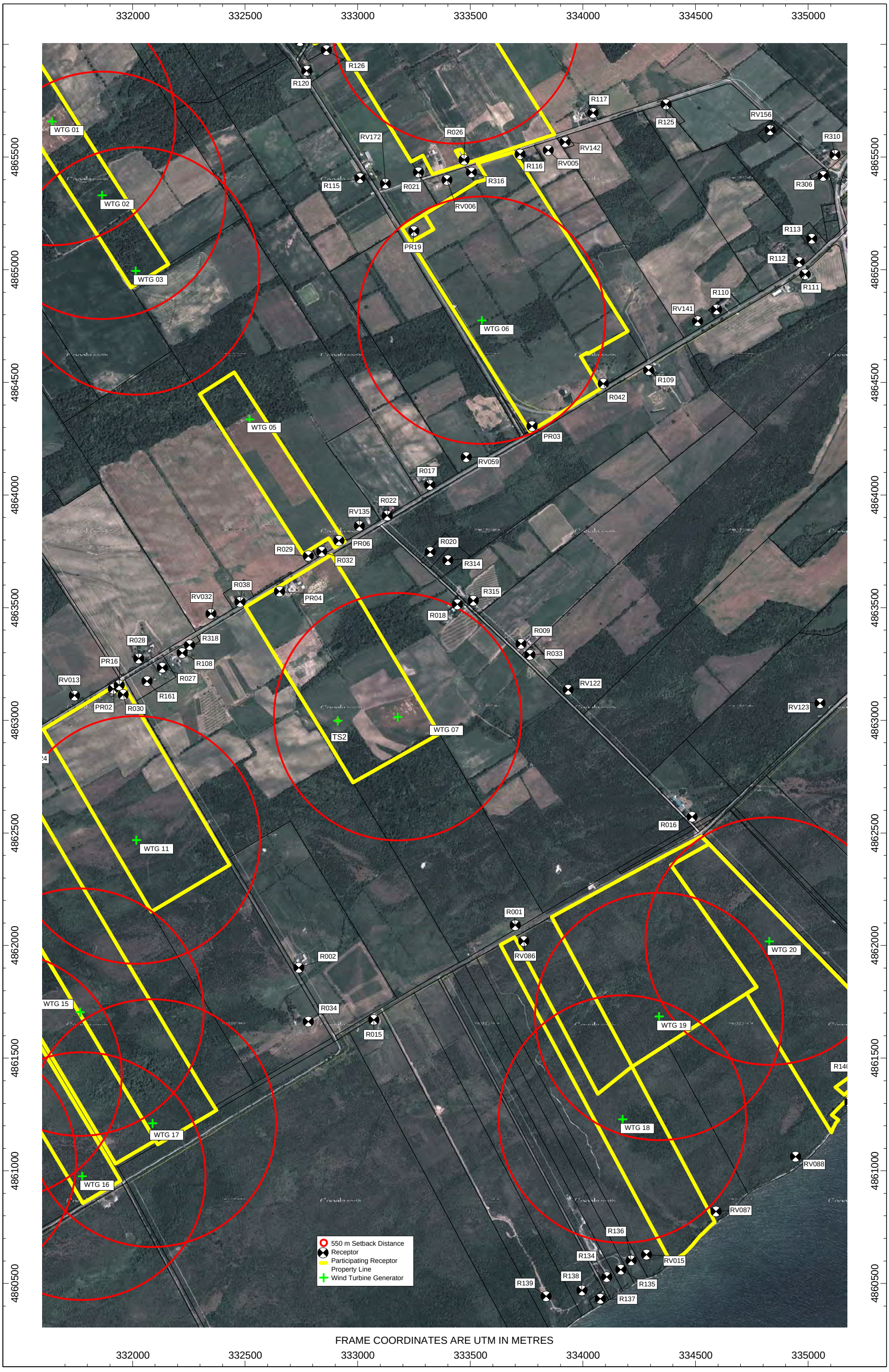

Figure 2d: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

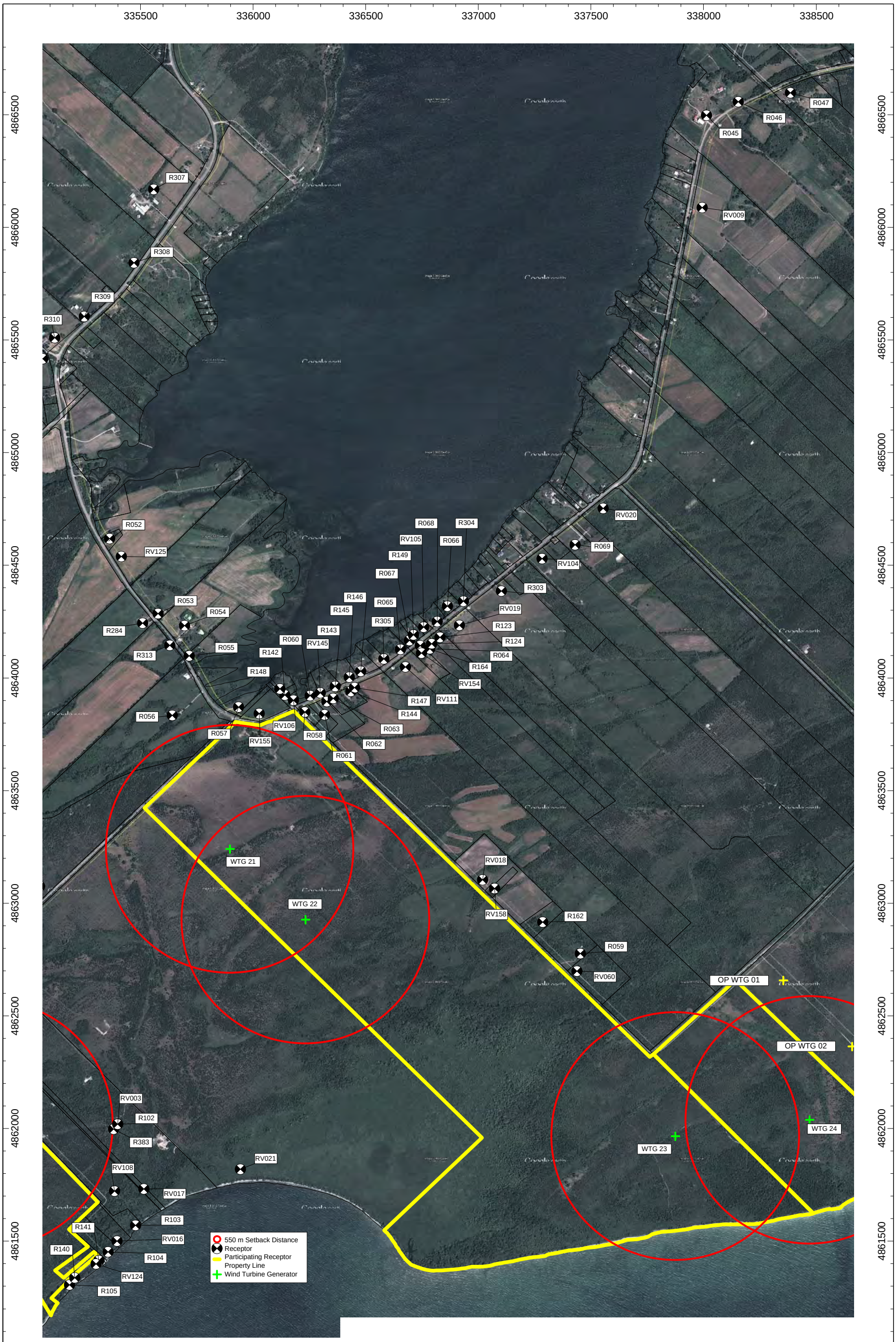

Figure 2e: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

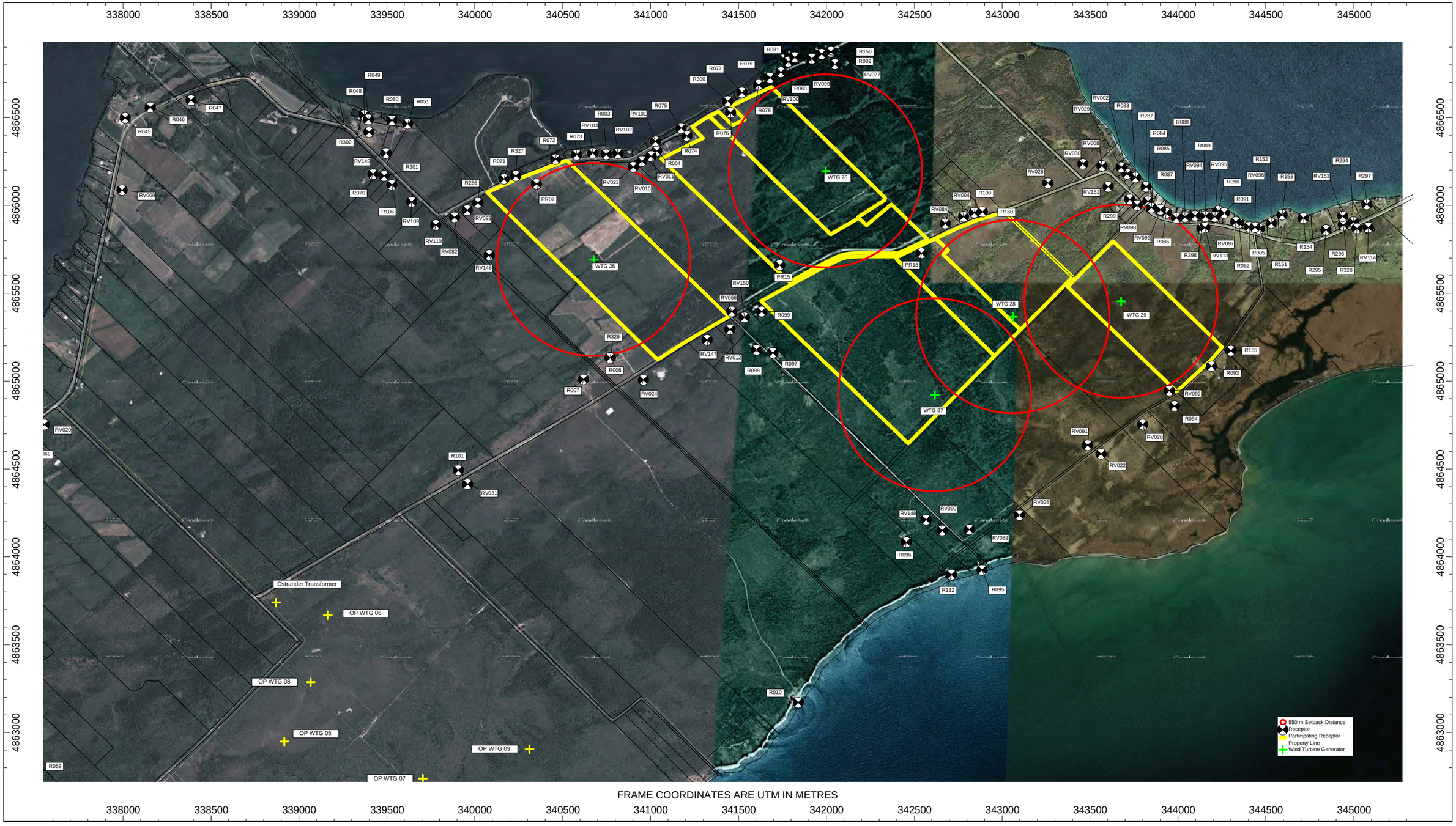

Figure 2f: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

Figure 2g: Proposed Wind Turbine Generator and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

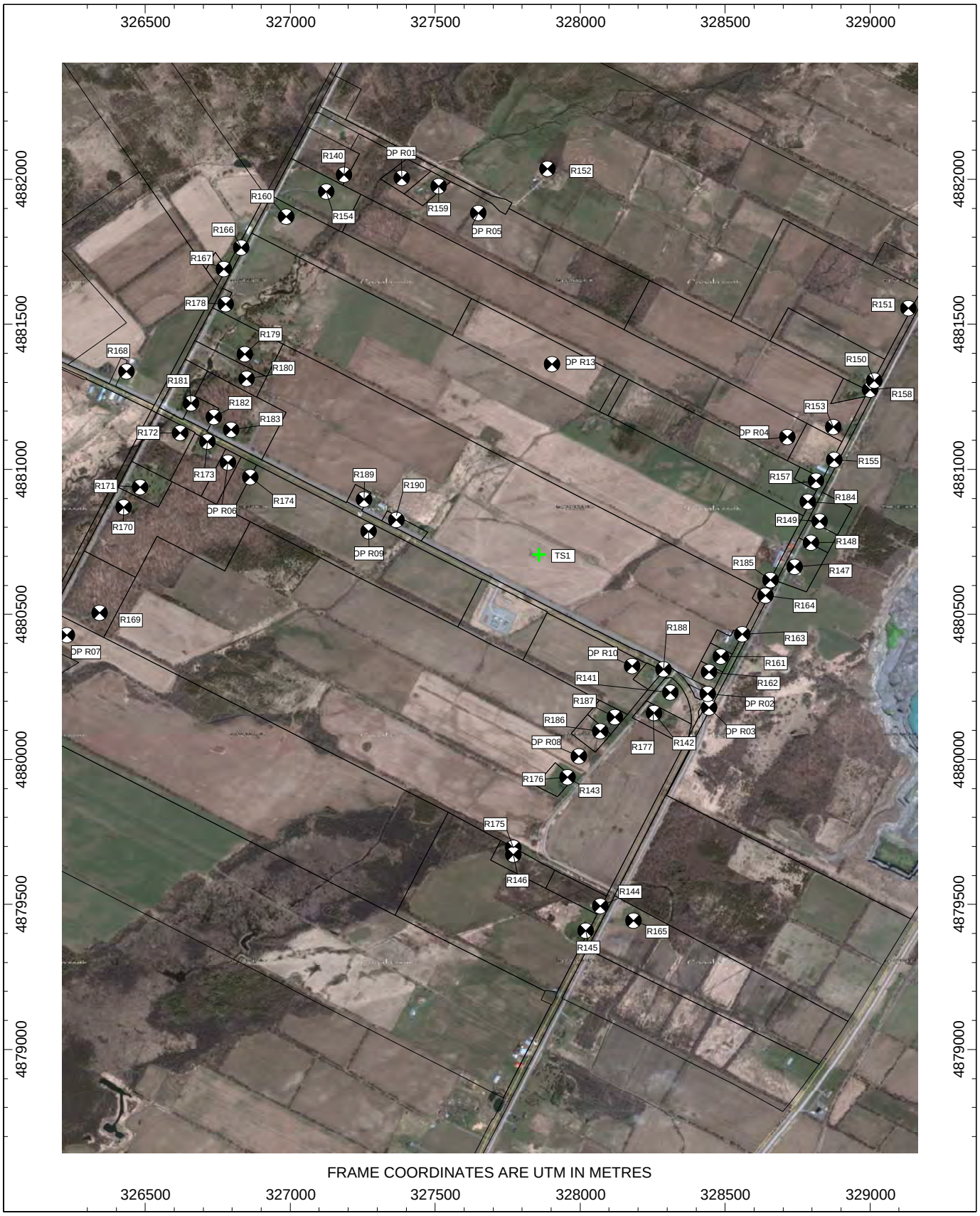

Figure 2h: Proposed Transformer and Receptor Locations
wpd Canada Corp.- White Pines Wind Project, Prince Edward County

Figure 3: Proposed Transformer (TS1) Acoustic Barrier
wpd Canada Corp. - White Pines Wind Project, Prince Edward County, Ontario

LEGEND

- Turbine
- 34.5 kV Collector Line
- Access Roads
- Laydown Area
- Crane Laydown
- Crane Pad
- Sub Station
- Storage Area
- Optioned Property

Wind Turbine Model:
Repower MM92

Hub Height: 100.0 m
Rotor Diameter: 92.5 m

Coordinate System: UTM NAD83 Zone 18N

Revision	Modifications	Date	Name Drawer

Project Title:
White Pines Wind Farm

Drawing Title:
Figure 4 – White Pines Wind Project Infrastructure

	Date	Name	Drawing Number: V01
Drawn By:	23.05.2012	Alessandro Tarli	
Verified By:			Replacement For:
Issued By:			

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Date:	Content: Figure 4 – White Pines Wind Project Infrastructure
Signature:	

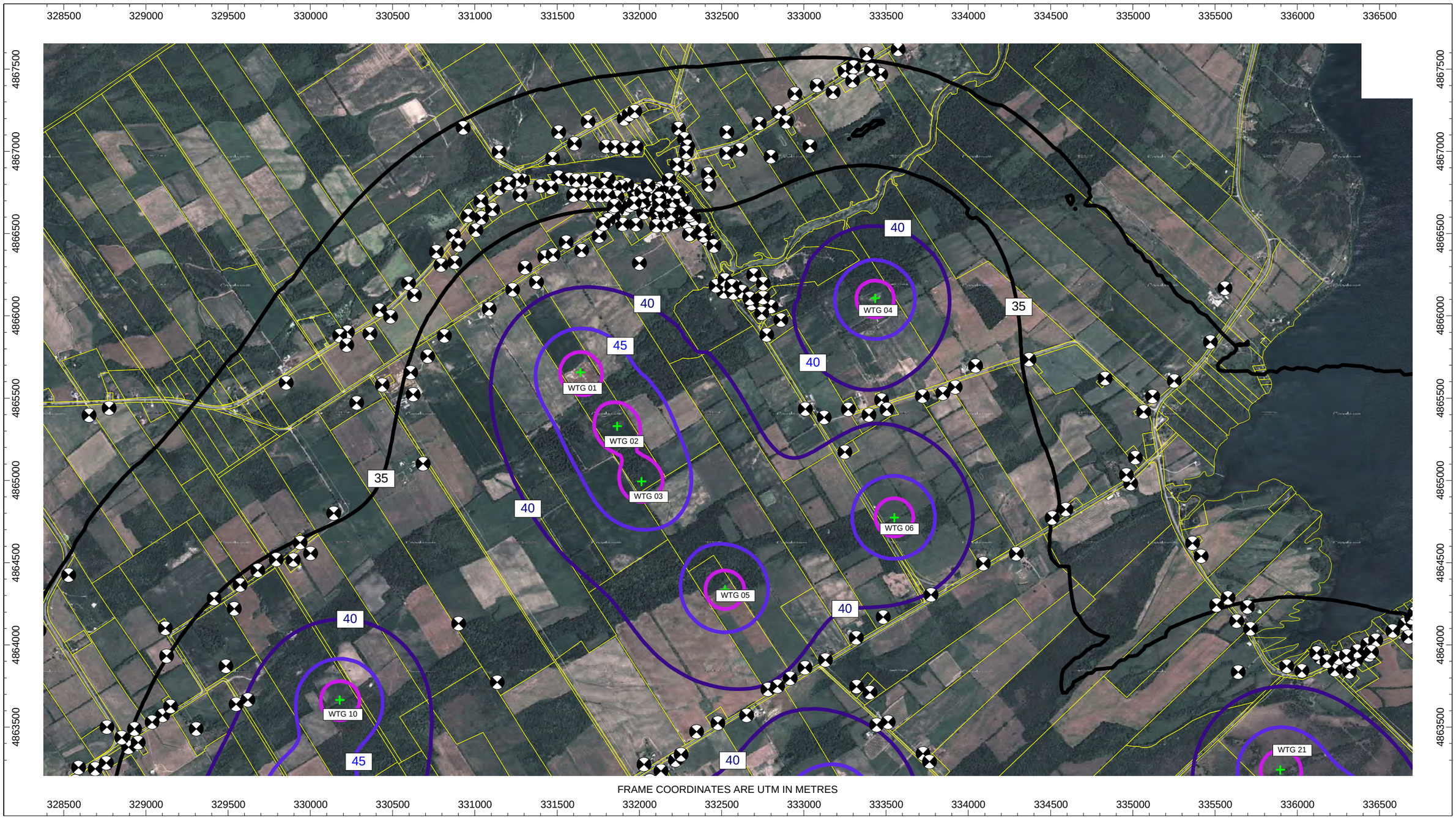


Figure 5a: Predicted Sound Levels, Leq [dBA], Northwest
wpd Canada Corp. - White Pines Wind Project, Prince Edward County, Ontario
Sound Level Grid Height Calculated at 4.5m

Figure 5b: Predicted Sound Levels, Leq [dBA], Southwest
wpd Canada Corp. - White Pines Wind Project, Prince Edward County, Ontario
Sound Level Grid Height Calculated at 4.5m

Figure 5c: Predicted Sound Levels, Leq [dBA], East
wpd Canada Corp. - White Pines Wind Project, Prince Edward County, Ontario
Sound Level Grid Height Calculated at 4.5m

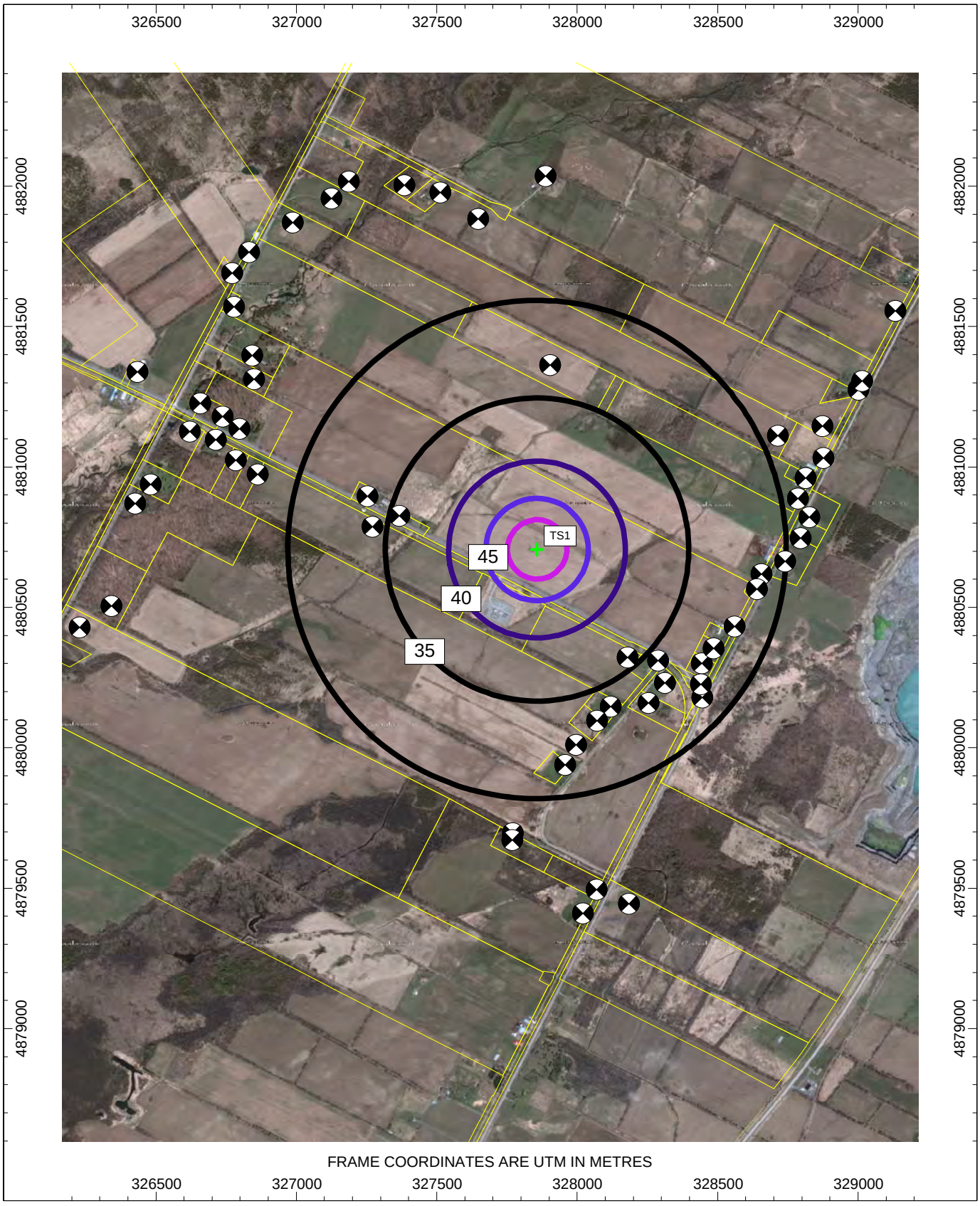


Figure 5d: Predicted Sound Levels, Leq [dBA], North Transformer
wpd Canada Corp. - White Pines Wind Project, Prince Edward County, Ontario
Sound Level Grid Height Calculated at 4.5m

APPENDIX A:
ASSESSMENT SUMMARY TABLES

ACOUSTIC ASSESSMENT SUMMARY TABLES

VERSION CONTROL

White Pines Wind Project, Prince Edward County, Ontario

Tables Ver.	Date	Issued as Part of AAR?	Version Description	Prepared By
1	May 25, 2012	Y	Original Acoustic Assessment Report supporting a Renewable Energy Application	I. Bonsma
2	Sept. 11, 2012	Y	Revised version of tables as part of Ver. 2 of the Acoustic Assessment Report	I. Bonsma

Table A1a: REpower MM92 Wind Turbine Acoustic Emmissions Summary
White Pines Wind Project

Make and Model:	REpower, MM92
Electrical Rating:	2050 kW
Hub Height (m):	100 m
Wind Shear Coefficient:	0.5

	Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					Adjusted Emission Level				
Wind Speed [m/s]	**6**	**7**	**8**	**9**	**10**	**6**	**7**	**8**	**9**	**10**
Frequency [Hz]										
63	109.0	110.5	111.0	110.8	111.8	110.5	110.5	110.5	110.5	110.5
125	107.7	108.4	108.3	107.9	106.6	108.4	108.4	108.4	108.4	108.4
250	106.0	106.5	105.7	105.3	103.4	106.5	106.5	106.5	106.5	106.5
500	102.1	102.9	102.6	102.3	101.5	102.9	102.9	102.9	102.9	102.9
1000	97.1	98.1	98.7	99.0	99.3	98.1	98.1	98.1	98.1	98.1
2000	90.4	91.3	92.2	92.8	95.3	91.3	91.3	91.3	91.3	91.3
4000	82.8	83.8	85.1	86.2	91.7	83.8	83.8	83.8	83.8	83.8
8000	74.2	75.7	78.5	79.5	82.3	75.7	75.7	75.7	75.7	75.7
Overall A-Weighted	103.4	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2

Table A1b: GE2.5XL Wind Turbine Acoustic Emmissions Summary
Ostrander Point Wind Farm

Make and Model:	GE2.5XL
Electrical Rating:	2500 kW
Hub Height (m):	85 m
Wind Shear Coefficient:	0.5

	Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					Adjusted Emission Level				
Wind Speed [m/s]	**6**	**7**	**8**	**9**	**10**	**6**	**7**	**8**	**9**	**10**
Frequency [Hz]										
63	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9	112.9
125	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3
250	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
500	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2
1000	98.3	98.3	98.3	98.3	98.3	98.3	98.3	98.3	98.3	98.3
2000	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8
4000	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2
8000	71.9	71.9	71.9	71.9	71.9	71.9	71.9	71.9	71.9	71.9
Overall A-Weighted	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0

Table A2: Wind Turbine Generator Locations
White Pines Wind Project

Source ID	Wind Turbine Generator Make and Model	UTM Coordinates	
		Easting	Northing
WTG01	REpower MM92, 100 m hub height	331642	4865658
WTG02	REpower MM92, 100 m hub height	331865	4865330
WTG03	REpower MM92, 100 m hub height	332014	4864994
WTG04	REpower MM92, 100 m hub height	333433	4866108
WTG05	REpower MM92, 100 m hub height	332520	4864336
WTG06	REpower MM92, 100 m hub height	333551	4864775
WTG07	REpower MM92, 100 m hub height	333178	4863015
WTG08	REpower MM92, 100 m hub height	329738	4862665
WTG09	REpower MM92, 100 m hub height	330014	4863071
WTG10	REpower MM92, 100 m hub height	330179	4863665
WTG11	REpower MM92, 100 m hub height	332017	4862468
WTG12	REpower MM92, 100 m hub height	330801	4861293
WTG13	REpower MM92, 100 m hub height	331200	4861043
WTG14	REpower MM92, 100 m hub height	331403	4861423
WTG15	REpower MM92, 100 m hub height	331767	4861704
WTG16	REpower MM92, 100 m hub height	331776	4860976
WTG17	REpower MM92, 100 m hub height	332089	4861211
WTG18	REpower MM92, 100 m hub height	334176	4861229
WTG19	REpower MM92, 100 m hub height	334338	4861685
WTG20	REpower MM92, 100 m hub height	334828	4862019
WTG21	REpower MM92, 100 m hub height	335897	4863241
WTG22	REpower MM92, 100 m hub height	336233	4862927
WTG23	REpower MM92, 100 m hub height	337875	4861966
WTG24	REpower MM92, 100 m hub height	338470	4862038
WTG25	REpower MM92, 100 m hub height	340676	4865691
WTG26	REpower MM92, 100 m hub height	341997	4866196
WTG27	REpower MM92, 100 m hub height	342616	4864922
WTG28	REpower MM92, 100 m hub height	343062	4865366
WTG29	REpower MM92, 100 m hub height	343677	4865454
TS1	North Transformer, 65 MVA	327857	4880706
TS2	South Transformer, 65 MVA	332911	4862998

Ostrander Point Wind Project

Source ID	Wind Turbine Generator Make and Model	UTM Coordinates	
		Easting	Northing
OP WTG1	GE2.5 XL, 85m hub height	338354	4862657
OP WTG2	GE2.5 XL, 85m hub height	338659	4862365
OP WTG3	GE2.5 XL, 85m hub height	339358	4862474
OP WTG4	GE2.5 XL, 85m hub height	338961	4862066
OP WTG5	GE2.5 XL, 85m hub height	338918	4862950
OP WTG6	GE2.5 XL, 85m hub height	339164	4863668
OP WTG7	GE2.5 XL, 85m hub height	339705	4862738
OP WTG8	GE2.5 XL, 85m hub height	339066	4863287
OP WTG9	GE2.5 XL, 85m hub height	340311	4862906
OP TS	Transformer, 25 MVA	338868	4863763

Table A3: Non-Participating Receptor Locations
White Pines Wind Project

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R001	Non-Participating Receptor	333699	4862091
R002	Non-Participating Receptor	332739	4861901
R003	Non-Participating Receptor	340748	4866291
R004	Non-Participating Receptor	341035	4866310
R005	Non-Participating Receptor	344406	4865878
R006	Non-Participating Receptor	340772	4865134
R007	Non-Participating Receptor	340618	4865009
R008	Non-Participating Receptor	330706	4862502
R009	Non-Participating Receptor	333725	4863339
R010	Non-Participating Receptor	341840	4863171
R011	Non-Participating Receptor	330437	4865580
R012	Non-Participating Receptor	329609	4861966
R013	Non-Participating Receptor	329060	4862678
R014	Non-Participating Receptor	329051	4862854
R015	Non-Participating Receptor	333071	4861671
R016	Non-Participating Receptor	334485	4862571
R017	Non-Participating Receptor	333320	4864044
R018	Non-Participating Receptor	333443	4863514
R019	Non-Participating Receptor	329573	4864364
R020	Non-Participating Receptor	333322	4863747
R021	Non-Participating Receptor	333270	4865432
R022	Non-Participating Receptor	333131	4863909
R023	Non-Participating Receptor	331096	4862686
R024	Non-Participating Receptor	331563	4862891
R025	Non-Participating Receptor	329938	4864622
R026	Non-Participating Receptor	333473	4865488
R027	Non-Participating Receptor	332132	4863234
R028	Non-Participating Receptor	332028	4863274
R029	Non-Participating Receptor	332781	4863730
R030	Non-Participating Receptor	331959	4863114
R031	Non-Participating Receptor	329101	4863571
R032	Non-Participating Receptor	332840	4863748
R033	Non-Participating Receptor	333765	4863290
R034	Non-Participating Receptor	332781	4861662
R035	Non-Participating Receptor	329689	4861865
R036	Non-Participating Receptor	329306	4863490
R037	Non-Participating Receptor	329897	4864517
R038	Non-Participating Receptor	332478	4863525
R039	Non-Participating Receptor	328830	4863153
R040	Non-Participating Receptor	329151	4863627
R041	Non-Participating Receptor	330685	4865101
R042	Non-Participating Receptor	334091	4864494
R043	Non-Participating Receptor	329038	4863531
R044	Non-Participating Receptor	329858	4861823
R045	Non-Participating Receptor	338013	4866497
R046	Non-Participating Receptor	338154	4866557
R047	Non-Participating Receptor	338386	4866597
R048	Non-Participating Receptor	339372	4866514
R049	Non-Participating Receptor	339396	4866489
R050	Non-Participating Receptor	339528	4866483
R051	Non-Participating Receptor	339619	4866465
R052	Non-Participating Receptor	335364	4864618
R053	Non-Participating Receptor	335579	4864286

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R054	Non-Participating Receptor	335697	4864232
R055	Non-Participating Receptor	335717	4864098
R056	Non-Participating Receptor	335642	4863834
R057	Non-Participating Receptor	335936	4863871
R058	Non-Participating Receptor	336230	4863849
R059	Non-Participating Receptor	337453	4862777
R060	Non-Participating Receptor	336254	4863921
R061	Non-Participating Receptor	336318	4863837
R062	Non-Participating Receptor	336327	4863895
R063	Non-Participating Receptor	336357	4863909
R064	Non-Participating Receptor	336785	4864130
R065	Non-Participating Receptor	336655	4864127
R066	Non-Participating Receptor	336863	4864319
R067	Non-Participating Receptor	336695	4864166
R068	Non-Participating Receptor	336818	4864250
R069	Non-Participating Receptor	337430	4864591
R070	Non-Participating Receptor	339421	4866177
R071	Non-Participating Receptor	340167	4866150
R072	Non-Participating Receptor	340461	4866262
R073	Non-Participating Receptor	340580	4866288
R074	Non-Participating Receptor	341208	4866395
R075	Non-Participating Receptor	341174	4866439
R076	Non-Participating Receptor	341455	4866528
R077	Non-Participating Receptor	341520	4866641
R078	Non-Participating Receptor	341615	4866685
R079	Non-Participating Receptor	341680	4866727
R080	Non-Participating Receptor	341784	4866818
R081	Non-Participating Receptor	341820	4866842
R082	Non-Participating Receptor	341974	4866862
R083	Non-Participating Receptor	343760	4866158
R084	Non-Participating Receptor	343829	4866024
R085	Non-Participating Receptor	343849	4865987
R086	Non-Participating Receptor	343933	4865956
R087	Non-Participating Receptor	343992	4865928
R088	Non-Participating Receptor	344041	4865934
R089	Non-Participating Receptor	344156	4865939
R090	Non-Participating Receptor	344230	4865968
R091	Non-Participating Receptor	344263	4865956
R092	Non-Participating Receptor	344346	4865898
R093	Non-Participating Receptor	344189	4865084
R094	Non-Participating Receptor	343980	4864858
R095	Non-Participating Receptor	342885	4863924
R096	Non-Participating Receptor	342456	4864082
R097	Non-Participating Receptor	341696	4865160
R098	Non-Participating Receptor	341603	4865177
R099	Non-Participating Receptor	341632	4865395
R100	Non-Participating Receptor	342842	4865959
R101	Non-Participating Receptor	339907	4864493
R102	Non-Participating Receptor	335399	4862019
R103	Non-Participating Receptor	335478	4861570
R104	Non-Participating Receptor	335357	4861453
R105	Non-Participating Receptor	335185	4861306
R106	Non-Participating Receptor	339528	4866117
R108	Non-Participating Receptor	332221	4863299
R109	Non-Participating Receptor	334292	4864555

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R110	Non-Participating Receptor	334593	4864823
R111	Non-Participating Receptor	334987	4864980
R112	Non-Participating Receptor	334961	4865034
R113	Non-Participating Receptor	335016	4865138
R114	Non-Participating Receptor	328953	4863406
R115	Non-Participating Receptor	333010	4865434
R116	Non-Participating Receptor	333721	4865512
R117	Non-Participating Receptor	334045	4865696
R118	Non-Participating Receptor	331088	4866043
R119	Non-Participating Receptor	330610	4865655
R120	Non-Participating Receptor	332774	4865884
R121	Non-Participating Receptor	332683	4866076
R122	Non-Participating Receptor	332696	4866248
R123	Non-Participating Receptor	336830	4864180
R124	Non-Participating Receptor	336793	4864152
R125	Non-Participating Receptor	334370	4865734
R126	Non-Participating Receptor	332861	4865975
R127	Non-Participating Receptor	331899	4866557
R128	Non-Participating Receptor	331979	4866555
R129	Non-Participating Receptor	331650	4866397
R130	Non-Participating Receptor	330714	4865754
R131	Non-Participating Receptor	330815	4865878
R132	Non-Participating Receptor	342711	4863899
R133	Non-Participating Receptor	330142	4864801
R134	Non-Participating Receptor	334106	4860529
R135	Non-Participating Receptor	334168	4860561
R136	Non-Participating Receptor	334215	4860602
R137	Non-Participating Receptor	334077	4860432
R138	Non-Participating Receptor	333996	4860469
R139	Non-Participating Receptor	333836	4860443
R140	Non-Participating Receptor	335209	4861337
R141	Non-Participating Receptor	335316	4861414
R142	Non-Participating Receptor	336142	4863924
R143	Non-Participating Receptor	336364	4863963
R144	Non-Participating Receptor	336435	4863940
R145	Non-Participating Receptor	336428	4864004
R146	Non-Participating Receptor	336478	4864029
R147	Non-Participating Receptor	336451	4863957
R148	Non-Participating Receptor	336119	4863952
R149	Non-Participating Receptor	336713	4864191
R150	Non-Participating Receptor	342026	4866874
R151	Non-Participating Receptor	344463	4865867
R152	Non-Participating Receptor	344530	4865899
R153	Non-Participating Receptor	344593	4865946
R154	Non-Participating Receptor	344713	4865929
R155	Non-Participating Receptor	344301	4865173
R157	Non-Participating Receptor	329370	4861582
R158	Non-Participating Vacant	329077	4861405
R159	Non-Participating Receptor	329680	4861778
R160	Non-Participating Receptor	342888	4865963
R161	Non-Participating Receptor	332065	4863173
R162	Non-Participating Receptor	337286	4862916
R163	Non-Participating Receptor	331757	4866485
R164	Non-Participating Receptor	336743	4864143
R165	Non-Participating Receptor	331601	4866734

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R166	Non-Participating Receptor	332027	4866628
R167	Non-Participating Receptor	332049	4866674
R168	Non-Participating Receptor	332075	4866679
R169	Non-Participating Receptor	332105	4866633
R170	Non-Participating Receptor	332117	4866595
R171	Non-Participating Receptor	332129	4866566
R172	Non-Participating Receptor	332209	4866569
R173	Non-Participating Receptor	332268	4866599
R174	Non-Participating Receptor	332289	4866571
R175	Non-Participating Receptor	332304	4866495
R176	Non-Participating Receptor	332417	4866463
R177	Non-Participating Receptor	332391	4866488
R178	Non-Participating Receptor	332384	4866524
R179	Non-Participating Receptor	332332	4866590
R180	Non-Participating Receptor	332311	4866613
R181	Non-Participating Receptor	332301	4866626
R182	Non-Participating Receptor	332263	4866703
R183	Non-Participating Receptor	332237	4866734
R184	Non-Participating Receptor	332207	4866776
R185	Non-Participating Receptor	332185	4866743
R186	Non-Participating Receptor	332221	4866637
R187	Non-Participating Receptor	332199	4866665
R188	Non-Participating Receptor	332202	4866698
R189	Non-Participating Receptor	332094	4866712
R190	Non-Participating Receptor	332145	4866651
R191	Non-Participating Receptor	332160	4866613
R192	Non-Participating Receptor	332140	4866722
R193	Non-Participating Receptor	332169	4866752
R194	Non-Participating Receptor	332134	4866776
R195	Non-Participating Receptor	332180	4866828
R196	Non-Participating Receptor	332105	4866762
R197	Non-Participating Receptor	332086	4866752
R198	Non-Participating Receptor	332074	4866739
R199	Non-Participating Receptor	331968	4866764
R200	Non-Participating Receptor	331924	4866797
R201	Non-Participating Receptor	331890	4866786
R202	Non-Participating Receptor	331851	4866783
R203	Non-Participating Receptor	331808	4866835
R204	Non-Participating Receptor	331789	4866800
R205	Non-Participating Receptor	331714	4866809
R206	Non-Participating Receptor	331660	4866828
R207	Non-Participating Receptor	331508	4866843
R208	Non-Participating Receptor	331865	4866722
R209	Non-Participating Receptor	331914	4866651
R210	Non-Participating Receptor	332015	4866699
R211	Non-Participating Receptor	331980	4866717
R212	Non-Participating Receptor	331865	4866646
R213	Non-Participating Receptor	331841	4866606
R214	Non-Participating Receptor	331811	4866583
R215	Non-Participating Receptor	331780	4866559
R216	Non-Participating Receptor	331426	4866357
R217	Non-Participating Receptor	331476	4866371
R218	Non-Participating Receptor	331231	4866158
R219	Non-Participating Receptor	331400	4866790
R220	Non-Participating Receptor	331464	4866781

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R221	Non-Participating Receptor	332015	4866751
R222	Non-Participating Receptor	332280	4866896
R223	Non-Participating Receptor	332530	4866989
R224	Non-Participating Receptor	331291	4866824
R225	Non-Participating Receptor	331256	4866828
R226	Non-Participating Receptor	332536	4866183
R227	Non-Participating Receptor	332513	4866145
R228	Non-Participating Receptor	332572	4866139
R229	Non-Participating Receptor	332582	4866182
R230	Non-Participating Receptor	332626	4866147
R231	Non-Participating Receptor	332671	4866106
R232	Non-Participating Receptor	332751	4866111
R233	Non-Participating Receptor	332754	4866196
R234	Non-Participating Receptor	331662	4866741
R235	Non-Participating Receptor	331723	4866732
R236	Non-Participating Receptor	331770	4866731
R237	Non-Participating Receptor	331808	4866734
R238	Non-Participating Receptor	331798	4867031
R239	Non-Participating Receptor	331605	4867048
R240	Non-Participating Receptor	331853	4867028
R241	Non-Participating Receptor	331911	4867014
R242	Non-Participating Receptor	331980	4867026
R243	Non-Participating Receptor	331688	4867181
R244	Non-Participating Receptor	332239	4867140
R245	Non-Participating Receptor	332274	4867076
R246	Non-Participating Receptor	332293	4867031
R247	Non-Participating Receptor	332286	4866995
R248	Non-Participating Receptor	332230	4866922
R249	Non-Participating Receptor	332532	4867116
R250	Non-Participating Receptor	331909	4867198
R251	Non-Participating Receptor	331511	4867116
R252	Non-Participating Receptor	331148	4866996
R253	Non-Participating Receptor	330870	4866489
R254	Non-Participating Receptor	332420	4866864
R255	Non-Participating Receptor	332730	4867170
R256	Non-Participating Receptor	332848	4867239
R257	Non-Participating Receptor	332893	4867178
R258	Non-Participating Receptor	333038	4867033
R259	Non-Participating Receptor	332946	4867350
R260	Non-Participating Receptor	333251	4867488
R261	Non-Participating Receptor	333302	4867513
R262	Non-Participating Receptor	333297	4867428
R263	Non-Participating Receptor	333468	4867466
R264	Non-Participating Receptor	333573	4867620
R265	Non-Participating Receptor	330598	4866198
R266	Non-Participating Receptor	330421	4866034
R267	Non-Participating Receptor	330225	4865902
R268	Non-Participating Receptor	330362	4865892
R269	Non-Participating Receptor	331007	4866522
R270	Non-Participating Receptor	331041	4866597
R271	Non-Participating Receptor	331109	4866647
R272	Non-Participating Receptor	331276	4866734
R273	Non-Participating Receptor	330766	4866390
R274	Non-Participating Receptor	331473	4866958
R275	Non-Participating Receptor	330178	4865880

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R276	Non-Participating Receptor	329119	4864102
R277	Non-Participating Receptor	328692	4863246
R278	Non-Participating Receptor	329127	4863932
R279	Non-Participating Receptor	328397	4862864
R280	Non-Participating Receptor	328590	4863254
R281	Non-Participating Receptor	328572	4863170
R282	Non-Participating Receptor	328369	4862574
R283	Non-Participating Receptor	328287	4862415
R284	Non-Participating Receptor	335510	4864243
R285	Non-Participating Receptor	332744	4866015
R286	Non-Participating Receptor	340018	4866015
R287	Non-Participating Receptor	343819	4866105
R288	Non-Participating Receptor	328763	4863501
R289	Non-Participating Receptor	328655	4865396
R290	Non-Participating Receptor	329854	4865594
R291	Non-Participating Receptor	330281	4865472
R292	Non-Participating Receptor	328278	4862786
R293	Non-Participating Receptor	328180	4862030
R294	Non-Participating Receptor	344998	4865905
R295	Non-Participating Receptor	344842	4865859
R296	Non-Participating Receptor	344941	4865888
R297	Non-Participating Receptor	345074	4866005
R298	Non-Participating Receptor	344137	4865868
R299	Non-Participating Receptor	343725	4866034
R300	Non-Participating Receptor	341440	4866593
R301	Non-Participating Receptor	339485	4866168
R302	Non-Participating Receptor	339399	4866417
R303	Non-Participating Receptor	337102	4864385
R304	Non-Participating Receptor	336934	4864341
R305	Non-Participating Receptor	336581	4864084
R306	Non-Participating Receptor	335066	4865416
R307	Non-Participating Receptor	335560	4866168
R308	Non-Participating Receptor	335472	4865842
R309	Non-Participating Receptor	335252	4865604
R310	Non-Participating Receptor	335120	4865510
R311	Non-Participating Receptor	332159	4866547
R312	Non-Participating Receptor	328350	4864086
R313	Non-Participating Receptor	335631	4864145
R314	Non-Participating Receptor	333401	4863711
R315	Non-Participating Receptor	333513	4863531
R316	Non-Participating Receptor	333505	4865432
R317	Non-Participating Receptor	329483	4861984
R318	Non-Participating Receptor	332254	4863334
R319	Non-Participating Receptor	329549	4862004
R320	Non-Participating Receptor	329793	4864519
R321	Non-Participating Receptor	330626	4865521
R322	Non-Participating Receptor	332118	4866715
R323	Non-Participating Receptor	332193	4866617
R324	Non-Participating Receptor	332454	4866426
R325	Non-Participating Receptor	332800	4866968
R326	Non-Participating Receptor	340769	4865132
R327	Non-Participating Receptor	340233	4866168
R328	Non-Participating Receptor	345018	4865869
R329	Non-Participating Receptor	331290	4862807
R330	Non-Participating Receptor	327366	4880826

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
R331	Non-Participating Receptor	327254	4880896
R332	Non-Participating Receptor	328288	4880311
R333	Non-Participating Receptor	328119	4880146
R334	Non-Participating Receptor	328070	4880097
R335	Non-Participating Receptor	328656	4880619
R336	Non-Participating Receptor	328785	4880888
R337	Non-Participating Receptor	326797	4881136
R338	Non-Participating Receptor	326737	4881180
R339	Non-Participating Receptor	326658	4881227
R340	Non-Participating Receptor	326850	4881312
R341	Non-Participating Receptor	326843	4881397
R342	Non-Participating Receptor	326778	4881570
R345	Non-Participating Receptor	327770	4879695
R346	Non-Participating Receptor	326862	4880973
R347	Non-Participating Receptor	326714	4881096
R348	Non-Participating Receptor	326620	4881126
R349	Non-Participating Receptor	326482	4880938
R350	Non-Participating Receptor	326426	4880869
R351	Non-Participating Receptor	326342	4880505
R352	Non-Participating Receptor	326435	4881338
R353	Non-Participating Receptor	326771	4881691
R354	Non-Participating Receptor	326831	4881765
R358	Non-Participating Receptor	328184	4879444
R359	Non-Participating Receptor	328639	4880565
R360	Non-Participating Receptor	328560	4880432
R361	Non-Participating Receptor	328444	4880301
R362	Non-Participating Receptor	328486	4880354
R363	Non-Participating Receptor	326987	4881871
R364	Non-Participating Receptor	327512	4881977
R365	Non-Participating Receptor	329001	4881275
R366	Non-Participating Receptor	328813	4880960
R367	Non-Participating Receptor	328877	4881032
R368	Non-Participating Receptor	327125	4881957
R369	Non-Participating Receptor	328873	4881146
R370	Non-Participating Receptor	327888	4882036
R371	Non-Participating Receptor	329133	4881556
R372	Non-Participating Receptor	329015	4881306
R373	Non-Participating Receptor	328826	4880821
R374	Non-Participating Receptor	328796	4880747
R375	Non-Participating Receptor	328740	4880664
R376	Non-Participating Receptor	327769	4879671
R377	Non-Participating Receptor	328020	4879410
R378	Non-Participating Receptor	328069	4879495
R379	Non-Participating Receptor	327957	4879939
R380	Non-Participating Receptor	328254	4880160
R381	Non-Participating Receptor	328312	4880230
R382	Non-Participating Receptor	327186	4882016
R383	Non-Participating Receptor	335382	4861998
RV001	Non-Participating Receptor Vacant	329680	4864453
RV002	Non-Participating Receptor Vacant	343710	4866180
RV003	Non-Participating Receptor Vacant	335399	4862019
RV004	Non-Participating Receptor Vacant	342780	4865936
RV005	Non-Participating Receptor Vacant	333846	4865530
RV006	Non-Participating Receptor Vacant	333397	4865398
RV007	Non-Participating Receptor Vacant	330546	4862284

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
RV008	Non-Participating Receptor Vacant	343568	4866225
RV009	Non-Participating Receptor Vacant	337994	4866087
RV010	Non-Participating Receptor Vacant	340950	4866251
RV011	Non-Participating Receptor Vacant	341004	4866280
RV012	Non-Participating Receptor Vacant	341452	4865293
RV013	Non-Participating Receptor Vacant	331742	4863109
RV014	Non-Participating Receptor Vacant	329966	4861940
RV015	Non-Participating Receptor Vacant	334283	4860628
RV016	Non-Participating Receptor Vacant	335396	4861500
RV017	Non-Participating Receptor Vacant	335515	4861732
RV018	Non-Participating Receptor Vacant	337019	4863104
RV019	Non-Participating Receptor Vacant	336916	4864234
RV020	Non-Participating Receptor Vacant	337554	4864752
RV021	Non-Participating Receptor Vacant	335944	4861819
RV022	Non-Participating Receptor Vacant	343562	4864585
RV023	Non-Participating Receptor Vacant	340902	4866218
RV024	Non-Participating Receptor Vacant	340959	4865007
RV025	Non-Participating Receptor Vacant	343098	4864238
RV026	Non-Participating Receptor Vacant	343799	4864752
RV027	Non-Participating Receptor Vacant	342049	4866804
RV028	Non-Participating Receptor Vacant	343260	4866126
RV029	Non-Participating Receptor Vacant	343676	4866216
RV030	Non-Participating Receptor Vacant	343459	4866236
RV031	Non-Participating Receptor Vacant	339960	4864413
RV032	Non-Participating Receptor Vacant	332348	4863472
RV033	Non-Participating Receptor Vacant	330100	4861115
RV034	Non-Participating Receptor Vacant	328827	4861239
RV035	Non-Participating Receptor Vacant	329318	4861553
RV036	Non-Participating Receptor Vacant	330152	4861025
RV037	Non-Participating Receptor Vacant	330202	4860938
RV038	Non-Participating Receptor Vacant	330264	4860841
RV039	Non-Participating Receptor Vacant	330319	4860744
RV040	Non-Participating Receptor Vacant	330374	4860655
RV041	Non-Participating Receptor Vacant	330422	4860574
RV042	Non-Participating Receptor Vacant	330477	4860481
RV043	Non-Participating Receptor Vacant	330535	4860387
RV044	Non-Participating Receptor Vacant	330635	4860220
RV045	Non-Participating Receptor Vacant	330702	4860257
RV046	Non-Participating Receptor Vacant	330766	4860296
RV047	Non-Participating Receptor Vacant	330832	4860334
RV048	Non-Participating Receptor Vacant	330896	4860373
RV049	Non-Participating Receptor Vacant	330043	4861209
RV050	Non-Participating Receptor Vacant	329988	4861299
RV051	Non-Participating Receptor Vacant	329932	4861390
RV052	Non-Participating Receptor Vacant	329879	4861486
RV053	Non-Participating Receptor Vacant	329828	4861574
RV054	Non-Participating Receptor Vacant	329773	4861827
RV055	Non-Participating Receptor Vacant	329467	4861639
RV056	Non-Participating Receptor Vacant	341462	4865396
RV057	Non-Participating Receptor Vacant	330902	4864129
RV058	Non-Participating Receptor Vacant	331137	4863772
RV059	Non-Participating Receptor Vacant	333482	4864169
RV060	Non-Participating Receptor Vacant	337438	4862699
RV061	Non-Participating Receptor Vacant	332229	4866752
RV062	Non-Participating Receptor Vacant	331939	4867224

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
RV063	Non-Participating Receptor Vacant	331973	4867242
RV064	Non-Participating Receptor Vacant	331943	4866672
RV065	Non-Participating Receptor Vacant	331969	4866687
RV066	Non-Participating Receptor Vacant	331145	4866774
RV067	Non-Participating Receptor Vacant	331036	4866697
RV068	Non-Participating Receptor Vacant	330960	4866609
RV069	Non-Participating Receptor Vacant	330902	4866432
RV070	Non-Participating Receptor Vacant	331556	4866448
RV071	Non-Participating Receptor Vacant	332612	4867010
RV072	Non-Participating Receptor Vacant	333383	4867594
RV073	Non-Participating Receptor Vacant	333081	4867400
RV074	Non-Participating Receptor Vacant	333179	4867359
RV075	Non-Participating Receptor Vacant	330795	4866309
RV076	Non-Participating Receptor Vacant	330632	4866125
RV077	Non-Participating Receptor Vacant	330488	4865996
RV078	Non-Participating Receptor Vacant	330222	4865822
RV079	Non-Participating Receptor Vacant	330878	4866325
RV080	Non-Participating Receptor Vacant	328909	4862897
RV081	Non-Participating Receptor Vacant	328967	4862813
RV082	Non-Participating Receptor Vacant	339885	4865932
RV083	Non-Participating Receptor Vacant	339958	4865973
RV084	Non-Participating Receptor Vacant	342677	4865896
RV085	Non-Participating Receptor Vacant	329487	4863870
RV086	Non-Participating Receptor Vacant	333738	4862020
RV087	Non-Participating Receptor Vacant	334591	4860820
RV088	Non-Participating Receptor Vacant	334944	4861063
RV089	Non-Participating Receptor Vacant	342813	4864155
RV090	Non-Participating Receptor Vacant	342659	4864149
RV091	Non-Participating Receptor Vacant	343487	4864634
RV092	Non-Participating Receptor Vacant	343951	4864946
RV093	Non-Participating Receptor Vacant	343900	4865975
RV094	Non-Participating Receptor Vacant	344096	4865941
RV095	Non-Participating Receptor Vacant	344209	4865936
RV096	Non-Participating Receptor Vacant	344438	4865876
RV097	Non-Participating Receptor Vacant	344328	4865906
RV098	Non-Participating Receptor Vacant	343768	4866001
RV099	Non-Participating Receptor Vacant	341917	4866835
RV100	Non-Participating Receptor Vacant	341741	4866758
RV101	Non-Participating Receptor Vacant	341028	4866365
RV102	Non-Participating Receptor Vacant	340816	4866295
RV103	Non-Participating Receptor Vacant	340672	4866297
RV104	Non-Participating Receptor Vacant	337283	4864530
RV105	Non-Participating Receptor Vacant	336757	4864226
RV106	Non-Participating Receptor Vacant	336180	4863901
RV107	Non-Participating Receptor Vacant	328931	4863489
RV108	Non-Participating Receptor Vacant	335385	4861722
RV109	Non-Participating Receptor Vacant	339642	4866019
RV110	Non-Participating Receptor Vacant	339779	4865887
RV111	Non-Participating Receptor Vacant	336677	4864049
RV112	Non-Participating Receptor Vacant	332001	4866321
RV113	Non-Participating Receptor Vacant	344153	4865873
RV114	Non-Participating Receptor Vacant	345083	4865874
RV115	Non-Participating Receptor Vacant	328530	4864424
RV116	Non-Participating Receptor Vacant	328854	4863437
RV117	Non-Participating Receptor Vacant	328777	4865440

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
RV118	Non-Participating Receptor Vacant	329174	4861451
RV119	Non-Participating Receptor Vacant	330279	4860009
RV120	Non-Participating Receptor Vacant	329045	4861486
RV121	Non-Participating Receptor Vacant	329207	4861583
RV122	Non-Participating Receptor Vacant	333934	4863135
RV123	Non-Participating Receptor Vacant	335053	4863075
RV124	Non-Participating Receptor Vacant	335304	4861399
RV125	Non-Participating Receptor Vacant	335416	4864539
RV126	Non-Participating Receptor Vacant	328760	4863282
RV127	Non-Participating Receptor Vacant	329897	4861904
RV128	Non-Participating Receptor Vacant	331306	4866294
RV129	Non-Participating Receptor Vacant	331575	4866830
RV130	Non-Participating Receptor Vacant	331617	4866823
RV131	Non-Participating Receptor Vacant	331849	4866670
RV132	Non-Participating Receptor Vacant	332053	4866794
RV133	Non-Participating Receptor Vacant	331206	4866805
RV134	Non-Participating Receptor Vacant	330930	4867143
RV135	Non-Participating Receptor Vacant	333007	4863862
RV136	Non-Participating Receptor Vacant	332466	4866184
RV137	Non-Participating Receptor Vacant	332103	4866548
RV138	Non-Participating Receptor Vacant	332122	4866675
RV139	Non-Participating Receptor Vacant	332520	4866219
RV140	Non-Participating Receptor Vacant	332562	4866184
RV141	Non-Participating Receptor Vacant	334510	4864772
RV142	Non-Participating Receptor Vacant	333921	4865567
RV143	Non-Participating Receptor Vacant	332424	4866795
RV144	Non-Participating Receptor Vacant	333411	4867497
RV145	Non-Participating Receptor Vacant	336299	4863934
RV146	Non-Participating Receptor Vacant	340083	4865718
RV147	Non-Participating Receptor Vacant	341321	4865234
RV148	Non-Participating Receptor Vacant	342568	4864212
RV149	Non-Participating Receptor Vacant	339495	4866297
RV150	Non-Participating Receptor Vacant	341534	4865362
RV151	Non-Participating Receptor Vacant	343603	4866106
RV152	Non-Participating Receptor Vacant	344936	4865937
RV153	Non-Participating Receptor Vacant	329416	4864282
RV154	Non-Participating Receptor Vacant	336748	4864110
RV155	Non-Participating Receptor Vacant	336028	4863842
RV156	Non-Participating Receptor Vacant	334832	4865620
RV157	Non-Participating Receptor Vacant	331457	4862916
RV158	Non-Participating Receptor Vacant	337072	4863066
RV159	Non-Participating Receptor Vacant	330001	4864556
RV160	Non-Participating Receptor Vacant	327903	4881363
RV161	Non-Participating Receptor Vacant	328179	4880321
RV162	Non-Participating Receptor Vacant	327271	4880787
RV163	Non-Participating Receptor Vacant	327996	4880011
RV164	Non-Participating Receptor Vacant	326229	4880428
RV165	Non-Participating Receptor Vacant	326785	4881023
RV166	Non-Participating Receptor Vacant	327648	4881884
RV167	Non-Participating Receptor Vacant	328715	4881111
RV168	Non-Participating Receptor Vacant	328445	4880179
RV170	Non-Participating Receptor Vacant	328440	4880226
RV171	Non-Participating Receptor Vacant	327385	4882004
RV172	Non-Participating Receptor Vacant	333123	4865382

Table A4: Participating Receptor Locations
White Pines Wind Project

Point of Reception ID	Description	UTM Coordinates	
		Easting	Northing
PR01	Participating Receptor	330181	4862054
PR02	Participating Receptor	331915	4863140
PR03	Participating Receptor	333774	4864305
PR04	Participating Receptor	332653	4863572
PR05	Participating Receptor	331122	4862590
PR06	Participating Receptor	332917	4863798
PR07	Participating Receptor	340351	4866122
PR08	Participating Receptor	331320	4862752
PR09	Participating Receptor	331374	4866203
PR10	Participating Receptor	332800	4866057
PR11	Participating Receptor	329549	4863639
PR12	Participating Receptor	330921	4862472
PR13	Participating Receptor	329621	4863665
PR14	Participating Receptor	329537	4864220
PR15	Participating Receptor	341735	4865660
PR16	Participating Receptor	331941	4863156
PR17	Participating Receptor	328895	4863379
PR18	Participating Receptor	342541	4865727
PR19	Participating Receptor	333249	4865172

Table A5: Wind Turbine Noise Impact Summary - Non-Participating Receptor Locations
White Pines Wind Project, Cumulative Impact

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R001	Non-Participating	4.5	757	WTG19	39.5	40.0
R002	Non-Participating	4.5	918	WTG11	39.8	40.0
R003	Non-Participating	4.5	604	WTG25	37.8	40.0
R004	Non-Participating	4.5	716	WTG25	37.3	40.0
R005	Non-Participating	4.5	843	WTG29	34.7	40.0
R006	Non-Participating	4.5	565	WTG25	38.6	40.0
R007	Non-Participating	4.5	684	WTG25	37.4	40.0
R008	Non-Participating	4.5	896	WTG09	39.3	40.0
R009	Non-Participating	4.5	636	WTG07	38.8	40.0
R010	Non-Participating	4.5	1915	WTG27	NA	40.0
R011	Non-Participating	4.5	1208	WTG01	34.2	40.0
R012	Non-Participating	4.5	711	WTG08	38.0	40.0
R013	Non-Participating	4.5	678	WTG08	37.8	40.0
R014	Non-Participating	4.5	713	WTG08	37.7	40.0
R015	Non-Participating	4.5	1084	WTG17	38.6	40.0
R016	Non-Participating	4.5	650	WTG20	39.5	40.0
R017	Non-Participating	4.5	767	WTG06	39.1	40.0
R018	Non-Participating	4.5	565	WTG07	39.7	40.0
R019	Non-Participating	4.5	925	WTG10	35.4	40.0
R020	Non-Participating	4.5	746	WTG07	38.9	40.0
R021	Non-Participating	4.5	695	WTG04	39.6	40.0
R022	Non-Participating	4.5	745	WTG05	39.4	40.0
R023	Non-Participating	4.5	946	WTG11	39.0	40.0
R024	Non-Participating	4.5	621	WTG11	39.9	40.0
R025	Non-Participating	4.5	987	WTG10	35.1	40.0
R026	Non-Participating	4.5	621	WTG04	39.7	40.0
R027	Non-Participating	4.5	775	WTG11	39.2	40.0
R028	Non-Participating	4.5	806	WTG11	38.9	40.0
R029	Non-Participating	4.5	660	WTG05	39.9	40.0
R030	Non-Participating	4.5	649	WTG11	39.8	40.0
R031	Non-Participating	4.5	1041	WTG09	36.1	40.0
R032	Non-Participating	4.5	669	WTG05	39.9	40.0
R033	Non-Participating	4.5	648	WTG07	38.7	40.0
R034	Non-Participating	4.5	826	WTG17	39.6	40.0
R035	Non-Participating	4.5	801	WTG08	37.5	40.0
R036	Non-Participating	4.5	823	WTG09	38.0	40.0
R037	Non-Participating	4.5	897	WTG10	35.7	40.0
R038	Non-Participating	4.5	682	TS2	39.3	40.0
R039	Non-Participating	4.5	1031	WTG08	35.2	40.0
R040	Non-Participating	4.5	1027	WTG09	36.3	40.0
R041	Non-Participating	4.5	1107	WTG01	36.1	40.0
R042	Non-Participating	4.5	609	WTG06	38.3	40.0
R043	Non-Participating	4.5	1079	WTG09	35.8	40.0
R044	Non-Participating	4.5	851	WTG08	37.8	40.0
R045	Non-Participating	4.5	2782	WTG25	NA	40.0
R046	Non-Participating	4.5	2667	WTG25	NA	40.0
R047	Non-Participating	4.5	2463	WTG25	NA	40.0
R048	Non-Participating	4.5	1542	WTG25	NA	40.0
R049	Non-Participating	4.5	1508	WTG25	NA	40.0
R050	Non-Participating	4.5	1395	WTG25	30.5	40.0
R051	Non-Participating	4.5	1310	WTG25	31.8	40.0
R052	Non-Participating	4.5	1477	WTG21	32.5	40.0
R053	Non-Participating	4.5	1092	WTG21	34.7	40.0
R054	Non-Participating	4.5	1011	WTG21	35.2	40.0
R055	Non-Participating	4.5	876	WTG21	36.1	40.0
R056	Non-Participating	4.5	646	WTG21	38.2	40.0
R057	Non-Participating	4.5	631	WTG21	38.4	40.0
R058	Non-Participating	4.5	693	WTG21	38.2	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R059	Non-Participating	4.5	914	WTG23	39.8	40.0
R060	Non-Participating	4.5	768	WTG21	37.4	40.0
R061	Non-Participating	4.5	730	WTG21	38.0	40.0
R062	Non-Participating	4.5	783	WTG21	37.4	40.0
R063	Non-Participating	4.5	811	WTG21	37.2	40.0
R064	Non-Participating	4.5	1257	WTG21	35.1	40.0
R065	Non-Participating	4.5	1166	WTG21	35.3	40.0
R066	Non-Participating	4.5	1447	WTG21	34.3	40.0
R067	Non-Participating	4.5	1222	WTG21	35.1	40.0
R068	Non-Participating	4.5	1366	WTG21	34.6	40.0
R069	Non-Participating	4.5	2043	WTG21	NA	40.0
R070	Non-Participating	4.5	1346	WTG25	32.1	40.0
R071	Non-Participating	4.5	685	WTG25	36.5	40.0
R072	Non-Participating	4.5	610	WTG25	37.5	40.0
R073	Non-Participating	4.5	605	WTG25	37.6	40.0
R074	Non-Participating	4.5	814	WTG26	36.9	40.0
R075	Non-Participating	4.5	858	WTG26	36.6	40.0
R076	Non-Participating	4.5	636	WTG26	37.6	40.0
R077	Non-Participating	4.5	652	WTG26	37.2	40.0
R078	Non-Participating	4.5	621	WTG26	37.5	40.0
R079	Non-Participating	4.5	618	WTG26	37.4	40.0
R080	Non-Participating	4.5	657	WTG26	36.9	40.0
R081	Non-Participating	4.5	670	WTG26	36.7	40.0
R082	Non-Participating	4.5	666	WTG26	36.7	40.0
R083	Non-Participating	4.5	709	WTG29	37.0	40.0
R084	Non-Participating	4.5	590	WTG29	38.3	40.0
R085	Non-Participating	4.5	560	WTG29	38.7	40.0
R086	Non-Participating	4.5	564	WTG29	38.5	40.0
R087	Non-Participating	4.5	569	WTG29	38.4	40.0
R088	Non-Participating	4.5	602	WTG29	37.8	40.0
R089	Non-Participating	4.5	682	WTG29	36.7	40.0
R090	Non-Participating	4.5	755	WTG29	35.8	40.0
R091	Non-Participating	4.5	772	WTG29	35.6	40.0
R092	Non-Participating	4.5	803	WTG29	35.2	40.0
R093	Non-Participating	4.5	632	WTG29	37.5	40.0
R094	Non-Participating	4.5	669	WTG29	37.5	40.0
R095	Non-Participating	4.5	1034	WTG27	34.5	40.0
R096	Non-Participating	4.5	855	WTG27	35.8	40.0
R097	Non-Participating	4.5	950	WTG27	37.1	40.0
R098	Non-Participating	4.5	1045	WTG27	36.9	40.0
R099	Non-Participating	4.5	880	WTG26	37.5	40.0
R100	Non-Participating	4.5	632	WTG28	39.5	40.0
R101	Non-Participating	4.5	1424	WTG25	37.1	40.0
R102	Non-Participating	4.5	571	WTG20	39.7	40.0
R103	Non-Participating	4.5	790	WTG20	37.7	40.0
R104	Non-Participating	4.5	775	WTG20	37.9	40.0
R105	Non-Participating	4.5	797	WTG20	38.3	40.0
R106	Non-Participating	4.5	1224	WTG25	32.7	40.0
R108	Non-Participating	4.5	753	TS2	39.1	40.0
R109	Non-Participating	4.5	773	WTG06	36.8	40.0
R110	Non-Participating	4.5	1043	WTG06	34.6	40.0
R111	Non-Participating	4.5	1451	WTG06	32.8	40.0
R112	Non-Participating	4.5	1434	WTG06	33.0	40.0
R113	Non-Participating	4.5	1509	WTG06	NA	40.0
R114	Non-Participating	4.5	1079	WTG08	35.5	40.0
R115	Non-Participating	4.5	796	WTG04	39.3	40.0
R116	Non-Participating	4.5	662	WTG04	39.0	40.0
R117	Non-Participating	4.5	738	WTG04	37.1	40.0
R118	Non-Participating	4.5	675	WTG01	37.8	40.0
R119	Non-Participating	4.5	1032	WTG01	35.2	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R120	Non-Participating	4.5	696	WTG04	38.9	40.0
R121	Non-Participating	4.5	751	WTG04	37.7	40.0
R122	Non-Participating	4.5	750	WTG04	37.5	40.0
R123	Non-Participating	4.5	1324	WTG21	34.9	40.0
R124	Non-Participating	4.5	1278	WTG21	35.0	40.0
R125	Non-Participating	4.5	1009	WTG04	34.7	40.0
R126	Non-Participating	4.5	587	WTG04	39.3	40.0
R127	Non-Participating	4.5	935	WTG01	35.7	40.0
R128	Non-Participating	4.5	958	WTG01	35.7	40.0
R129	Non-Participating	4.5	739	WTG01	37.2	40.0
R130	Non-Participating	4.5	933	WTG01	35.8	40.0
R131	Non-Participating	4.5	856	WTG01	36.2	40.0
R132	Non-Participating	4.5	1027	WTG27	34.5	40.0
R133	Non-Participating	4.5	1137	WTG10	34.7	40.0
R134	Non-Participating	4.5	703	WTG18	37.5	40.0
R135	Non-Participating	4.5	668	WTG18	37.8	40.0
R136	Non-Participating	4.5	628	WTG18	38.3	40.0
R137	Non-Participating	4.5	803	WTG18	36.5	40.0
R138	Non-Participating	4.5	781	WTG18	36.8	40.0
R139	Non-Participating	4.5	857	WTG18	36.2	40.0
R140	Non-Participating	4.5	781	WTG20	38.3	40.0
R141	Non-Participating	4.5	777	WTG20	38.0	40.0
R142	Non-Participating	4.5	726	WTG21	37.7	40.0
R143	Non-Participating	4.5	860	WTG21	36.8	40.0
R144	Non-Participating	4.5	882	WTG21	36.8	40.0
R145	Non-Participating	4.5	930	WTG21	36.4	40.0
R146	Non-Participating	4.5	979	WTG21	36.1	40.0
R147	Non-Participating	4.5	905	WTG21	36.6	40.0
R148	Non-Participating	4.5	745	WTG21	37.4	40.0
R149	Non-Participating	4.5	1252	WTG21	34.9	40.0
R150	Non-Participating	4.5	679	WTG26	36.5	40.0
R151	Non-Participating	4.5	888	WTG29	34.3	40.0
R152	Non-Participating	4.5	962	WTG29	33.6	40.0
R153	Non-Participating	4.5	1040	WTG29	32.9	40.0
R154	Non-Participating	4.5	1140	WTG29	32.0	40.0
R155	Non-Participating	4.5	684	WTG29	36.7	40.0
R157	Non-Participating	4.5	1144	WTG08	35.0	40.0
R158	Non-Participating	4.5	1423	WTG08	33.1	40.0
R159	Non-Participating	4.5	889	WTG08	37.1	40.0
R160	Non-Participating	4.5	622	WTG28	39.5	40.0
R161	Non-Participating	4.5	707	WTG11	39.5	40.0
R162	Non-Participating	4.5	1053	WTG22	38.8	40.0
R163	Non-Participating	4.5	835	WTG01	36.4	40.0
R164	Non-Participating	4.5	1237	WTG21	35.1	40.0
R165	Non-Participating	4.5	1077	WTG01	34.2	40.0
R166	Non-Participating	4.5	1044	WTG01	35.1	40.0
R167	Non-Participating	4.5	1094	WTG01	34.8	40.0
R168	Non-Participating	4.5	1109	WTG01	34.8	40.0
R169	Non-Participating	4.5	1079	WTG01	35.1	40.0
R170	Non-Participating	4.5	1051	WTG01	35.3	40.0
R171	Non-Participating	4.5	1030	WTG01	35.5	40.0
R172	Non-Participating	4.5	1073	WTG01	35.5	40.0
R173	Non-Participating	4.5	1130	WTG01	35.2	40.0
R174	Non-Participating	4.5	1119	WTG01	35.4	40.0
R175	Non-Participating	4.5	1067	WTG01	35.9	40.0
R176	Non-Participating	4.5	1076	WTG04	36.0	40.0
R177	Non-Participating	4.5	1109	WTG04	35.9	40.0
R178	Non-Participating	4.5	1128	WTG04	35.7	40.0
R179	Non-Participating	4.5	1160	WTG01	35.3	40.0
R180	Non-Participating	4.5	1166	WTG01	35.1	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R181	Non-Participating	4.5	1171	WTG01	35.1	40.0
R182	Non-Participating	4.5	1216	WTG01	34.6	40.0
R183	Non-Participating	4.5	1230	WTG01	34.4	40.0
R184	Non-Participating	4.5	1253	WTG01	34.1	40.0
R185	Non-Participating	4.5	1213	WTG01	34.3	40.0
R186	Non-Participating	4.5	1137	WTG01	35.0	40.0
R187	Non-Participating	4.5	1151	WTG01	34.8	40.0
R188	Non-Participating	4.5	1181	WTG01	34.6	40.0
R189	Non-Participating	4.5	1147	WTG01	34.5	40.0
R190	Non-Participating	4.5	1113	WTG01	34.9	40.0
R191	Non-Participating	4.5	1086	WTG01	35.2	40.0
R192	Non-Participating	4.5	1175	WTG01	34.4	40.0
R193	Non-Participating	4.5	1214	WTG01	34.3	40.0
R194	Non-Participating	4.5	1221	WTG01	34.1	40.0
R195	Non-Participating	4.5	1288	WTG01	33.8	40.0
R196	Non-Participating	4.5	1197	WTG01	34.2	40.0
R197	Non-Participating	4.5	1181	WTG01	34.3	40.0
R198	Non-Participating	4.5	1164	WTG01	34.3	40.0
R199	Non-Participating	4.5	1153	WTG01	34.2	40.0
R200	Non-Participating	4.5	1173	WTG01	33.9	40.0
R201	Non-Participating	4.5	1155	WTG01	34.0	40.0
R202	Non-Participating	4.5	1144	WTG01	34.0	40.0
R203	Non-Participating	4.5	1189	WTG01	33.6	40.0
R204	Non-Participating	4.5	1151	WTG01	33.9	40.0
R205	Non-Participating	4.5	1153	WTG01	33.7	40.0
R206	Non-Participating	4.5	1170	WTG01	33.6	40.0
R207	Non-Participating	4.5	1193	WTG01	33.2	40.0
R208	Non-Participating	4.5	1087	WTG01	34.4	40.0
R209	Non-Participating	4.5	1030	WTG01	35.0	40.0
R210	Non-Participating	4.5	1106	WTG01	34.6	40.0
R211	Non-Participating	4.5	1112	WTG01	34.5	40.0
R212	Non-Participating	4.5	1013	WTG01	35.0	40.0
R213	Non-Participating	4.5	969	WTG01	35.3	40.0
R214	Non-Participating	4.5	940	WTG01	35.5	40.0
R215	Non-Participating	4.5	912	WTG01	35.7	40.0
R216	Non-Participating	4.5	732	WTG01	37.1	40.0
R217	Non-Participating	4.5	732	WTG01	37.1	40.0
R218	Non-Participating	4.5	647	WTG01	38.0	40.0
R219	Non-Participating	4.5	1158	WTG01	33.4	40.0
R220	Non-Participating	4.5	1137	WTG01	33.6	40.0
R221	Non-Participating	4.5	1155	WTG01	34.3	40.0
R222	Non-Participating	4.5	1393	WTG01	33.4	40.0
R223	Non-Participating	4.5	1262	WTG04	33.1	40.0
R224	Non-Participating	4.5	1218	WTG01	32.9	40.0
R225	Non-Participating	4.5	1232	WTG01	32.8	40.0
R226	Non-Participating	4.5	900	WTG04	37.5	40.0
R227	Non-Participating	4.5	921	WTG04	37.7	40.0
R228	Non-Participating	4.5	862	WTG04	37.7	40.0
R229	Non-Participating	4.5	854	WTG04	37.5	40.0
R230	Non-Participating	4.5	808	WTG04	37.5	40.0
R231	Non-Participating	4.5	762	WTG04	37.6	40.0
R232	Non-Participating	4.5	682	WTG04	37.9	40.0
R233	Non-Participating	4.5	685	WTG04	37.7	40.0
R234	Non-Participating	4.5	1083	WTG01	34.2	40.0
R235	Non-Participating	4.5	1077	WTG01	34.3	40.0
R236	Non-Participating	4.5	1081	WTG01	34.3	40.0
R237	Non-Participating	4.5	1089	WTG01	34.3	40.0
R238	Non-Participating	4.5	1382	WTG01	32.4	40.0
R239	Non-Participating	4.5	1390	WTG01	32.1	40.0
R240	Non-Participating	4.5	1386	WTG01	32.4	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R241	Non-Participating	4.5	1382	WTG01	32.6	40.0
R242	Non-Participating	4.5	1409	WTG01	32.5	40.0
R243	Non-Participating	4.5	1524	WTG01	NA	40.0
R244	Non-Participating	4.5	1578	WTG04	NA	40.0
R245	Non-Participating	4.5	1510	WTG04	NA	40.0
R246	Non-Participating	4.5	1467	WTG04	32.6	40.0
R247	Non-Participating	4.5	1450	WTG04	32.8	40.0
R248	Non-Participating	4.5	1394	WTG01	33.2	40.0
R249	Non-Participating	4.5	1352	WTG04	32.3	40.0
R250	Non-Participating	4.5	1563	WTG01	NA	40.0
R251	Non-Participating	4.5	1464	WTG01	31.6	40.0
R252	Non-Participating	4.5	1426	WTG01	31.5	40.0
R253	Non-Participating	4.5	1134	WTG01	33.5	40.0
R254	Non-Participating	4.5	1264	WTG04	33.7	40.0
R255	Non-Participating	4.5	1274	WTG04	32.2	40.0
R256	Non-Participating	4.5	1273	WTG04	31.9	40.0
R257	Non-Participating	4.5	1199	WTG04	32.4	40.0
R258	Non-Participating	4.5	1006	WTG04	33.6	40.0
R259	Non-Participating	4.5	1334	WTG04	31.3	40.0
R260	Non-Participating	4.5	1392	WTG04	30.5	40.0
R261	Non-Participating	4.5	1411	WTG04	30.4	40.0
R262	Non-Participating	4.5	1327	WTG04	30.9	40.0
R263	Non-Participating	4.5	1358	WTG04	30.5	40.0
R264	Non-Participating	4.5	1518	WTG04	NA	40.0
R265	Non-Participating	4.5	1175	WTG01	33.4	40.0
R266	Non-Participating	4.5	1278	WTG01	33.0	40.0
R267	Non-Participating	4.5	1438	WTG01	32.4	40.0
R268	Non-Participating	4.5	1301	WTG01	33.1	40.0
R269	Non-Participating	4.5	1072	WTG01	33.9	40.0
R270	Non-Participating	4.5	1115	WTG01	33.6	40.0
R271	Non-Participating	4.5	1123	WTG01	33.5	40.0
R272	Non-Participating	4.5	1137	WTG01	33.5	40.0
R273	Non-Participating	4.5	1142	WTG01	33.5	40.0
R274	Non-Participating	4.5	1311	WTG01	32.4	40.0
R275	Non-Participating	4.5	1481	WTG01	32.2	40.0
R276	Non-Participating	4.5	1147	WTG10	34.2	40.0
R277	Non-Participating	4.5	1197	WTG08	34.0	40.0
R278	Non-Participating	4.5	1085	WTG10	35.0	40.0
R279	Non-Participating	4.5	1356	WTG08	32.4	40.0
R280	Non-Participating	4.5	1290	WTG08	33.3	40.0
R281	Non-Participating	4.5	1271	WTG08	33.3	40.0
R282	Non-Participating	4.5	1372	WTG08	32.1	40.0
R283	Non-Participating	4.5	1472	WTG08	31.5	40.0
R284	Non-Participating	4.5	1074	WTG21	34.8	40.0
R285	Non-Participating	4.5	695	WTG04	38.1	40.0
R286	Non-Participating	4.5	733	WTG25	36.1	40.0
R287	Non-Participating	4.5	666	WTG29	37.4	40.0
R288	Non-Participating	4.5	1284	WTG08	34.0	40.0
R289	Non-Participating	4.5	2306	WTG10	NA	40.0
R290	Non-Participating	4.5	1789	WTG01	NA	40.0
R291	Non-Participating	4.5	1374	WTG01	33.6	40.0
R292	Non-Participating	4.5	1465	WTG08	31.6	40.0
R293	Non-Participating	4.5	1682	WTG08	NA	40.0
R294	Non-Participating	4.5	1396	WTG29	30.1	40.0
R295	Non-Participating	4.5	1233	WTG29	31.2	40.0
R296	Non-Participating	4.5	1336	WTG29	30.5	40.0
R297	Non-Participating	4.5	1502	WTG29	NA	40.0
R298	Non-Participating	4.5	619	WTG29	37.5	40.0
R299	Non-Participating	4.5	582	WTG29	38.6	40.0
R300	Non-Participating	4.5	684	WTG26	37.0	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R301	Non-Participating	4.5	1283	WTG25	32.4	40.0
R302	Non-Participating	4.5	1469	WTG25	31.3	40.0
R303	Non-Participating	4.5	1662	WTG21	NA	40.0
R304	Non-Participating	4.5	1512	WTG21	NA	40.0
R305	Non-Participating	4.5	1086	WTG21	35.6	40.0
R306	Non-Participating	4.5	1645	WTG06	NA	40.0
R307	Non-Participating	4.5	2128	WTG04	NA	40.0
R308	Non-Participating	4.5	2056	WTG04	NA	40.0
R309	Non-Participating	4.5	1888	WTG04	NA	40.0
R310	Non-Participating	4.5	1733	WTG06	NA	40.0
R311	Non-Participating	4.5	1028	WTG01	35.6	40.0
R312	Non-Participating	4.5	1877	WTG10	NA	40.0
R313	Non-Participating	4.5	942	WTG21	35.6	40.0
R314	Non-Participating	4.5	731	WTG07	38.8	40.0
R315	Non-Participating	4.5	615	WTG07	39.2	40.0
R316	Non-Participating	4.5	659	WTG06	39.7	40.0
R317	Non-Participating	4.5	727	WTG08	37.6	40.0
R318	Non-Participating	4.5	738	TS2	39.0	40.0
R319	Non-Participating	4.5	687	WTG08	38.0	40.0
R320	Non-Participating	4.5	937	WTG10	35.3	40.0
R321	Non-Participating	4.5	1025	WTG01	35.5	40.0
R322	Non-Participating	4.5	1159	WTG01	34.5	40.0
R323	Non-Participating	4.5	1106	WTG01	35.1	40.0
R324	Non-Participating	4.5	1029	WTG04	36.2	40.0
R325	Non-Participating	4.5	1068	WTG04	33.6	40.0
R326	Non-Participating	4.5	567	WTG25	38.6	40.0
R327	Non-Participating	4.5	651	WTG25	36.9	40.0
R328	Non-Participating	4.5	1404	WTG29	30.0	40.0
R329	Non-Participating	4.5	802	WTG11	39.0	40.0
R330	Non-Participating	4.5	505	TS1	35.6	40.0
R331	Non-Participating	4.5	632	TS1	33.5	40.0
R332	Non-Participating	4.5	585	TS1	34.2	40.0
R333	Non-Participating	4.5	618	TS1	33.7	40.0
R334	Non-Participating	4.5	645	TS1	33.3	40.0
R335	Non-Participating	4.5	804	TS1	31.0	40.0
R336	Non-Participating	4.5	946	TS1	29.3	40.0
R337	Non-Participating	4.5	1144	TS1	27.3	40.0
R338	Non-Participating	4.5	1216	TS1	26.6	40.0
R339	Non-Participating	4.5	1307	TS1	25.8	40.0
R340	Non-Participating	4.5	1175	TS1	27.0	40.0
R341	Non-Participating	4.5	1227	TS1	26.5	40.0
R342	Non-Participating	4.5	1382	TS1	25.2	40.0
R345	Non-Participating	4.5	1015	TS1	28.6	40.0
R346	Non-Participating	4.5	1030	TS1	28.4	40.0
R347	Non-Participating	4.5	1208	TS1	26.7	40.0
R348	Non-Participating	4.5	1306	TS1	25.8	40.0
R349	Non-Participating	4.5	1394	TS1	25.1	40.0
R350	Non-Participating	4.5	1440	TS1	24.7	40.0
R351	Non-Participating	4.5	1528	TS1	NA	40.0
R352	Non-Participating	4.5	1556	TS1	NA	40.0
R353	Non-Participating	4.5	1466	TS1	24.5	40.0
R354	Non-Participating	4.5	1475	TS1	24.4	40.0
R358	Non-Participating	4.5	1304	TS1	25.8	40.0
R359	Non-Participating	4.5	795	TS1	31.1	40.0
R360	Non-Participating	4.5	755	TS1	31.7	40.0
R361	Non-Participating	4.5	713	TS1	32.2	40.0
R362	Non-Participating	4.5	721	TS1	32.1	40.0
R363	Non-Participating	4.5	1454	TS1	24.6	40.0
R364	Non-Participating	4.5	1317	TS1	21.3	40.0
R365	Non-Participating	4.5	1278	TS1	26.0	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R366	Non-Participating	4.5	989	TS1	28.8	40.0
R367	Non-Participating	4.5	1071	TS1	28.0	40.0
R368	Non-Participating	4.5	1449	TS1	20.2	40.0
R369	Non-Participating	4.5	1107	TS1	27.6	40.0
R370	Non-Participating	4.5	1330	TS1	21.2	40.0
R371	Non-Participating	4.5	1533	TS1	NA	40.0
R372	Non-Participating	4.5	1304	TS1	25.8	40.0
R373	Non-Participating	4.5	976	TS1	29.0	40.0
R374	Non-Participating	4.5	940	TS1	29.4	40.0
R375	Non-Participating	4.5	884	TS1	30.0	40.0
R376	Non-Participating	4.5	1039	TS1	28.3	40.0
R377	Non-Participating	4.5	1306	TS1	25.8	40.0
R378	Non-Participating	4.5	1229	TS1	26.5	40.0
R379	Non-Participating	4.5	773	TS1	31.4	40.0
R380	Non-Participating	4.5	675	TS1	32.8	40.0
R381	Non-Participating	4.5	658	TS1	33.0	40.0
R382	Non-Participating	4.5	1472	TS1	20.0	40.0
R383	Non-Participating	4.5	554	WTG20	39.8	40.0
RV001	Non-Participating Vacant	4.5	933	WTG10	35.3	40.0
RV002	Non-Participating Vacant	4.5	727	WTG29	36.9	40.0
RV003	Non-Participating Vacant	4.5	571	WTG20	39.7	40.0
RV004	Non-Participating Vacant	4.5	636	WTG28	39.6	40.0
RV005	Non-Participating Vacant	4.5	710	WTG04	38.3	40.0
RV006	Non-Participating Vacant	4.5	642	WTG06	39.8	40.0
RV007	Non-Participating Vacant	4.5	893	WTG08	39.5	40.0
RV008	Non-Participating Vacant	4.5	779	WTG29	36.8	40.0
RV009	Non-Participating Vacant	4.5	2711	WTG25	NA	40.0
RV010	Non-Participating Vacant	4.5	623	WTG25	37.9	40.0
RV011	Non-Participating Vacant	4.5	674	WTG25	37.6	40.0
RV012	Non-Participating Vacant	4.5	872	WTG25	37.2	40.0
RV013	Non-Participating Vacant	4.5	697	WTG11	39.3	40.0
RV014	Non-Participating Vacant	4.5	760	WTG08	38.6	40.0
RV015	Non-Participating Vacant	4.5	610	WTG18	38.5	40.0
RV016	Non-Participating Vacant	4.5	769	WTG20	37.9	40.0
RV017	Non-Participating Vacant	4.5	745	WTG20	38.0	40.0
RV018	Non-Participating Vacant	4.5	806	WTG22	38.5	40.0
RV019	Non-Participating Vacant	4.5	1423	WTG21	34.6	40.0
RV020	Non-Participating Vacant	4.5	2242	WTG21	NA	40.0
RV021	Non-Participating Vacant	4.5	1134	WTG20	36.6	40.0
RV022	Non-Participating Vacant	4.5	877	WTG29	37.2	40.0
RV023	Non-Participating Vacant	4.5	573	WTG25	38.4	40.0
RV024	Non-Participating Vacant	4.5	740	WTG25	37.0	40.0
RV025	Non-Participating Vacant	4.5	837	WTG27	36.4	40.0
RV026	Non-Participating Vacant	4.5	713	WTG29	37.6	40.0
RV027	Non-Participating Vacant	4.5	610	WTG26	37.4	40.0
RV028	Non-Participating Vacant	4.5	785	WTG28	38.1	40.0
RV029	Non-Participating Vacant	4.5	762	WTG29	36.7	40.0
RV030	Non-Participating Vacant	4.5	812	WTG29	36.9	40.0
RV031	Non-Participating Vacant	4.5	1465	WTG25	37.3	40.0
RV032	Non-Participating Vacant	4.5	736	TS2	39.0	40.0
RV033	Non-Participating Vacant	4.5	723	WTG12	38.3	40.0
RV034	Non-Participating Vacant	4.5	1692	WTG08	NA	40.0
RV035	Non-Participating Vacant	4.5	1189	WTG08	34.6	40.0
RV036	Non-Participating Vacant	4.5	702	WTG12	38.5	40.0
RV037	Non-Participating Vacant	4.5	696	WTG12	38.6	40.0
RV038	Non-Participating Vacant	4.5	702	WTG12	38.7	40.0
RV039	Non-Participating Vacant	4.5	731	WTG12	38.5	40.0
RV040	Non-Participating Vacant	4.5	768	WTG12	38.4	40.0
RV041	Non-Participating Vacant	4.5	813	WTG12	38.2	40.0
RV042	Non-Participating Vacant	4.5	874	WTG12	37.8	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV043	Non-Participating Vacant	4.5	934	WTG13	37.5	40.0
RV044	Non-Participating Vacant	4.5	998	WTG13	36.8	40.0
RV045	Non-Participating Vacant	4.5	930	WTG13	37.3	40.0
RV046	Non-Participating Vacant	4.5	864	WTG13	37.9	40.0
RV047	Non-Participating Vacant	4.5	799	WTG13	38.5	40.0
RV048	Non-Participating Vacant	4.5	736	WTG13	39.1	40.0
RV049	Non-Participating Vacant	4.5	763	WTG12	38.0	40.0
RV050	Non-Participating Vacant	4.5	813	WTG12	37.7	40.0
RV051	Non-Participating Vacant	4.5	874	WTG12	37.4	40.0
RV052	Non-Participating Vacant	4.5	942	WTG12	37.1	40.0
RV053	Non-Participating Vacant	4.5	1013	WTG12	37.0	40.0
RV054	Non-Participating Vacant	4.5	839	WTG08	37.6	40.0
RV055	Non-Participating Vacant	4.5	1061	WTG08	35.6	40.0
RV056	Non-Participating Vacant	4.5	840	WTG25	37.5	40.0
RV057	Non-Participating Vacant	4.5	859	WTG10	37.5	40.0
RV058	Non-Participating Vacant	4.5	964	WTG10	37.5	40.0
RV059	Non-Participating Vacant	4.5	610	WTG06	39.5	40.0
RV060	Non-Participating Vacant	4.5	853	WTG23	39.9	40.0
RV061	Non-Participating Vacant	4.5	1242	WTG01	34.3	40.0
RV062	Non-Participating Vacant	4.5	1594	WTG01	NA	40.0
RV063	Non-Participating Vacant	4.5	1618	WTG01	NA	40.0
RV064	Non-Participating Vacant	4.5	1058	WTG01	34.8	40.0
RV065	Non-Participating Vacant	4.5	1080	WTG01	34.7	40.0
RV066	Non-Participating Vacant	4.5	1222	WTG01	32.8	40.0
RV067	Non-Participating Vacant	4.5	1203	WTG01	32.9	40.0
RV068	Non-Participating Vacant	4.5	1170	WTG01	33.2	40.0
RV069	Non-Participating Vacant	4.5	1071	WTG01	33.9	40.0
RV070	Non-Participating Vacant	4.5	795	WTG01	36.5	40.0
RV071	Non-Participating Vacant	4.5	1220	WTG04	33.0	40.0
RV072	Non-Participating Vacant	4.5	1487	WTG04	29.7	40.0
RV073	Non-Participating Vacant	4.5	1339	WTG04	31.0	40.0
RV074	Non-Participating Vacant	4.5	1277	WTG04	31.3	40.0
RV075	Non-Participating Vacant	4.5	1068	WTG01	34.1	40.0
RV076	Non-Participating Vacant	4.5	1113	WTG01	33.9	40.0
RV077	Non-Participating Vacant	4.5	1202	WTG01	33.5	40.0
RV078	Non-Participating Vacant	4.5	1429	WTG01	32.6	40.0
RV079	Non-Participating Vacant	4.5	1014	WTG01	34.4	40.0
RV080	Non-Participating Vacant	4.5	861	WTG08	36.2	40.0
RV081	Non-Participating Vacant	4.5	785	WTG08	36.8	40.0
RV082	Non-Participating Vacant	4.5	827	WTG25	35.3	40.0
RV083	Non-Participating Vacant	4.5	771	WTG25	35.7	40.0
RV084	Non-Participating Vacant	4.5	655	WTG28	39.7	40.0
RV085	Non-Participating Vacant	4.5	722	WTG10	37.9	40.0
RV086	Non-Participating Vacant	4.5	687	WTG19	39.8	40.0
RV087	Non-Participating Vacant	4.5	583	WTG18	39.3	40.0
RV088	Non-Participating Vacant	4.5	786	WTG18	38.5	40.0
RV089	Non-Participating Vacant	4.5	792	WTG27	36.4	40.0
RV090	Non-Participating Vacant	4.5	774	WTG27	36.5	40.0
RV091	Non-Participating Vacant	4.5	842	WTG29	37.9	40.0
RV092	Non-Participating Vacant	4.5	577	WTG29	38.6	40.0
RV093	Non-Participating Vacant	4.5	567	WTG29	38.5	40.0
RV094	Non-Participating Vacant	4.5	642	WTG29	37.3	40.0
RV095	Non-Participating Vacant	4.5	718	WTG29	36.3	40.0
RV096	Non-Participating Vacant	4.5	870	WTG29	34.5	40.0
RV097	Non-Participating Vacant	4.5	793	WTG29	35.3	40.0
RV098	Non-Participating Vacant	4.5	555	WTG29	38.9	40.0
RV099	Non-Participating Vacant	4.5	644	WTG26	37.0	40.0
RV100	Non-Participating Vacant	4.5	618	WTG26	37.4	40.0
RV101	Non-Participating Vacant	4.5	760	WTG25	36.9	40.0
RV102	Non-Participating Vacant	4.5	620	WTG25	37.7	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV103	Non-Participating Vacant	4.5	606	WTG25	37.7	40.0
RV104	Non-Participating Vacant	4.5	1893	WTG21	NA	40.0
RV105	Non-Participating Vacant	4.5	1308	WTG21	34.7	40.0
RV106	Non-Participating Vacant	4.5	718	WTG21	37.8	40.0
RV107	Non-Participating Vacant	4.5	1153	WTG08	35.1	40.0
RV108	Non-Participating Vacant	4.5	631	WTG20	39.0	40.0
RV109	Non-Participating Vacant	4.5	1085	WTG25	33.5	40.0
RV110	Non-Participating Vacant	4.5	918	WTG25	34.6	40.0
RV111	Non-Participating Vacant	4.5	1123	WTG21	35.6	40.0
RV112	Non-Participating Vacant	4.5	754	WTG01	37.7	40.0
RV113	Non-Participating Vacant	4.5	634	WTG29	37.3	40.0
RV114	Non-Participating Vacant	4.5	1467	WTG29	29.6	40.0
RV115	Non-Participating Vacant	4.5	1815	WTG10	NA	40.0
RV116	Non-Participating Vacant	4.5	1174	WTG08	34.7	40.0
RV117	Non-Participating Vacant	4.5	2262	WTG10	NA	40.0
RV118	Non-Participating Vacant	4.5	1339	WTG08	33.6	40.0
RV119	Non-Participating Vacant	4.5	1385	WTG13	34.1	40.0
RV120	Non-Participating Vacant	4.5	1368	WTG08	33.2	40.0
RV121	Non-Participating Vacant	4.5	1205	WTG08	34.2	40.0
RV122	Non-Participating Vacant	4.5	765	WTG07	38.0	40.0
RV123	Non-Participating Vacant	4.5	860	WTG21	37.8	40.0
RV124	Non-Participating Vacant	4.5	782	WTG20	38.0	40.0
RV125	Non-Participating Vacant	4.5	1384	WTG21	33.3	40.0
RV126	Non-Participating Vacant	4.5	1156	WTG08	34.4	40.0
RV127	Non-Participating Vacant	4.5	777	WTG08	38.3	40.0
RV128	Non-Participating Vacant	4.5	719	WTG01	37.2	40.0
RV129	Non-Participating Vacant	4.5	1174	WTG01	33.4	40.0
RV130	Non-Participating Vacant	4.5	1165	WTG01	33.5	40.0
RV131	Non-Participating Vacant	4.5	1033	WTG01	34.9	40.0
RV132	Non-Participating Vacant	4.5	1208	WTG01	34.0	40.0
RV133	Non-Participating Vacant	4.5	1227	WTG01	32.8	40.0
RV134	Non-Participating Vacant	4.5	1647	WTG01	NA	40.0
RV135	Non-Participating Vacant	4.5	680	WTG05	39.7	40.0
RV136	Non-Participating Vacant	4.5	970	WTG04	37.5	40.0
RV137	Non-Participating Vacant	4.5	1002	WTG01	35.7	40.0
RV138	Non-Participating Vacant	4.5	1125	WTG01	34.8	40.0
RV139	Non-Participating Vacant	4.5	920	WTG04	37.3	40.0
RV140	Non-Participating Vacant	4.5	874	WTG04	37.5	40.0
RV141	Non-Participating Vacant	4.5	959	WTG06	35.2	40.0
RV142	Non-Participating Vacant	4.5	729	WTG04	37.9	40.0
RV143	Non-Participating Vacant	4.5	1221	WTG04	34.1	40.0
RV144	Non-Participating Vacant	4.5	1389	WTG04	30.3	40.0
RV145	Non-Participating Vacant	4.5	801	WTG21	37.2	40.0
RV146	Non-Participating Vacant	4.5	594	WTG25	37.8	40.0
RV147	Non-Participating Vacant	4.5	790	WTG25	37.2	40.0
RV148	Non-Participating Vacant	4.5	712	WTG27	37.1	40.0
RV149	Non-Participating Vacant	4.5	1327	WTG25	32.0	40.0
RV150	Non-Participating Vacant	4.5	919	WTG25	37.3	40.0
RV151	Non-Participating Vacant	4.5	656	WTG29	38.0	40.0
RV152	Non-Participating Vacant	4.5	1348	WTG29	30.4	40.0
RV153	Non-Participating Vacant	4.5	981	WTG10	35.1	40.0
RV154	Non-Participating Vacant	4.5	1216	WTG21	35.2	40.0
RV155	Non-Participating Vacant	4.5	615	WTG21	38.7	40.0
RV156	Non-Participating Vacant	4.5	1482	WTG04	32.5	40.0
RV157	Non-Participating Vacant	4.5	717	WTG11	39.3	40.0
RV158	Non-Participating Vacant	4.5	850	WTG22	38.4	40.0
RV159	Non-Participating Vacant	4.5	909	WTG10	35.7	40.0
RV160	Non-Participating Vacant	4.5	659	TS1	33.0	40.0
RV161	Non-Participating Vacant	4.5	502	TS1	35.7	40.0
RV162	Non-Participating Vacant	4.5	592	TS1	34.1	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Source [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV163	Non-Participating Vacant	4.5	709	TS1	32.3	40.0
RV164	Non-Participating Vacant	4.5	1652	TS1	NA	40.0
RV165	Non-Participating Vacant	4.5	1118	TS1	27.5	40.0
RV166	Non-Participating Vacant	4.5	1196	TS1	22.4	40.0
RV167	Non-Participating Vacant	4.5	949	TS1	29.3	40.0
RV168	Non-Participating Vacant	4.5	790	TS1	31.2	40.0
RV170	Non-Participating Vacant	4.5	755	TS1	31.7	40.0
RV171	Non-Participating Vacant	4.5	1381	TS1	20.8	40.0
RV172	Non-Participating Vacant	4.5	743	WTG06	39.5	40.0

Table A6: Wind Turbine Noise Impact Summary - Participating Receptor Locations
White Pines Wind Project, Cumulative Impact

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
PR01	Participating	4.5	755	WTG08	39.2	40.0
PR02	Participating	4.5	680	WTG11	39.5	40.0
PR03	Participating	4.5	520	WTG06	39.8	40.0
PR04	Participating	4.5	629	TS2	39.6	40.0
PR05	Participating	4.5	903	WTG11	39.3	40.0
PR06	Participating	4.5	669	WTG05	39.8	40.0
PR07	Participating	4.5	540	WTG25	38.4	40.0
PR08	Participating	4.5	753	WTG11	39.3	40.0
PR09	Participating	4.5	607	WTG01	38.6	40.0
PR10	Participating	4.5	635	WTG04	38.3	40.0
PR11	Participating	4.5	631	WTG10	39.6	40.0
PR12	Participating	4.5	1087	WTG09	39.3	40.0
PR13	Participating	4.5	558	WTG10	40.3	40.0
PR14	Participating	4.5	849	WTG10	36.1	40.0
PR15	Participating	4.5	597	WTG26	39.1	40.0
PR16	Participating	4.5	692	WTG11	39.5	40.0
PR17	Participating	4.5	1105	WTG08	35.2	40.0
PR18	Participating	4.5	634	WTG28	40.3	40.0
PR19	Participating	4.5	499	WTG06	40.8	40.0

Table A7: Wind Turbine Noise Impact Summary - Non-Participating Receptor Locations
White Pines Wind Project, No Cumulative Impact

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R001	Non-Participating	4.5	757	WTG19	39.4	40.0
R002	Non-Participating	4.5	918	WTG11	39.8	40.0
R003	Non-Participating	4.5	604	WTG25	37.5	40.0
R004	Non-Participating	4.5	716	WTG25	36.9	40.0
R005	Non-Participating	4.5	843	WTG29	34.7	40.0
R006	Non-Participating	4.5	565	WTG25	37.9	40.0
R007	Non-Participating	4.5	684	WTG25	36.2	40.0
R008	Non-Participating	4.5	896	WTG09	39.3	40.0
R009	Non-Participating	4.5	636	WTG07	38.8	40.0
R010	Non-Participating	4.5	1915	WTG27	NA	40.0
R011	Non-Participating	4.5	1208	WTG01	34.2	40.0
R012	Non-Participating	4.5	711	WTG08	38.0	40.0
R013	Non-Participating	4.5	678	WTG08	37.8	40.0
R014	Non-Participating	4.5	713	WTG08	37.7	40.0
R015	Non-Participating	4.5	1084	WTG17	38.6	40.0
R016	Non-Participating	4.5	650	WTG20	39.3	40.0
R017	Non-Participating	4.5	767	WTG06	39.1	40.0
R018	Non-Participating	4.5	565	WTG07	39.7	40.0
R019	Non-Participating	4.5	925	WTG10	35.4	40.0
R020	Non-Participating	4.5	746	WTG07	38.9	40.0
R021	Non-Participating	4.5	695	WTG04	39.6	40.0
R022	Non-Participating	4.5	745	WTG05	39.4	40.0
R023	Non-Participating	4.5	946	WTG11	39.0	40.0
R024	Non-Participating	4.5	621	WTG11	39.9	40.0
R025	Non-Participating	4.5	987	WTG10	35.1	40.0
R026	Non-Participating	4.5	621	WTG04	39.7	40.0
R027	Non-Participating	4.5	775	WTG11	39.2	40.0
R028	Non-Participating	4.5	806	WTG11	38.9	40.0
R029	Non-Participating	4.5	660	WTG05	39.9	40.0
R030	Non-Participating	4.5	649	WTG11	39.8	40.0
R031	Non-Participating	4.5	1041	WTG09	36.1	40.0
R032	Non-Participating	4.5	669	WTG05	39.9	40.0
R033	Non-Participating	4.5	648	WTG07	38.7	40.0
R034	Non-Participating	4.5	826	WTG17	39.6	40.0
R035	Non-Participating	4.5	801	WTG08	37.5	40.0
R036	Non-Participating	4.5	823	WTG09	38.0	40.0
R037	Non-Participating	4.5	897	WTG10	35.7	40.0
R038	Non-Participating	4.5	682	TS2	39.3	40.0
R039	Non-Participating	4.5	1031	WTG08	35.2	40.0
R040	Non-Participating	4.5	1027	WTG09	36.3	40.0
R041	Non-Participating	4.5	1107	WTG01	36.1	40.0
R042	Non-Participating	4.5	609	WTG06	38.3	40.0
R043	Non-Participating	4.5	1079	WTG09	35.8	40.0
R044	Non-Participating	4.5	851	WTG08	37.8	40.0
R045	Non-Participating	4.5	2782	WTG25	NA	40.0
R046	Non-Participating	4.5	2667	WTG25	NA	40.0
R047	Non-Participating	4.5	2463	WTG25	NA	40.0
R048	Non-Participating	4.5	1542	WTG25	NA	40.0
R049	Non-Participating	4.5	1508	WTG25	NA	40.0
R050	Non-Participating	4.5	1395	WTG25	29.4	40.0
R051	Non-Participating	4.5	1310	WTG25	30.1	40.0
R052	Non-Participating	4.5	1477	WTG21	31.7	40.0
R053	Non-Participating	4.5	1092	WTG21	34.0	40.0
R054	Non-Participating	4.5	1011	WTG21	34.5	40.0
R055	Non-Participating	4.5	876	WTG21	35.5	40.0
R056	Non-Participating	4.5	646	WTG21	37.8	40.0
R057	Non-Participating	4.5	631	WTG21	38.0	40.0
R058	Non-Participating	4.5	693	WTG21	37.6	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R059	Non-Participating	4.5	914	WTG23	36.0	40.0
R060	Non-Participating	4.5	768	WTG21	36.7	40.0
R061	Non-Participating	4.5	730	WTG21	37.3	40.0
R062	Non-Participating	4.5	783	WTG21	36.7	40.0
R063	Non-Participating	4.5	811	WTG21	36.4	40.0
R064	Non-Participating	4.5	1257	WTG21	33.1	40.0
R065	Non-Participating	4.5	1166	WTG21	33.6	40.0
R066	Non-Participating	4.5	1447	WTG21	31.8	40.0
R067	Non-Participating	4.5	1222	WTG21	33.3	40.0
R068	Non-Participating	4.5	1366	WTG21	32.3	40.0
R069	Non-Participating	4.5	2043	WTG21	NA	40.0
R070	Non-Participating	4.5	1346	WTG25	29.8	40.0
R071	Non-Participating	4.5	685	WTG25	35.9	40.0
R072	Non-Participating	4.5	610	WTG25	37.1	40.0
R073	Non-Participating	4.5	605	WTG25	37.2	40.0
R074	Non-Participating	4.5	814	WTG26	36.6	40.0
R075	Non-Participating	4.5	858	WTG26	36.2	40.0
R076	Non-Participating	4.5	636	WTG26	37.4	40.0
R077	Non-Participating	4.5	652	WTG26	37.0	40.0
R078	Non-Participating	4.5	621	WTG26	37.3	40.0
R079	Non-Participating	4.5	618	WTG26	37.3	40.0
R080	Non-Participating	4.5	657	WTG26	36.7	40.0
R081	Non-Participating	4.5	670	WTG26	36.5	40.0
R082	Non-Participating	4.5	666	WTG26	36.6	40.0
R083	Non-Participating	4.5	709	WTG29	37.0	40.0
R084	Non-Participating	4.5	590	WTG29	38.3	40.0
R085	Non-Participating	4.5	560	WTG29	38.7	40.0
R086	Non-Participating	4.5	564	WTG29	38.5	40.0
R087	Non-Participating	4.5	569	WTG29	38.3	40.0
R088	Non-Participating	4.5	602	WTG29	37.8	40.0
R089	Non-Participating	4.5	682	WTG29	36.7	40.0
R090	Non-Participating	4.5	755	WTG29	35.8	40.0
R091	Non-Participating	4.5	772	WTG29	35.6	40.0
R092	Non-Participating	4.5	803	WTG29	35.2	40.0
R093	Non-Participating	4.5	632	WTG29	37.4	40.0
R094	Non-Participating	4.5	669	WTG29	37.4	40.0
R095	Non-Participating	4.5	1034	WTG27	33.7	40.0
R096	Non-Participating	4.5	855	WTG27	35.0	40.0
R097	Non-Participating	4.5	950	WTG27	36.5	40.0
R098	Non-Participating	4.5	1045	WTG27	36.3	40.0
R099	Non-Participating	4.5	880	WTG26	37.1	40.0
R100	Non-Participating	4.5	632	WTG28	39.4	40.0
R101	Non-Participating	4.5	1424	WTG25	30.1	40.0
R102	Non-Participating	4.5	571	WTG20	39.5	40.0
R103	Non-Participating	4.5	790	WTG20	37.4	40.0
R104	Non-Participating	4.5	775	WTG20	37.7	40.0
R105	Non-Participating	4.5	797	WTG20	38.0	40.0
R106	Non-Participating	4.5	1224	WTG25	30.6	40.0
R108	Non-Participating	4.5	753	TS2	39.1	40.0
R109	Non-Participating	4.5	773	WTG06	36.7	40.0
R110	Non-Participating	4.5	1043	WTG06	34.4	40.0
R111	Non-Participating	4.5	1451	WTG06	32.4	40.0
R112	Non-Participating	4.5	1434	WTG06	32.6	40.0
R113	Non-Participating	4.5	1509	WTG06	NA	40.0
R114	Non-Participating	4.5	1079	WTG08	35.5	40.0
R115	Non-Participating	4.5	796	WTG04	39.3	40.0
R116	Non-Participating	4.5	662	WTG04	39.0	40.0
R117	Non-Participating	4.5	738	WTG04	37.1	40.0
R118	Non-Participating	4.5	675	WTG01	37.8	40.0
R119	Non-Participating	4.5	1032	WTG01	35.2	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R120	Non-Participating	4.5	696	WTG04	38.9	40.0
R121	Non-Participating	4.5	751	WTG04	37.7	40.0
R122	Non-Participating	4.5	750	WTG04	37.5	40.0
R123	Non-Participating	4.5	1324	WTG21	32.6	40.0
R124	Non-Participating	4.5	1278	WTG21	32.9	40.0
R125	Non-Participating	4.5	1009	WTG04	34.7	40.0
R126	Non-Participating	4.5	587	WTG04	39.3	40.0
R127	Non-Participating	4.5	935	WTG01	35.7	40.0
R128	Non-Participating	4.5	958	WTG01	35.7	40.0
R129	Non-Participating	4.5	739	WTG01	37.2	40.0
R130	Non-Participating	4.5	933	WTG01	35.8	40.0
R131	Non-Participating	4.5	856	WTG01	36.2	40.0
R132	Non-Participating	4.5	1027	WTG27	33.6	40.0
R133	Non-Participating	4.5	1137	WTG10	34.7	40.0
R134	Non-Participating	4.5	703	WTG18	37.4	40.0
R135	Non-Participating	4.5	668	WTG18	37.8	40.0
R136	Non-Participating	4.5	628	WTG18	38.2	40.0
R137	Non-Participating	4.5	803	WTG18	36.4	40.0
R138	Non-Participating	4.5	781	WTG18	36.7	40.0
R139	Non-Participating	4.5	857	WTG18	36.2	40.0
R140	Non-Participating	4.5	781	WTG20	38.1	40.0
R141	Non-Participating	4.5	777	WTG20	37.7	40.0
R142	Non-Participating	4.5	726	WTG21	37.1	40.0
R143	Non-Participating	4.5	860	WTG21	35.9	40.0
R144	Non-Participating	4.5	882	WTG21	35.8	40.0
R145	Non-Participating	4.5	930	WTG21	35.3	40.0
R146	Non-Participating	4.5	979	WTG21	34.9	40.0
R147	Non-Participating	4.5	905	WTG21	35.6	40.0
R148	Non-Participating	4.5	745	WTG21	36.9	40.0
R149	Non-Participating	4.5	1252	WTG21	33.0	40.0
R150	Non-Participating	4.5	679	WTG26	36.4	40.0
R151	Non-Participating	4.5	888	WTG29	34.3	40.0
R152	Non-Participating	4.5	962	WTG29	33.6	40.0
R153	Non-Participating	4.5	1040	WTG29	32.9	40.0
R154	Non-Participating	4.5	1140	WTG29	32.0	40.0
R155	Non-Participating	4.5	684	WTG29	36.6	40.0
R157	Non-Participating	4.5	1144	WTG08	35.0	40.0
R158	Non-Participating	4.5	1423	WTG08	33.1	40.0
R159	Non-Participating	4.5	889	WTG08	37.1	40.0
R160	Non-Participating	4.5	622	WTG28	39.4	40.0
R161	Non-Participating	4.5	707	WTG11	39.5	40.0
R162	Non-Participating	4.5	1053	WTG22	35.6	40.0
R163	Non-Participating	4.5	835	WTG01	36.4	40.0
R164	Non-Participating	4.5	1237	WTG21	33.2	40.0
R165	Non-Participating	4.5	1077	WTG01	34.2	40.0
R166	Non-Participating	4.5	1044	WTG01	35.1	40.0
R167	Non-Participating	4.5	1094	WTG01	34.8	40.0
R168	Non-Participating	4.5	1109	WTG01	34.8	40.0
R169	Non-Participating	4.5	1079	WTG01	35.1	40.0
R170	Non-Participating	4.5	1051	WTG01	35.3	40.0
R171	Non-Participating	4.5	1030	WTG01	35.5	40.0
R172	Non-Participating	4.5	1073	WTG01	35.5	40.0
R173	Non-Participating	4.5	1130	WTG01	35.2	40.0
R174	Non-Participating	4.5	1119	WTG01	35.4	40.0
R175	Non-Participating	4.5	1067	WTG01	35.9	40.0
R176	Non-Participating	4.5	1076	WTG04	36.0	40.0
R177	Non-Participating	4.5	1109	WTG04	35.9	40.0
R178	Non-Participating	4.5	1128	WTG04	35.7	40.0
R179	Non-Participating	4.5	1160	WTG01	35.3	40.0
R180	Non-Participating	4.5	1166	WTG01	35.1	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R181	Non-Participating	4.5	1171	WTG01	35.1	40.0
R182	Non-Participating	4.5	1216	WTG01	34.6	40.0
R183	Non-Participating	4.5	1230	WTG01	34.4	40.0
R184	Non-Participating	4.5	1253	WTG01	34.1	40.0
R185	Non-Participating	4.5	1213	WTG01	34.3	40.0
R186	Non-Participating	4.5	1137	WTG01	35.0	40.0
R187	Non-Participating	4.5	1151	WTG01	34.8	40.0
R188	Non-Participating	4.5	1181	WTG01	34.6	40.0
R189	Non-Participating	4.5	1147	WTG01	34.5	40.0
R190	Non-Participating	4.5	1113	WTG01	34.9	40.0
R191	Non-Participating	4.5	1086	WTG01	35.2	40.0
R192	Non-Participating	4.5	1175	WTG01	34.4	40.0
R193	Non-Participating	4.5	1214	WTG01	34.3	40.0
R194	Non-Participating	4.5	1221	WTG01	34.1	40.0
R195	Non-Participating	4.5	1288	WTG01	33.8	40.0
R196	Non-Participating	4.5	1197	WTG01	34.2	40.0
R197	Non-Participating	4.5	1181	WTG01	34.3	40.0
R198	Non-Participating	4.5	1164	WTG01	34.3	40.0
R199	Non-Participating	4.5	1153	WTG01	34.2	40.0
R200	Non-Participating	4.5	1173	WTG01	33.9	40.0
R201	Non-Participating	4.5	1155	WTG01	34.0	40.0
R202	Non-Participating	4.5	1144	WTG01	34.0	40.0
R203	Non-Participating	4.5	1189	WTG01	33.6	40.0
R204	Non-Participating	4.5	1151	WTG01	33.9	40.0
R205	Non-Participating	4.5	1153	WTG01	33.7	40.0
R206	Non-Participating	4.5	1170	WTG01	33.6	40.0
R207	Non-Participating	4.5	1193	WTG01	33.2	40.0
R208	Non-Participating	4.5	1087	WTG01	34.4	40.0
R209	Non-Participating	4.5	1030	WTG01	35.0	40.0
R210	Non-Participating	4.5	1106	WTG01	34.6	40.0
R211	Non-Participating	4.5	1112	WTG01	34.5	40.0
R212	Non-Participating	4.5	1013	WTG01	35.0	40.0
R213	Non-Participating	4.5	969	WTG01	35.3	40.0
R214	Non-Participating	4.5	940	WTG01	35.5	40.0
R215	Non-Participating	4.5	912	WTG01	35.7	40.0
R216	Non-Participating	4.5	732	WTG01	37.1	40.0
R217	Non-Participating	4.5	732	WTG01	37.1	40.0
R218	Non-Participating	4.5	647	WTG01	38.0	40.0
R219	Non-Participating	4.5	1158	WTG01	33.4	40.0
R220	Non-Participating	4.5	1137	WTG01	33.6	40.0
R221	Non-Participating	4.5	1155	WTG01	34.3	40.0
R222	Non-Participating	4.5	1393	WTG01	33.4	40.0
R223	Non-Participating	4.5	1262	WTG04	33.1	40.0
R224	Non-Participating	4.5	1218	WTG01	32.9	40.0
R225	Non-Participating	4.5	1232	WTG01	32.8	40.0
R226	Non-Participating	4.5	900	WTG04	37.5	40.0
R227	Non-Participating	4.5	921	WTG04	37.7	40.0
R228	Non-Participating	4.5	862	WTG04	37.7	40.0
R229	Non-Participating	4.5	854	WTG04	37.5	40.0
R230	Non-Participating	4.5	808	WTG04	37.5	40.0
R231	Non-Participating	4.5	762	WTG04	37.6	40.0
R232	Non-Participating	4.5	682	WTG04	37.9	40.0
R233	Non-Participating	4.5	685	WTG04	37.7	40.0
R234	Non-Participating	4.5	1083	WTG01	34.2	40.0
R235	Non-Participating	4.5	1077	WTG01	34.3	40.0
R236	Non-Participating	4.5	1081	WTG01	34.3	40.0
R237	Non-Participating	4.5	1089	WTG01	34.3	40.0
R238	Non-Participating	4.5	1382	WTG01	32.4	40.0
R239	Non-Participating	4.5	1390	WTG01	32.1	40.0
R240	Non-Participating	4.5	1386	WTG01	32.4	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R241	Non-Participating	4.5	1382	WTG01	32.6	40.0
R242	Non-Participating	4.5	1409	WTG01	32.5	40.0
R243	Non-Participating	4.5	1524	WTG01	NA	40.0
R244	Non-Participating	4.5	1578	WTG04	NA	40.0
R245	Non-Participating	4.5	1510	WTG04	NA	40.0
R246	Non-Participating	4.5	1467	WTG04	32.6	40.0
R247	Non-Participating	4.5	1450	WTG04	32.8	40.0
R248	Non-Participating	4.5	1394	WTG01	33.2	40.0
R249	Non-Participating	4.5	1352	WTG04	32.3	40.0
R250	Non-Participating	4.5	1563	WTG01	NA	40.0
R251	Non-Participating	4.5	1464	WTG01	31.6	40.0
R252	Non-Participating	4.5	1426	WTG01	31.5	40.0
R253	Non-Participating	4.5	1134	WTG01	33.5	40.0
R254	Non-Participating	4.5	1264	WTG04	33.7	40.0
R255	Non-Participating	4.5	1274	WTG04	32.2	40.0
R256	Non-Participating	4.5	1273	WTG04	31.9	40.0
R257	Non-Participating	4.5	1199	WTG04	32.4	40.0
R258	Non-Participating	4.5	1006	WTG04	33.6	40.0
R259	Non-Participating	4.5	1334	WTG04	31.3	40.0
R260	Non-Participating	4.5	1392	WTG04	30.5	40.0
R261	Non-Participating	4.5	1411	WTG04	30.4	40.0
R262	Non-Participating	4.5	1327	WTG04	30.9	40.0
R263	Non-Participating	4.5	1358	WTG04	30.5	40.0
R264	Non-Participating	4.5	1518	WTG04	NA	40.0
R265	Non-Participating	4.5	1175	WTG01	33.4	40.0
R266	Non-Participating	4.5	1278	WTG01	33.0	40.0
R267	Non-Participating	4.5	1438	WTG01	32.4	40.0
R268	Non-Participating	4.5	1301	WTG01	33.1	40.0
R269	Non-Participating	4.5	1072	WTG01	33.9	40.0
R270	Non-Participating	4.5	1115	WTG01	33.6	40.0
R271	Non-Participating	4.5	1123	WTG01	33.5	40.0
R272	Non-Participating	4.5	1137	WTG01	33.5	40.0
R273	Non-Participating	4.5	1142	WTG01	33.5	40.0
R274	Non-Participating	4.5	1311	WTG01	32.4	40.0
R275	Non-Participating	4.5	1481	WTG01	32.2	40.0
R276	Non-Participating	4.5	1147	WTG10	34.2	40.0
R277	Non-Participating	4.5	1197	WTG08	34.0	40.0
R278	Non-Participating	4.5	1085	WTG10	35.0	40.0
R279	Non-Participating	4.5	1356	WTG08	32.4	40.0
R280	Non-Participating	4.5	1290	WTG08	33.3	40.0
R281	Non-Participating	4.5	1271	WTG08	33.3	40.0
R282	Non-Participating	4.5	1372	WTG08	32.1	40.0
R283	Non-Participating	4.5	1472	WTG08	31.5	40.0
R284	Non-Participating	4.5	1074	WTG21	34.2	40.0
R285	Non-Participating	4.5	695	WTG04	38.1	40.0
R286	Non-Participating	4.5	733	WTG25	35.2	40.0
R287	Non-Participating	4.5	666	WTG29	37.4	40.0
R288	Non-Participating	4.5	1284	WTG08	34.0	40.0
R289	Non-Participating	4.5	2306	WTG10	NA	40.0
R290	Non-Participating	4.5	1789	WTG01	NA	40.0
R291	Non-Participating	4.5	1374	WTG01	33.6	40.0
R292	Non-Participating	4.5	1465	WTG08	31.6	40.0
R293	Non-Participating	4.5	1682	WTG08	NA	40.0
R294	Non-Participating	4.5	1396	WTG29	30.1	40.0
R295	Non-Participating	4.5	1233	WTG29	31.2	40.0
R296	Non-Participating	4.5	1336	WTG29	30.5	40.0
R297	Non-Participating	4.5	1502	WTG29	NA	40.0
R298	Non-Participating	4.5	619	WTG29	37.5	40.0
R299	Non-Participating	4.5	582	WTG29	38.6	40.0
R300	Non-Participating	4.5	684	WTG26	36.8	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R301	Non-Participating	4.5	1283	WTG25	30.2	40.0
R302	Non-Participating	4.5	1469	WTG25	29.0	40.0
R303	Non-Participating	4.5	1662	WTG21	NA	40.0
R304	Non-Participating	4.5	1512	WTG21	NA	40.0
R305	Non-Participating	4.5	1086	WTG21	34.2	40.0
R306	Non-Participating	4.5	1645	WTG06	NA	40.0
R307	Non-Participating	4.5	2128	WTG04	NA	40.0
R308	Non-Participating	4.5	2056	WTG04	NA	40.0
R309	Non-Participating	4.5	1888	WTG04	NA	40.0
R310	Non-Participating	4.5	1733	WTG06	NA	40.0
R311	Non-Participating	4.5	1028	WTG01	35.6	40.0
R312	Non-Participating	4.5	1877	WTG10	NA	40.0
R313	Non-Participating	4.5	942	WTG21	35.0	40.0
R314	Non-Participating	4.5	731	WTG07	38.8	40.0
R315	Non-Participating	4.5	615	WTG07	39.2	40.0
R316	Non-Participating	4.5	659	WTG06	39.7	40.0
R317	Non-Participating	4.5	727	WTG08	37.6	40.0
R318	Non-Participating	4.5	738	TS2	39.0	40.0
R319	Non-Participating	4.5	687	WTG08	38.0	40.0
R320	Non-Participating	4.5	937	WTG10	35.3	40.0
R321	Non-Participating	4.5	1025	WTG01	35.5	40.0
R322	Non-Participating	4.5	1159	WTG01	34.5	40.0
R323	Non-Participating	4.5	1106	WTG01	35.1	40.0
R324	Non-Participating	4.5	1029	WTG04	36.2	40.0
R325	Non-Participating	4.5	1068	WTG04	33.6	40.0
R326	Non-Participating	4.5	567	WTG25	37.8	40.0
R327	Non-Participating	4.5	651	WTG25	36.4	40.0
R328	Non-Participating	4.5	1404	WTG29	30.0	40.0
R329	Non-Participating	4.5	802	WTG11	39.0	40.0
R330	Non-Participating	4.5	505	TS1	35.6	40.0
R331	Non-Participating	4.5	632	TS1	33.5	40.0
R332	Non-Participating	4.5	585	TS1	34.2	40.0
R333	Non-Participating	4.5	618	TS1	33.7	40.0
R334	Non-Participating	4.5	645	TS1	33.3	40.0
R335	Non-Participating	4.5	804	TS1	31.0	40.0
R336	Non-Participating	4.5	946	TS1	29.3	40.0
R337	Non-Participating	4.5	1144	TS1	27.3	40.0
R338	Non-Participating	4.5	1216	TS1	26.6	40.0
R339	Non-Participating	4.5	1307	TS1	25.8	40.0
R340	Non-Participating	4.5	1175	TS1	27.0	40.0
R341	Non-Participating	4.5	1227	TS1	26.5	40.0
R342	Non-Participating	4.5	1382	TS1	25.2	40.0
R345	Non-Participating	4.5	1015	TS1	28.6	40.0
R346	Non-Participating	4.5	1030	TS1	28.4	40.0
R347	Non-Participating	4.5	1208	TS1	26.7	40.0
R348	Non-Participating	4.5	1306	TS1	25.8	40.0
R349	Non-Participating	4.5	1394	TS1	25.1	40.0
R350	Non-Participating	4.5	1440	TS1	24.7	40.0
R351	Non-Participating	4.5	1528	TS1	NA	40.0
R352	Non-Participating	4.5	1556	TS1	NA	40.0
R353	Non-Participating	4.5	1466	TS1	24.5	40.0
R354	Non-Participating	4.5	1475	TS1	24.4	40.0
R358	Non-Participating	4.5	1304	TS1	25.8	40.0
R359	Non-Participating	4.5	795	TS1	31.1	40.0
R360	Non-Participating	4.5	755	TS1	31.7	40.0
R361	Non-Participating	4.5	713	TS1	32.2	40.0
R362	Non-Participating	4.5	721	TS1	32.1	40.0
R363	Non-Participating	4.5	1454	TS1	24.6	40.0
R364	Non-Participating	4.5	1317	TS1	21.3	40.0
R365	Non-Participating	4.5	1278	TS1	26.0	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R366	Non-Participating	4.5	989	TS1	28.8	40.0
R367	Non-Participating	4.5	1071	TS1	28.0	40.0
R368	Non-Participating	4.5	1449	TS1	20.2	40.0
R369	Non-Participating	4.5	1107	TS1	27.6	40.0
R370	Non-Participating	4.5	1330	TS1	21.2	40.0
R371	Non-Participating	4.5	1533	TS1	NA	40.0
R372	Non-Participating	4.5	1304	TS1	25.8	40.0
R373	Non-Participating	4.5	976	TS1	29.0	40.0
R374	Non-Participating	4.5	940	TS1	29.4	40.0
R375	Non-Participating	4.5	884	TS1	30.0	40.0
R376	Non-Participating	4.5	1039	TS1	28.3	40.0
R377	Non-Participating	4.5	1306	TS1	25.8	40.0
R378	Non-Participating	4.5	1229	TS1	26.5	40.0
R379	Non-Participating	4.5	773	TS1	31.4	40.0
R380	Non-Participating	4.5	675	TS1	32.8	40.0
R381	Non-Participating	4.5	658	TS1	33.0	40.0
R382	Non-Participating	4.5	1472	TS1	20.0	40.0
R383	Non-Participating	4.5	554	WTG20	39.6	40.0
RV001	Non-Participating Vacant	4.5	933	WTG10	35.3	40.0
RV002	Non-Participating Vacant	4.5	727	WTG29	36.9	40.0
RV003	Non-Participating Vacant	4.5	571	WTG20	39.5	40.0
RV004	Non-Participating Vacant	4.5	636	WTG28	39.5	40.0
RV005	Non-Participating Vacant	4.5	710	WTG04	38.3	40.0
RV006	Non-Participating Vacant	4.5	642	WTG06	39.8	40.0
RV007	Non-Participating Vacant	4.5	893	WTG08	39.5	40.0
RV008	Non-Participating Vacant	4.5	779	WTG29	36.8	40.0
RV009	Non-Participating Vacant	4.5	2711	WTG25	NA	40.0
RV010	Non-Participating Vacant	4.5	623	WTG25	37.6	40.0
RV011	Non-Participating Vacant	4.5	674	WTG25	37.2	40.0
RV012	Non-Participating Vacant	4.5	872	WTG25	36.6	40.0
RV013	Non-Participating Vacant	4.5	697	WTG11	39.3	40.0
RV014	Non-Participating Vacant	4.5	760	WTG08	38.6	40.0
RV015	Non-Participating Vacant	4.5	610	WTG18	38.5	40.0
RV016	Non-Participating Vacant	4.5	769	WTG20	37.6	40.0
RV017	Non-Participating Vacant	4.5	745	WTG20	37.7	40.0
RV018	Non-Participating Vacant	4.5	806	WTG22	36.6	40.0
RV019	Non-Participating Vacant	4.5	1423	WTG21	32.1	40.0
RV020	Non-Participating Vacant	4.5	2242	WTG21	NA	40.0
RV021	Non-Participating Vacant	4.5	1134	WTG20	35.9	40.0
RV022	Non-Participating Vacant	4.5	877	WTG29	37.1	40.0
RV023	Non-Participating Vacant	4.5	573	WTG25	38.1	40.0
RV024	Non-Participating Vacant	4.5	740	WTG25	35.9	40.0
RV025	Non-Participating Vacant	4.5	837	WTG27	36.0	40.0
RV026	Non-Participating Vacant	4.5	713	WTG29	37.5	40.0
RV027	Non-Participating Vacant	4.5	610	WTG26	37.3	40.0
RV028	Non-Participating Vacant	4.5	785	WTG28	38.0	40.0
RV029	Non-Participating Vacant	4.5	762	WTG29	36.6	40.0
RV030	Non-Participating Vacant	4.5	812	WTG29	36.8	40.0
RV031	Non-Participating Vacant	4.5	1465	WTG25	30.0	40.0
RV032	Non-Participating Vacant	4.5	736	TS2	39.0	40.0
RV033	Non-Participating Vacant	4.5	723	WTG12	38.3	40.0
RV034	Non-Participating Vacant	4.5	1692	WTG08	NA	40.0
RV035	Non-Participating Vacant	4.5	1189	WTG08	34.6	40.0
RV036	Non-Participating Vacant	4.5	702	WTG12	38.5	40.0
RV037	Non-Participating Vacant	4.5	696	WTG12	38.6	40.0
RV038	Non-Participating Vacant	4.5	702	WTG12	38.7	40.0
RV039	Non-Participating Vacant	4.5	731	WTG12	38.5	40.0
RV040	Non-Participating Vacant	4.5	768	WTG12	38.4	40.0
RV041	Non-Participating Vacant	4.5	813	WTG12	38.2	40.0
RV042	Non-Participating Vacant	4.5	874	WTG12	37.8	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV043	Non-Participating Vacant	4.5	934	WTG13	37.5	40.0
RV044	Non-Participating Vacant	4.5	998	WTG13	36.8	40.0
RV045	Non-Participating Vacant	4.5	930	WTG13	37.3	40.0
RV046	Non-Participating Vacant	4.5	864	WTG13	37.9	40.0
RV047	Non-Participating Vacant	4.5	799	WTG13	38.5	40.0
RV048	Non-Participating Vacant	4.5	736	WTG13	39.1	40.0
RV049	Non-Participating Vacant	4.5	763	WTG12	38.0	40.0
RV050	Non-Participating Vacant	4.5	813	WTG12	37.7	40.0
RV051	Non-Participating Vacant	4.5	874	WTG12	37.4	40.0
RV052	Non-Participating Vacant	4.5	942	WTG12	37.1	40.0
RV053	Non-Participating Vacant	4.5	1013	WTG12	37.0	40.0
RV054	Non-Participating Vacant	4.5	839	WTG08	37.6	40.0
RV055	Non-Participating Vacant	4.5	1061	WTG08	35.6	40.0
RV056	Non-Participating Vacant	4.5	840	WTG25	37.0	40.0
RV057	Non-Participating Vacant	4.5	859	WTG10	37.5	40.0
RV058	Non-Participating Vacant	4.5	964	WTG10	37.5	40.0
RV059	Non-Participating Vacant	4.5	610	WTG06	39.5	40.0
RV060	Non-Participating Vacant	4.5	853	WTG23	36.3	40.0
RV061	Non-Participating Vacant	4.5	1242	WTG01	34.3	40.0
RV062	Non-Participating Vacant	4.5	1594	WTG01	NA	40.0
RV063	Non-Participating Vacant	4.5	1618	WTG01	NA	40.0
RV064	Non-Participating Vacant	4.5	1058	WTG01	34.8	40.0
RV065	Non-Participating Vacant	4.5	1080	WTG01	34.7	40.0
RV066	Non-Participating Vacant	4.5	1222	WTG01	32.8	40.0
RV067	Non-Participating Vacant	4.5	1203	WTG01	32.9	40.0
RV068	Non-Participating Vacant	4.5	1170	WTG01	33.2	40.0
RV069	Non-Participating Vacant	4.5	1071	WTG01	33.9	40.0
RV070	Non-Participating Vacant	4.5	795	WTG01	36.5	40.0
RV071	Non-Participating Vacant	4.5	1220	WTG04	33.0	40.0
RV072	Non-Participating Vacant	4.5	1487	WTG04	29.7	40.0
RV073	Non-Participating Vacant	4.5	1339	WTG04	31.0	40.0
RV074	Non-Participating Vacant	4.5	1277	WTG04	31.3	40.0
RV075	Non-Participating Vacant	4.5	1068	WTG01	34.1	40.0
RV076	Non-Participating Vacant	4.5	1113	WTG01	33.9	40.0
RV077	Non-Participating Vacant	4.5	1202	WTG01	33.5	40.0
RV078	Non-Participating Vacant	4.5	1429	WTG01	32.6	40.0
RV079	Non-Participating Vacant	4.5	1014	WTG01	34.4	40.0
RV080	Non-Participating Vacant	4.5	861	WTG08	36.2	40.0
RV081	Non-Participating Vacant	4.5	785	WTG08	36.8	40.0
RV082	Non-Participating Vacant	4.5	827	WTG25	34.1	40.0
RV083	Non-Participating Vacant	4.5	771	WTG25	34.8	40.0
RV084	Non-Participating Vacant	4.5	655	WTG28	39.7	40.0
RV085	Non-Participating Vacant	4.5	722	WTG10	37.9	40.0
RV086	Non-Participating Vacant	4.5	687	WTG19	39.8	40.0
RV087	Non-Participating Vacant	4.5	583	WTG18	39.2	40.0
RV088	Non-Participating Vacant	4.5	786	WTG18	38.3	40.0
RV089	Non-Participating Vacant	4.5	792	WTG27	35.9	40.0
RV090	Non-Participating Vacant	4.5	774	WTG27	36.0	40.0
RV091	Non-Participating Vacant	4.5	842	WTG29	37.8	40.0
RV092	Non-Participating Vacant	4.5	577	WTG29	38.6	40.0
RV093	Non-Participating Vacant	4.5	567	WTG29	38.5	40.0
RV094	Non-Participating Vacant	4.5	642	WTG29	37.2	40.0
RV095	Non-Participating Vacant	4.5	718	WTG29	36.2	40.0
RV096	Non-Participating Vacant	4.5	870	WTG29	34.5	40.0
RV097	Non-Participating Vacant	4.5	793	WTG29	35.3	40.0
RV098	Non-Participating Vacant	4.5	555	WTG29	38.9	40.0
RV099	Non-Participating Vacant	4.5	644	WTG26	36.9	40.0
RV100	Non-Participating Vacant	4.5	618	WTG26	37.3	40.0
RV101	Non-Participating Vacant	4.5	760	WTG25	36.5	40.0
RV102	Non-Participating Vacant	4.5	620	WTG25	37.4	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV103	Non-Participating Vacant	4.5	606	WTG25	37.3	40.0
RV104	Non-Participating Vacant	4.5	1893	WTG21	NA	40.0
RV105	Non-Participating Vacant	4.5	1308	WTG21	32.6	40.0
RV106	Non-Participating Vacant	4.5	718	WTG21	37.2	40.0
RV107	Non-Participating Vacant	4.5	1153	WTG08	35.1	40.0
RV108	Non-Participating Vacant	4.5	631	WTG20	38.8	40.0
RV109	Non-Participating Vacant	4.5	1085	WTG25	31.7	40.0
RV110	Non-Participating Vacant	4.5	918	WTG25	33.2	40.0
RV111	Non-Participating Vacant	4.5	1123	WTG21	34.0	40.0
RV112	Non-Participating Vacant	4.5	754	WTG01	37.7	40.0
RV113	Non-Participating Vacant	4.5	634	WTG29	37.3	40.0
RV114	Non-Participating Vacant	4.5	1467	WTG29	29.6	40.0
RV115	Non-Participating Vacant	4.5	1815	WTG10	NA	40.0
RV116	Non-Participating Vacant	4.5	1174	WTG08	34.7	40.0
RV117	Non-Participating Vacant	4.5	2262	WTG10	NA	40.0
RV118	Non-Participating Vacant	4.5	1339	WTG08	33.6	40.0
RV119	Non-Participating Vacant	4.5	1385	WTG13	34.1	40.0
RV120	Non-Participating Vacant	4.5	1368	WTG08	33.2	40.0
RV121	Non-Participating Vacant	4.5	1205	WTG08	34.2	40.0
RV122	Non-Participating Vacant	4.5	765	WTG07	37.9	40.0
RV123	Non-Participating Vacant	4.5	860	WTG21	37.6	40.0
RV124	Non-Participating Vacant	4.5	782	WTG20	37.7	40.0
RV125	Non-Participating Vacant	4.5	1384	WTG21	32.5	40.0
RV126	Non-Participating Vacant	4.5	1156	WTG08	34.4	40.0
RV127	Non-Participating Vacant	4.5	777	WTG08	38.3	40.0
RV128	Non-Participating Vacant	4.5	719	WTG01	37.2	40.0
RV129	Non-Participating Vacant	4.5	1174	WTG01	33.4	40.0
RV130	Non-Participating Vacant	4.5	1165	WTG01	33.5	40.0
RV131	Non-Participating Vacant	4.5	1033	WTG01	34.9	40.0
RV132	Non-Participating Vacant	4.5	1208	WTG01	34.0	40.0
RV133	Non-Participating Vacant	4.5	1227	WTG01	32.8	40.0
RV134	Non-Participating Vacant	4.5	1647	WTG01	NA	40.0
RV135	Non-Participating Vacant	4.5	680	WTG05	39.7	40.0
RV136	Non-Participating Vacant	4.5	970	WTG04	37.5	40.0
RV137	Non-Participating Vacant	4.5	1002	WTG01	35.7	40.0
RV138	Non-Participating Vacant	4.5	1125	WTG01	34.8	40.0
RV139	Non-Participating Vacant	4.5	920	WTG04	37.3	40.0
RV140	Non-Participating Vacant	4.5	874	WTG04	37.5	40.0
RV141	Non-Participating Vacant	4.5	959	WTG06	35.1	40.0
RV142	Non-Participating Vacant	4.5	729	WTG04	37.9	40.0
RV143	Non-Participating Vacant	4.5	1221	WTG04	34.1	40.0
RV144	Non-Participating Vacant	4.5	1389	WTG04	30.3	40.0
RV145	Non-Participating Vacant	4.5	801	WTG21	36.4	40.0
RV146	Non-Participating Vacant	4.5	594	WTG25	37.1	40.0
RV147	Non-Participating Vacant	4.5	790	WTG25	36.5	40.0
RV148	Non-Participating Vacant	4.5	712	WTG27	36.6	40.0
RV149	Non-Participating Vacant	4.5	1327	WTG25	29.9	40.0
RV150	Non-Participating Vacant	4.5	919	WTG25	36.8	40.0
RV151	Non-Participating Vacant	4.5	656	WTG29	38.0	40.0
RV152	Non-Participating Vacant	4.5	1348	WTG29	30.4	40.0
RV153	Non-Participating Vacant	4.5	981	WTG10	35.1	40.0
RV154	Non-Participating Vacant	4.5	1216	WTG21	33.3	40.0
RV155	Non-Participating Vacant	4.5	615	WTG21	38.3	40.0
RV156	Non-Participating Vacant	4.5	1482	WTG04	32.3	40.0
RV157	Non-Participating Vacant	4.5	717	WTG11	39.3	40.0
RV158	Non-Participating Vacant	4.5	850	WTG22	36.3	40.0
RV159	Non-Participating Vacant	4.5	909	WTG10	35.7	40.0
RV160	Non-Participating Vacant	4.5	659	TS1	33.0	40.0
RV161	Non-Participating Vacant	4.5	502	TS1	35.7	40.0
RV162	Non-Participating Vacant	4.5	592	TS1	34.1	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV163	Non-Participating Vacant	4.5	709	TS1	32.3	40.0
RV164	Non-Participating Vacant	4.5	1652	TS1	NA	40.0
RV165	Non-Participating Vacant	4.5	1118	TS1	27.5	40.0
RV166	Non-Participating Vacant	4.5	1196	TS1	22.4	40.0
RV167	Non-Participating Vacant	4.5	949	TS1	29.3	40.0
RV168	Non-Participating Vacant	4.5	790	TS1	31.2	40.0
RV170	Non-Participating Vacant	4.5	755	TS1	31.7	40.0
RV171	Non-Participating Vacant	4.5	1381	TS1	20.8	40.0
RV172	Non-Participating Vacant	4.5	743	WTG06	39.5	40.0

Table A8: Wind Turbine Noise Impact Summary - Participating Receptor Locations
White Pines Wind Project, No Cumulative Effects

Point of Reception ID	Description	Height [m]	Distance to Nearest White Pines Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
PR01	Participating	4.5	755	WTG08	39.2	40.0
PR02	Participating	4.5	680	WTG11	39.5	40.0
PR03	Participating	4.5	520	WTG06	39.8	40.0
PR04	Participating	4.5	629	TS2	39.6	40.0
PR05	Participating	4.5	903	WTG11	39.3	40.0
PR06	Participating	4.5	669	WTG05	39.8	40.0
PR07	Participating	4.5	540	WTG25	38.1	40.0
PR08	Participating	4.5	753	WTG11	39.3	40.0
PR09	Participating	4.5	607	WTG01	38.6	40.0
PR10	Participating	4.5	635	WTG04	38.3	40.0
PR11	Participating	4.5	631	WTG10	39.6	40.0
PR12	Participating	4.5	1087	WTG09	39.3	40.0
PR13	Participating	4.5	558	WTG10	40.3	40.0
PR14	Participating	4.5	849	WTG10	36.1	40.0
PR15	Participating	4.5	597	WTG26	38.8	40.0
PR16	Participating	4.5	692	WTG11	39.5	40.0
PR17	Participating	4.5	1105	WTG08	35.2	40.0
PR18	Participating	4.5	634	WTG28	40.2	40.0
PR19	Participating	4.5	499	WTG06	40.8	40.0

Table A9: Transformer Noise Impact Summary - Non-Participating Receptor Locations
White Pines Wind Project

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R001	Non-Participating	4.5	1201	TS2	26.7	40.0
R002	Non-Participating	4.5	1110	TS2	27.6	40.0
R003	Non-Participating	4.5	3150	OP Transformer	NA	40.0
R004	Non-Participating	4.5	3344	OP Transformer	NA	40.0
R005	Non-Participating	4.5	5928	OP Transformer	NA	40.0
R006	Non-Participating	4.5	2346	OP Transformer	NA	40.0
R007	Non-Participating	4.5	2148	OP Transformer	NA	40.0
R008	Non-Participating	4.5	2260	TS2	NA	40.0
R009	Non-Participating	4.5	883	TS2	24.7	40.0
R010	Non-Participating	4.5	3030	OP Transformer	NA	40.0
R011	Non-Participating	4.5	3576	TS2	NA	40.0
R012	Non-Participating	4.5	3460	TS2	NA	40.0
R013	Non-Participating	4.5	3864	TS2	NA	40.0
R014	Non-Participating	4.5	3863	TS2	NA	40.0
R015	Non-Participating	4.5	1337	TS2	25.5	40.0
R016	Non-Participating	4.5	1631	TS2	NA	40.0
R017	Non-Participating	4.5	1123	TS2	22.6	40.0
R018	Non-Participating	4.5	741	TS2	26.1	40.0
R019	Non-Participating	4.5	3607	TS2	NA	40.0
R020	Non-Participating	4.5	854	TS2	25.2	40.0
R021	Non-Participating	4.5	2460	TS2	NA	40.0
R022	Non-Participating	4.5	937	TS2	24.4	40.0
R023	Non-Participating	4.5	1842	TS2	NA	40.0
R024	Non-Participating	4.5	1352	TS2	25.4	40.0
R025	Non-Participating	4.5	3388	TS2	NA	40.0
R026	Non-Participating	4.5	2553	TS2	NA	40.0
R027	Non-Participating	4.5	814	TS2	28.3	40.0
R028	Non-Participating	4.5	925	TS2	27.0	40.0
R029	Non-Participating	4.5	743	TS2	25.9	40.0
R030	Non-Participating	4.5	959	TS2	29.2	40.0
R031	Non-Participating	4.5	3853	TS2	NA	40.0
R032	Non-Participating	4.5	753	TS2	25.9	40.0
R033	Non-Participating	4.5	903	TS2	24.5	40.0
R034	Non-Participating	4.5	1342	TS2	25.5	40.0
R035	Non-Participating	4.5	3415	TS2	NA	40.0
R036	Non-Participating	4.5	3638	TS2	NA	40.0
R037	Non-Participating	4.5	3375	TS2	NA	40.0
R038	Non-Participating	4.5	682	TS2	26.9	40.0
R039	Non-Participating	4.5	4084	TS2	NA	40.0
R040	Non-Participating	4.5	3812	TS2	NA	40.0
R041	Non-Participating	4.5	3062	TS2	NA	40.0
R042	Non-Participating	4.5	1905	TS2	NA	40.0
R043	Non-Participating	4.5	3910	TS2	NA	40.0
R044	Non-Participating	4.5	3271	TS2	NA	40.0
R045	Non-Participating	4.5	2865	OP Transformer	NA	40.0
R046	Non-Participating	4.5	2884	OP Transformer	NA	40.0
R047	Non-Participating	4.5	2875	OP Transformer	NA	40.0
R048	Non-Participating	4.5	2797	OP Transformer	NA	40.0
R049	Non-Participating	4.5	2777	OP Transformer	NA	40.0
R050	Non-Participating	4.5	2799	OP Transformer	NA	40.0
R051	Non-Participating	4.5	2804	OP Transformer	NA	40.0
R052	Non-Participating	4.5	2940	TS2	NA	40.0
R053	Non-Participating	4.5	2963	TS2	NA	40.0
R054	Non-Participating	4.5	3047	TS2	NA	40.0
R055	Non-Participating	4.5	3014	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R056	Non-Participating	4.5	2856	TS2	NA	40.0
R057	Non-Participating	4.5	2934	OP Transformer	NA	40.0
R058	Non-Participating	4.5	2639	OP Transformer	NA	40.0
R059	Non-Participating	4.5	1725	OP Transformer	NA	40.0
R060	Non-Participating	4.5	2619	OP Transformer	NA	40.0
R061	Non-Participating	4.5	2551	OP Transformer	NA	40.0
R062	Non-Participating	4.5	2544	OP Transformer	NA	40.0
R063	Non-Participating	4.5	2515	OP Transformer	NA	40.0
R064	Non-Participating	4.5	2115	OP Transformer	NA	40.0
R065	Non-Participating	4.5	2243	OP Transformer	NA	40.0
R066	Non-Participating	4.5	2081	OP Transformer	NA	40.0
R067	Non-Participating	4.5	2210	OP Transformer	NA	40.0
R068	Non-Participating	4.5	2107	OP Transformer	NA	40.0
R069	Non-Participating	4.5	1659	OP Transformer	NA	40.0
R070	Non-Participating	4.5	2477	OP Transformer	NA	40.0
R071	Non-Participating	4.5	2718	OP Transformer	NA	40.0
R072	Non-Participating	4.5	2964	OP Transformer	NA	40.0
R073	Non-Participating	4.5	3051	OP Transformer	NA	40.0
R074	Non-Participating	4.5	3522	OP Transformer	NA	40.0
R075	Non-Participating	4.5	3533	OP Transformer	NA	40.0
R076	Non-Participating	4.5	3787	OP Transformer	NA	40.0
R077	Non-Participating	4.5	3914	OP Transformer	NA	40.0
R078	Non-Participating	4.5	4010	OP Transformer	NA	40.0
R079	Non-Participating	4.5	4086	OP Transformer	NA	40.0
R080	Non-Participating	4.5	4223	OP Transformer	NA	40.0
R081	Non-Participating	4.5	4266	OP Transformer	NA	40.0
R082	Non-Participating	4.5	4388	OP Transformer	NA	40.0
R083	Non-Participating	4.5	5447	OP Transformer	NA	40.0
R084	Non-Participating	4.5	5452	OP Transformer	NA	40.0
R085	Non-Participating	4.5	5455	OP Transformer	NA	40.0
R086	Non-Participating	4.5	5519	OP Transformer	NA	40.0
R087	Non-Participating	4.5	5563	OP Transformer	NA	40.0
R088	Non-Participating	4.5	5610	OP Transformer	NA	40.0
R089	Non-Participating	4.5	5718	OP Transformer	NA	40.0
R090	Non-Participating	4.5	5798	OP Transformer	NA	40.0
R091	Non-Participating	4.5	5824	OP Transformer	NA	40.0
R092	Non-Participating	4.5	5879	OP Transformer	NA	40.0
R093	Non-Participating	4.5	5483	OP Transformer	NA	40.0
R094	Non-Participating	4.5	5228	OP Transformer	NA	40.0
R095	Non-Participating	4.5	4020	OP Transformer	NA	40.0
R096	Non-Participating	4.5	3602	OP Transformer	NA	40.0
R097	Non-Participating	4.5	3154	OP Transformer	NA	40.0
R098	Non-Participating	4.5	3079	OP Transformer	NA	40.0
R099	Non-Participating	4.5	3210	OP Transformer	NA	40.0
R100	Non-Participating	4.5	4540	OP Transformer	NA	40.0
R101	Non-Participating	4.5	1270	OP Transformer	-88.0	40.0
R102	Non-Participating	4.5	2674	TS2	NA	40.0
R103	Non-Participating	4.5	2937	TS2	NA	40.0
R104	Non-Participating	4.5	2893	TS2	NA	40.0
R105	Non-Participating	4.5	2834	TS2	NA	40.0
R106	Non-Participating	4.5	2445	OP Transformer	NA	40.0
R108	Non-Participating	4.5	753	TS2	28.0	40.0
R109	Non-Participating	4.5	2081	TS2	NA	40.0
R110	Non-Participating	4.5	2482	TS2	NA	40.0
R111	Non-Participating	4.5	2870	TS2	NA	40.0
R112	Non-Participating	4.5	2889	TS2	NA	40.0
R113	Non-Participating	4.5	3002	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R114	Non-Participating	4.5	3979	TS2	NA	40.0
R115	Non-Participating	4.5	2438	TS2	NA	40.0
R116	Non-Participating	4.5	2641	TS2	NA	40.0
R117	Non-Participating	4.5	2927	TS2	NA	40.0
R118	Non-Participating	4.5	3549	TS2	NA	40.0
R119	Non-Participating	4.5	3515	TS2	NA	40.0
R120	Non-Participating	4.5	2889	TS2	NA	40.0
R121	Non-Participating	4.5	3086	TS2	NA	40.0
R122	Non-Participating	4.5	3257	TS2	NA	40.0
R123	Non-Participating	4.5	2080	OP Transformer	NA	40.0
R124	Non-Participating	4.5	2111	OP Transformer	NA	40.0
R125	Non-Participating	4.5	3101	TS2	NA	40.0
R126	Non-Participating	4.5	2977	TS2	NA	40.0
R127	Non-Participating	4.5	3700	TS2	NA	40.0
R128	Non-Participating	4.5	3677	TS2	NA	40.0
R129	Non-Participating	4.5	3625	TS2	NA	40.0
R130	Non-Participating	4.5	3525	TS2	NA	40.0
R131	Non-Participating	4.5	3562	TS2	NA	40.0
R132	Non-Participating	4.5	3845	OP Transformer	NA	40.0
R133	Non-Participating	4.5	3304	TS2	NA	40.0
R134	Non-Participating	4.5	2743	TS2	NA	40.0
R135	Non-Participating	4.5	2742	TS2	NA	40.0
R136	Non-Participating	4.5	2728	TS2	NA	40.0
R137	Non-Participating	4.5	2818	TS2	NA	40.0
R138	Non-Participating	4.5	2752	TS2	NA	40.0
R139	Non-Participating	4.5	2718	TS2	NA	40.0
R140	Non-Participating	4.5	2835	TS2	NA	40.0
R141	Non-Participating	4.5	2880	TS2	NA	40.0
R142	Non-Participating	4.5	2731	OP Transformer	NA	40.0
R143	Non-Participating	4.5	2512	OP Transformer	NA	40.0
R144	Non-Participating	4.5	2439	OP Transformer	NA	40.0
R145	Non-Participating	4.5	2452	OP Transformer	NA	40.0
R146	Non-Participating	4.5	2405	OP Transformer	NA	40.0
R147	Non-Participating	4.5	2425	OP Transformer	NA	40.0
R148	Non-Participating	4.5	2755	OP Transformer	NA	40.0
R149	Non-Participating	4.5	2197	OP Transformer	NA	40.0
R150	Non-Participating	4.5	4433	OP Transformer	NA	40.0
R151	Non-Participating	4.5	5978	OP Transformer	NA	40.0
R152	Non-Participating	4.5	6052	OP Transformer	NA	40.0
R153	Non-Participating	4.5	6127	OP Transformer	NA	40.0
R154	Non-Participating	4.5	6233	OP Transformer	NA	40.0
R155	Non-Participating	4.5	5613	OP Transformer	NA	40.0
R157	Non-Participating	4.5	3814	TS2	NA	40.0
R158	Non-Participating	4.5	4152	TS2	NA	40.0
R159	Non-Participating	4.5	3454	TS2	NA	40.0
R160	Non-Participating	4.5	4583	OP Transformer	NA	40.0
R161	Non-Participating	4.5	864	TS2	28.4	40.0
R162	Non-Participating	4.5	1794	OP Transformer	NA	40.0
R163	Non-Participating	4.5	3673	TS2	NA	40.0
R164	Non-Participating	4.5	2159	OP Transformer	NA	40.0
R165	Non-Participating	4.5	3959	TS2	NA	40.0
R166	Non-Participating	4.5	3736	TS2	NA	40.0
R167	Non-Participating	4.5	3776	TS2	NA	40.0
R168	Non-Participating	4.5	3775	TS2	NA	40.0
R169	Non-Participating	4.5	3723	TS2	NA	40.0
R170	Non-Participating	4.5	3684	TS2	NA	40.0
R171	Non-Participating	4.5	3653	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R172	Non-Participating	4.5	3639	TS2	NA	40.0
R173	Non-Participating	4.5	3658	TS2	NA	40.0
R174	Non-Participating	4.5	3627	TS2	NA	40.0
R175	Non-Participating	4.5	3549	TS2	NA	40.0
R176	Non-Participating	4.5	3500	TS2	NA	40.0
R177	Non-Participating	4.5	3529	TS2	NA	40.0
R178	Non-Participating	4.5	3565	TS2	NA	40.0
R179	Non-Participating	4.5	3638	TS2	NA	40.0
R180	Non-Participating	4.5	3664	TS2	NA	40.0
R181	Non-Participating	4.5	3679	TS2	NA	40.0
R182	Non-Participating	4.5	3761	TS2	NA	40.0
R183	Non-Participating	4.5	3796	TS2	NA	40.0
R184	Non-Participating	4.5	3843	TS2	NA	40.0
R185	Non-Participating	4.5	3815	TS2	NA	40.0
R186	Non-Participating	4.5	3704	TS2	NA	40.0
R187	Non-Participating	4.5	3735	TS2	NA	40.0
R188	Non-Participating	4.5	3767	TS2	NA	40.0
R189	Non-Participating	4.5	3803	TS2	NA	40.0
R190	Non-Participating	4.5	3732	TS2	NA	40.0
R191	Non-Participating	4.5	3692	TS2	NA	40.0
R192	Non-Participating	4.5	3803	TS2	NA	40.0
R193	Non-Participating	4.5	3827	TS2	NA	40.0
R194	Non-Participating	4.5	3857	TS2	NA	40.0
R195	Non-Participating	4.5	3899	TS2	NA	40.0
R196	Non-Participating	4.5	3849	TS2	NA	40.0
R197	Non-Participating	4.5	3844	TS2	NA	40.0
R198	Non-Participating	4.5	3833	TS2	NA	40.0
R199	Non-Participating	4.5	3882	TS2	NA	40.0
R200	Non-Participating	4.5	3925	TS2	NA	40.0
R201	Non-Participating	4.5	3923	TS2	NA	40.0
R202	Non-Participating	4.5	3931	TS2	NA	40.0
R203	Non-Participating	4.5	3992	TS2	NA	40.0
R204	Non-Participating	4.5	3964	TS2	NA	40.0
R205	Non-Participating	4.5	3995	TS2	NA	40.0
R206	Non-Participating	4.5	4029	TS2	NA	40.0
R207	Non-Participating	4.5	4093	TS2	NA	40.0
R208	Non-Participating	4.5	3868	TS2	NA	40.0
R209	Non-Participating	4.5	3787	TS2	NA	40.0
R210	Non-Participating	4.5	3808	TS2	NA	40.0
R211	Non-Participating	4.5	3834	TS2	NA	40.0
R212	Non-Participating	4.5	3795	TS2	NA	40.0
R213	Non-Participating	4.5	3763	TS2	NA	40.0
R214	Non-Participating	4.5	3750	TS2	NA	40.0
R215	Non-Participating	4.5	3736	TS2	NA	40.0
R216	Non-Participating	4.5	3673	TS2	NA	40.0
R217	Non-Participating	4.5	3666	TS2	NA	40.0
R218	Non-Participating	4.5	3579	TS2	NA	40.0
R219	Non-Participating	4.5	4082	TS2	NA	40.0
R220	Non-Participating	4.5	4050	TS2	NA	40.0
R221	Non-Participating	4.5	3858	TS2	NA	40.0
R222	Non-Participating	4.5	3949	TS2	NA	40.0
R223	Non-Participating	4.5	4009	TS2	NA	40.0
R224	Non-Participating	4.5	4155	TS2	NA	40.0
R225	Non-Participating	4.5	4172	TS2	NA	40.0
R226	Non-Participating	4.5	3207	TS2	NA	40.0
R227	Non-Participating	4.5	3172	TS2	NA	40.0
R228	Non-Participating	4.5	3159	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R229	Non-Participating	4.5	3201	TS2	NA	40.0
R230	Non-Participating	4.5	3162	TS2	NA	40.0
R231	Non-Participating	4.5	3117	TS2	NA	40.0
R232	Non-Participating	4.5	3117	TS2	NA	40.0
R233	Non-Participating	4.5	3202	TS2	NA	40.0
R234	Non-Participating	4.5	3946	TS2	NA	40.0
R235	Non-Participating	4.5	3918	TS2	NA	40.0
R236	Non-Participating	4.5	3903	TS2	NA	40.0
R237	Non-Participating	4.5	3895	TS2	NA	40.0
R238	Non-Participating	4.5	4184	TS2	NA	40.0
R239	Non-Participating	4.5	4255	TS2	NA	40.0
R240	Non-Participating	4.5	4167	TS2	NA	40.0
R241	Non-Participating	4.5	4139	TS2	NA	40.0
R242	Non-Participating	4.5	4134	TS2	NA	40.0
R243	Non-Participating	4.5	4358	TS2	NA	40.0
R244	Non-Participating	4.5	4196	TS2	NA	40.0
R245	Non-Participating	4.5	4127	TS2	NA	40.0
R246	Non-Participating	4.5	4080	TS2	NA	40.0
R247	Non-Participating	4.5	4046	TS2	NA	40.0
R248	Non-Participating	4.5	3983	TS2	NA	40.0
R249	Non-Participating	4.5	4135	TS2	NA	40.0
R250	Non-Participating	4.5	4318	TS2	NA	40.0
R251	Non-Participating	4.5	4349	TS2	NA	40.0
R252	Non-Participating	4.5	4369	TS2	NA	40.0
R253	Non-Participating	4.5	4044	TS2	NA	40.0
R254	Non-Participating	4.5	3897	TS2	NA	40.0
R255	Non-Participating	4.5	4176	TS2	NA	40.0
R256	Non-Participating	4.5	4241	TS2	NA	40.0
R257	Non-Participating	4.5	4180	TS2	NA	40.0
R258	Non-Participating	4.5	4037	TS2	NA	40.0
R259	Non-Participating	4.5	4352	TS2	NA	40.0
R260	Non-Participating	4.5	4503	TS2	NA	40.0
R261	Non-Participating	4.5	4532	TS2	NA	40.0
R262	Non-Participating	4.5	4447	TS2	NA	40.0
R263	Non-Participating	4.5	4503	TS2	NA	40.0
R264	Non-Participating	4.5	4669	TS2	NA	40.0
R265	Non-Participating	4.5	3948	TS2	NA	40.0
R266	Non-Participating	4.5	3926	TS2	NA	40.0
R267	Non-Participating	4.5	3956	TS2	NA	40.0
R268	Non-Participating	4.5	3857	TS2	NA	40.0
R269	Non-Participating	4.5	4005	TS2	NA	40.0
R270	Non-Participating	4.5	4056	TS2	NA	40.0
R271	Non-Participating	4.5	4070	TS2	NA	40.0
R272	Non-Participating	4.5	4078	TS2	NA	40.0
R273	Non-Participating	4.5	4013	TS2	NA	40.0
R274	Non-Participating	4.5	4213	TS2	NA	40.0
R275	Non-Participating	4.5	3972	TS2	NA	40.0
R276	Non-Participating	4.5	3949	TS2	NA	40.0
R277	Non-Participating	4.5	4226	TS2	NA	40.0
R278	Non-Participating	4.5	3898	TS2	NA	40.0
R279	Non-Participating	4.5	4516	TS2	NA	40.0
R280	Non-Participating	4.5	4329	TS2	NA	40.0
R281	Non-Participating	4.5	4342	TS2	NA	40.0
R282	Non-Participating	4.5	4562	TS2	NA	40.0
R283	Non-Participating	4.5	4661	TS2	NA	40.0
R284	Non-Participating	4.5	2882	TS2	NA	40.0
R285	Non-Participating	4.5	3022	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R286	Non-Participating	4.5	2529	OP Transformer	NA	40.0
R287	Non-Participating	4.5	5477	OP Transformer	NA	40.0
R288	Non-Participating	4.5	4178	TS2	NA	40.0
R289	Non-Participating	4.5	4885	TS2	NA	40.0
R290	Non-Participating	4.5	4011	TS2	NA	40.0
R291	Non-Participating	4.5	3611	TS2	NA	40.0
R292	Non-Participating	4.5	4638	TS2	NA	40.0
R293	Non-Participating	4.5	4829	TS2	NA	40.0
R294	Non-Participating	4.5	6493	OP Transformer	NA	40.0
R295	Non-Participating	4.5	6331	OP Transformer	NA	40.0
R296	Non-Participating	4.5	6434	OP Transformer	NA	40.0
R297	Non-Participating	4.5	6599	OP Transformer	NA	40.0
R298	Non-Participating	4.5	5674	OP Transformer	NA	40.0
R299	Non-Participating	4.5	5362	OP Transformer	NA	40.0
R300	Non-Participating	4.5	3824	OP Transformer	NA	40.0
R301	Non-Participating	4.5	2483	OP Transformer	NA	40.0
R302	Non-Participating	4.5	2707	OP Transformer	NA	40.0
R303	Non-Participating	4.5	1872	OP Transformer	NA	40.0
R304	Non-Participating	4.5	2019	OP Transformer	NA	40.0
R305	Non-Participating	4.5	2309	OP Transformer	NA	40.0
R306	Non-Participating	4.5	3239	TS2	NA	40.0
R307	Non-Participating	4.5	4090	OP Transformer	NA	40.0
R308	Non-Participating	4.5	3827	TS2	NA	40.0
R309	Non-Participating	4.5	3503	TS2	NA	40.0
R310	Non-Participating	4.5	3345	TS2	NA	40.0
R311	Non-Participating	4.5	3628	TS2	NA	40.0
R312	Non-Participating	4.5	4689	TS2	NA	40.0
R313	Non-Participating	4.5	2952	TS2	NA	40.0
R314	Non-Participating	4.5	865	TS2	25.0	40.0
R315	Non-Participating	4.5	804	TS2	25.4	40.0
R316	Non-Participating	4.5	2505	TS2	NA	40.0
R317	Non-Participating	4.5	3575	TS2	NA	40.0
R318	Non-Participating	4.5	738	TS2	27.7	40.0
R319	Non-Participating	4.5	3506	TS2	NA	40.0
R320	Non-Participating	4.5	3469	TS2	NA	40.0
R321	Non-Participating	4.5	3404	TS2	NA	40.0
R322	Non-Participating	4.5	3801	TS2	NA	40.0
R323	Non-Participating	4.5	3690	TS2	NA	40.0
R324	Non-Participating	4.5	3458	TS2	NA	40.0
R325	Non-Participating	4.5	3972	TS2	NA	40.0
R326	Non-Participating	4.5	2343	OP Transformer	NA	40.0
R327	Non-Participating	4.5	2765	OP Transformer	NA	40.0
R328	Non-Participating	4.5	6501	OP Transformer	NA	40.0
R329	Non-Participating	4.5	1632	TS2	NA	40.0
R330	Non-Participating	4.5	505	TS1	35.6	40.0
R331	Non-Participating	4.5	632	TS1	33.5	40.0
R332	Non-Participating	4.5	585	TS1	34.2	40.0
R333	Non-Participating	4.5	618	TS1	33.7	40.0
R334	Non-Participating	4.5	645	TS1	33.3	40.0
R335	Non-Participating	4.5	804	TS1	31.0	40.0
R336	Non-Participating	4.5	946	TS1	29.3	40.0
R337	Non-Participating	4.5	1144	TS1	27.3	40.0
R338	Non-Participating	4.5	1216	TS1	26.6	40.0
R339	Non-Participating	4.5	1307	TS1	25.8	40.0
R340	Non-Participating	4.5	1175	TS1	27.0	40.0
R341	Non-Participating	4.5	1227	TS1	26.5	40.0
R342	Non-Participating	4.5	1382	TS1	25.2	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
R345	Non-Participating	4.5	1015	TS1	28.6	40.0
R346	Non-Participating	4.5	1030	TS1	28.4	40.0
R347	Non-Participating	4.5	1208	TS1	26.7	40.0
R348	Non-Participating	4.5	1306	TS1	25.8	40.0
R349	Non-Participating	4.5	1394	TS1	25.1	40.0
R350	Non-Participating	4.5	1440	TS1	24.7	40.0
R351	Non-Participating	4.5	1528	TS1	NA	40.0
R352	Non-Participating	4.5	1556	TS1	NA	40.0
R353	Non-Participating	4.5	1466	TS1	24.5	40.0
R354	Non-Participating	4.5	1475	TS1	24.4	40.0
R358	Non-Participating	4.5	1304	TS1	25.8	40.0
R359	Non-Participating	4.5	795	TS1	31.1	40.0
R360	Non-Participating	4.5	755	TS1	31.7	40.0
R361	Non-Participating	4.5	713	TS1	32.2	40.0
R362	Non-Participating	4.5	721	TS1	32.1	40.0
R363	Non-Participating	4.5	1454	TS1	24.6	40.0
R364	Non-Participating	4.5	1317	TS1	21.3	40.0
R365	Non-Participating	4.5	1278	TS1	26.0	40.0
R366	Non-Participating	4.5	989	TS1	28.8	40.0
R367	Non-Participating	4.5	1071	TS1	28.0	40.0
R368	Non-Participating	4.5	1449	TS1	20.2	40.0
R369	Non-Participating	4.5	1107	TS1	27.6	40.0
R370	Non-Participating	4.5	1330	TS1	21.2	40.0
R371	Non-Participating	4.5	1533	TS1	NA	40.0
R372	Non-Participating	4.5	1304	TS1	25.8	40.0
R373	Non-Participating	4.5	976	TS1	29.0	40.0
R374	Non-Participating	4.5	940	TS1	29.4	40.0
R375	Non-Participating	4.5	884	TS1	30.0	40.0
R376	Non-Participating	4.5	1039	TS1	28.3	40.0
R377	Non-Participating	4.5	1306	TS1	25.8	40.0
R378	Non-Participating	4.5	1229	TS1	26.5	40.0
R379	Non-Participating	4.5	773	TS1	31.4	40.0
R380	Non-Participating	4.5	675	TS1	32.8	40.0
R381	Non-Participating	4.5	658	TS1	33.0	40.0
R382	Non-Participating	4.5	1472	TS1	20.0	40.0
R383	Non-Participating	4.5	2666	TS2	NA	40.0
RV001	Non-Participating Vacant	4.5	3543	TS2	NA	40.0
RV002	Non-Participating Vacant	4.5	5412	OP Transformer	NA	40.0
RV003	Non-Participating Vacant	4.5	2674	TS2	NA	40.0
RV004	Non-Participating Vacant	4.5	4475	OP Transformer	NA	40.0
RV005	Non-Participating Vacant	4.5	2699	TS2	NA	40.0
RV006	Non-Participating Vacant	4.5	2449	TS2	NA	40.0
RV007	Non-Participating Vacant	4.5	2470	TS2	NA	40.0
RV008	Non-Participating Vacant	4.5	5306	OP Transformer	NA	40.0
RV009	Non-Participating Vacant	4.5	2483	OP Transformer	NA	40.0
RV010	Non-Participating Vacant	4.5	3244	OP Transformer	NA	40.0
RV011	Non-Participating Vacant	4.5	3301	OP Transformer	NA	40.0
RV012	Non-Participating Vacant	4.5	3003	OP Transformer	NA	40.0
RV013	Non-Participating Vacant	4.5	1174	TS2	27.0	40.0
RV014	Non-Participating Vacant	4.5	3129	TS2	NA	40.0
RV015	Non-Participating Vacant	4.5	2738	TS2	NA	40.0
RV016	Non-Participating Vacant	4.5	2902	TS2	NA	40.0
RV017	Non-Participating Vacant	4.5	2895	TS2	NA	40.0
RV018	Non-Participating Vacant	4.5	1963	OP Transformer	NA	40.0
RV019	Non-Participating Vacant	4.5	2008	OP Transformer	NA	40.0
RV020	Non-Participating Vacant	4.5	1645	OP Transformer	NA	40.0
RV021	Non-Participating Vacant	4.5	3254	TS2	NA	40.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV022	Non-Participating Vacant	4.5	4765	OP Transformer	NA	40.0
RV023	Non-Participating Vacant	4.5	3188	OP Transformer	NA	40.0
RV024	Non-Participating Vacant	4.5	2433	OP Transformer	NA	40.0
RV025	Non-Participating Vacant	4.5	4257	OP Transformer	NA	40.0
RV026	Non-Participating Vacant	4.5	5029	OP Transformer	NA	40.0
RV027	Non-Participating Vacant	4.5	4401	OP Transformer	NA	40.0
RV028	Non-Participating Vacant	4.5	4987	OP Transformer	NA	40.0
RV029	Non-Participating Vacant	4.5	5398	OP Transformer	NA	40.0
RV030	Non-Participating Vacant	4.5	5215	OP Transformer	NA	40.0
RV031	Non-Participating Vacant	4.5	1271	OP Transformer	-88.0	40.0
RV032	Non-Participating Vacant	4.5	736	TS2	26.7	40.0
RV033	Non-Participating Vacant	4.5	3383	TS2	NA	40.0
RV034	Non-Participating Vacant	4.5	4447	TS2	NA	40.0
RV035	Non-Participating Vacant	4.5	3873	TS2	NA	40.0
RV036	Non-Participating Vacant	4.5	3392	TS2	NA	40.0
RV037	Non-Participating Vacant	4.5	3403	TS2	NA	40.0
RV038	Non-Participating Vacant	4.5	3415	TS2	NA	40.0
RV039	Non-Participating Vacant	4.5	3435	TS2	NA	40.0
RV040	Non-Participating Vacant	4.5	3453	TS2	NA	40.0
RV041	Non-Participating Vacant	4.5	3474	TS2	NA	40.0
RV042	Non-Participating Vacant	4.5	3501	TS2	NA	40.0
RV043	Non-Participating Vacant	4.5	3530	TS2	NA	40.0
RV044	Non-Participating Vacant	4.5	3591	TS2	NA	40.0
RV045	Non-Participating Vacant	4.5	3520	TS2	NA	40.0
RV046	Non-Participating Vacant	4.5	3450	TS2	NA	40.0
RV047	Non-Participating Vacant	4.5	3379	TS2	NA	40.0
RV048	Non-Participating Vacant	4.5	3309	TS2	NA	40.0
RV049	Non-Participating Vacant	4.5	3380	TS2	NA	40.0
RV050	Non-Participating Vacant	4.5	3381	TS2	NA	40.0
RV051	Non-Participating Vacant	4.5	3385	TS2	NA	40.0
RV052	Non-Participating Vacant	4.5	3388	TS2	NA	40.0
RV053	Non-Participating Vacant	4.5	3396	TS2	NA	40.0
RV054	Non-Participating Vacant	4.5	3349	TS2	NA	40.0
RV055	Non-Participating Vacant	4.5	3702	TS2	NA	40.0
RV056	Non-Participating Vacant	4.5	3065	OP Transformer	NA	40.0
RV057	Non-Participating Vacant	4.5	2305	TS2	NA	40.0
RV058	Non-Participating Vacant	4.5	1935	TS2	NA	40.0
RV059	Non-Participating Vacant	4.5	1303	TS2	21.0	40.0
RV060	Non-Participating Vacant	4.5	1782	OP Transformer	NA	40.0
RV061	Non-Participating Vacant	4.5	3815	TS2	NA	40.0
RV062	Non-Participating Vacant	4.5	4336	TS2	NA	40.0
RV063	Non-Participating Vacant	4.5	4346	TS2	NA	40.0
RV064	Non-Participating Vacant	4.5	3799	TS2	NA	40.0
RV065	Non-Participating Vacant	4.5	3807	TS2	NA	40.0
RV066	Non-Participating Vacant	4.5	4169	TS2	NA	40.0
RV067	Non-Participating Vacant	4.5	4147	TS2	NA	40.0
RV068	Non-Participating Vacant	4.5	4104	TS2	NA	40.0
RV069	Non-Participating Vacant	4.5	3978	TS2	NA	40.0
RV070	Non-Participating Vacant	4.5	3707	TS2	NA	40.0
RV071	Non-Participating Vacant	4.5	4023	TS2	NA	40.0
RV072	Non-Participating Vacant	4.5	4620	TS2	NA	40.0
RV073	Non-Participating Vacant	4.5	4405	TS2	NA	40.0
RV074	Non-Participating Vacant	4.5	4369	TS2	NA	40.0
RV075	Non-Participating Vacant	4.5	3929	TS2	NA	40.0
RV076	Non-Participating Vacant	4.5	3869	TS2	NA	40.0
RV077	Non-Participating Vacant	4.5	3855	TS2	NA	40.0
RV078	Non-Participating Vacant	4.5	3899	TS2	NA	40.0

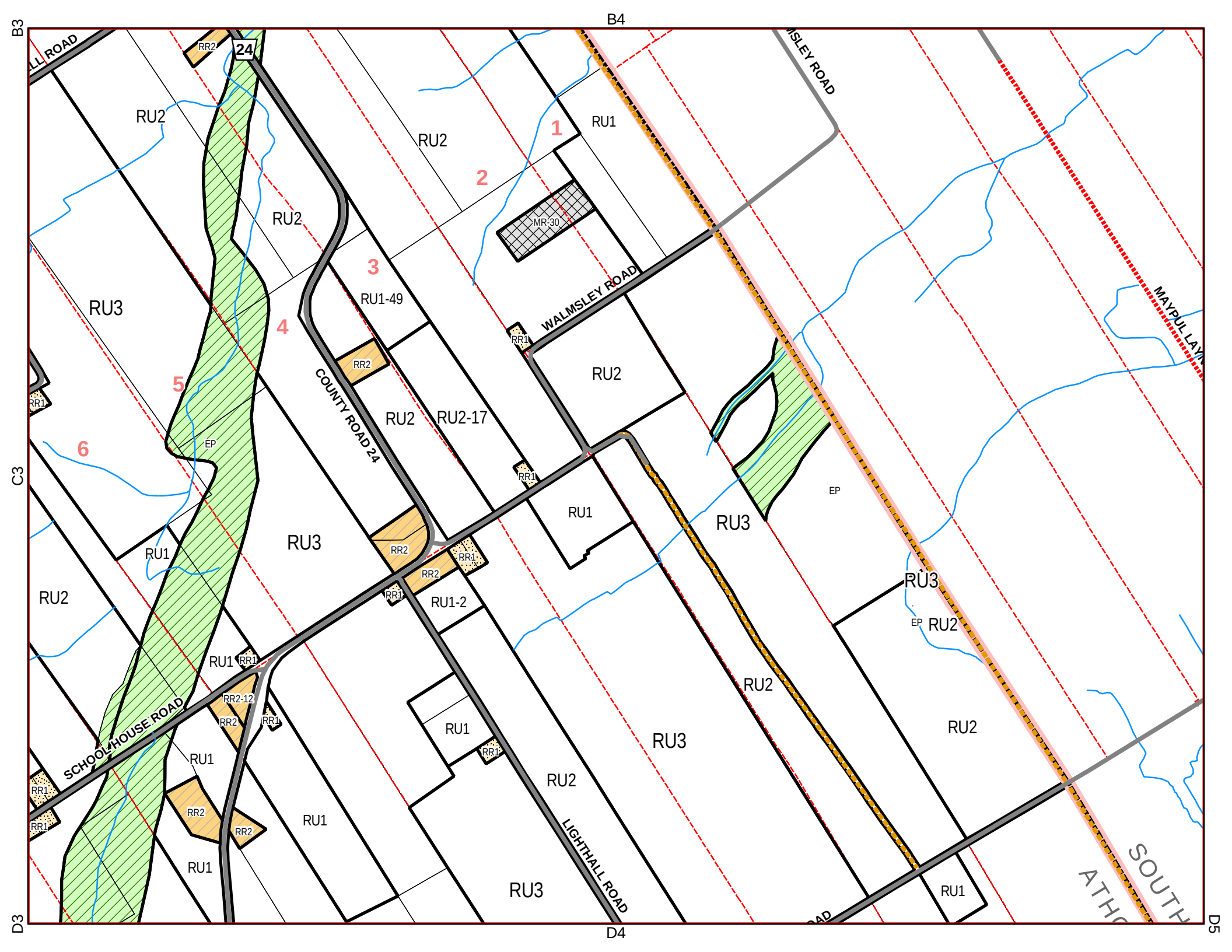
Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV079	Non-Participating Vacant	4.5	3899	TS2	NA	40.0
RV080	Non-Participating Vacant	4.5	4003	TS2	NA	40.0
RV081	Non-Participating Vacant	4.5	3948	TS2	NA	40.0
RV082	Non-Participating Vacant	4.5	2396	OP Transformer	NA	40.0
RV083	Non-Participating Vacant	4.5	2464	OP Transformer	NA	40.0
RV084	Non-Participating Vacant	4.5	4366	OP Transformer	NA	40.0
RV085	Non-Participating Vacant	4.5	3533	TS2	NA	40.0
RV086	Non-Participating Vacant	4.5	1281	TS2	26.0	40.0
RV087	Non-Participating Vacant	4.5	2751	TS2	NA	40.0
RV088	Non-Participating Vacant	4.5	2807	TS2	NA	40.0
RV089	Non-Participating Vacant	4.5	3964	OP Transformer	NA	40.0
RV090	Non-Participating Vacant	4.5	3811	OP Transformer	NA	40.0
RV091	Non-Participating Vacant	4.5	4700	OP Transformer	NA	40.0
RV092	Non-Participating Vacant	4.5	5219	OP Transformer	NA	40.0
RV093	Non-Participating Vacant	4.5	5497	OP Transformer	NA	40.0
RV094	Non-Participating Vacant	4.5	5664	OP Transformer	NA	40.0
RV095	Non-Participating Vacant	4.5	5766	OP Transformer	NA	40.0
RV096	Non-Participating Vacant	4.5	5957	OP Transformer	NA	40.0
RV097	Non-Participating Vacant	4.5	5865	OP Transformer	NA	40.0
RV098	Non-Participating Vacant	4.5	5387	OP Transformer	NA	40.0
RV099	Non-Participating Vacant	4.5	4328	OP Transformer	NA	40.0
RV100	Non-Participating Vacant	4.5	4150	OP Transformer	NA	40.0
RV101	Non-Participating Vacant	4.5	3382	OP Transformer	NA	40.0
RV102	Non-Participating Vacant	4.5	3195	OP Transformer	NA	40.0
RV103	Non-Participating Vacant	4.5	3111	OP Transformer	NA	40.0
RV104	Non-Participating Vacant	4.5	1761	OP Transformer	NA	40.0
RV105	Non-Participating Vacant	4.5	2161	OP Transformer	NA	40.0
RV106	Non-Participating Vacant	4.5	2692	OP Transformer	NA	40.0
RV107	Non-Participating Vacant	4.5	4010	TS2	NA	40.0
RV108	Non-Participating Vacant	4.5	2784	TS2	NA	40.0
RV109	Non-Participating Vacant	4.5	2385	OP Transformer	NA	40.0
RV110	Non-Participating Vacant	4.5	2311	OP Transformer	NA	40.0
RV111	Non-Participating Vacant	4.5	2210	OP Transformer	NA	40.0
RV112	Non-Participating Vacant	4.5	3445	TS2	NA	40.0
RV113	Non-Participating Vacant	4.5	5691	OP Transformer	NA	40.0
RV114	Non-Participating Vacant	4.5	6564	OP Transformer	NA	40.0
RV115	Non-Participating Vacant	4.5	4607	TS2	NA	40.0
RV116	Non-Participating Vacant	4.5	4081	TS2	NA	40.0
RV117	Non-Participating Vacant	4.5	4801	TS2	NA	40.0
RV118	Non-Participating Vacant	4.5	4045	TS2	NA	40.0
RV119	Non-Participating Vacant	4.5	3983	TS2	NA	40.0
RV120	Non-Participating Vacant	4.5	4151	TS2	NA	40.0
RV121	Non-Participating Vacant	4.5	3965	TS2	NA	40.0
RV122	Non-Participating Vacant	4.5	1032	TS2	23.0	40.0
RV123	Non-Participating Vacant	4.5	2143	TS2	NA	40.0
RV124	Non-Participating Vacant	4.5	2878	TS2	NA	40.0
RV125	Non-Participating Vacant	4.5	2941	TS2	NA	40.0
RV126	Non-Participating Vacant	4.5	4161	TS2	NA	40.0
RV127	Non-Participating Vacant	4.5	3206	TS2	NA	40.0
RV128	Non-Participating Vacant	4.5	3666	TS2	NA	40.0
RV129	Non-Participating Vacant	4.5	4058	TS2	NA	40.0
RV130	Non-Participating Vacant	4.5	4038	TS2	NA	40.0
RV131	Non-Participating Vacant	4.5	3822	TS2	NA	40.0
RV132	Non-Participating Vacant	4.5	3892	TS2	NA	40.0
RV133	Non-Participating Vacant	4.5	4171	TS2	NA	40.0
RV134	Non-Participating Vacant	4.5	4594	TS2	NA	40.0
RV135	Non-Participating Vacant	4.5	869	TS2	24.9	40.0

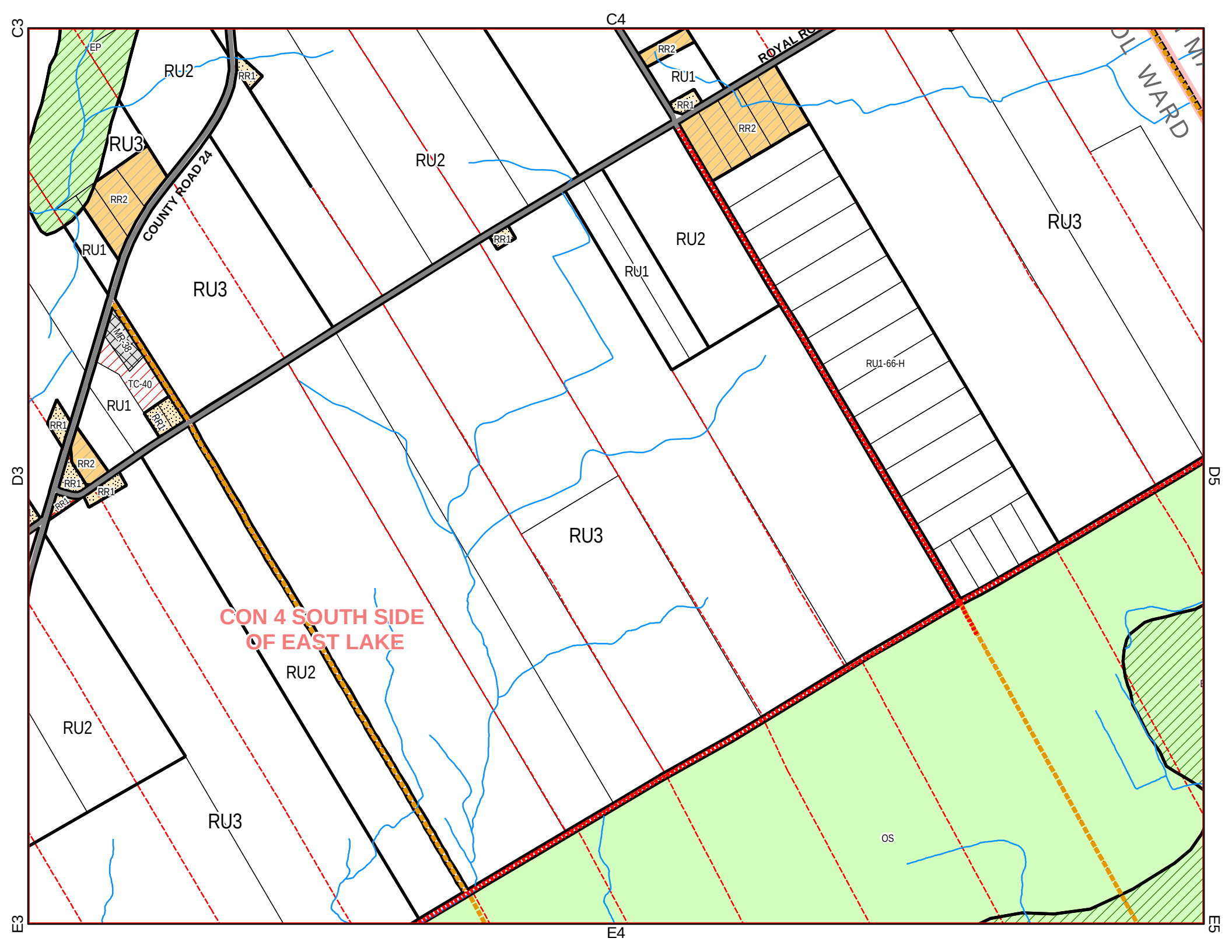
Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Turbine ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
RV136	Non-Participating Vacant	4.5	3217	TS2	NA	40.0
RV137	Non-Participating Vacant	4.5	3641	TS2	NA	40.0
RV138	Non-Participating Vacant	4.5	3761	TS2	NA	40.0
RV139	Non-Participating Vacant	4.5	3245	TS2	NA	40.0
RV140	Non-Participating Vacant	4.5	3205	TS2	NA	40.0
RV141	Non-Participating Vacant	4.5	2388	TS2	NA	40.0
RV142	Non-Participating Vacant	4.5	2760	TS2	NA	40.0
RV143	Non-Participating Vacant	4.5	3828	TS2	NA	40.0
RV144	Non-Participating Vacant	4.5	4527	TS2	NA	40.0
RV145	Non-Participating Vacant	4.5	2575	OP Transformer	NA	40.0
RV146	Non-Participating Vacant	4.5	2302	OP Transformer	NA	40.0
RV147	Non-Participating Vacant	4.5	2860	OP Transformer	NA	40.0
RV148	Non-Participating Vacant	4.5	3727	OP Transformer	NA	40.0
RV149	Non-Participating Vacant	4.5	2610	OP Transformer	NA	40.0
RV150	Non-Participating Vacant	4.5	3109	OP Transformer	NA	40.0
RV151	Non-Participating Vacant	4.5	5283	OP Transformer	NA	40.0
RV152	Non-Participating Vacant	4.5	6446	OP Transformer	NA	40.0
RV153	Non-Participating Vacant	4.5	3723	TS2	NA	40.0
RV154	Non-Participating Vacant	4.5	2148	OP Transformer	NA	40.0
RV155	Non-Participating Vacant	4.5	2841	OP Transformer	NA	40.0
RV156	Non-Participating Vacant	4.5	3250	TS2	NA	40.0
RV157	Non-Participating Vacant	4.5	1456	TS2	24.6	40.0
RV158	Non-Participating Vacant	4.5	1927	OP Transformer	NA	40.0
RV159	Non-Participating Vacant	4.5	3301	TS2	NA	40.0
RV160	Non-Participating Vacant	4.5	659	TS1	33.0	40.0
RV161	Non-Participating Vacant	4.5	502	TS1	35.7	40.0
RV162	Non-Participating Vacant	4.5	592	TS1	34.1	40.0
RV163	Non-Participating Vacant	4.5	709	TS1	32.3	40.0
RV164	Non-Participating Vacant	4.5	1652	TS1	NA	40.0
RV165	Non-Participating Vacant	4.5	1118	TS1	27.5	40.0
RV166	Non-Participating Vacant	4.5	1196	TS1	22.4	40.0
RV167	Non-Participating Vacant	4.5	949	TS1	29.3	40.0
RV168	Non-Participating Vacant	4.5	790	TS1	31.2	40.0
RV170	Non-Participating Vacant	4.5	755	TS1	31.7	40.0
RV171	Non-Participating Vacant	4.5	1381	TS1	20.8	40.0
RV172	Non-Participating Vacant	4.5	2393	TS2	NA	40.0

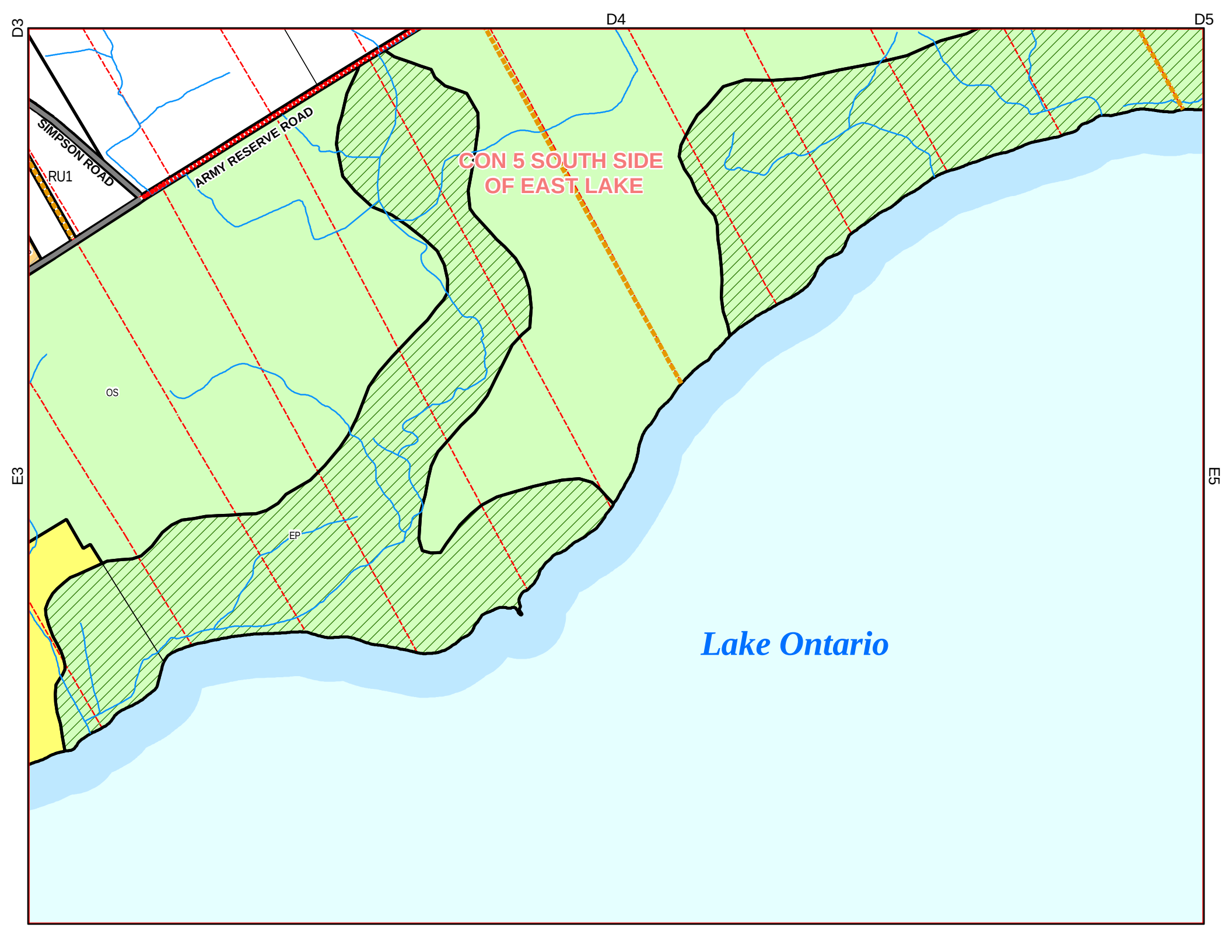
Table A10: Transformer Noise Impact Summary - Participating Receptor Locations
White Pines Wind Project

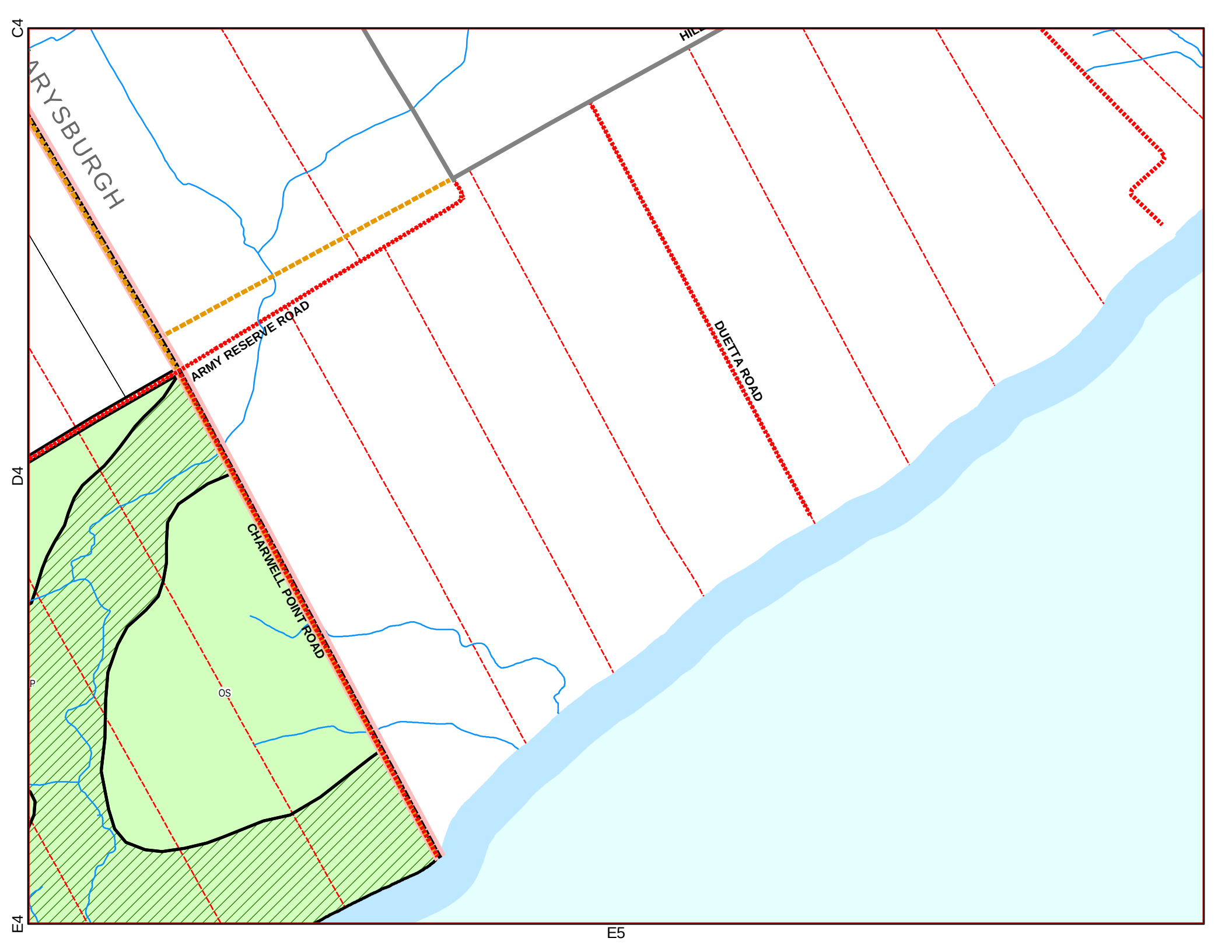
Point of Reception ID	Description	Height [m]	Distance to Nearest Transformer [m]	Nearest Transformer ID	Calculated Sound Level [dBA]	Sound Level Limit [dBA]
PR01	Participating	4.5	2889	TS2	NA	40.0
PR02	Participating	4.5	1006	TS2	28.7	40.0
PR03	Participating	4.5	1566	TS2	NA	40.0
PR04	Participating	4.5	629	TS2	27.3	40.0
PR05	Participating	4.5	1835	TS2	NA	40.0
PR06	Participating	4.5	800	TS2	25.5	40.0
PR07	Participating	4.5	2786	OP Transformer	NA	40.0
PR08	Participating	4.5	1610	TS2	NA	40.0
PR09	Participating	4.5	3554	TS2	NA	40.0
PR10	Participating	4.5	3061	TS2	NA	40.0
PR11	Participating	4.5	3423	TS2	NA	40.0
PR12	Participating	4.5	2058	TS2	NA	40.0
PR13	Participating	4.5	3357	TS2	NA	40.0
PR14	Participating	4.5	3588	TS2	NA	40.0
PR15	Participating	4.5	3438	OP Transformer	NA	40.0
PR16	Participating	4.5	983	TS2	28.9	40.0
PR17	Participating	4.5	4034	TS2	NA	40.0
PR18	Participating	4.5	4165	OP Transformer	NA	40.0
PR19	Participating	4.5	2200	TS2	NA	40.0

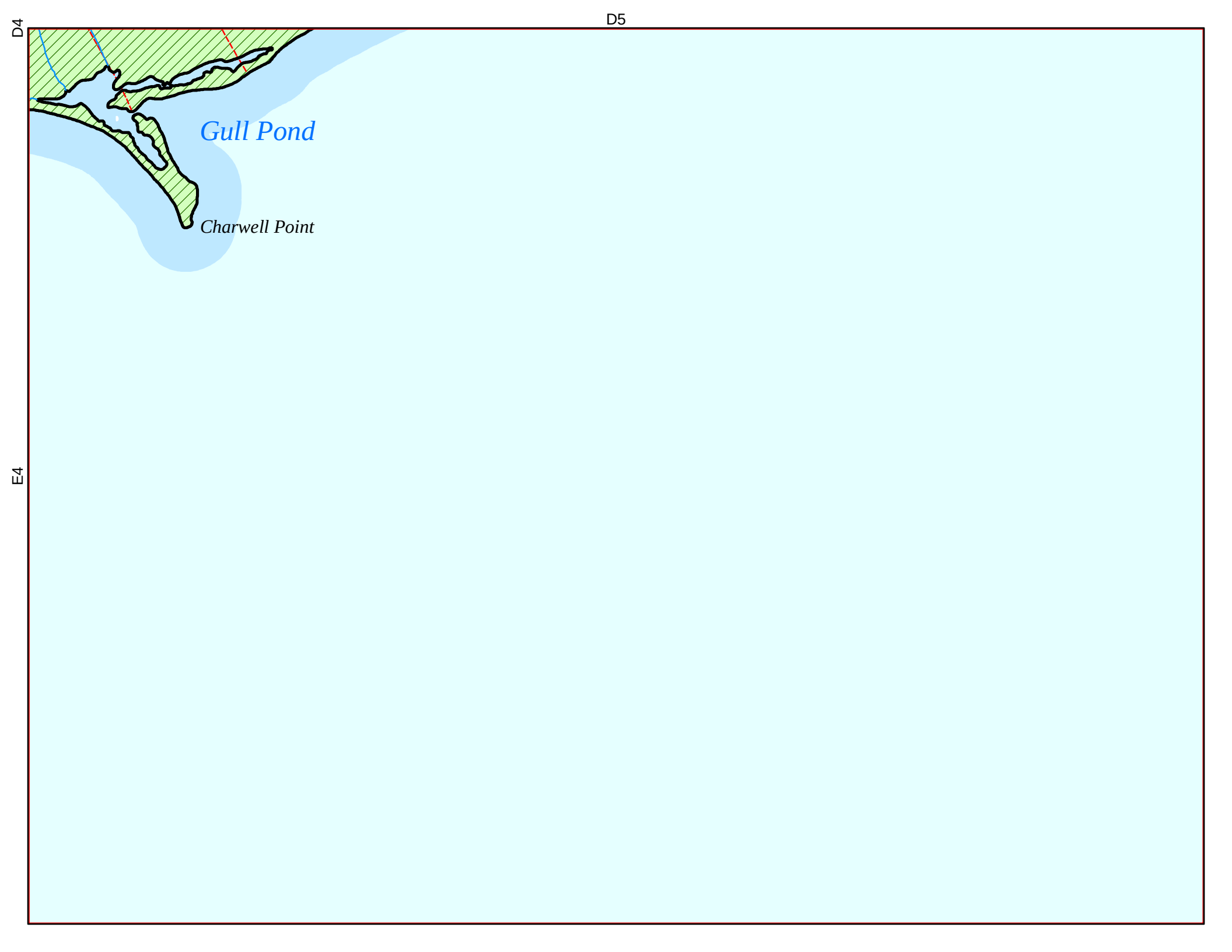
APPENDIX B:
Zoning Maps


B3
B4
C3
D3
D4
D5
24
RR2
RU2
RU1
RU3
1
2
3
4
5
6
MR-30
RU1-49
RU2-17
RU1-2
RR2-12
RR1
EP
WALMSLEY ROAD
COUNTY ROAD 24
SCHOOL HOUSE ROAD
LIGHTHALL ROAD
MAYPUL LAYN
SOUTH


C3
C4
D3
D5
E3
E4
E5
EP
RU2
RR1
RU3
RR2
COUNTY ROAD 24
RU1
RU2
RR2
RR1
RU1
RU2
RU3
RU1-66-H
MP-39
TC-40
RU1
RR1
RR1
RR2
RR1
RR1
RR1
RU3
CON 4 SOUTH SIDE
OF EAST LAKE
RU2
RU2
RU3
OS


D3
D4
D5
E3
E5
SIMPSON ROAD
ARMY RESERVE ROAD
RU1
CON 5 SOUTH SIDE
OF EAST LAKE
OS
EP
Lake Ontario


C4
D4
E4
E5
ARYSBURGH
ARMY RESERVE ROAD
DUETTA ROAD
CHARWELL POINT ROAD
OS
P


D5
D4
E4
Gull Pond
Charwell Point

A1 A2

B2 C2

C1

ATHOL WARD
SOUTH MARYSBURGH

NORTH OF CON 1

21 22 23 24 25 26 27 28 29 30 31 32 33

CROWES ROAD

JOHNSTON ROAD

COUNTY ROAD 10

BOND ROAD

SCOTTS MILL ROAD

OLD MILFORD ROAD

CLAPP STREET

SAINT PHILIP STREET

CHAPMANS CRESCENT

BLACK RIVER

Mill Pond

Macks River

Charlie Creek

Milford

See Schedule A9-1
A9-1.2 Milford

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

RU1 RU2 RU3 RU3-1 RR1 RR1-5 RR1-6 RR2 RR2-42 EP MR

LEGEND

RU1 - RURAL 1
RU3 - RURAL 3
RU2 - RURAL 2
R1 - URBAN RESIDENTIAL TYPE 1
R2 - URBAN RESIDENTIAL TYPE 2
R3 - URBAN RESIDENTIAL TYPE 3
HR - HAMLET RESIDENTIAL
LSR - LIMITED SERVICE RESIDENTIAL
MHR - MOBILE HOME RESIDENTIAL
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RR2 - RURAL RESIDENTIAL 2
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TC - TOURIST COMMERCIAL
TPC - TRAILER PARK COMMERCIAL
MG - GENERAL INDUSTRIAL
MH - HEAVY INDUSTRIAL
MR - RURAL INDUSTRIAL
MX - EXTRACTIVE INDUSTRIAL
MD - WASTE DISPOSAL INDUSTRIAL
I - INSTITUTIONAL
OS - OPEN SPACE
EP - ENVIRONMENTAL PROTECTION
EP-W - ENVIRONMENTAL PROTECTION - PROVINCIALLY SIGNIFICANT WETLAND
FD - FUTURE DEVELOPMENT

ROADS & OTHER FEATURES

YEAR ROUND MAINTAINED ROAD
SEASONALLY MAINTAINED ROAD
PROVINCIAL HIGHWAY
PRIVATE LANE
PRIVATELY MAINTAINED UNASSUMED PUBLIC ROAD ALLOWANCE
UNOPENED ROAD ALLOWANCE
WARD BOUNDARY
LOT AND CONCESSION LINE
DETAIL BOUNDARY - Reference seperate schedule as noted
WATERCOURSE - EP Zone applies within 15m on either side of watercourse

DATE	REVISION	PER
31/08/06	FINAL DRAFT	PEC
08/05/06	SECOND DRAFT	PEC
01/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
22/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
09/04/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
04/12/03	ALTERED ZONING COLOURS	NS
10/12/03	ALTERED ZONING COLOURS	NS
26/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW
No. ___-___
SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

B1 B2

C2

D1 D2

WALMSLEY ROAD

MAYPUL LAYN ROAD

DAINARD ROAD

SOUTH MARYSBURGH ROAD

ATHOL WARD

BLACK RIVER

BLOCK C

BLOCK D

CON 1

RU1 RU1-14 RU1-63 RU2 RU3

RR1 RR2

EP

INSET A: BASSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

5 6

LEGEND

RU1 - RURAL 1
RU3 - RURAL 3
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01/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
12/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
30/03/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
19/12/03	ALTERED ZONING COLOURS	NS
30/12/03	ALTERED ZONING COLOURS	NS
26/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

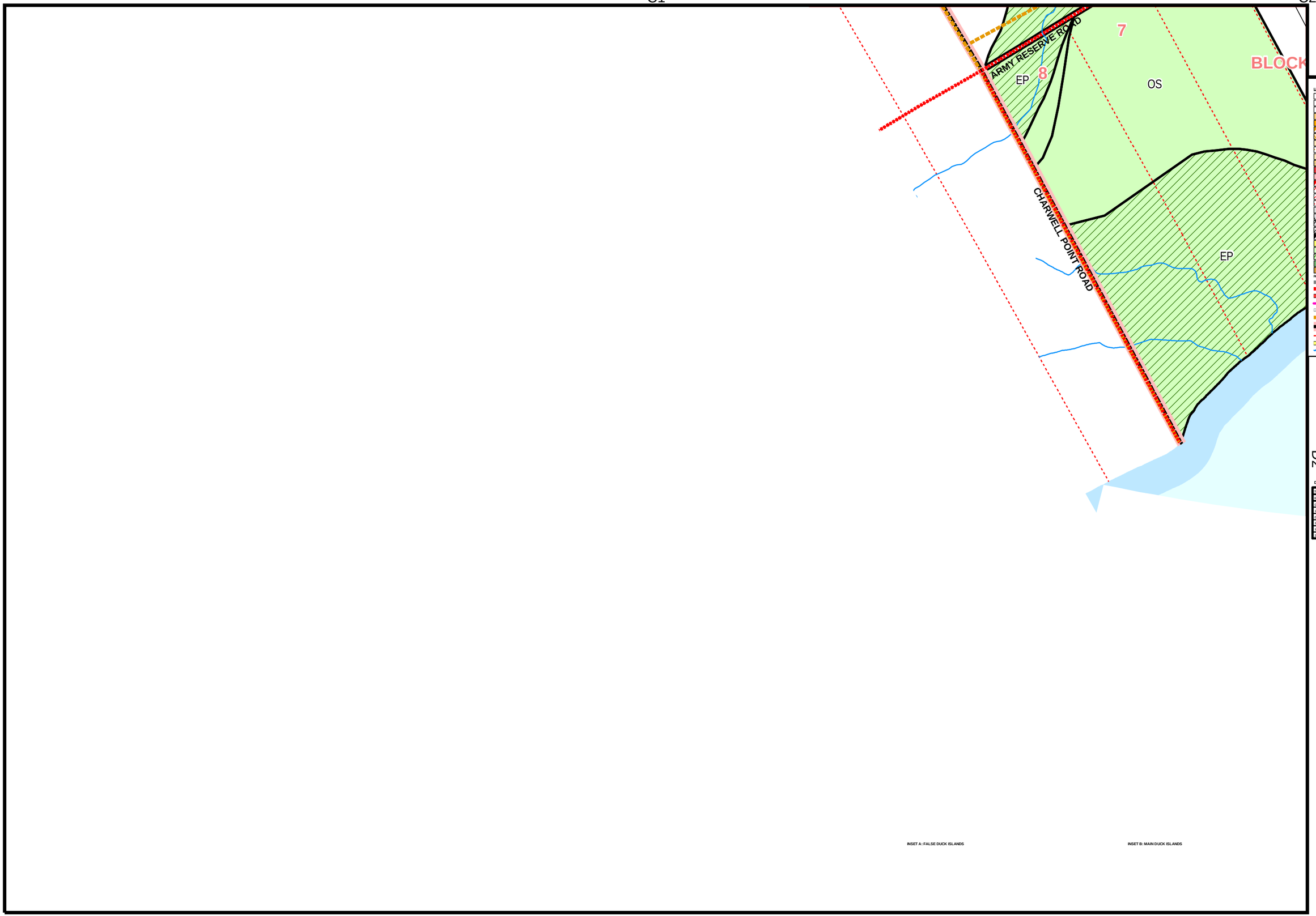
ZONING BY-LAW No. ___-___
SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

C1

C2



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D2

DATE	REVISION	PER
31/08/06	FINAL DRAFT	PEC
20/05/06	SECOND DRAFT	PEC
31/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
17/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
29/09/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
16/12/03	ALTERED ZONING COLOURS	NS
10/12/03	ALTERED ZONING COLOURS	NS
28/11/03	ALTERED ZONING COLOURS	PEC

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

±

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. ___-___
SCHEDULE A9

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DATE	SCALE	SCHEDULE
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A2

A3

B3

C2

C3

BLACK RIVER

Flatts P

South Bay

Black River

COUNTY ROAD 17

COUNTY ROAD 13

COLLIERS ROAD

MURPHY ROAD

S FALLS ROAD

MCMAHON LANE

WYCOTT LANE

PIRATES COVE LANE

CON NORTH OF POINT TRAVERSE ROUND THE MOUTH OF BLACK RIVER

GORE A

28 27 26 25 24 23 22 21 20

RU1 RU2 RU3 RU1-70 EP EPW RR1 RR2 RR1-21 RR2-13 LSR LSR-11 LSR-8 LSR-7-H I-8 TPC OS MX OS-11 TC-39 RR1-5

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

LEGEND

RU1 - RURAL 1
RU3 - RURAL 3
RU2 - RURAL 2
R1 - URBAN RESIDENTIAL TYPE 1
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DETAIL BOUNDARY - Reference seperate schedule as noted
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DATE	REVISION	PER
31/05/06	FINAL DRAFT	PEC
18/05/06	SECOND DRAFT	PEC
05/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
22/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
09/06/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
19/12/03	ALTERED ZONING COLOURS	NS
29/11/03	ALTERED ZONING COLOURS	NS
29/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. ____

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B2

B3

C3

D2

SOUTH BAY CRES.

CARMEN'S LANE

COUNTY ROAD 13

HELMER ROAD

BREWERS ROAD

HILLTOP ROAD

PETTICOAT POINT ROAD

BLOCK TRACT

CONCESSION ROUND

EDWARD PRINCE ONTARIO

CON ON LAKE

RU1 RU2 RU3 RU2-30

RR1 RR2 RR1-3

LSR LSR-10 CH

EP EP-W

I

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

LEGEND

RU1 - RURAL 1
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UNOPENED ROAD ALLOWANCE
WARD BOUNDARY
LOT AND CONCESSION LINE
DETAIL BOUNDARY - Reference seperate schedule as noted
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DATE	REVISION	PER
2/2006	FINAL DRAFT	PEC
8/2006	SECOND DRAFT	PEC
31/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
12/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
09/08/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
29/12/03	ALTERED ZONING COLOURS	NS
01/12/03	ALTERED ZONING COLOURS	NS
28/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. - -
SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

C1 C2 C3

D1

RU3

RU1

RU2

15

DUETTA ROAD

EP-W

LSR

Petticoat Point

LEGEND

- RU1 - RURAL 1
- RU3 - RURAL 3
- RU2 - RURAL 2
- R1 - URBAN RESIDENTIAL TYPE 1
- R2 - URBAN RESIDENTIAL TYPE 2
- R3 - URBAN RESIDENTIAL TYPE 3
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DATE	REVISION	PER
31/08/06	FINAL DRAFT	PEC
18/05/06	SECOND DRAFT	PEC
01/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
12/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
09/06/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
16/12/03	ALTERED ZONING COLOURS	NS
30/12/03	ALTERED ZONING COLOURS	NS
26/11/03	ALTERED ZONING COLOURS	PEC

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

±

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW
No. _-_
SCHEDULE A9

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

A3

B2

B4

C2

C3

C4

oint

Halfmoon Point

Little Bluff

RR1-5

RR1-80

RR2-2-H

LSR

EP

RU1

RU2

RU3

RR1

RR2

MR-1

WHATTAMS ROAD

CON 1 SOUTH OF PRINCE EDWARD BAY

D E F G H I K

BAY 2

INSET A : FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

RU1-68

LEGEND

- RU1 - RURAL 1
- RU3 - RURAL 3
- RU2 - RURAL 2
- R1 - URBAN RESIDENTIAL TYPE 1
- R2 - URBAN RESIDENTIAL TYPE 2
- R3 - URBAN RESIDENTIAL TYPE 3
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- LOT AND CONCESSION LINE
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DATE	REVISION	PER
5/05/06	FINAL DRAFT	PEC
5/05/06	SECOND DRAFT	PEC
5/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
12/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
5/09/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
5/12/03	ALTERED ZONING COLOURS	NS
5/12/03	ALTERED ZONING COLOURS	NS
28/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. -

SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
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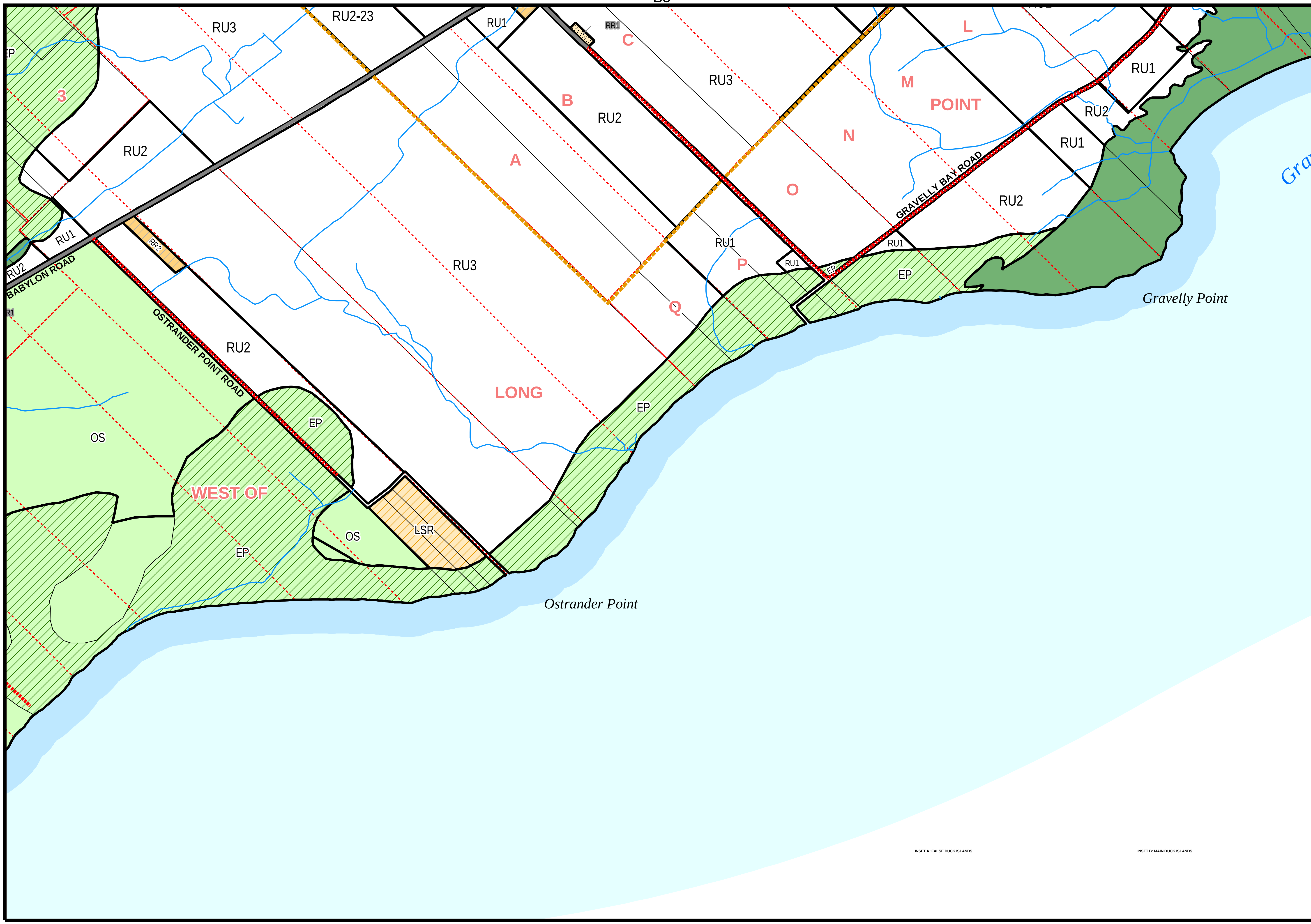

LEGEND

- RU1 - RURAL 1
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- OS - OPEN SPACE
- EP - ENVIRONMENTAL PROTECTION
- EP-W - ENVIROMENTAL PROTECTION - PROVINCIALLY SIGNIFICANT WETLAND
- FD - FUTURE DEVELOPMENT

ROADS & OTHER FEATURES

- YEAR ROUND MAINTAINED ROAD
- SEASONALLY MAINTAINED ROAD
- PROVINCIAL HIGHWAY
- PRIVATE LANE
- PRIVATELY MAINTAINED UNASSUMED PUBLIC ROAD ALLOWANCE
- UNOPENED ROAD ALLOWANCE
- WARD BOUNDARY
- LOT AND CONCESSION LINE
- DETAIL BOUNDARY - Reference seperate schedule as noted
- WATERCOURSE - EP Zone applies within 15m on either side of watercourse

DATE	REVISION	PER
31/08/06	FINAL DRAFT	PEC
18/05/06	SECOND DRAFT	PEC
01/12/04	TURN OVER TO PRINCE EDWARD COUNTY	NS
12/10/04	REVISED AS PER JUL 29 & AUG 17, 2004 MEETINGS	NS
09/06/04	ADD EP BOUNDARIES FROM 1999 CONSOLIDATION	NS
19/12/03	ALTERED ZONING COLOURS	NS
10/12/03	ALTERED ZONING COLOURS	NS
28/11/03	ALTERED ZONING COLOURS	PEC

INSET A: FALSE DUCK ISLANDS

INSET B: MAIN DUCK ISLANDS

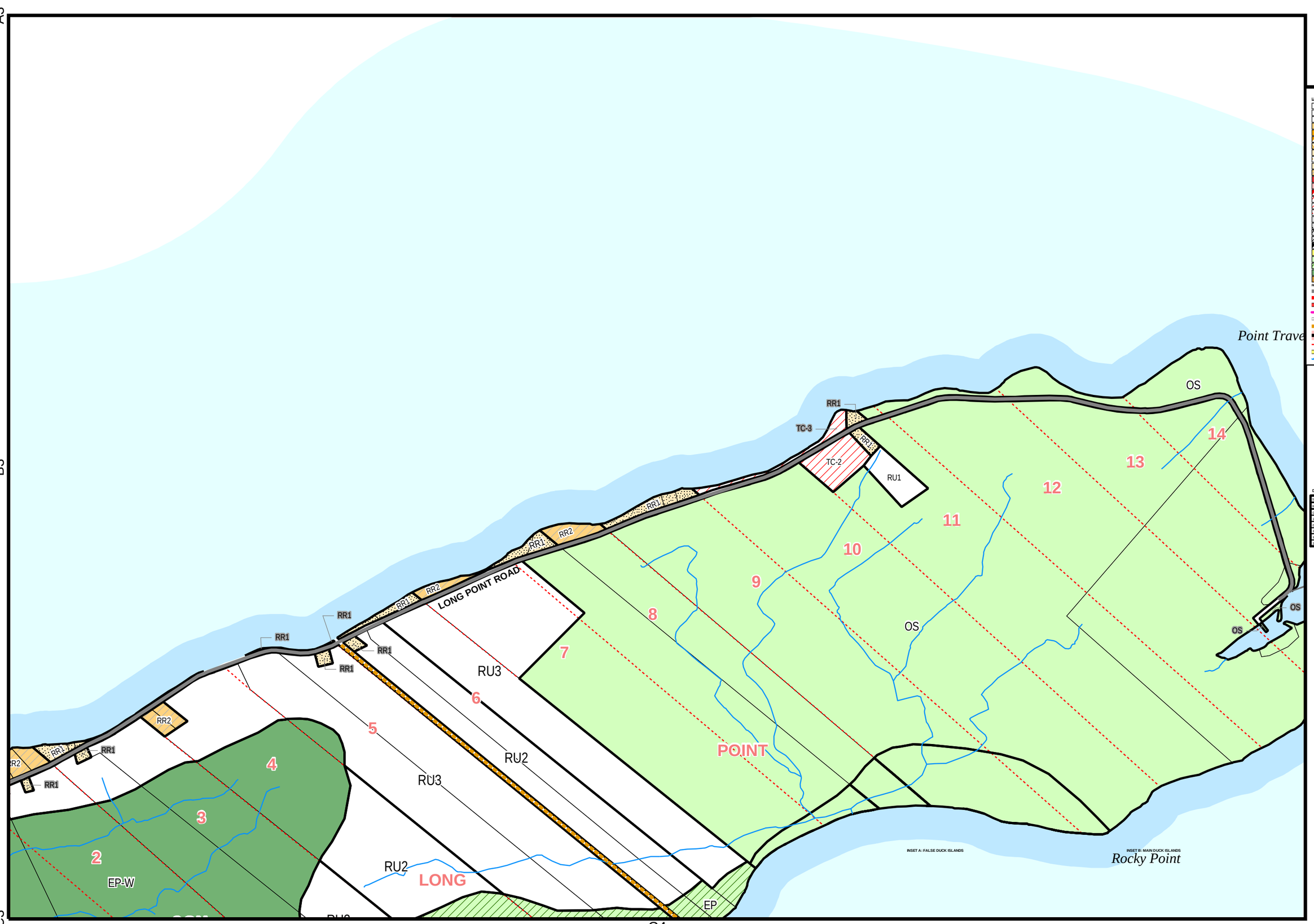
COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. __-___ SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9



LEGEND

- RU1 - RURAL 1
- RU3 - RURAL 3
- RU2 - RURAL 2
- R1 - URBAN RESIDENTIAL TYPE 1
- R2 - URBAN RESIDENTIAL TYPE 2
- R3 - URBAN RESIDENTIAL TYPE 3
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- LSR - LIMITED SERVICE RESIDENTIAL
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30/12/03	ALTERED ZONING COLOURS	NS
26/11/03	ALTERED ZONING COLOURS	PEC

COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. ___-___
SCHEDULE A9

DRAFT

DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

C4

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R03

EP

Poplar Point

elly Bay

LEGEND

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COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD

ZONING BY-LAW No. ___-__
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DATE	SCALE	SCHEDULE
AUG-2006	1:15,000	A9

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- OS - OPEN SPACE
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- EP-W - ENVIROMENTAL PROTECTION PSW (NOTE 1)
- FD - FUTURE DEVELOPMENT

Road

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- PRIVATELY MAINTAINED UNASSUMED PUBLIC ROAD ALLOWANCE
- PROVINCIAL HIGHWAY
- UNOPENED ROAD ALLOWANCE
- WATERCOURSE (NOTE 2)
- LOT AND CONCESSION LINE
- WARD BOUNDARY

A9-1.1 BLACK RIVER DETAIL

SCALE 1: 5,000

NOTES:

NOTE 1: PSW DENOTES PROVINCIALLY SIGNIFICANT WETLAND

NOTE 2: EP ZONE APPLIES TO 15 METRES ON EITHER SIDE OF WATERCOURSE

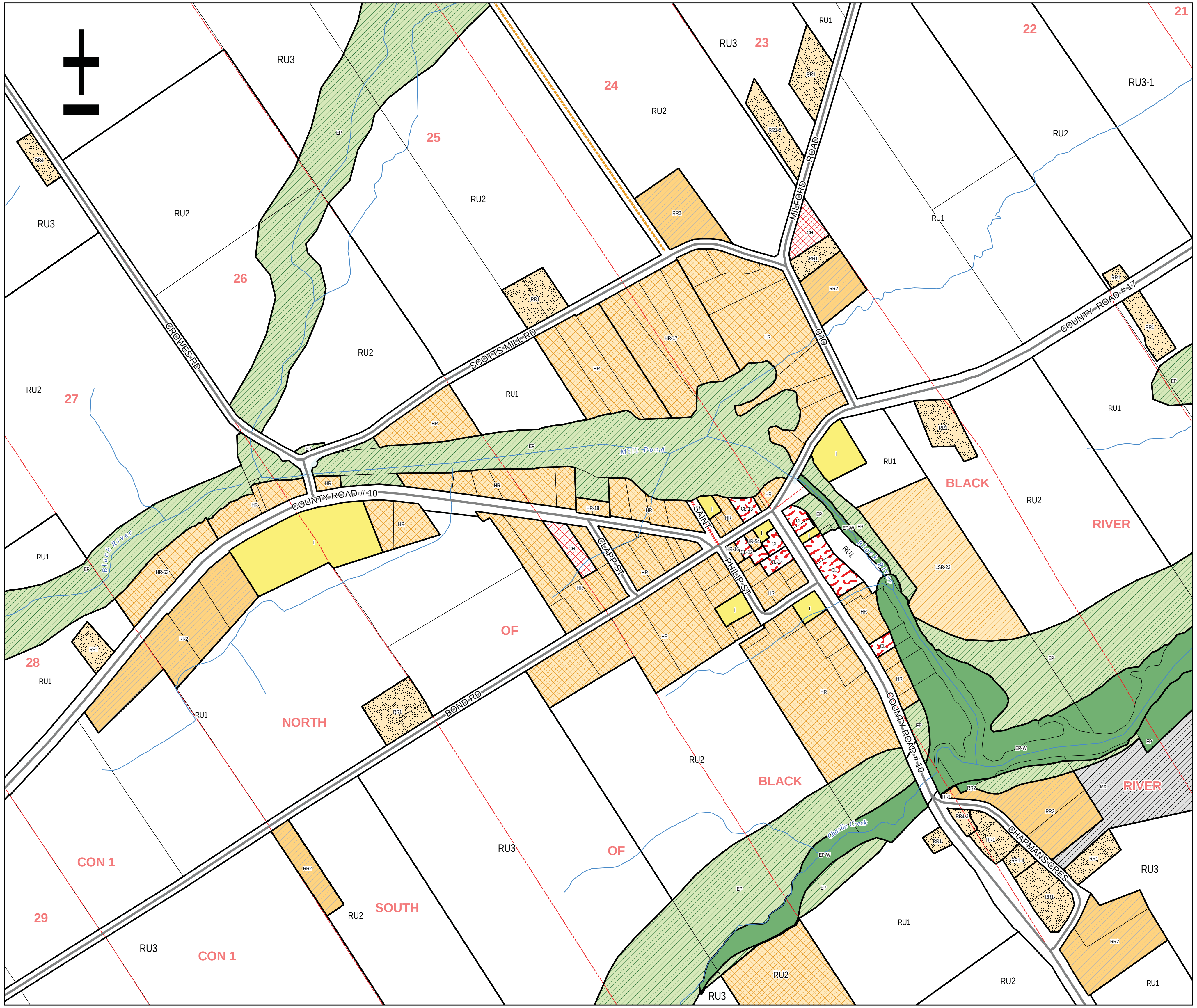
COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD DETAILS

DRAFT

ZONING BY-LAW
No. __-___
SCHEDULE A9-1

DATE	SCALE	SCHEDULE
AUG-2006	VARIES	**A9-1**



SCALE 1: 5,000

A9-1.2 MILFORD DETAIL

Legend

- RU1 - RURAL 1
- RU3 - RURAL 3
- RU2 - RURAL 2
- R1 - URBAN RESIDENTIAL TYPE 1
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COUNTY OF PRINCE EDWARD

SOUTH MARYSBURGH WARD DETAILS

DRAFT

ZONING BY-LAW
No. __-___
SCHEDULE A9-1

DATE	SCALE	SCHEDULE
AUG-2006	VARIES	A9-1

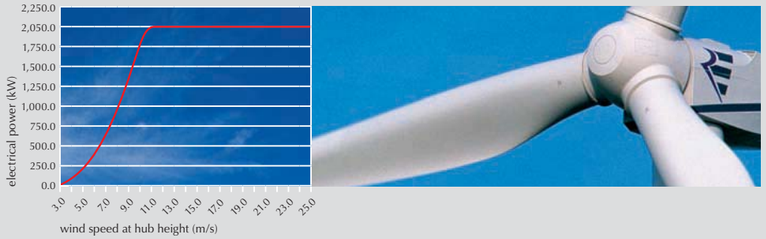
APPENDIX C:
REPOWER MM92 Wind Turbine Generator Information

The reliable 2-megawatt power plant with 92 metre rotor diameter

The variable speed generator, converter system, and pitch control of the well established and successful 1.5MW MD series laid the foundation for the windpower plants of the MM series. The second generation of these high-performance power plants offers the same high reliability and maximum power output as previous models. Due to the leading technology and innovative solutions developed by REpower, the company's wind turbines can be fully integrated into the existing power grid.

Thanks to its innovative, detailed design, the MM series offers you excellent returns over the entire service life of the equipment.

The MM92 has a swept rotor area of 6,720 square metres and is available with hub heights between 68.5 and 100 metres. It has been specifically optimised for use in regions with low to medium wind speeds.



Powerful, economical, reliable

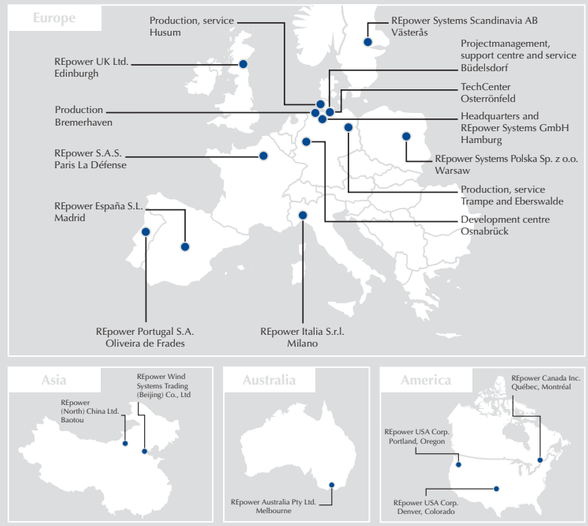
By choosing REpower turbines, you are selecting power plant technology of the highest quality. To ensure that your investment retains its value, we offer a comprehensive after-sales service.

Our permanent monitoring system monitors your power plants 24 hours a day, 365 days a year, ensuring the quickest possible response times of our local service teams. We also offer integrated service packs (ISPs) that allow you to calculate long-term operating costs.

We are constantly upgrading our services to meet the increasingly stringent requirements of monitoring, documenting and optimizing the operational behaviour of windfarms. With our "REguard" package, we offer a comprehensive modular windfarm management system that can be flexibly configured to suit local factors, ensuring efficient operation of your plant at all times.

For more information, please refer to our brochures or contact our sales team.

The REpower sales teams are always there for you.



Please visit our website: at **www.repower.de ▶ Company ▶ REpower Germany** or **REpower International** you can find the addresses of all our company sites.

	MM82	MM92	MM100	3.4M104	3.2M114	5M	6M
Rated power	2,050 kW	2,050 kW	1,800 kW	3,370 kW	3,170 kW	5,075 kW	6,150 kW
Rotor diameter	82.0 m	92.5 m	100.0 m	104.0 m	114.0 m	126.0 m	126.0 m

REpower Systems SE · Headquarters · Überseering 10 · 22297 Hamburg · Germany
Phone: +49-40-5 55 50 90-0 · Fax: +49-40-5 55 50 90-39 99
E-mail: info@repower.de · www.repower.de

GBR · 11.2010

MM92

The reliable 2-megawatt power plant with 92 metre rotor diameter

www.burstch.design.de

MM92

Technical Data

Design data

Rated power	2,050 kW
Cut-in speed	3.0 m/s
Rated wind speed	12.5 m/s
Cut-out speed	24.0 m/s
Wind zone	up to DIBt 3
Type class	up to IEC IIA

Rotor

Diametre	92.5 m
Rotor area	6,720 m²
Rotor speed	7.8 –15.0 rpm (+12.5%)

Rotor blade

Length	45.2 m
Type	GRP sandwich construction; manufactured in Infusion-process

Yaw system

Type	Double-row externally geared four-point bearing
Drive system	Gear motors
Stabilisation	Disc brakes

Gear system

Type	Combined planetary/spur wheel gearbox
Transmission ratio	i = approx. 120.0 (50 Hz) i = approx. 96.0 (60 Hz)

Electrical system

Generator type	Double-fed asynchronous generator, 4-pole (50 Hz) 6-pole (60 Hz)
Rated power	2,050 kW
Rated voltage	690 V (50 Hz) 575 V (60 Hz)
Rated speed	900–1,800 rpm (50 Hz) 720–1,440 rpm (60 Hz)
Generator protection class	IP 54
Converter type	Pulse width-modulated IGBTs

Power control

Principle	Electrical blade angle adjustment – pitch and speed control

Tower

Type	Steel tube
Hub height	68.5/80/100 m

Foundation

Reinforced concrete foundation with foundation insert, adjusted to site conditions

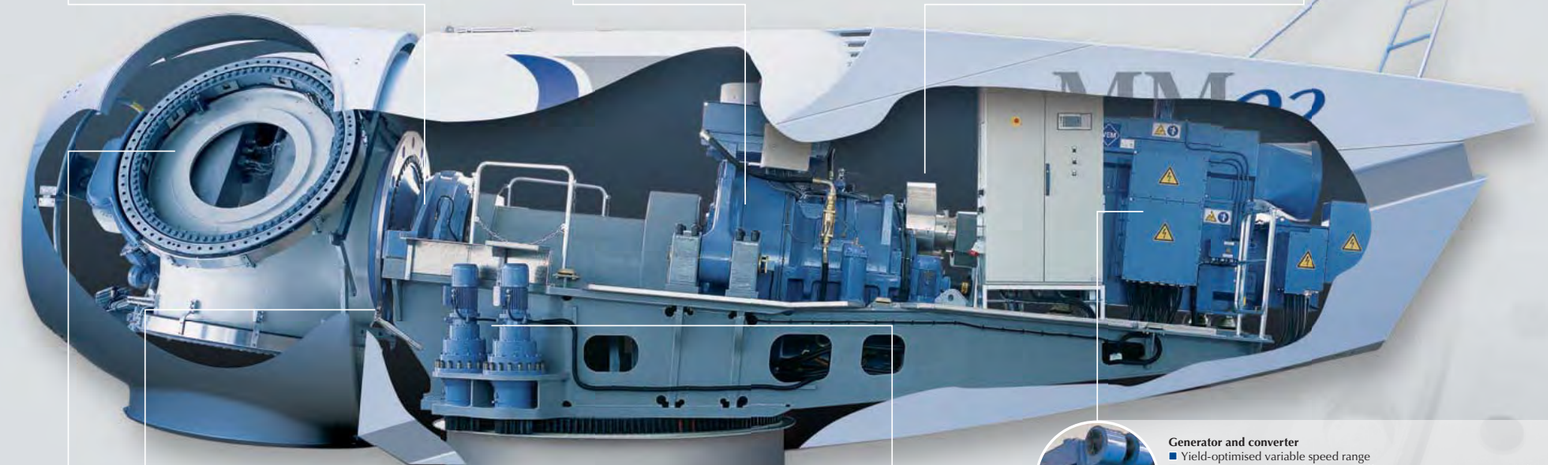
Safety system

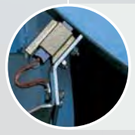
- Individually adjustable blades (electrically controlled) – fail-safe system
- Extensive redundant temperature and speed sensing system
- Fully integrated lightning protection
- Shielded cables and power rails protecting people and machinery
- Rotor holding brake with soft-brake function

Rotor bearing and shaft
- High-performance spherical roller bearing with adjusted bearing housing and permanent lubrication for prolonged service life
- Rotor shaft forged from heat-treated steel and optimised for power flow

Gear system
- Combined planetary/spur wheel gearbox
- Dimensioned according to REpower gear regulations, meeting the most stringent requirements regarding service life and smooth running
- optimised efficiency
- Elastomer bearing of torque multiplier for structure-born sound insulation
- Low temperature level due to effective oil cooling system
- Excellent oil quality due to three-stage oil filter system

Holding brake
- Secure holding of rotor due to generously dimensioned disc brake
- Soft-brake function reducing stress to the gearbox





Lightning protection
- Lightning protection concept conforming to IEC regulations with internal and external lightning protection
- External lightning protection system with blade receptors and lightning rod at the weather mast
- Reliable protection of bearings due to defined lightning conduits
- GFC coupling for the galvanic insulation of the generator system from the gear system
- Over-voltage arrester protecting the electric system
- Reliable protection of the generator by means of insulated bearing bushings

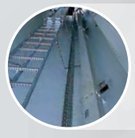
Pitch system
- Virtually maintenance-free electronic system
- High-quality, generously dimensioned blade bearing with permanent track lubrication
- Protected against the elements by means of integrated deflector in the spinner
- Maximum reliability via redundant blade angle detection by means of two separate measuring systems
- Fail-safe design with separate control and regulation systems for each rotor blade

Rotor hub
- Low deformation due to compact design adjusted to power flow
- optimised integration into pitch drive
- Generously dimensioned spinner allowing access to the hub in all weather

Environment
- No leakage of lubricants at hub or nacelle, due to
  - labyrinth packing in spinner
  - coaming edges in nacelle panelling and
  - grease pan below azimuth gearing
- Closed central lubrication system of blade bearings
- Shielding of all relevant cables and use of power rails to protect workers and machine

Generator and converter
- Yield-optimised variable speed range
- Low conversion loss and high total efficiency as converter output is limited to maximum 20% of the overall output
- Fully enclosed generator with air/air heat exchanger
- optimised temperature level in generator, even at high outside temperatures

Yaw
- Externally geared four-point bearing, driven by generously dimensioned high-quality gear motors
- Holding brakes with fail-safe function implemented with hydraulic pressure accumulator release the drives in idle mode and stabilise the nacelle
- Minimum load on drives due to low friction at four-point bearing and release of brakes during tracking



Power rail
- Prevention of electrical interference in the plant
- Compliance with VDE regulations
- Best possible protection in the event of a short circuit or fire

Tube tower
- Characteristic frequency of the tower is above rotating frequency of the rotor (rigid design) and ensures minimum stress in tower and machine
- No restrictions regarding speed range of unit, as there is no risk of frequency interference
- Excellent component safety due to elbow flanges and load-optimised door opening

Serviceability
- Ample space in nacelle for ergonomically optimised and reliable service
- Hub easily accessible in all weathers without having to leave the nacelle
- Excellent accessibility of all components
- Guards mounted over all rotating components ensure safe servicing
- If necessary, virtually all components of the plant can be easily and safely dismantled

APPENDIX D:
REPOWER MM92 SOUND POWER DATA

Power Curve &

Sound Power Level

REpower MM92

[2050 kW]

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Fax: +49 - 40 - 5555090 - 3999

www.repower.de

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Possible work procedures shown in this product description comply with German and the REpower's own safety provisions and regulations. The national laws of other countries may provide for further safety specifications.
It is essential that all precautionary measures, both project- and country-specific, be strictly complied with. It is the duty of each customer to inform itself, implement and observe these measures.
The applicability and validity of the relevant legal and/or contractual provisions, the technical guidelines, DIN standards and other comparable regulations is not excluded by the contents or demonstrations contained in product description. Moreover these provisions and regulations shall continue to apply without any limitation.

All information contained in this product description are subject to change at any time without notice or approval by the customer.
REpower Systems AG assumes no liability for any errors or omissions in the content of this product description. Legal claims against REpower Systems AG based on damage caused by the use or non-use of the information offered here or the use of erroneous or incomplete information are excluded.

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Table of Content

Applicable Documents

The documents referred to in the table below are included for information only. Reference to them in this product description does not make them part of the contract.

Title	Document no.

* If the products referred to in the table above are to be included within the project, the relevant product descriptions in their current version will be amended to the contract.

List of Abbreviations and Units

Abbreviation/Unit	Description
cp	Power coefficient
ct	Thrust coefficient
FGW	Fördergesellschaft Windenergie e.V.
IEC	International Electrotechnical Commission
WEC	Wind Energy Converter

1 Introduction

This document shows the guaranteed power curve and sound power level of the *REpower MM92 [2050kW]* and the corresponding guarantee and measurement conditions.

2 Conditions for guarantee and measurement of power curve and sound power level

2.1 General information

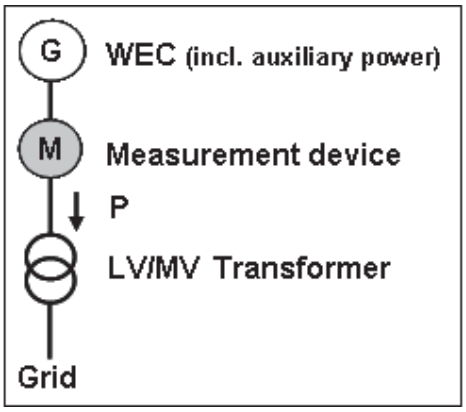
Rotor diameter:	92.5	m
Air density:	1.225	kg/m³
Cut in wind speed:	approx. 3.0	m/s
Cut out wind speed:	24	m/s
Wind speed at hub height:	10 minutes mean values	
Blades:	clean, no ice/snow formation	

2.2 Conditions for power curve guarantee and measurement

Verification according to IEC 61400-12-1: 2005[1]		
Turbulence intensity:	6 to 12	%
Terrain:	not complex according to IEC 61400-12-1: 2005[1]	
Vertical wind shear coefficient (measured between hub height and hub height minus rotor diameter divided by 2):	≤ 0.2	
air density at location (10 minutes mean value):	≥ 1.13	kg/m³
Temperature range:	≤ 35	°C
Power factor:	cos phi ~ 1	
Anemometer type:	Thies First Class	
Voltage level for measurement:	690 V (50 Hz) / 575 V (60Hz)	

[1] For obstacle assessment according to 61400-12-1: 2005 Annex A.2 the following condition applies:

No obstacles with a height greater than 1/3 of the distance between the ground and the lower blade tip shall exist in the measurement sector within 0-4 rotor diameters of the wind turbine or met mast.



Arrangement of a measuring unit for the power curve measurement of a *REpower MM92*

2.3 Conditions for sound power level guarantee and measurement

Verification according to IEC 61400-11: 2002 + A1: 2006[2]

Roughness length (average peak): 0.05 m

[2] Method 1, as outlined in section 7.3 of the IEC standard 61400-11

3 Guaranteed electrical power curve und guaranteed sound power level[3]

The sound power level guaranteed by REpower includes a measurement uncertainty of approx. 1 dB(A). REpower warrants that there is no tonal audibility > 0 dB.

3.1 Sound power level according to IEC for wind speed at hub height

Wind speed v [m/s]	Power P [kW] [4]	Sound Power Level L_{WA} [dB(A)] [5]	Thrust coefficient ct [-]	Power coefficient cp [-]
3.0	20	--	0.98	0.180
4.0	94	--	0.87	0.357
5.0	205	--	0.79	0.398
6.0	391	100.4	0.79	0.440
7.0	645	101.8	0.79	0.457
8.0	979	103.3	0.79	0.465
9.0	1375	104.2	0.74	0.458
10.0	1795	104.2	0.69	0.436
11.0	2000	104.2	0.54	0.365
12.0	2040	104.2	0.39	0.287
13.0	2050	104.2	0.29	0.227
14.0	2050	104.2	0.23	0.182
15.0	2050	104.2	0.19	0.148
16.0	2050	104.2	0.15	0.122
17.0	2050	104.2	0.13	0.101
18.0	2050	104.2	0.11	0.085
19.0	2050	104.2	0.09	0.073
20.0	2050	104.2	0.08	0.062
21.0	2050	104.2	0.07	0.054
22.0	2050	104.2	0.06	0.047
23.0	2050	104.2	0.06	0.041
24.0	2050	104.2	0.05	0.036

[3] Valid for unrestricted operation only. During sound reduced operation different power and sound levels are effective.

[4] Guaranteed on 690 V (for 50 Hz) / 575 V (for 60Hz) voltage level

[5] Sound power level at hub height

3.2 Sound power level according to IEC for wind speed at 10 m height

HH	v_{10} [m/s]	4.0	5.0	6.0	7.0	8.0	9.0	10.0
68.0 – 68.5 m	L_{WA} [5] [dB(A)]	95.7	101.2	103.1	104.2	104.2	104.2	104.2
78.0 – 80.0 m	L_{WA} [5] [dB(A)]	96.0	101.4	103.3	104.2	104.2	104.2	104.2
98.0 – 100.0 m	L_{WA} [5] [dB(A)]	96.4	101.7	103.4	104.2	104.2	104.2	104.2

All sound power levels above are based on wind speeds of v_{10} at 10 m height. The data of the noise level are based on the requirements of the IEC 61400-11: 2002 + A1: 2006.

The calculation of the wind speed in 10 m height is based on a roughness length of 0.05m.

3.3 Sound power level according to FGW Guideline at 95% of rated power

The sound power level measured according to the "Technische Richtlinie für Windenergieanlagen Teil 1: Rev. 18 der FGW" at 95 % of the rated power is independent of the hub height:

$$\mathbf{L_{WA,\,95\%} = 104.2\ dB(A)}$$

MM92
Hub Height 100m

Octave Band Sound Power Level [dB (A)]
Manufacturer's Emission Levels

Wind Speed [m/s]			6		7		8		9		10	
LWA [dB]			103.4		104.2		104.2		104.2		104.2	
Frequency												
		min		74.3		71.6		74.6		78.3		79.1
63	mean	max	82.8	91.6	84.3	92.3	84.8	94.7	84.6	92.6	85.6	91.1
		min		83.6		84.7		82.4		86.8		87.3
125	mean	max	91.6	100.7	92.3	100.4	92.2	101.3	91.8	98.3	90.5	93.8
		min		95.2		92.5		90.7		92.7		91.8
250	mean	max	97.4	99.7	97.9	101.3	97.1	101.1	96.7	101.5	94.8	97.6
		min		96.9		98.0		96.9		96.9		96.1
500	mean	max	98.9	100.3	99.7	101.2	99.4	101.2	99.1	100.9	98.3	100.6
		min		93.6		93.4		95.0		96.0		97.3
1000	mean	max	97.1	99.5	98.1	101.8	98.7	102.1	99.0	101.2	99.3	101.3
		min		86.9		87.9		87.9		87.4		94.5
2000	mean	max	91.6	95.4	92.5	98.4	93.4	101.4	94.0	100.4	96.5	98.7
		min		78.5		79.5		77.6		79.1		88.2
4000	mean	max	83.8	90.8	84.8	96.3	86.1	95.9	87.2	100.1	92.7	97.2
		min		55.8		56.0		61.7		57.9		59.2
8000	mean	max	73.1	89.9	74.6	94.4	77.4	97.4	78.4	89.0	81.2	91.0

windtest
grevenbroich gmbh

Acoustic report for a wind turbine type REpower MM 92 at Chemin d`Ablis / France, operation mode 2050 kW

Measurement 2009-01-22

Full Report

2009-03-13

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Acoustic report for a wind turbine type RE-power MM 92 at Chemin d`Ablis / France, operation mode 2050 kW

Report SE09001B4

Location:	Windfarm Chemin d`Ablis, WEC No. E 14, Ser.-No. R90223

Customer:	REpower Systems AG Rödemis Hallig D-25813 Husum / Germany

Supplier:	windtest grevenbroich gmbh Frimmersdorfer Str. 73 D-41517 Grevenbroich / Germany

Date of Order:	2008-12-23	**Order Number:**	09 0004 06

Auditor:	**Editor:**
Dipl.-Ing. Thomas Fischer	Dipl.-Ing. David Rode

Grevenbroich, 2009-03-13

1 Conceptual formulation

windtest grevenbroich gmbh (windtest) was ordered 2008-12-23 by REpower Systems AG to:

- determine the apparent sound power level as characteristic parameters of noise emission in accordance with IEC 61400-11 [1] of a wind energy converter (WEC), type REpower MM 92, hub height H = 80 m (including base), located at Chemin d`Ablis / France (WEC E 14, Ser.-No. R90223).

2 Measurement execution

2.1 Measurement procedure selection

Methods of measurement and determination were, according to the order, based on the following regulation: „IEC 61400-11, Wind energy turbine generator systems – Part 11: Acoustic noise measurement techniques, 2002-12“ [1].

The apparent sound power level and tonality for various integer wind speeds at a height of 10 m as well as for that wind speed at a height of 10 m, at which the WEC operates at about 95 % of its rated power (in case this is reached below a wind speed of 10 m/s in 10 m height) are specified.

2.2 Measurement object

The object to be measured was a WEC, type REpower MM 92, during continuous operation in normal operation mode (Fig. 1).

2.2.1 Acoustic sources

The sound of a WEC is the combination of several single acoustic sources. Components like generator, gears, hydraulic pumps, fans, transformers and converter are mentioned here as examples. The sound emissions of the different sources leave the apertures in the gondola (nacelle) and the tower directly and are as well transferred as mechanical vibrations by the machine housing. Some of these sources can cause tonality noises.

The noise created by aerodynamical effects, represents the second essential acoustic source. They are caused by the rotation of the rotor blades. These wideband noises depend on the blade tip speed in first place and in the second on the blade profile and the pitch angle.

The technical data of the WEC are as stated in Tab 1. More detailed information about the components of the WEC are given in the manufacturer’s specification in the appendix.

Tab. 1: Technical data of the WEC

Manufacturer	REpower Systems AG
WEC type	REpower MM 92
Serial No.	R90223
Location	Chemin d`Ablis
Rated power	2050 kW
Performance control	Pitch
Hub height ab. ground	80 m
Tower design	conical steel tube
Position of blades to the tower	luv
Number of blades	3
Rotor diameter	92,5 m
Blade type	RE 45.2
Rotational speed / range	7,8 – 15,0 rpm
Gear type	CPNHZ-224/G50115XB
Generator type	DASAA 5025-4UA

Fig. 1: WEC REpower MM 92

2.3 Measurement location

The WEC is situated with further WECs at Chemin d`Ablis. The environment is used agriculturally.

2.4 Measurement setup

The installation of the measuring point was chosen according to [1]. The measurement of noise emission was performed using a microphone mounted on a soundproof board (diameter 1 m) in $R_{0,chosen}$ = 102 m distance to the centre of the WEC tower (comp. Fig. 2).

$$R_0 = H + D/2 \pm 20\% \quad \text{(H: hub height; D: rotor diameter)}$$

The sound pressure levels (operating noise (BG) and background noise (HG)) were recorded by a sound pressure level meter. Additionally the sound was recorded with a digital audio tape (DAT) recorder. The damping influence of the secondary wind screen is less than 0,1 dB and is not taken into account any further.

The electrical power of the WEC was measured by a special electronical device from the manufacturer and was analogue-to-digital transformed and saved onto the hard disk of a computer.

As the WEC of type REpower MM 92 can be operated in different operational modes, the generator speed of the turbine has been recorded while measuring. Additionally the wind speed at hub height was measured, too. The information has been taken from the control panel of the WEC by a special electronical device and was stored onto the hard disk of the computer.

Wind direction and wind speed at a height of 10 m were measured by a wind vane and anemometer fixed on a mast in a distance of 54 m upwind from the WEC (see Fig. 3). Signals were also analogue-to-digital transformed and saved onto the hard disk of the computer.

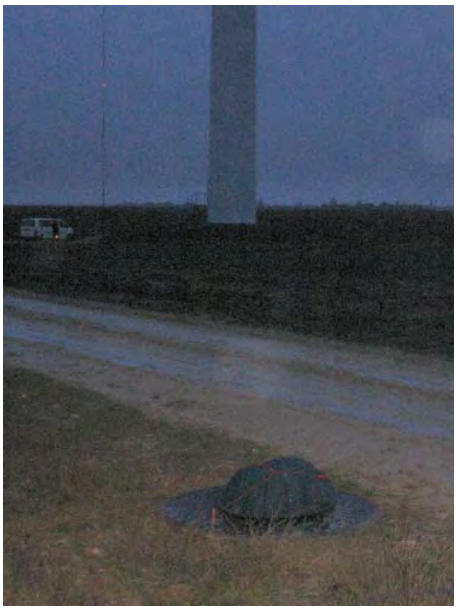


Fig. 2: Microphone

Fig. 3: Wind measuring mast

All recordings of meteorological, acoustical and WEC data were synchronised with an accuracy of less than one second.

All devices used for recording signals are listed in Tab. 2.

To ensure accuracy of data and measurement at any time, all devices are revised within certain periods as stated in [1]. All acoustic measurement instruments were calibrated before and after measurement with an acoustic calibrator.

Tab. 2: Used measuring devices

Device	Manufacturer / type / serial No.	Calibrated until	Internal device No.
Devices acoustic			
Microphone	Norsonic, Type 1220, Serial No. 28411	31.12.10	WTGMT 034/2
Noise level meter	Norsonic 110, Serial No. 19604	31.12.10	WTGMT 034/1
Calibrator	Brüel & Kjaer, Type 4231, Serial No. 2162810	12.09.09	WTGMT 269
Tascam HD-P2	Frontier / 0290104		WTGMT 1542
Primary wind screen	Norsonic		
Secondary wind screen	Windtest, Schulze-Brakel		WTGMT 1137
Devices meteorological measurments			
Wind measuring mast 11,40 m	Teksam Clark-Mast, Type OT 12M/HP, Serial No. 6K4820		WTGMT 996
Anemometer	Vector, Type A100L2, Serial No. 6034	19.01.11	WTGMT 501
Wind vane	Thies, Type 4.3124.30.012, Serial No. 705033		WTGMT 1134
Signal transformer	Schuhmann, Type Waz5 Pro RTD		WTGMT 788
Barometer	Vaisala, Type PTB100A		WTGMT 743
Thermometer/hygrometer	Galltec, Type KPC 2/6 ME		WTGMT 776
Devices hardware + software			
Data logger	IMC µ-MUSYCS, Serial No. 99031200		WTGMT 364
Computer	Asus L8400, Serial No. 12NG032430		WTGPC 179

2.5 Measuring performance

The measurement was performed 2009-01-22 from 16:00 until 19:40. During the measurement of the sound emissions, the neighbouring WEC (no. E 15) was taken out of operation. The appeared wind speeds at a height of 10 m above ground ranged from 4 m/s up to 11 m/s (10 s average). The produced effective power ranged from 750 kW up to 2200 kW (10-s-average). While measuring the noise emission, the WEC was operated in normal mode (2050 kW).

Sound pressure level, effective power, rotational speed, as well as wind speed and wind direction at a height of 10 m were measured and recorded simultaneously.

Periods with disturbing noises (as passing cars, planes, etc.) during the measurement have been excluded later during the analysis of apparent sound power level for operating noise and background noise.

2.6 Meteorological conditions

The temperature, the air pressure and the humidity have been measured meanwhile the measurement. The meteorological conditions were as stated in Tab. 3.

Tab. 3: Meteorological conditions during time of measurement

cloudiness	cloudy
air pressure	978 hPa
air temperature	7 °C
relative atmospheric humidity	96 %

3 Measurement Results

3.1 Directional characteristic

From subjective listening tests no obvious directional characteristic of the operating sound could be found.

3.2 Subjective sense of noise

Mainly aerodynamic noise from rotating blades could be noticed. Furthermore, low tonality noise could be noticed sometimes at some wind speeds in the nearby vicinity of the WEC and at the reference position. On the whole, the operating sound of the WEC can be stated as inconspicuous.

3.3 Sound pressure level

For the analysis of noise characteristics within different wind conditions, the measured parameter (as 1 sec. values) are differentiated and analysed according to their state. It is distinguished between periods of operating noise („BG“, state = 1) and background noise with stopped WEC („HG“, state = 0,5). State = 0 means, that the data are excluded from the analysis, because of disturbances, partly missing data, different operating modes etc. The measured raw data are shown in Fig. 4.

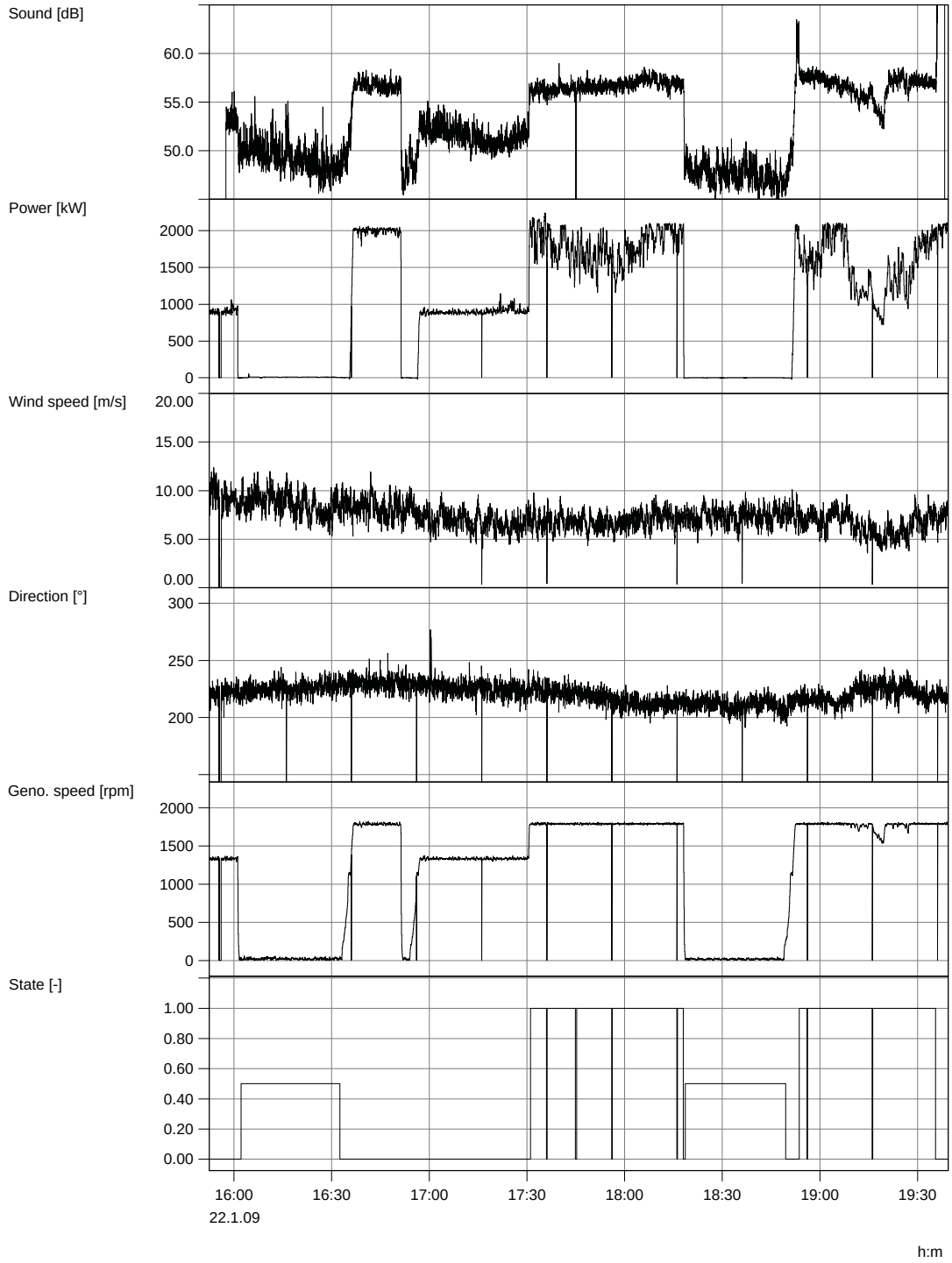


Fig. 4: Measurement data

From the time charts of effective power, wind speed, wind direction and sound pressure level all values with state = 1 or state = 0,5 were extracted. Arithmetical average over 10 s of wind speed, wind direction and electric power were calculated and the corresponding energetic average of sound pressure level were used for the following evaluation of the sound characteristics of the WEC. (Fig. 5 and Fig. 7*)*

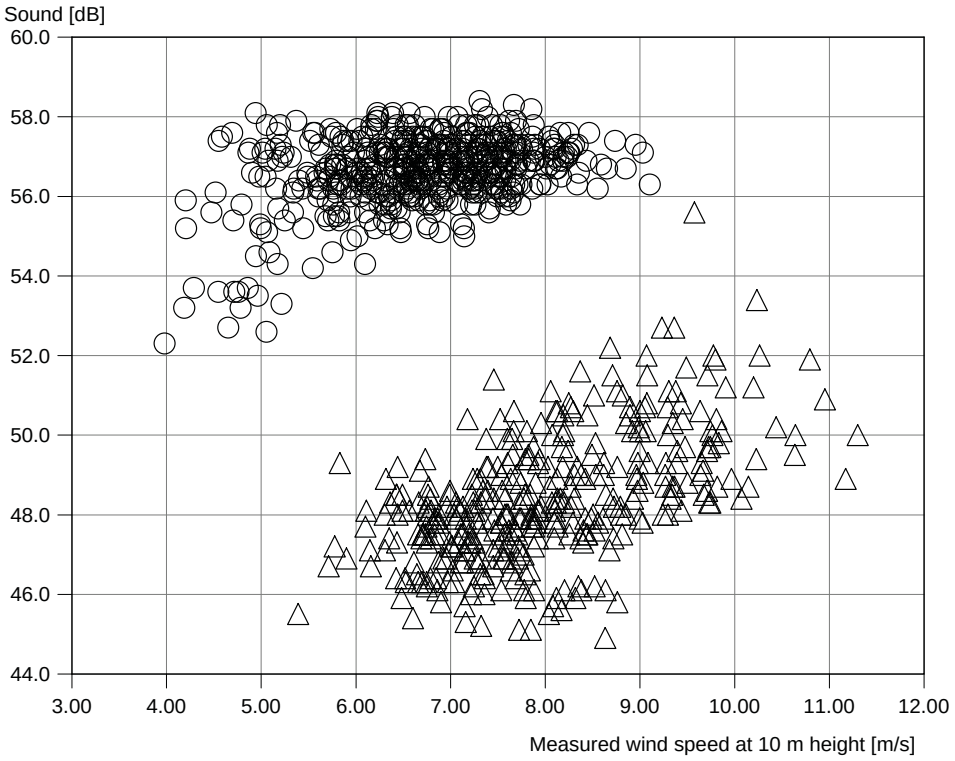


Fig. 5: Sound pressure level (operating noise O and background noise Δ)versus measured wind speed at 10m height

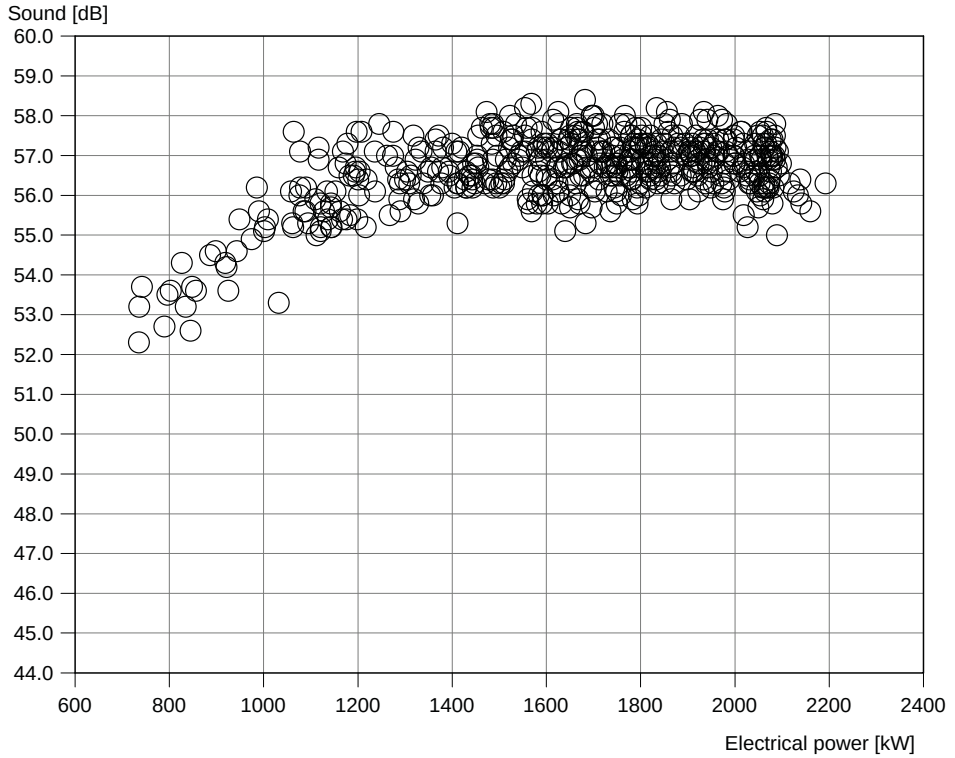


Fig. 6: Sound pressure level versus electrical power

3.4 Apparent sound power level

According to the first method of wind speed determination in [1], the measured effective power is transformed into a wind speed at hub height by means of the power curve of the WEC.

The wind speed at hub height is corrected according to [1] with regard to air density and reference height (10 m above ground), applying a logarithmic approximation, with the reference length z_0 0,05 m.

$$v_{p10} = v_H \cdot \frac{\ln 10 / z_0}{\ln H / z_0} \quad \text{with } z_0 = 0{,}05 \text{ m, H = 80 m}$$

From both the resulting standardised wind speeds and the simultaneously measured wind speeds at the wind measuring mast, a correction factor κ was determined for the measured wind speeds.

$$\kappa = \frac{v_{p10}}{v_{mess,10}} \quad \text{and} \quad v_{mess,10,korr} = \kappa \cdot v_{mess,10}$$

For this measurement the correction factor has a value κ = 1,05. The κ-factor was used to correct the measured background wind speeds. For data pairs, which exhibit an average electric power over 95 % of rated power, a similar procedure for the wind speed determination has been applied according to [3. Therefore, for all measured data with electrical power between 5 % and 95 % of rated power, a linear correction function from the standardised wind speed (calculated from the power and the power curve) and from the measured wind speed of the nacelle anemometer has been determined. This correction function has then been applied to the nacelle anemometer wind speeds for all data pairs with electrical power above 95 % of rated power. For this reason the values might stray into the wind speed region below 95 % of rated power. Data points over 95 % of rated power, but with corrected measured wind speed below the wind speed corresponding to 95 % of rated power, are omitted.

Deviating from [1], a regression curve of 3rd order has been applied. The 2nd order regression is not well suited to give a correct representation of the measured sound values over a wide wind speed range as shown here.

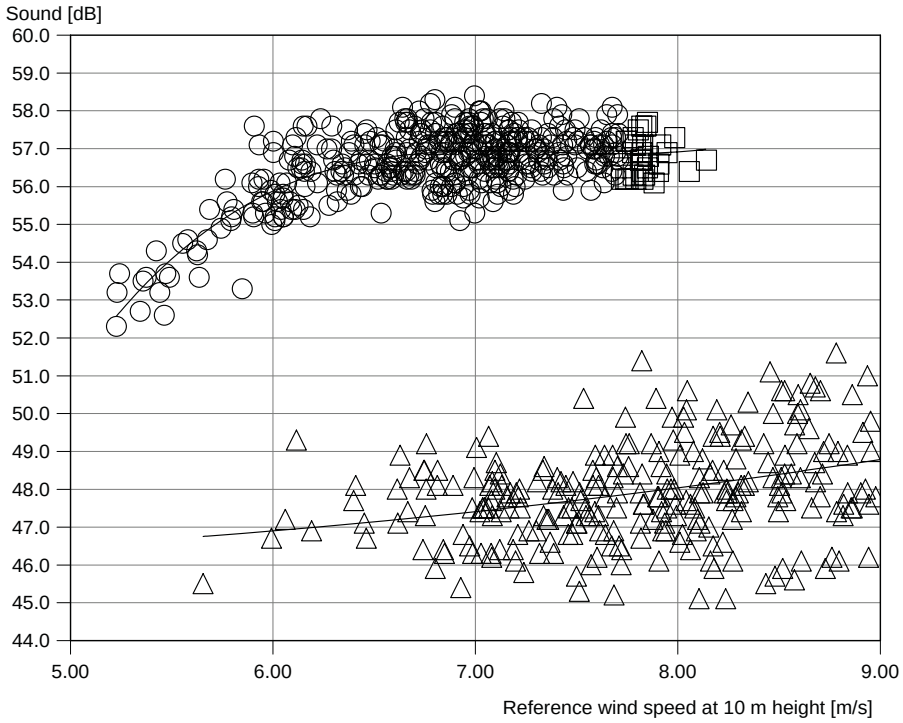


Fig. 7: Sound pressure level versus standardised wind speed
*Regression operating ○: - 127,62 + 75,212 * X – 10,1976 * X² + 0,45994 * X³ [dB]*
*Regression background noise △: 46,38 – 0,277 * X + 0,0604 * X² [dB]*
□ Measurement data above 95 % of rated power

For integer values of wind speed from 6 m/s up to 8 m/s the difference of operating noise and background noise has been determined from the regression equations. By means of that level difference ΔL_{Aeq} the background noise correction has been applied to the measured operating noise with the following equation:

$$L_{Aeq,c} = 10\lg\left[10^{(0,1*L_{Aeq,BG+HG})} - 10^{(0,1*L_{Aeq,HG})}\right]$$

From the background corrected sound pressure level $L_{Aeq,c}$ the apparent sound power level L_{WA} was calculated for all wind speeds from 6 m/s up to 8 m/s as follows:

$$L_{WA} = L_{Aeq,c} - 6\text{dB} + 10 \cdot \log(4\pi \cdot \frac{R_i^2}{1\text{m}^2}) \qquad \text{dB}$$

$$\text{with } R_i = \sqrt{(R_o + N_A)^2 + (H - h_A)^2}$$

and R_0 = 102 m, N_A = 3,15 m, H = 80 m, h_A = -1 m

The apparent sound power levels of the WEC REpower MM 92 in the present configuration (normal operation mode) are listed in Tab. 4.

Tab. 4: Apparent sound power level of WEC REpower MM 92, 2050 kW

Wind speed at 10 m height (V_{10m})	**BIN 6 5,5–6,5 m/s**	**BIN 7 6,5–7,5 m/s**	**7,7 m/s[1)]**	**BIN 8 7,5–8,5 m/s**
Operating noise ($L_{Aeq, BG}$ / dB)	55,9	56,9	56,9	56,9
Background noise ($L_{Aeq, HG}$ / dB)	46,9	47,4	47,8	48,0
Difference level (ΔL_{Aeq} / dB)	9,0	9,5	9,1	8,9
Corrected noise ($L_{Aeq,c}$ / dB)	55,3	56,4	56,3	56,3
Sound power level (L_{WA} / dB)	**102,8**	**103,9**	**103,8**	**103,8**
Electrical Power (P / kW)	1181	1688	1948	2006

1) 95 % of rated power

From the shown data above 95 % of rated power (Fig. 7) it is obvious, that no increase of sound power level for higher wind speeds has to be expected.

3.5 Further sound characteristics

No distinct impulsive character noise could be noticed. Further special sound characteristics, which might be supposed to draw attention on the WEC, could not be noticed.

3.6 Level of single noise events

Single events like starting or stopping the WEC, which exceeded the normal operating noise to a noteworthy content, could not be noticed.

3.7 Tonality analysis

The noise (operating and background) is sampled with 40 kHz and a 20 kHz antialiasing filter and then Fourier transformed. For each wind speed bin 12 samples of operating noise are used, each of them 10 s duration. The frequency resolution is 2 Hz, therefore 20 spectra of 0.5 s time windows have to be averaged. A Hanning window is applied. For background noise a 2 minute sample is used, with a frequency resolution of 2 Hz, too. From these spectra tonal audibilities $\Delta L_{a,k}$ are determined according to [1].

3.7.1 Results of the tonality analysis

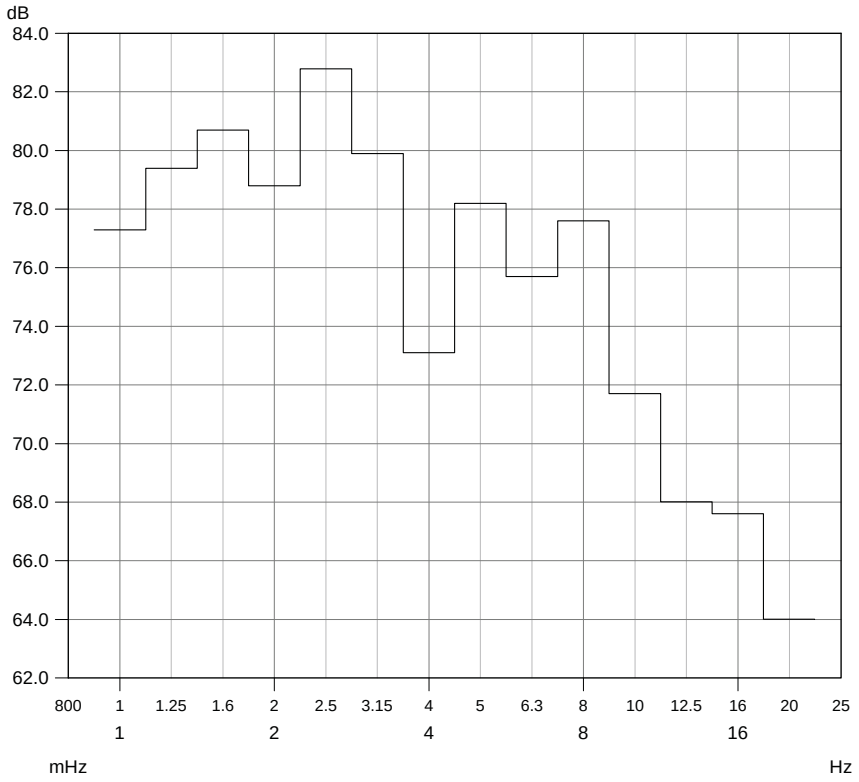
The operating noise of the REpower MM 92 contains low tonal components in a different wind speed range from 5 m/s up to rated power, which lead to values $\Delta L_{a,k} < -3$ dB. These components are so low that they do not lead to any tonality to be stated according to [1]. So there is no requirement to report the values [1].

Note 1: Tonality sounds can be noticed subjectively at some times and some wind speeds at (150 Hz, 300 Hz and 2500 Hz).

Note 2: The stated tonality is only valid for the nearby vicinity of the WEC. These values cannot be transferred directly to longer distances (several 100 meter).

3.8 Third octave measurements at low frequencies

During the noise emission measurement in the normal operation mode (2050 kW), a third octave measurement at low frequencies was performed by using the noise level meter at reference position. Third octave frequencies at 1 Hz – 20 Hz were measured. The produced electrical power of the WEC was during that measurement permanently at rated power.



Measured third octave sound power level, sum level = 89,2 dB			
middle frequency [Hz]	sound power level [dB]	middle frequency [Hz]	sound power level [dB]
1	77,30	5	78,20
1,25	79,40	6,3	75,70
1,6	80,70	8	77,60
2	78,80	10	71,70
2,5	82,80	12,5	68,00
3,15	79,90	16	67,60
4	73,10	20	64,00

3.9 Turbulence intensity

The turbulence intensity (TI) has been determined according to [1] from the measured wind speed averages of 10 minute time series and the corresponding standard deviations. The turbulence intensity has been 13 % on average. This value is measured in 10 m height and cannot be compared directly to values in other documents like site assessment evaluations.

3.10 Operating mode

Deviating to [1] and as demanded from the manufacturer, details about the operating mode (measured rotational generator speed versus measured electrical power) are not presented in this report. This information can be inquired at the manufacturer, if necessary.

4 Sound power levels for different hub heights

4.1 Calculation basics

The recalculation of the apparent sound power levels for wind turbines of same type but different hub heights is performed according to the “Technische Richtlinie für Windenergieanlagen, Teil 1” [3], Appendix C.

At first, the wind speed $v_{10,i}$ is calculated by application of a logarithmic height profile, at which the measured WEC (in this case at $h_{N,\ measured}$ = 80 m) generates the same electric output power as the WEC with the new hub height will do at the chosen wind speed $v_{10,ref}$ in 10 m height:

$$v_{10,i} = v_{10,ref} \cdot \frac{\ln(h_{N,new} / z_0)}{\ln(h_{N,measured} / z_0)}$$

A reference length of z_0 = 0.05 m is adopted.

For these wind speeds the operating and background noises are calculated from the regression equations (s. Chapter 3.4). In the following, analogue to the calculations for the measured wind turbine, the apparent sound power levels are calculated from the background noise corrected operating noises and the measuring distance.

Note: No distinct statement about noteworthy changes in tonality or impulsivity can be made for the new hub heights, because no measurements have been done for these hub heights.

4.2 Sound power levels for the new hub heights

For the measured wind turbine under test (with a hub height of $h_{N,\ measured}$ = 80 m) this leads to the following sound power levels for the new hub heights:

Tab. 5: Sound power levels for new hub heights

	BIN 6 5,5–6,5 m/s	**BIN 7 6,5–7,5 m/s**	**BIN 8 7,5–8,5 m/s**	**103,7 dB 1)**
L_{WA} / dB H_{neu} = 68,5 m	102,4	103,9	103,7	7,9 m/s
L_{WA} / dB H_{neu} = 78,5 m	102,7	103,9	103,8	7,7 m/s
L_{WA} / dB H_{neu} = 100 m	103,2	103,9	103,9	7,5 m/s

1) 95 % rated power are reached at the stated wind speed in 10 m height

Note: The sound power level L_{WA} at 95 % of rated power does not change by definition, only the wind speed at 10 m height changes, at which 95 % of rated power are reached.

5 Measurement uncertainty

5.1 Measurement uncertainty type A

From the measured sound pressure levels and the calculated sound pressure levels (regression analysis) the measurement uncertainty type A has been calculated at a wind speed of 6 m/s as a reference value. According to [1] a value is calculated for the average stray of single data points with regard to the regression curve:

$$U_A = \sqrt{\frac{\sum (L_{Aeq,mess} - L_{Aeq,bin})^2}{N-2}}$$

The data analysis gives a value of U_A = 0,69 dB.

Deviating from [1], here the uncertainty of the regression value is used for the further calculations instead of the average stray of single data points. Therefore, the number of data points within the wind speed bin has to be taken into account as $1/\sqrt{N}$. This leads to a value of

$U_{A,regr}$ = 0,07 dB.

5.2 Measurement uncertainty type B

The uncertainty of measurement type B was estimated as shown in Tab. 6:

Tab. 6: Measurement uncertainty type B

	margin of errors ± a	likely error $U_a = a/\sqrt{3}$
acoustic calibrator UB1	± 0,3 dB	0,17 dB
sound pressure level meter UB2	± 0,3 dB	0,17 dB
sound proof board UB3	± 0,5 dB	0,29 dB
measurement distance UB4	± 0,1 dB	0,06 dB
air impedance UB5	± 0,2 dB	0,12 dB
turbulence UB6	± 0,7 dB	0,40 dB
wind speed UB7	± 0,3 dB	0,17 dB
wind direction UB8	± 0,5 dB	0,29 dB
background UB9	± 0,6 dB	0,35 dB

5.3 Estimation of the measurement uncertainty U_c

From the measurement uncertainties type A and B results the combined uncertainty U_C of the given sound power level for 6 m/s:

$$U_C = \sqrt{U_{A,regr}^2 + U_{B1}^2 + U_{B2}^2 + U_{B3}^2 + U_{B4}^2 + U_{B5}^2 + U_{B6}^2 + U_{B7}^2 + U_{B8}^2 + U_{B9}^2}$$

U_C = 0,8 dB

This value can be taken as a reference value for the uncertainties of the sound power levels at other wind speeds as well.

6 Summary

As ordered by the customer REpower Systems AG, windtest grevenbroich gmbh has measured the noise emission of a WEC type REpower MM 92 with a hub height of 80 m (including the base) according to IEC 61400-11 [1].

The measurement has been performed on 2009-01-22 in Chemin d`Ablis on the WEC with the serial no. R90223 and the wind farm no. E14, in normal operation mode (2050 kW).

A distinct directional characteristic could not be measured for this turbine. Single noise events, exceeding the average noise of the turbine more than 10 dB could not be noticed. Nor any other special noise characteristics like impulsivity could be stated.

The tonality analysis according to IEC 61400-11 [2] for the measured WEC noise in 102 m distance, shows no tonality for the analysed wind bins.

Generally speaking, the operating noise of the wind turbine REpower MM 92 can be stated to be inconspicuously.

For the given sound power levels a measurement uncertainty of typical 0,8 dB has been found.

The data analysis gives the following noise values for the single wind speed bins:

Tab. 7: Measurement results for the REpower MM 92, normal operation mode 2050 kW

Wind speed at 10 m height (v_{10m})	**BIN 6 5,5–6,5 m/s**	**Bin 7 6,5–7,5 m/s**	**7,7 m/s[1)]**	**BIN 8 7,5–8,5 m/s**
Sound power level L_{WA} [dB]	**102,8**	**103,9**	**103,8**	**103,8**
Tonal audability $\Delta L_{a,k}$ [dB]	0	0	0	0
Impulsivity K_{IN} [dB]	0	0	0	0
Elektrical power [kW]	1181	1688	1948	2006

1) 95 % of rated power

It is assured that the testing of the sound performance of the WEC REpower MM 92 was performed according to the state of technology, independently and impartially and to the best of our knowledge and conscience.

The results presented in this report only refer to and apply on this WEC.

Grevenbroich, 2009-03-13

David Rode

Dipl.-Ing. David Rode

windtest grevenbroich gmbh

Schallemission FGW Fördergesellschaft Windenergie 2009 Konformitätssiegel

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[2] IEC 61400-11:2002, Amendment 1: Wind turbine generator systems - Part 11: Acoustic noise measurement techniques, June 2006

[3] Technische Richtlinien für Windenergieanlagen, Revision 17, Stand 01.02.2008 Teil1: Bestimmung der Schallemissionswerte, Herausgeber: Fördergesellschaft Windenergie e. V., Stresemannplatz 4, 24103 Kiel

8 Abbreviations

ΔL	-	level difference	dB
$\Delta L_{a,k}$	-	tonal audibility	dB
BG	-	operating noise	-
D	-	rotor diameter	m
f_T	-	tonal frequency	Hz
H	-	hub height	m
h_A	-	height of measuring microphone	m
HG	-	background noise	-
κ	-	correction factor	-
L_{Aeq}	-	equivalent, A-weighted continuous sound pressure level	dB
$L_{Aeq,c}$	-	background corrected sound pressure level	dB
$L_{Aeq,mess}$	-	measured sound pressure level	dB
$L_{Aeq,regr}$	-	calculated sound pressure level	dB
L_T	-	tone level	dB
L_{WA}	-	A-weighted sound power level	dB
N	-	number of values	-
N_A	-	horizontal distance between rotor centre and tower centre	m
P	-	electrical power	kW
R_0	-	horizontal distance between WEC and sound proof board	m
R_i	-	radius of cover surface	m
U_a, U_b, U_c	-	measurement uncertainties	dB

9 Appendix

Appendix 1 Manufacturer’s specification

Appendix 2 Power curve

Appendix 3 Octave spectra

Appendix 4 Narrow band spectra

REpower Systems

Herstellerbescheinigung, Kurzfassung für akustische Nachmessungen
Manufacturer's certificate, short version for control measurements of acoustic noise

1. Allgemeine Informationen – General information	
Anlagenhersteller – turbine manufacturer:	REpower Systems AG
Spezifische Anlagenbezeichnung – specific turbine type name:	MM92
Seriennummer der vermessenden WEA – serial number of tested WT:	90223
Standort der vermessenden WEA – location of tested WT:	Chemin d'Ablis
Koordinaten des Standortes – coordinates of turbine location:	583820 / 2384807
Rotorachse – rotor axis:	horizontal – horizontal ☒ vertikal – vertical ☐
Nennleistung – rated power:	2050 kW
Leistungsregelung – power control:	pitch ☒ stall ☐
Nabenhöhe über Grund – hub height above ground:	80 m
Nabenhöhe über Fundamentflansch – hub height above top of foundation flange:	78,2 m
Nennwindgeschwindigkeit – rated wind speed:	12,5 m/s
Ein- / Abschaltwindgeschwindigkeit – cut-in / cut-out wind speed:	3 / 24 m/s
2. Rotor – Rotor	
Durchmesser – rotor diameter:	92,5 m
Anzahl der Blätter – number of blades:	3
Nabenart – kind of hub:	pendelnd – teetered ☐ starr – rigid ☒
Anordnung zum Turm – position relative to tower:	Luvseitig
Drehzahlbereich/Drehzahlstufen – rotor speed range/stages of rotor speed:	7,8 – 15,0 rpm
Rotorblatteinstellwinkel – rotor blade pitch setting:	variabel (0-91°)
Konuswinkel – cone angel:	3,5°
Achsneigung – tilt angle:	5°
Horizontaler Abstand zwischen Rotormittelpunkt und Turmmittellinie – horizontal distance between centre of rotor and tower centre line:	3150 mm
3. Rotorblatt – Rotor blade	
Hersteller – manufacturer:	A&R
Typenbezeichnung – type:	RE45.2
Seriennummer der Rotorblätter – serial number of rotor blades:	0007/0008/0009
Zusatzkomponenten (z.B. strips, Vortex-Gen., Turbulatoren) – additional components (e.g. stall strips, vortex gen., trip strips):	-
4. Getriebe – Gearbox	
Hersteller – manufacturer:	Eickhoff
Typenbezeichnung – type:	CPNHZ-224/G50115XB
Seriennummer des Getriebes – serial number of gear box:	22639
Ausführung – design:	Planeten-Stirnrad
Übersetzungsverhältnis – gear ratio:	120
5. Generator – Generator	
Hersteller – manufacturer:	VEM
Typenbezeichnung – type:	DASAA 5025-4UA
Seriennummer des Generators – serial number of generator:	2353344
Anzahl der Generatoren – number of generators:	1
Art des Generators (z.B. synchron, asynchr.) – kind of generator (e.g. synchronous, asynchr.):	asynchron
Nennleistung(en) – rated power values(s):	2080 kW
Drehzahlbereich/Drehzahlstufen – rotor speed range/stages of rotor speed:	900-1800 rpm
6. Turm – Tower	
Ausführung – design:	Gitter – lattice ☐ Rohr – tubular ☒ zylindrisch – cylindrical ☐ konisch – conical ☐
Material – material:	Stahl
Durchmesser Turmfuß – foot of the tower diameter	4300 mm
7. Betriebsführung / Regelung – Control system	
Art der Leistungsregelung – kind of power control:	pitch
Antrieb der Leistungsregelung – actuation of power control:	elektrisch
Hersteller der Betriebsführung / Regelung – manufacturer of control system:	REguard Control
Typenbezeichnung der Betriebsführung / Regelung – control system type:	MPC270
Bezeichnung der verwendeten Steuerungskurve – designation of used control setup:	Standard
Bezeichnung / Messbericht der verwendeten Leistungskurve – designation of power curve report:	[illegible].LK.11-A A

REpower Dokumenten-Nummer | Rev.
D-2.9-VM.HB.13-A | B
Freigabe | Datum

27.2.09

REpower Systems

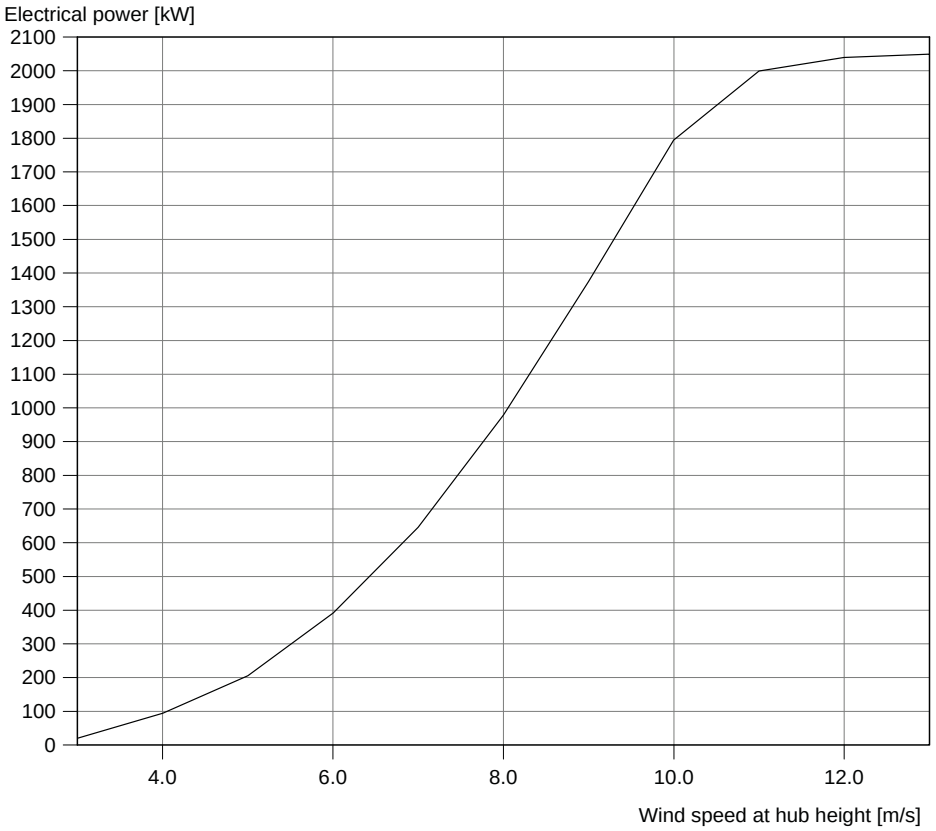
REpower Systems AG
Hollesenstraße 15, 24768 Rendsburg
Tel.: +49-(0)-4331-9456-2000
Fax: +49-(0)-4331-94 56-2915

Datum, Stempel und Unterschrift des Herstellers
Date, manufacturer's stamp and signature

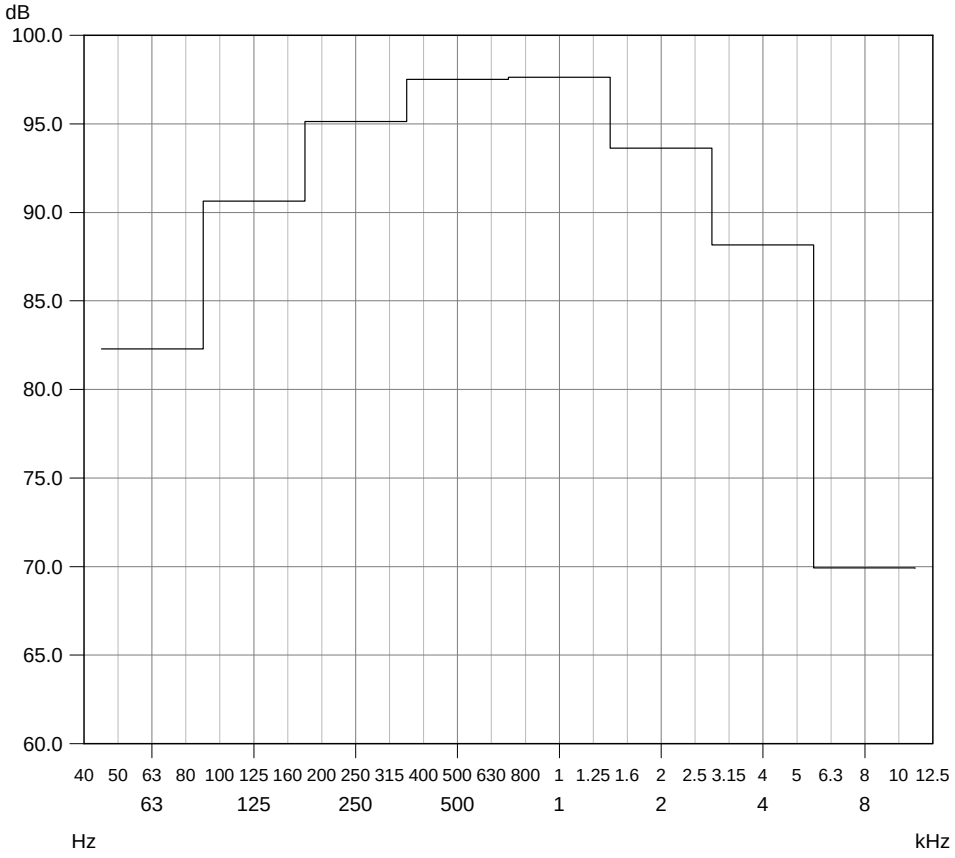
Der Hersteller der Windenergieanlage bestätigt, dass die WEA, deren Schallemission, Leistungskurve und elektrische Eigenschaften in den Prüfberichten abgebildet sind, die o.g. Eigenschaften aufweist. – The manufacturer of the wind turbine (WT) confirms that the WT whose noise level, performance curve and power quality is measured and depicted in the test reports, shows the characteristics given above.

Used power curve REpower MM 92

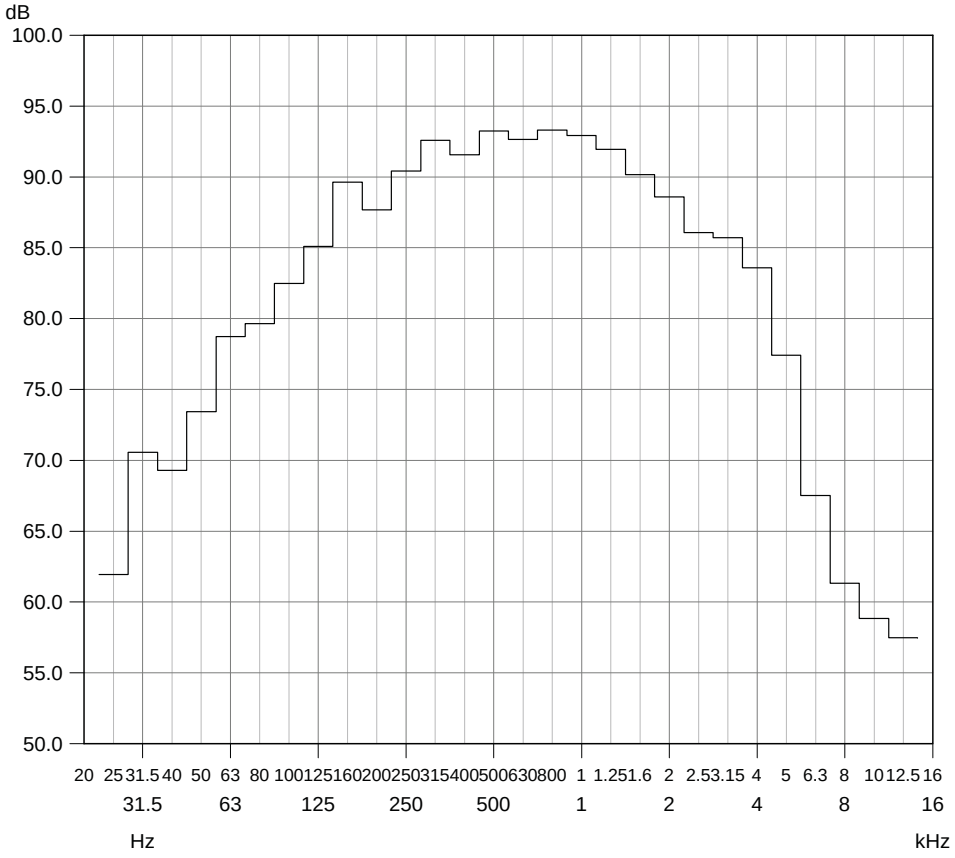
Source: REpower, Document-No.: C-2.9-VM.LK.11-A Rev.: A



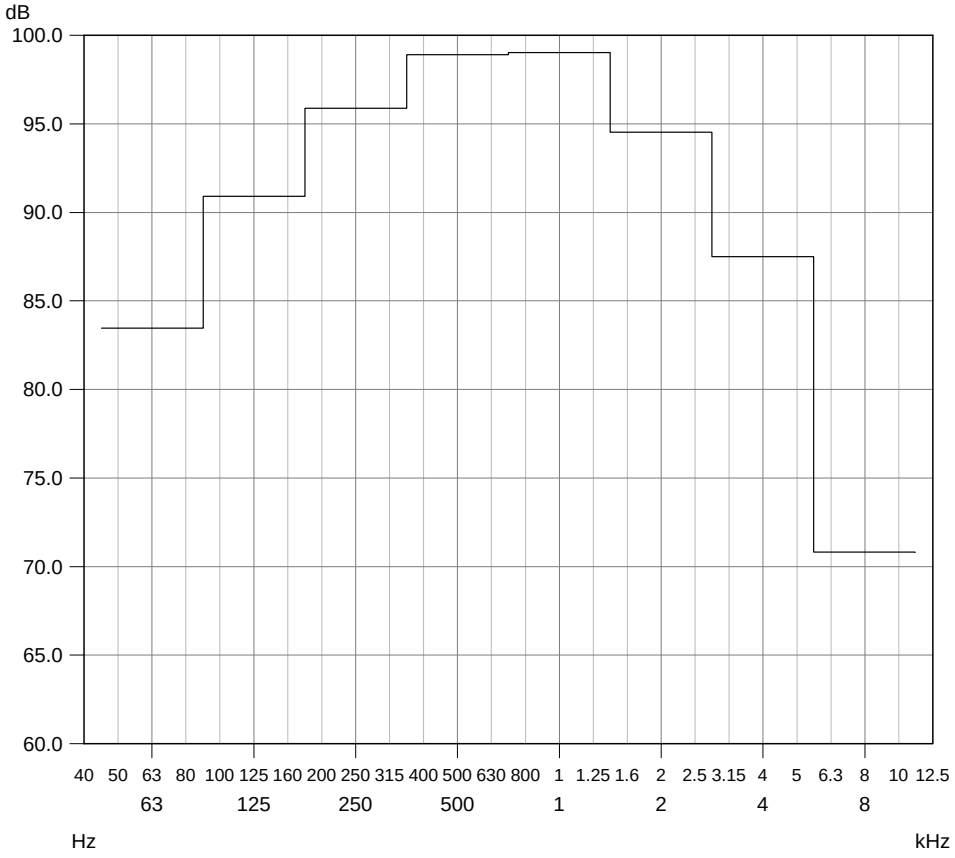
WG [m/s]	P [kW]	WG [m/s]	P [kW]
2	0	8	979
3	20	9	1375
4	94	10	1795
5	205	11	2000
6	391	12	2040
7	645	13	2050



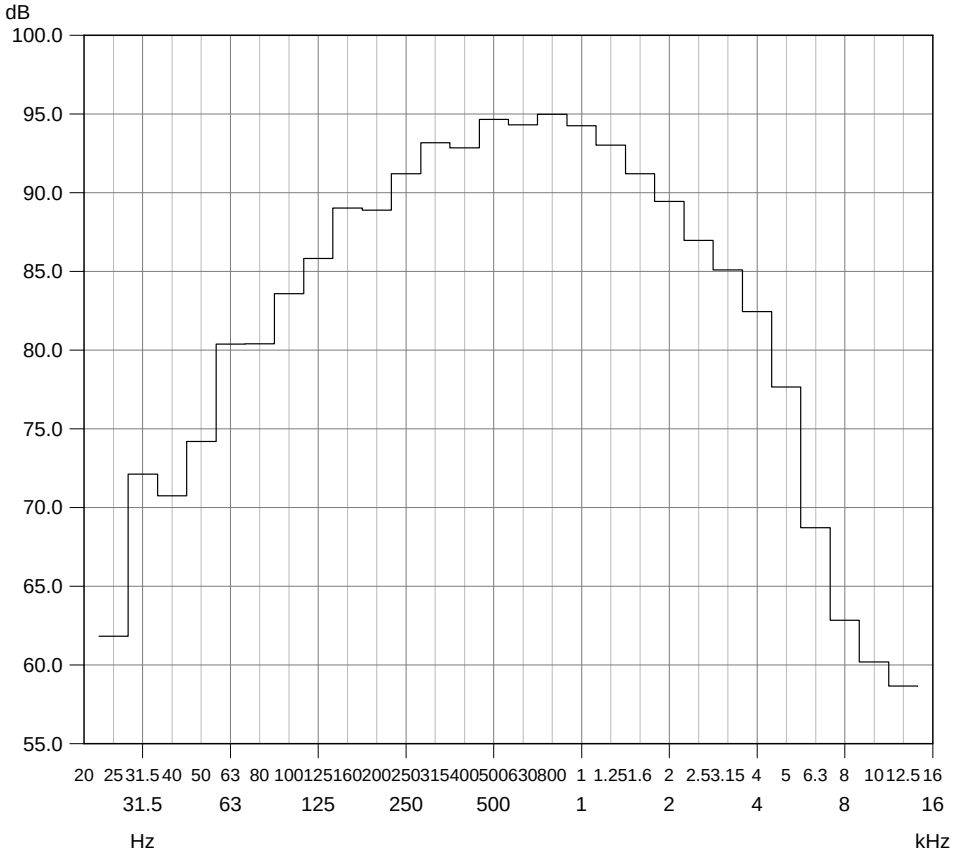
Octave sound power level at 6 m/s, sum level = 102,8 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	82,29	1000	97,65
125	90,64	2000	93,63
250	95,15	4000	88,17
500	97,53	8000	69,91



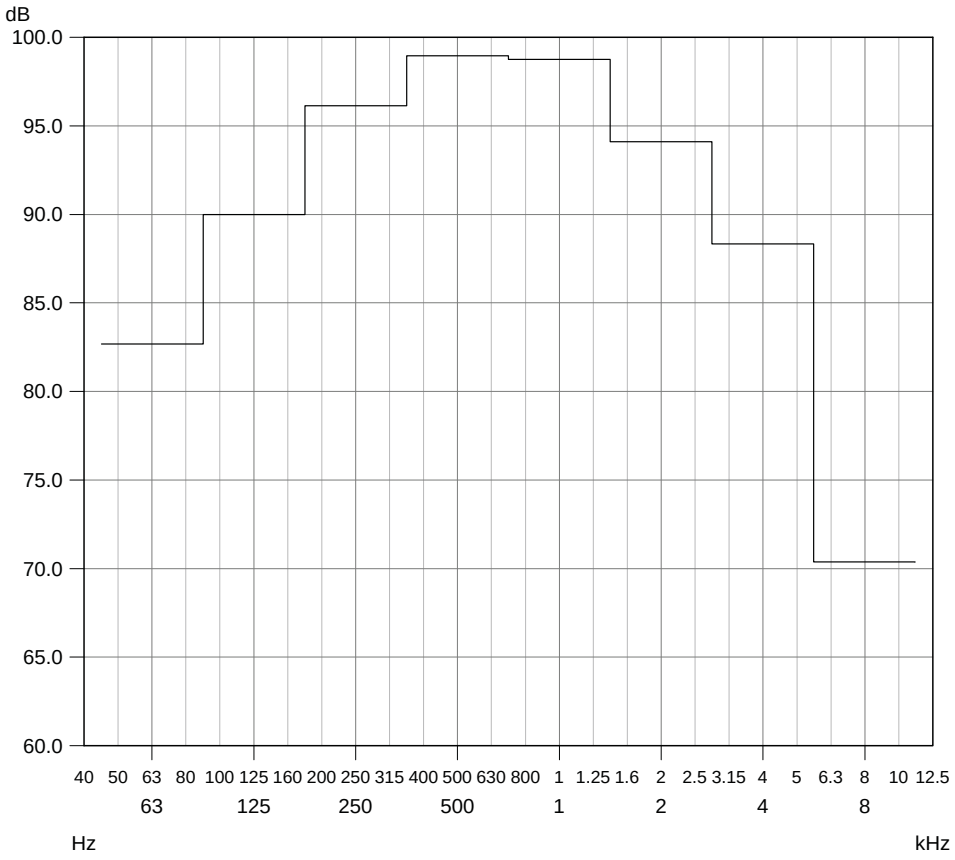
Third octave sound power level at 6 m/s, sum level = 102,8 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
25	61,92	630	92,66
31,5	70,56	800	93,31
40	69,29	1000	92,94
50	73,42	1250	91,96
63	78,72	1600	90,17
80	79,66	2000	88,61
100	82,49	2500	86,08
125	85,11	3150	85,72
160	89,65	4000	83,59
200	87,69	5000	77,43
250	90,43	6300	67,51
315	92,58	8000	61,32
400	91,56	10000	58,83
500	93,24	12500	57,47



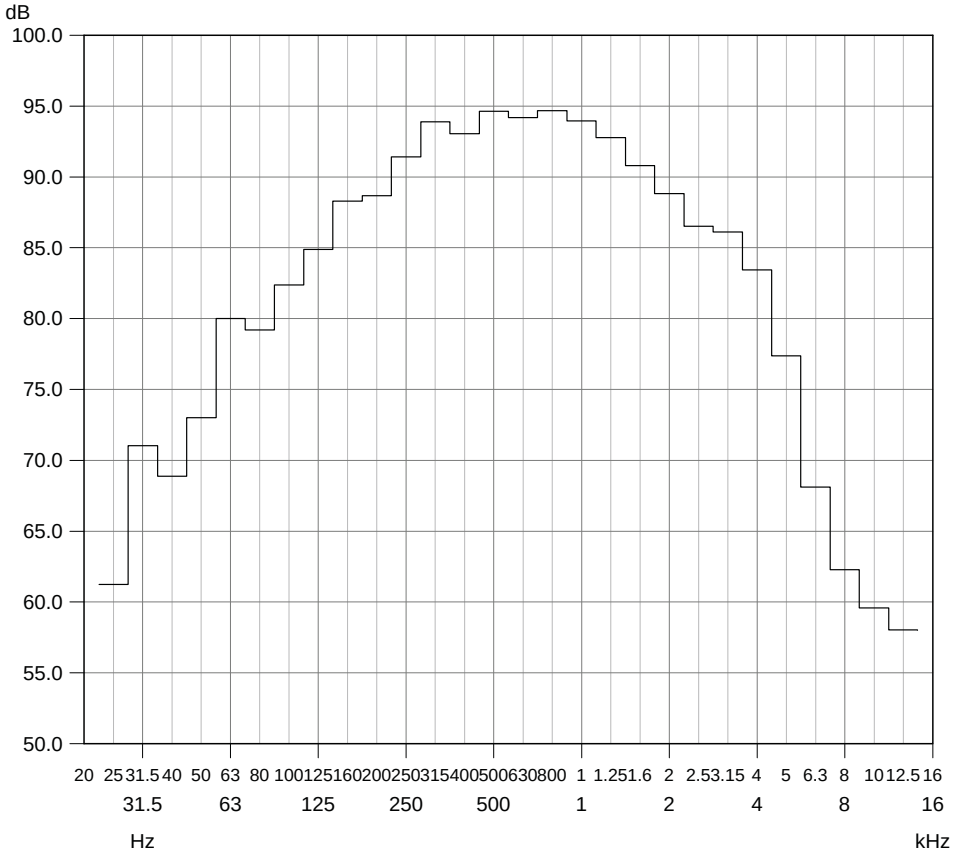
Octave sound power level at 7 m/s, sum level = 103,9 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	83,46	1000	99,03
125	90,92	2000	94,53
250	95,89	4000	87,51
500	98,91	8000	70,81



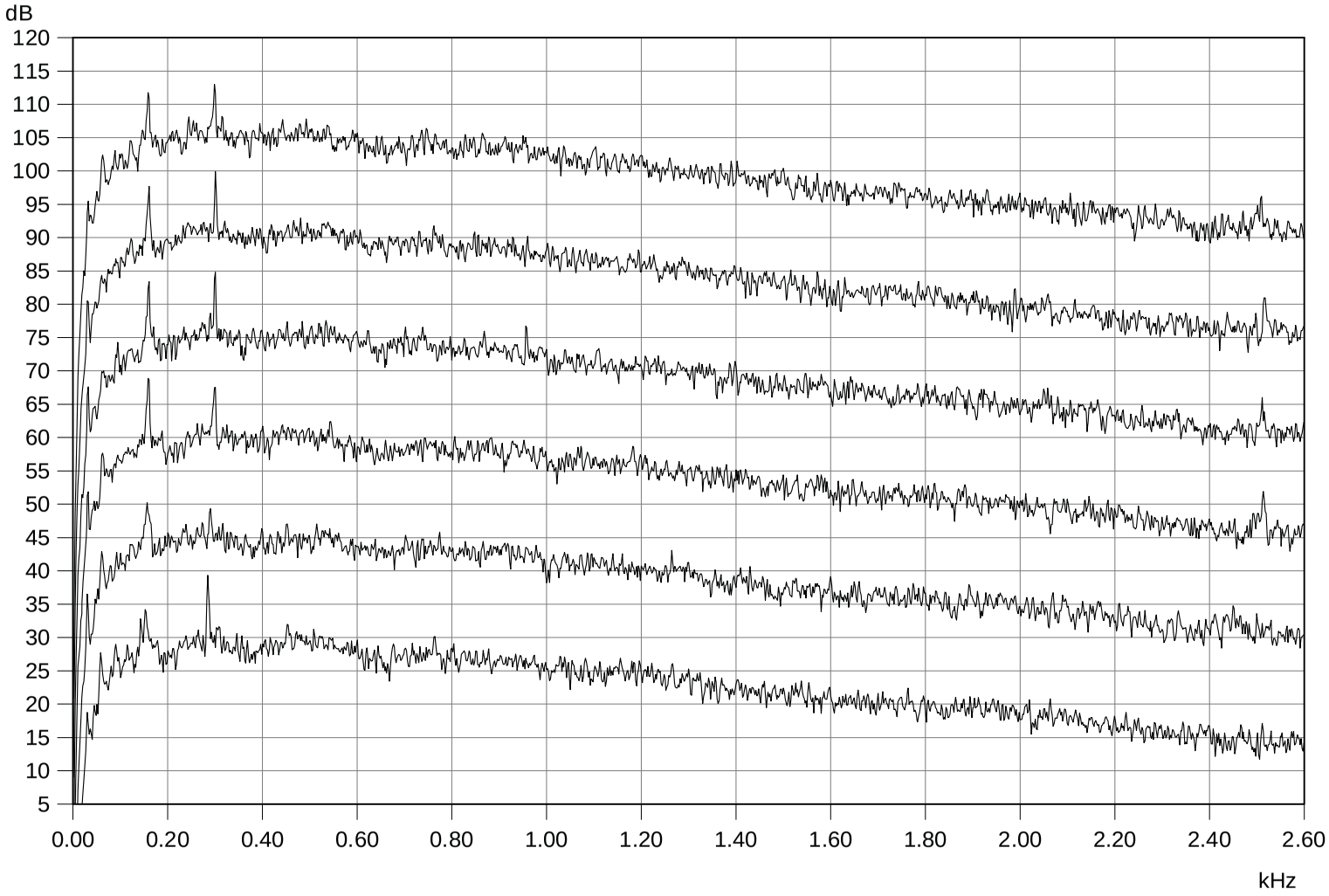
Third octave sound power level at 7 m/s, sum level = 103,9 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
25	61,82	630	94,32
31,5	72,11	800	95,00
40	70,74	1000	94,27
50	74,19	1250	93,03
63	80,38	1600	91,21
80	80,41	2000	89,45
100	83,60	2500	86,98
125	85,82	3150	85,10
160	89,03	4000	82,46
200	88,91	5000	77,65
250	91,22	6300	68,72
315	93,17	8000	62,84
400	92,86	10000	60,17
500	94,67	12500	58,65



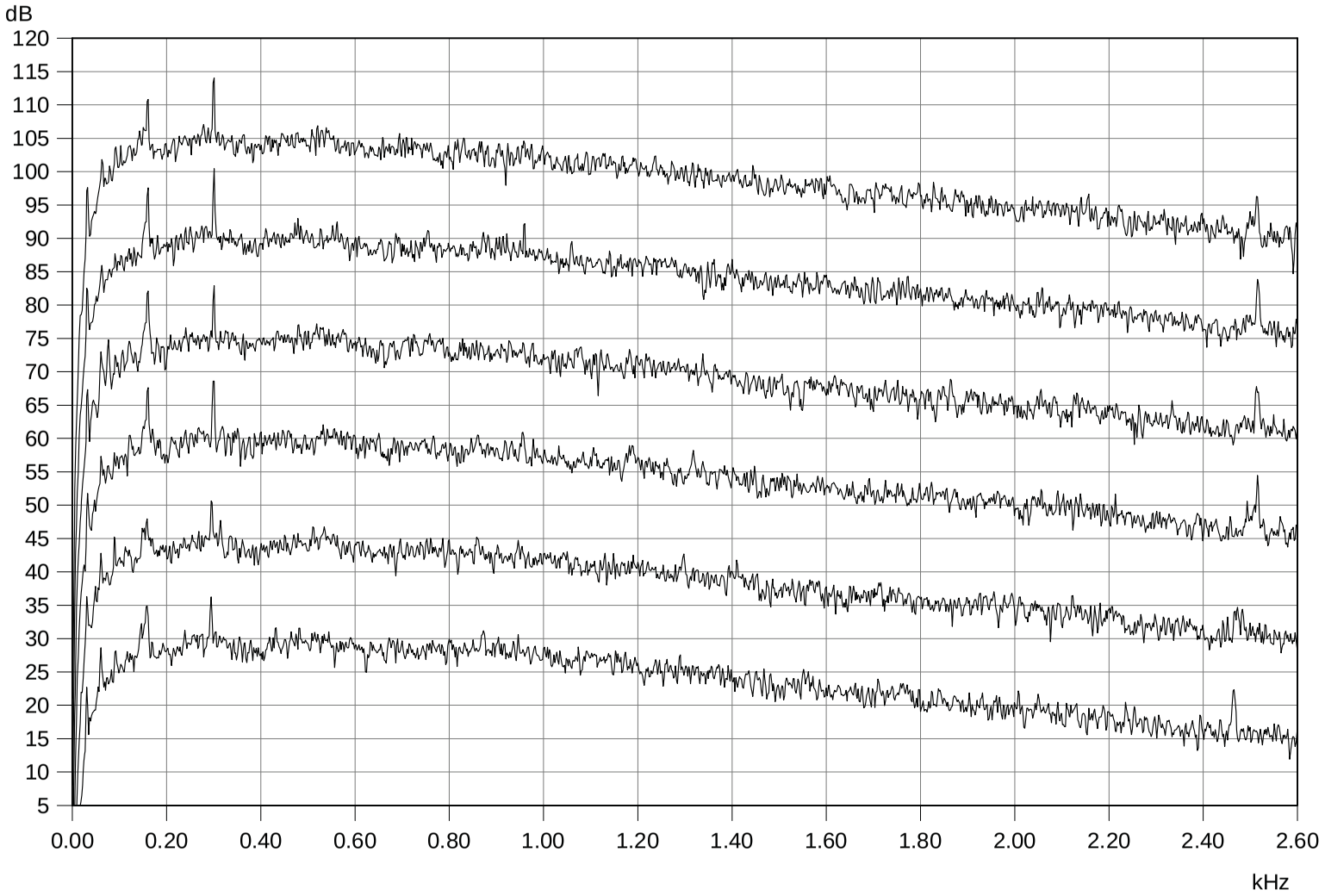
Octave sound power level at 8 m/s, sum level = 103,8 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	82,68	1000	98,77
125	90,01	2000	94,10
250	96,15	4000	88,33
500	98,97	8000	70,38



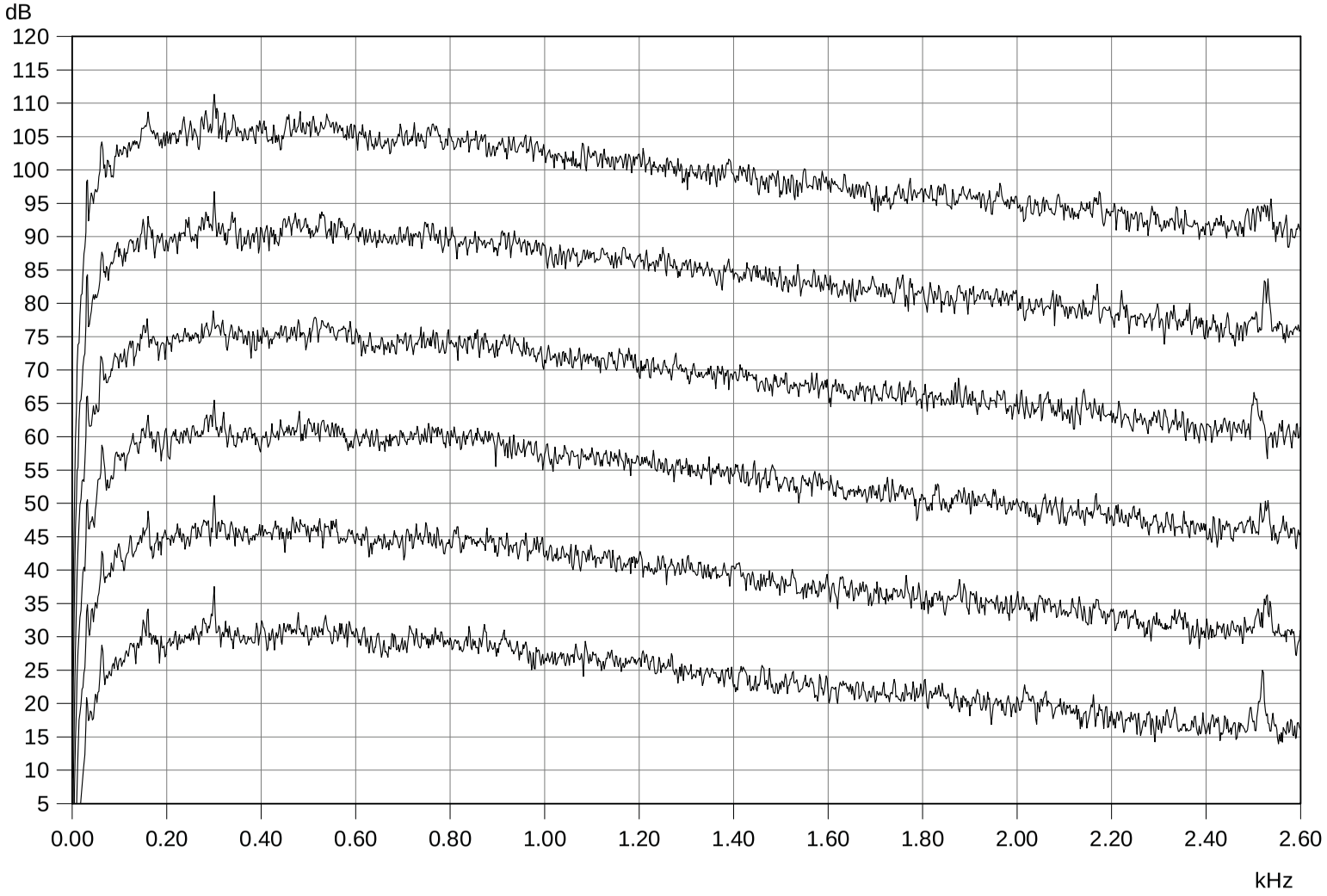
Third octave sound power level at 8 m/s, sum level = 103,8 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
25	61,24	630	94,21
31,5	71,03	800	94,69
40	68,87	1000	93,96
50	73,01	1250	92,79
63	80,01	1600	90,81
80	79,21	2000	88,83
100	82,40	2500	86,53
125	84,88	3150	86,12
160	88,31	4000	83,46
200	88,68	5000	77,38
250	91,44	6300	68,11
315	93,90	8000	62,26
400	93,05	10000	59,57
500	94,65	12500	58,02



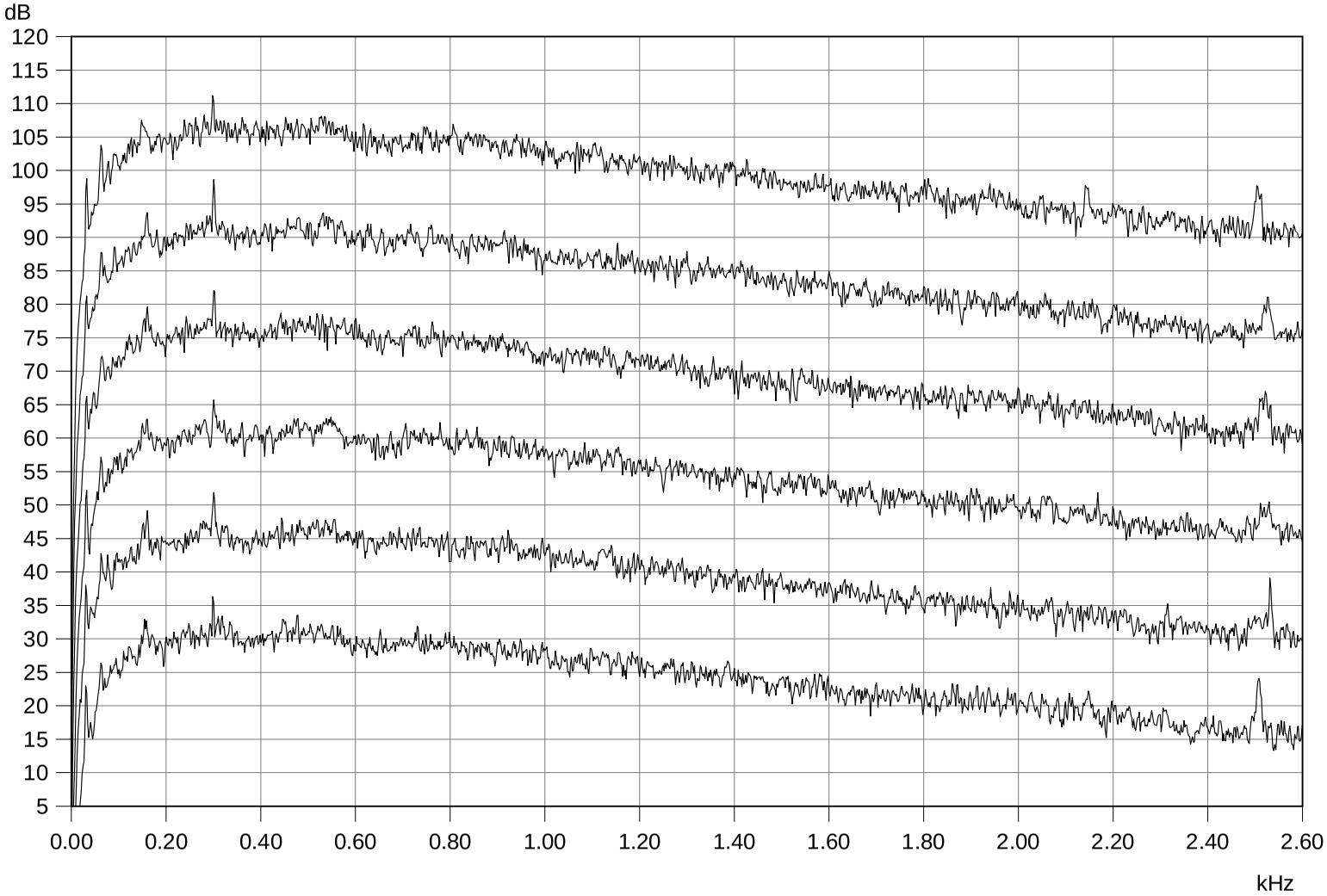
Spectra 1 – 6, at 6 m/s (upper spectra shifted by 15 dB each, no. 1 at top)



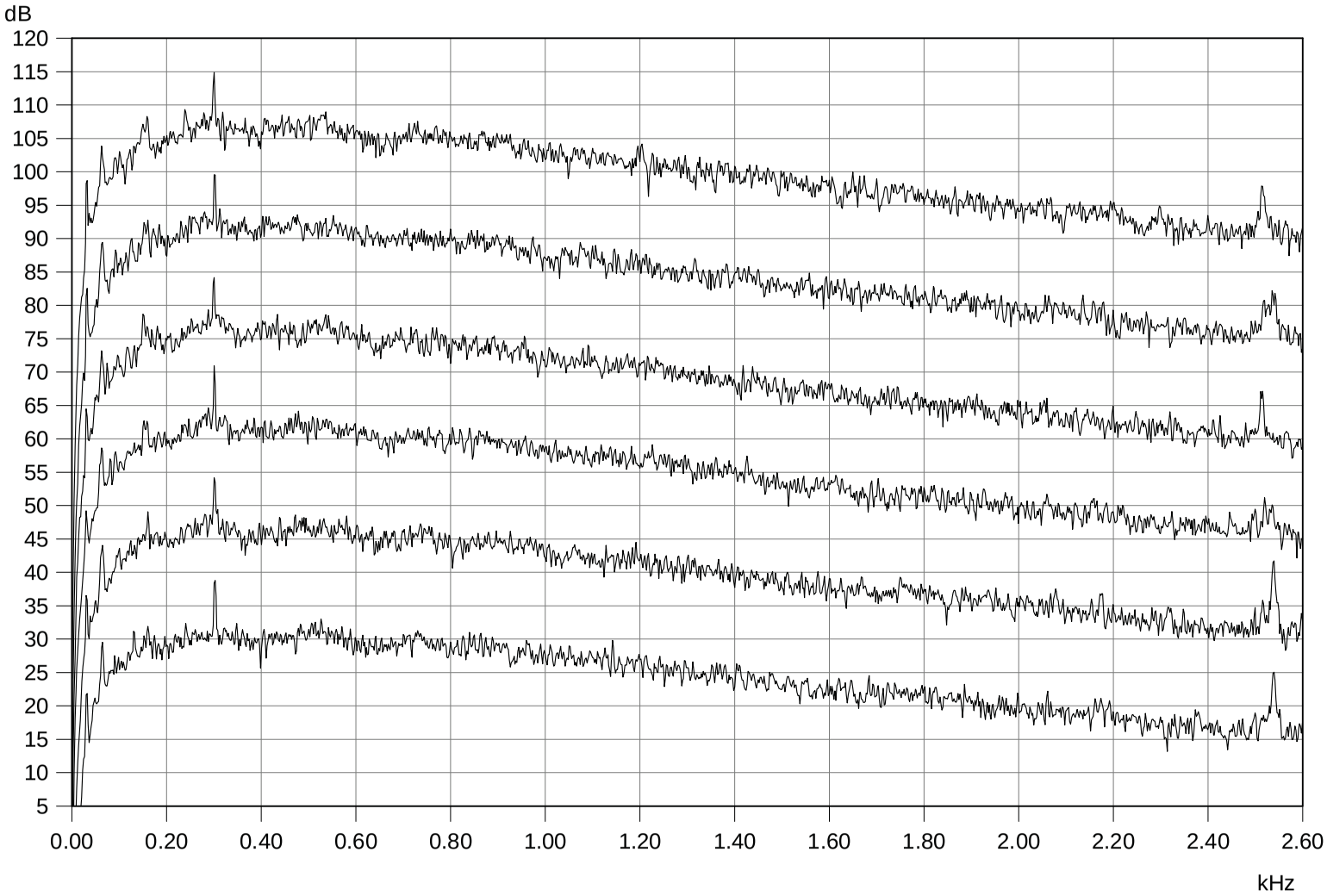
Spectra 7 – 12, at 6 m/s (upper spectra shifted by 15 dB each, no. 7 at top)



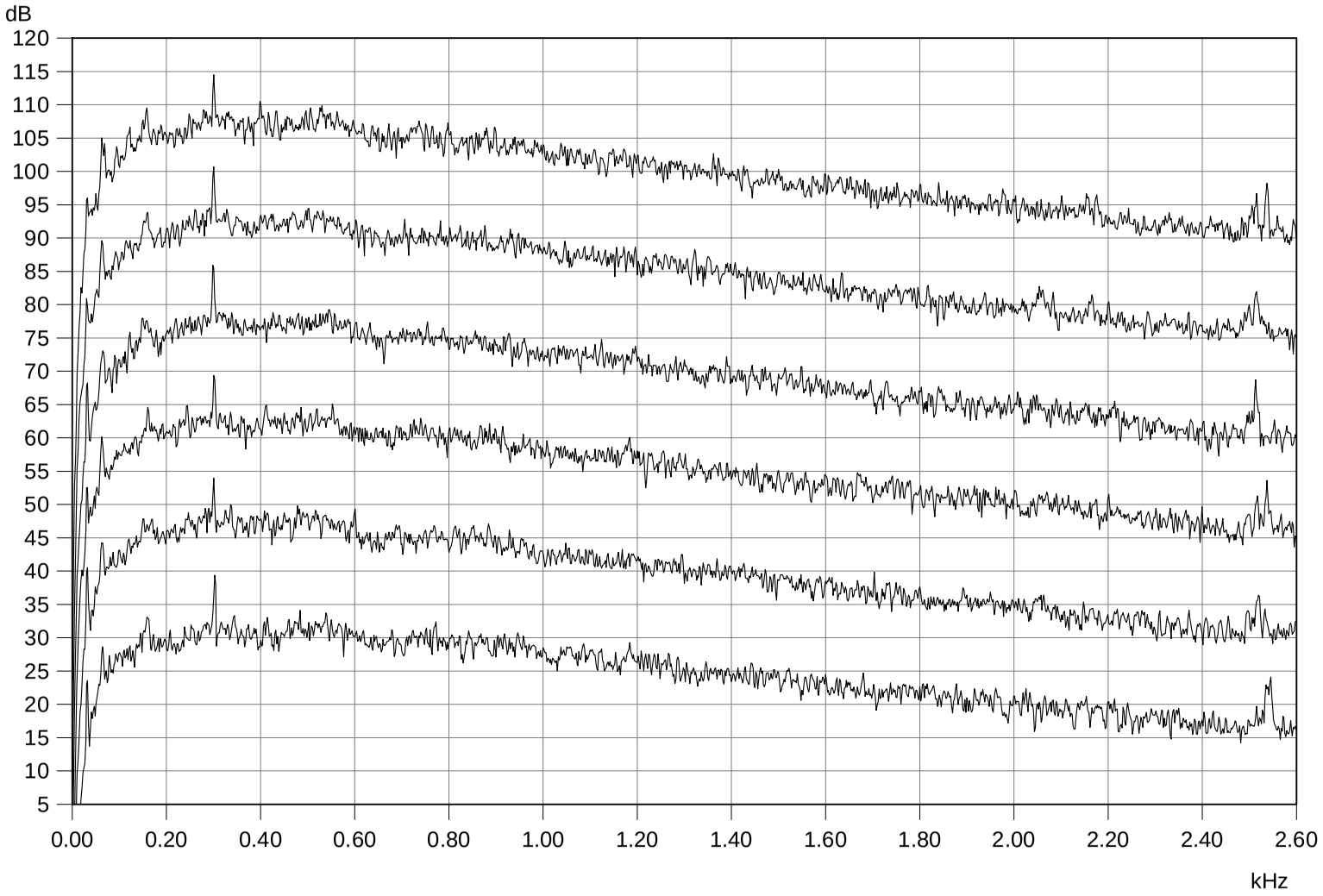
Spectra 1 – 6, at 7 m/s (upper spectra shifted by 15 dB each, no. 1 at top)



Spectra 7 – 12, at 7 m/s (upper spectra shifted by 15 dB each, no. 7 at top)



Spectra 1 – 6, at 8 m/s (upper spectra shifted by 15 dB each, no. 1 at top)



Spectra 7 – 12, at 8 m/s (upper spectra shifted by 15 dB each, no. 7 at top)

APPENDIX E:
CALCULATION DETAILS

Summary of Calculations - Condensed Overall dBA

R018	Non-Participating	333443	4863514	102.9														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
OP WTG1	Ostrander Point WTG 01	338354	4862657	164.8	105	105	85.0	0	0.0	-0.7	0.0	7.6	0.0	0.0	0.0	0.0	13.2	13.2
TS2	White Pines Transformer2	332911	4862998	99.3	101	101	68.4	0	0.0	-0.2	5.4	1.7	0.0	0.0	0.0	0.0	26.2	26.2
WTG01	White Pines WTG01	331642	4865658	195.0	104	104	80.0	0	0.0	-0.3	0.0	5.1	0.0	0.0	0.0	0.0	19.4	19.4
WTG02	White Pines WTG02	331865	4865330	201.1	104	104	78.6	0	0.0	-0.3	0.0	4.6	0.0	0.0	0.0	0.0	21.3	21.3
WTG03	White Pines WTG03	332014	4864994	201.2	104	104	77.3	0	0.0	-0.3	0.0	4.0	0.0	0.0	0.0	0.0	23.2	23.2
WTG04	White Pines WTG04	333433	4866108	201.9	104	104	79.3	0	0.0	-0.3	0.0	4.8	0.0	0.0	0.0	0.0	20.3	20.3
WTG05	White Pines WTG05	332520	4864336	200.0	104	104	72.9	0	0.0	-0.4	0.0	2.7	0.0	0.0	0.0	0.0	29.1	29.1
WTG06	White Pines WTG06	333551	4864776	195.0	104	104	73.1	0	0.0	-0.4	0.0	2.7	0.0	0.0	0.0	0.0	28.8	28.8
WTG07	White Pines WTG07	333178	4863016	195.4	104	104	66.2	0	0.0	-0.5	0.0	1.4	0.0	0.0	0.0	0.0	37.1	37.1
WTG08	White Pines WTG08	329738	4862665	200.0	104	104	82.6	0	0.0	-0.4	0.0	6.5	0.0	0.0	0.0	0.0	15.5	15.5
WTG09	White Pines WTG09	330014	4863072	200.0	104	104	81.8	0	0.0	-0.3	0.0	6.0	0.0	0.0	0.0	0.0	16.7	16.7
WTG10	White Pines WTG10	330179	4863665	198.6	104	104	81.3	0	0.0	-0.3	0.0	5.8	0.0	0.0	0.0	0.0	17.4	17.4
WTG11	White Pines WTG11	332017	4862468	194.0	104	104	76.0	0	0.0	-0.4	0.0	3.6	0.0	0.0	0.0	0.0	25.0	25.0
WTG12	White Pines WTG12	330801	4861293	190.0	104	104	81.8	0	0.0	-0.3	0.0	6.0	0.0	0.0	0.0	0.0	16.7	16.7
WTG13	White Pines WTG13	331200	4861044	187.6	104	104	81.5	0	0.0	-0.3	0.0	5.9	0.0	0.0	0.0	0.0	17.1	17.1
WTG14	White Pines WTG14	331403	4861424	188.1	104	104	80.3	0	0.0	-0.3	0.0	5.3	0.0	0.0	0.0	0.0	18.8	18.8
WTG15	White Pines WTG15	331767	4861704	188.8	104	104	78.9	0	0.0	-0.3	0.0	4.7	0.0	0.0	0.0	0.0	21.0	21.0
WTG16	White Pines WTG16	331776	4860976	185.0	104	104	80.7	0	0.0	-0.3	0.0	5.5	0.0	0.0	0.0	0.0	18.3	18.3
WTG17	White Pines WTG17	332089	4861212	185.0	104	104	79.5	0	0.0	-0.3	0.0	4.9	0.0	0.0	0.0	0.0	20.0	20.0
WTG18	White Pines WTG18	334176	4861229	182.6	104	104	78.6	0	0.0	-0.3	0.0	4.6	0.0	0.0	0.0	0.0	21.3	21.3
WTG19	White Pines WTG19	334338	4861685	185.0	104	104	77.2	0	0.0	-0.4	0.0	4.0	0.0	0.0	0.0	0.0	23.3	23.3
WTG20	White Pines WTG20	334828	4862020	185.0	104	104	77.2	0	0.0	-0.4	0.0	4.0	0.0	0.0	0.0	0.0	23.3	23.3
WTG21	White Pines WTG21	335897	4863241	185.0	104	104	78.9	0	0.0	-0.3	0.0	4.6	0.0	0.0	0.0	0.0	21.0	21.0
WTG22	White Pines WTG22	336233	4862928	182.4	104	104	80.1	0	0.0	-0.3	0.0	5.2	0.0	0.0	0.0	0.0	19.1	19.1
WTG23	White Pines WTG23	337875	4861966	176.4	104	104	84.4	0	0.0	-0.5	0.0	7.5	0.0	0.0	0.0	0.0	12.7	12.7

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

R030	Non-Participating	331959	4863114	104.5														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
TS2	White Pines Transformer2	332911	4862998	99.3	101	101	70.6	0	0.0	-0.9	0.0	2.4	0.0	0.0	0.0	0.0	29.2	29.2
WTG01	White Pines WTG01	331642	4865658	195.0	104	104	79.2	0	0.0	-0.3	0.0	4.8	0.0	0.0	0.0	0.0	20.5	20.5
WTG02	White Pines WTG02	331865	4865330	201.1	104	104	77.9	0	0.0	-0.3	0.0	4.3	0.0	0.0	0.0	0.0	22.3	22.3
WTG03	White Pines WTG03	332014	4864994	201.2	104	104	76.5	0	0.0	-0.4	0.0	3.8	0.0	0.0	0.0	0.0	24.3	24.3
WTG04	White Pines WTG04	333433	4866108	201.9	104	104	81.5	0	0.0	-0.3	0.0	5.9	0.0	0.0	0.0	0.0	17.1	17.1
WTG05	White Pines WTG05	332520	4864336	200.0	104	104	73.6	0	0.0	-0.4	0.0	2.9	0.0	0.0	0.0	0.0	28.1	28.1
WTG06	White Pines WTG06	333551	4864776	195.0	104	104	78.2	0	0.0	-0.3	0.0	4.4	0.0	0.0	0.0	0.0	21.8	21.8
WTG07	White Pines WTG07	333178	4863016	195.4	104	104	72.8	0	0.0	-0.4	0.0	2.6	0.0	0.0	0.0	0.0	29.2	29.2
WTG08	White Pines WTG08	329738	4862665	200.0	104	104	78.1	0	0.0	-0.3	0.0	4.4	0.0	0.0	0.0	0.0	22.0	22.0
WTG09	White Pines WTG09	330014	4863072	200.0	104	104	76.8	0	0.0	-0.4	0.0	3.9	0.0	0.0	0.0	0.0	23.9	23.9
WTG10	White Pines WTG10	330179	4863665	198.6	104	104	76.4	0	0.0	-0.4	0.0	3.7	0.0	0.0	0.0	0.0	24.4	24.4
WTG11	White Pines WTG11	332017	4862468	194.0	104	104	67.3	0	0.0	-0.5	0.0	1.6	0.0	0.0	0.0	0.0	35.8	35.8
WTG12	White Pines WTG12	330801	4861293	190.0	104	104	77.7	0	0.0	-0.3	0.0	4.2	0.0	0.0	0.0	0.0	22.6	22.6
WTG13	White Pines WTG13	331200	4861044	187.6	104	104	77.9	0	0.0	-0.3	0.0	4.3	0.0	0.0	0.0	0.0	22.4	22.4
WTG14	White Pines WTG14	331403	4861424	188.1	104	104	76.0	0	0.0	-0.4	0.0	3.6	0.0	0.0	0.0	0.0	24.9	24.9
WTG15	White Pines WTG15	331767	4861704	188.8	104	104	74.1	0	0.0	-0.4	0.0	3.0	0.0	0.0	0.0	0.0	27.5	27.5
WTG16	White Pines WTG16	331776	4860976	185.0	104	104	77.6	0	0.0	-0.3	0.0	4.2	0.0	0.0	0.0	0.0	22.7	22.7
WTG17	White Pines WTG17	332089	4861212	185.0	104	104	76.6	0	0.0	-0.4	0.0	3.8	0.0	0.0	0.0	0.0	24.1	24.1
WTG18	White Pines WTG18	334176	4861229	182.6	104	104	80.3	0	0.0	-0.3	0.0	5.3	0.0	0.0	0.0	0.0	18.9	18.9
WTG19	White Pines WTG19	334338	4861685	185.0	104	104	79.9	0	0.0	-0.3	0.0	5.1	0.0	0.0	0.0	0.0	19.5	19.5
WTG20	White Pines WTG20	334828	4862020	185.0	104	104	80.8	0	0.0	-0.3	0.0	5.5	0.0	0.0	0.0	0.0	18.2	18.2
WTG21	White Pines WTG21	335897	4863241	185.0	104	104	82.9	0	0.0	-0.4	0.0	6.6	0.0	0.0	0.0	0.0	15.0	15.0
WTG22	White Pines WTG22	336233	4862928	182.4	104	104	83.6	0	0.0	-0.5	0.0	7.0	0.0	0.0	0.0	0.0	13.9	13.9

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

R059	Non-Participating	337453	4862777	83.4														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
OP Transformer	Ostrander Transformer	338870	4863741	82.0	102	102	75.7	0	0.0	0.9	0.0	4.3	0.0	0.0	0.0	0.0	21.2	21.2
OP WTG1	Ostrander Point WTG 01	338354	4862657	164.8	105	105	70.2	0	0.0	-0.4	0.0	2.1	0.0	0.0	0.0	0.0	33.2	33.2
OP WTG2	Ostrander Point WTG 02	338659	4862365	163.7	105	105	73.1	0	0.0	-0.4	0.0	2.8	0.0	0.0	0.0	0.0	29.5	29.5
OP WTG3	Ostrander Point WTG 03	339358	4862474	160.0	105	105	76.7	0	0.0	-0.3	0.0	3.8	0.0	0.0	0.0	0.0	24.9	24.9
OP WTG4	Ostrander Point WTG 04	338961	4862066	160.7	105	105	75.5	0	0.0	-0.4	0.0	3.4	0.0	0.0	0.0	0.0	26.5	26.5
OP WTG5	Ostrander Point WTG 05	338918	4862950	165.0	105	105	74.4	0	0.0	-0.4	0.0	3.1	0.0	0.0	0.0	0.0	27.9	27.9
OP WTG6	Ostrander Point WTG 06	339164	4863668	165.5	105	105	76.7	0	0.0	-0.3	0.0	3.8	0.0	0.0	0.0	0.0	24.9	24.9
OP WTG7	Ostrander Point WTG 07	339705	4862738	161.0	105	105	78.1	0	0.0	-0.3	0.0	4.3	0.0	0.0	0.0	0.0	23.0	23.0
OP WTG8	Ostrander Point WTG 08	339066	4863288	165.0	105	105	75.6	0	0.0	-0.4	0.0	3.4	0.0	0.0	0.0	0.0	26.4	26.4
OP WTG9	Ostrander Point WTG 09	340311	4862906	161.6	105	105	80.1	0	0.0	-0.3	0.0	5.1	0.0	0.0	0.0	0.0	20.1	20.1
TS2	White Pines Transformer2	332911	4862998	99.3	101	101	84.2	0	0.0	0.6	4.0	7.2	0.0	0.0	0.0	0.0	5.4	5.4
WTG06	White Pines WTG06	333551	4864776	195.0	104	104	83.8	0	0.0	-0.5	0.0	7.2	0.0	0.0	0.0	0.0	13.6	13.6
WTG07	White Pines WTG07	333178	4863016	195.4	104	104	83.6	0	0.0	-0.5	0.0	7.0	0.0	0.0	0.0	0.0	13.9	13.9
WTG18	White Pines WTG18	334176	4861229	182.6	104	104	82.2	0	0.0	-0.3	0.0	6.2	0.0	0.0	0.0	0.0	16.1	16.1
WTG19	White Pines WTG19	334338	4861685	185.0	104	104	81.4	0	0.0	-0.3	0.0	5.8	0.0	0.0	0.0	0.0	17.3	17.3
WTG20	White Pines WTG20	334828	4862020	185.0	104	104	79.7	0	0.0	-0.3	0.0	5.0	0.0	0.0	0.0	0.0	19.7	19.7
WTG21	White Pines WTG21	335897	4863241	185.0	104	104	75.2	0	0.0	-0.4	0.0	3.3	0.0	0.0	0.0	0.0	26.0	26.0
WTG22	White Pines WTG22	336233	4862928	182.4	104	104	72.8	0	0.0	-0.4	0.0	2.7	0.0	0.0	0.0	0.0	29.1	29.1
WTG23	White Pines WTG23	337875	4861966	176.4	104	104	70.3	0	0.0	-0.5	0.0	2.1	0.0	0.0	0.0	0.0	32.3	32.3
WTG24	White Pines WTG24	338470	4862038	177.1	104	104	73.0	0	0.0	-0.4	0.0	2.7	0.0	0.0	0.0	0.0	28.9	28.9
WTG25	White Pines WTG25	340676	4865692	185.0	104	104	83.8	0	0.0	-0.5	0.0	7.1	0.0	0.0	0.0	0.0	13.7	13.7

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

R100	Non-Participating	342842	4865959	89.5														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
OP Transformer	Ostrander Transformer	338870	4863741	82.0	102	102	84.2	0	0.0	1.2	0.0	8.6	0.0	0.0	0.0	0.0	8.1	8.1
OP WTG3	Ostrander Point WTG 03	339358	4862474	160.0	105	105	84.9	0	0.0	-0.7	0.0	7.5	0.0	0.0	0.0	0.0	13.4	13.4
OP WTG5	Ostrander Point WTG 05	338918	4862950	165.0	105	105	84.9	0	0.0	-0.7	0.0	7.6	0.0	0.0	0.0	0.0	13.3	13.3
OP WTG6	Ostrander Point WTG 06	339164	4863668	165.5	105	105	83.7	0	0.0	-0.6	0.0	6.9	0.0	0.0	0.0	0.0	15.0	15.0
OP WTG7	Ostrander Point WTG 07	339705	4862738	161.0	105	105	84.1	0	0.0	-0.7	0.0	7.1	0.0	0.0	0.0	0.0	14.6	14.6
OP WTG8	Ostrander Point WTG 08	339066	4863288	165.0	105	105	84.3	0	0.0	-0.7	0.0	7.2	0.0	0.0	0.0	0.0	14.2	14.2
OP WTG9	Ostrander Point WTG 09	340311	4862906	161.6	105	105	83.0	0	0.0	-0.6	0.0	6.5	0.0	0.0	0.0	0.0	16.2	16.2
WTG25	White Pines WTG25	340676	4865692	185.0	104	104	77.8	0	0.0	-0.3	0.0	4.2	0.0	0.0	0.0	0.0	22.5	22.5
WTG26	White Pines WTG26	341997	4866196	182.6	104	104	69.9	0	0.0	-0.5	0.0	2.0	0.0	0.0	0.0	0.0	32.7	32.7
WTG27	White Pines WTG27	342616	4864922	183.6	104	104	71.6	0	0.0	-0.5	0.0	2.4	0.0	0.0	0.0	0.0	30.7	30.7
WTG28	White Pines WTG28	343062	4865366	184.3	104	104	67.1	0	0.0	-0.5	0.0	1.5	0.0	0.0	0.0	0.0	36.0	36.0
WTG29	White Pines WTG29	343677	4865454	180.0	104	104	70.8	0	0.0	-0.5	0.0	2.2	0.0	0.0	0.0	0.0	31.6	31.6

R299	Non-Participating	343725	4866034	86.1														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
OP WTG9	Ostrander Point WTG 09	340311	4862906	161.6	105	105	84.3	0	0.0	-0.7	0.0	7.2	0.0	0.0	0.0	0.0	14.2	14.2
WTG25	White Pines WTG25	340676	4865692	185.0	104	104	80.7	0	0.0	-0.3	0.0	5.5	0.0	0.0	0.0	0.0	18.2	18.2
WTG26	White Pines WTG26	341997	4866196	182.6	104	104	75.8	0	0.0	-0.4	0.0	3.5	0.0	0.0	0.0	0.0	25.2	25.2
WTG27	White Pines WTG27	342616	4864922	183.6	104	104	74.9	0	0.0	-0.4	0.0	3.2	0.0	0.0	0.0	0.0	26.4	26.4
WTG28	White Pines WTG28	343062	4865366	184.3	104	104	70.5	0	0.0	-0.5	0.0	2.1	0.0	0.0	0.0	0.0	32.0	32.0
WTG29	White Pines WTG29	343677	4865454	180.0	104	104	66.4	0	0.0	-0.5	0.0	1.4	0.0	0.0	0.0	0.0	36.9	36.9

R330	Non-Participating	327366	4880826	109.3														
Src ID	Src Name	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN
TS1	White Pines Transformer1	327857	4880706	110.2	101	101	65.1	0	0.0	-0.8	0.0	1.5	0.0	0.0	0.0	0.0	35.6	35.6

Where: LrD = LxD - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + CmetD + ReflD
LrN = LxN - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + CmetN + ReflN

The column headings in this table follow the terminology of standard ISO 9613-2. LxD is the daytime A-weighted one-hour energy-equivalent source sound power level, and LxN is the corresponding nighttime level. These quantities include penalties for distictive source character if applicable. LrD is the daytime A-weighted one-hour energy-equivalent sound pressure level at a receptor, and LrN is the corresponding nighttime level.

X and Y are UTM coordinates in metres. Z is the elevation in metres

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

Summary of Calculations - Octave Band Format

R018	Non-Participating		333443	4863514	102.9														
Src ID	Src Name	Band	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN	Band
OP WTG1	Ostrander Point WTG 01	32	338354	4862657	164.8	0	0	85.0	0	0.0	-4.4	0.0	0.2	0.0	0.0	0.0	0.0	--	--	32
OP WTG1	Ostrander Point WTG 01	63	338354	4862657	164.8	87	87	85.0	0	0.0	-4.4	0.0	0.6	0.0	0.0	0.0	0.0	6	6	63
OP WTG1	Ostrander Point WTG 01	125	338354	4862657	164.8	93	93	85.0	0	0.0	1.4	0.0	2.1	0.0	0.0	0.0	0.0	5	5	125
OP WTG1	Ostrander Point WTG 01	250	338354	4862657	164.8	99	99	85.0	0	0.0	-0.3	0.0	5.2	0.0	0.0	0.0	0.0	10	10	250
OP WTG1	Ostrander Point WTG 01	500	338354	4862657	164.8	100	100	85.0	0	0.0	-1.3	0.0	9.6	0.0	0.0	0.0	0.0	7	7	500
OP WTG1	Ostrander Point WTG 01	1000	338354	4862657	164.8	98	98	85.0	0	0.0	-1.3	0.0	18.2	0.0	0.0	0.0	0.0	--	--	1000
OP WTG1	Ostrander Point WTG 01	2000	338354	4862657	164.8	95	95	85.0	0	0.0	-1.3	0.0	48.2	0.0	0.0	0.0	0.0	--	--	2000
OP WTG1	Ostrander Point WTG 01	4000	338354	4862657	164.8	87	87	85.0	0	0.0	-1.3	0.0	163.4	0.0	0.0	0.0	0.0	--	--	4000
OP WTG1	Ostrander Point WTG 01	8000	338354	4862657	164.8	71	71	85.0	0	0.0	-1.3	0.0	582.7	0.0	0.0	0.0	0.0	--	--	8000
TS2	White Pines Transformer2	32	332911	4862998	99.3	59	59	68.4	0	0.0	-5.0	3.1	0.0	0.0	0.0	0.0	0.0	--	--	32
TS2	White Pines Transformer2	63	332911	4862998	99.3	78	78	68.4	0	0.0	-5.0	3.8	0.1	0.0	0.0	0.0	0.0	10	10	63
TS2	White Pines Transformer2	125	332911	4862998	99.3	90	90	68.4	0	0.0	3.7	1.2	0.3	0.0	0.0	0.0	0.0	16	16	125
TS2	White Pines Transformer2	250	332911	4862998	99.3	92	92	68.4	0	0.0	0.9	4.3	0.8	0.0	0.0	0.0	0.0	18	18	250
TS2	White Pines Transformer2	500	332911	4862998	99.3	98	98	68.4	0	0.0	-1.5	6.0	1.4	0.0	0.0	0.0	0.0	23	23	500
TS2	White Pines Transformer2	1000	332911	4862998	99.3	95	95	68.4	0	0.0	-1.5	7.2	2.7	0.0	0.0	0.0	0.0	18	18	1000
TS2	White Pines Transformer2	2000	332911	4862998	99.3	91	91	68.4	0	0.0	-1.5	8.8	7.2	0.0	0.0	0.0	0.0	8	8	2000
TS2	White Pines Transformer2	4000	332911	4862998	99.3	86	86	68.4	0	0.0	-1.5	11.0	24.3	0.0	0.0	0.0	0.0	--	--	4000
TS2	White Pines Transformer2	8000	332911	4862998	99.3	77	77	68.4	0	0.0	-1.5	13.4	86.6	0.0	0.0	0.0	0.0	--	--	8000
WTG01	White Pines WTG01	32	331642	4865658	195.0	0	0	80.0	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG01	White Pines WTG01	63	331642	4865658	195.0	84	84	80.0	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	7	7	63
WTG01	White Pines WTG01	125	331642	4865658	195.0	92	92	80.0	0	0.0	1.8	0.0	1.2	0.0	0.0	0.0	0.0	9	9	125
WTG01	White Pines WTG01	250	331642	4865658	195.0	98	98	80.0	0	0.0	0.1	0.0	2.9	0.0	0.0	0.0	0.0	15	15	250
WTG01	White Pines WTG01	500	331642	4865658	195.0	100	100	80.0	0	0.0	-0.9	0.0	5.4	0.0	0.0	0.0	0.0	15	15	500
WTG01	White Pines WTG01	1000	331642	4865658	195.0	98	98	80.0	0	0.0	-0.9	0.0	10.3	0.0	0.0	0.0	0.0	9	9	1000
WTG01	White Pines WTG01	2000	331642	4865658	195.0	93	93	80.0	0	0.0	-0.9	0.0	27.1	0.0	0.0	0.0	0.0	--	--	2000
WTG01	White Pines WTG01	4000	331642	4865658	195.0	85	85	80.0	0	0.0	-0.9	0.0	91.8	0.0	0.0	0.0	0.0	--	--	4000
WTG01	White Pines WTG01	8000	331642	4865658	195.0	75	75	80.0	0	0.0	-0.9	0.0	327.5	0.0	0.0	0.0	0.0	--	--	8000
WTG02	White Pines WTG02	32	331865	4865330	201.1	0	0	78.6	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG02	White Pines WTG02	63	331865	4865330	201.1	84	84	78.6	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	8	8	63
WTG02	White Pines WTG02	125	331865	4865330	201.1	92	92	78.6	0	0.0	1.8	0.0	1.0	0.0	0.0	0.0	0.0	11	11	125
WTG02	White Pines WTG02	250	331865	4865330	201.1	98	98	78.6	0	0.0	0.1	0.0	2.5	0.0	0.0	0.0	0.0	17	17	250
WTG02	White Pines WTG02	500	331865	4865330	201.1	100	100	78.6	0	0.0	-0.9	0.0	4.7	0.0	0.0	0.0	0.0	17	17	500
WTG02	White Pines WTG02	1000	331865	4865330	201.1	98	98	78.6	0	0.0	-0.9	0.0	8.8	0.0	0.0	0.0	0.0	12	12	1000
WTG02	White Pines WTG02	2000	331865	4865330	201.1	93	93	78.6	0	0.0	-0.9	0.0	23.3	0.0	0.0	0.0	0.0	--	--	2000
WTG02	White Pines WTG02	4000	331865	4865330	201.1	85	85	78.6	0	0.0	-0.9	0.0	78.9	0.0	0.0	0.0	0.0	--	--	4000
WTG02	White Pines WTG02	8000	331865	4865330	201.1	75	75	78.6	0	0.0	-0.9	0.0	281.4	0.0	0.0	0.0	0.0	--	--	8000
WTG03	White Pines WTG03	32	332014	4864994	201.2	0	0	77.3	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG03	White Pines WTG03	63	332014	4864994	201.2	84	84	77.3	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	10	10	63
WTG03	White Pines WTG03	125	332014	4864994	201.2	92	92	77.3	0	0.0	1.8	0.0	0.9	0.0	0.0	0.0	0.0	12	12	125
WTG03	White Pines WTG03	250	332014	4864994	201.2	98	98	77.3	0	0.0	0.1	0.0	2.2	0.0	0.0	0.0	0.0	18	18	250
WTG03	White Pines WTG03	500	332014	4864994	201.2	100	100	77.3	0	0.0	-0.9	0.0	4.0	0.0	0.0	0.0	0.0	19	19	500
WTG03	White Pines WTG03	1000	332014	4864994	201.2	98	98	77.3	0	0.0	-0.9	0.0	7.5	0.0	0.0	0.0	0.0	14	14	1000
WTG03	White Pines WTG03	2000	332014	4864994	201.2	93	93	77.3	0	0.0	-0.9	0.0	19.9	0.0	0.0	0.0	0.0	--	--	2000
WTG03	White Pines WTG03	4000	332014	4864994	201.2	85	85	77.3	0	0.0	-0.9	0.0	67.5	0.0	0.0	0.0	0.0	--	--	4000
WTG03	White Pines WTG03	8000	332014	4864994	201.2	75	75	77.3	0	0.0	-0.9	0.0	240.7	0.0	0.0	0.0	0.0	--	--	8000
WTG04	White Pines WTG04	32	333433	4866108	201.9	0	0	79.3	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG04	White Pines WTG04	63	333433	4866108	201.9	84	84	79.3	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	8	8	63
WTG04	White Pines WTG04	125	333433	4866108	201.9	92	92	79.3	0	0.0	1.8	0.0	1.1	0.0	0.0	0.0	0.0	10	10	125
WTG04	White Pines WTG04	250	333433	4866108	201.9	98	98	79.3	0	0.0	0.1	0.0	2.7	0.0	0.0	0.0	0.0	16	16	250
WTG04	White Pines WTG04	500	333433	4866108	201.9	100	100	79.3	0	0.0	-0.9	0.0	5.0	0.0	0.0	0.0	0.0	16	16	500
WTG04	White Pines WTG04	1000	333433	4866108	201.9	98	98	79.3	0	0.0	-0.9	0.0	9.5	0.0	0.0	0.0	0.0	10	10	1000
WTG04	White Pines WTG04	2000	333433	4866108	201.9	93	93	79.3	0	0.0	-0.9	0.0	25.1	0.0	0.0	0.0	0.0	--	--	2000
WTG04	White Pines WTG04	4000	333433	4866108	201.9	85	85	79.3	0	0.0	-0.9	0.0	85.1	0.0	0.0	0.0	0.0	--	--	4000
WTG04	White Pines WTG04	8000	333433	4866108	201.9	75	75	79.3	0	0.0	-0.9	0.0	303.4	0.0	0.0	0.0	0.0	--	--	8000
WTG05	White Pines WTG05	32	332520	4864336	200.0	0	0	72.9	0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	32
WTG05	White Pines WTG05	63	332520	4864336	200.0	84	84	72.9	0	0.0	-3.0	0.0	0.2	0.0	0.0	0.0	0.0	14	14	63
WTG05	White Pines WTG05	125	332520	4864336	200.0	92	92	72.9	0	0.0	1.8	0.0	0.5	0.0	0.0	0.0	0.0	17	17	125

R018	Non-Participating		333443	4863514	102.9														
Src ID	Src Name	Band	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN	Band
WTG05	White Pines WTG05	250	332520	4864336	200.0	98	98	72.9	0	0.0	0.1	0.0	1.3	0.0	0.0	0.0	0.0	24	24	250
WTG05	White Pines WTG05	500	332520	4864336	200.0	100	100	72.9	0	0.0	-0.9	0.0	2.4	0.0	0.0	0.0	0.0	25	25	500
WTG05	White Pines WTG05	1000	332520	4864336	200.0	98	98	72.9	0	0.0	-0.9	0.0	4.5	0.0	0.0	0.0	0.0	22	22	1000
WTG05	White Pines WTG05	2000	332520	4864336	200.0	93	93	72.9	0	0.0	-0.9	0.0	12.0	0.0	0.0	0.0	0.0	9	9	2000
WTG05	White Pines WTG05	4000	332520	4864336	200.0	85	85	72.9	0	0.0	-0.9	0.0	40.6	0.0	0.0	0.0	0.0	--	--	4000
WTG05	White Pines WTG05	8000	332520	4864336	200.0	75	75	72.9	0	0.0	-0.9	0.0	144.9	0.0	0.0	0.0	0.0	--	--	8000
WTG06	White Pines WTG06	32	333551	4864775	195.0	0	0	73.1	0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	32
WTG06	White Pines WTG06	63	333551	4864775	195.0	84	84	73.1	0	0.0	-3.0	0.0	0.2	0.0	0.0	0.0	0.0	14	14	63
WTG06	White Pines WTG06	125	333551	4864775	195.0	92	92	73.1	0	0.0	1.8	0.0	0.5	0.0	0.0	0.0	0.0	17	17	125
WTG06	White Pines WTG06	250	333551	4864775	195.0	98	98	73.1	0	0.0	0.1	0.0	1.3	0.0	0.0	0.0	0.0	23	23	250
WTG06	White Pines WTG06	500	333551	4864775	195.0	100	100	73.1	0	0.0	-0.9	0.0	2.5	0.0	0.0	0.0	0.0	25	25	500
WTG06	White Pines WTG06	1000	333551	4864775	195.0	98	98	73.1	0	0.0	-0.9	0.0	4.6	0.0	0.0	0.0	0.0	21	21	1000
WTG06	White Pines WTG06	2000	333551	4864775	195.0	93	93	73.1	0	0.0	-0.9	0.0	12.3	0.0	0.0	0.0	0.0	8	8	2000
WTG06	White Pines WTG06	4000	333551	4864775	195.0	85	85	73.1	0	0.0	-0.9	0.0	41.6	0.0	0.0	0.0	0.0	--	--	4000
WTG06	White Pines WTG06	8000	333551	4864775	195.0	75	75	73.1	0	0.0	-0.9	0.0	148.3	0.0	0.0	0.0	0.0	--	--	8000
WTG07	White Pines WTG07	32	333178	4863015	195.4	0	0	66.2	0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	32
WTG07	White Pines WTG07	63	333178	4863015	195.4	84	84	66.2	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	21	21	63
WTG07	White Pines WTG07	125	333178	4863015	195.4	92	92	66.2	0	0.0	1.5	0.0	0.2	0.0	0.0	0.0	0.0	24	24	125
WTG07	White Pines WTG07	250	333178	4863015	195.4	98	98	66.2	0	0.0	0.1	0.0	0.6	0.0	0.0	0.0	0.0	31	31	250
WTG07	White Pines WTG07	500	333178	4863015	195.4	100	100	66.2	0	0.0	-0.9	0.0	1.1	0.0	0.0	0.0	0.0	33	33	500
WTG07	White Pines WTG07	1000	333178	4863015	195.4	98	98	66.2	0	0.0	-0.9	0.0	2.1	0.0	0.0	0.0	0.0	31	31	1000
WTG07	White Pines WTG07	2000	333178	4863015	195.4	93	93	66.2	0	0.0	-0.9	0.0	5.5	0.0	0.0	0.0	0.0	22	22	2000
WTG07	White Pines WTG07	4000	333178	4863015	195.4	85	85	66.2	0	0.0	-0.9	0.0	18.8	0.0	0.0	0.0	0.0	1	1	4000
WTG07	White Pines WTG07	8000	333178	4863015	195.4	75	75	66.2	0	0.0	-0.9	0.0	66.9	0.0	0.0	0.0	0.0	--	--	8000
WTG08	White Pines WTG08	32	329738	4862665	200.0	0	0	82.6	0	0.0	-3.5	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG08	White Pines WTG08	63	329738	4862665	200.0	84	84	82.6	0	0.0	-3.5	0.0	0.5	0.0	0.0	0.0	0.0	5	5	63
WTG08	White Pines WTG08	125	329738	4862665	200.0	92	92	82.6	0	0.0	1.6	0.0	1.6	0.0	0.0	0.0	0.0	7	7	125
WTG08	White Pines WTG08	250	329738	4862665	200.0	98	98	82.6	0	0.0	-0.1	0.0	4.0	0.0	0.0	0.0	0.0	11	11	250
WTG08	White Pines WTG08	500	329738	4862665	200.0	100	100	82.6	0	0.0	-1.1	0.0	7.3	0.0	0.0	0.0	0.0	11	11	500
WTG08	White Pines WTG08	1000	329738	4862665	200.0	98	98	82.6	0	0.0	-1.1	0.0	13.9	0.0	0.0	0.0	0.0	3	3	1000
WTG08	White Pines WTG08	2000	329738	4862665	200.0	93	93	82.6	0	0.0	-1.1	0.0	36.8	0.0	0.0	0.0	0.0	--	--	2000
WTG08	White Pines WTG08	4000	329738	4862665	200.0	85	85	82.6	0	0.0	-1.1	0.0	124.6	0.0	0.0	0.0	0.0	--	--	4000
WTG08	White Pines WTG08	8000	329738	4862665	200.0	75	75	82.6	0	0.0	-1.1	0.0	444.4	0.0	0.0	0.0	0.0	--	--	8000
WTG09	White Pines WTG09	32	330014	4863071	200.0	0	0	81.8	0	0.0	-3.3	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG09	White Pines WTG09	63	330014	4863071	200.0	84	84	81.8	0	0.0	-3.3	0.0	0.4	0.0	0.0	0.0	0.0	5	5	63
WTG09	White Pines WTG09	125	330014	4863071	200.0	92	92	81.8	0	0.0	1.7	0.0	1.4	0.0	0.0	0.0	0.0	7	7	125
WTG09	White Pines WTG09	250	330014	4863071	200.0	98	98	81.8	0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	13	13	250
WTG09	White Pines WTG09	500	330014	4863071	200.0	100	100	81.8	0	0.0	-1.0	0.0	6.7	0.0	0.0	0.0	0.0	12	12	500
WTG09	White Pines WTG09	1000	330014	4863071	200.0	98	98	81.8	0	0.0	-1.0	0.0	12.7	0.0	0.0	0.0	0.0	5	5	1000
WTG09	White Pines WTG09	2000	330014	4863071	200.0	93	93	81.8	0	0.0	-1.0	0.0	33.4	0.0	0.0	0.0	0.0	--	--	2000
WTG09	White Pines WTG09	4000	330014	4863071	200.0	85	85	81.8	0	0.0	-1.0	0.0	113.3	0.0	0.0	0.0	0.0	--	--	4000
WTG09	White Pines WTG09	8000	330014	4863071	200.0	75	75	81.8	0	0.0	-1.0	0.0	404.3	0.0	0.0	0.0	0.0	--	--	8000
WTG10	White Pines WTG10	32	330179	4863665	198.6	0	0	81.3	0	0.0	-3.1	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG10	White Pines WTG10	63	330179	4863665	198.6	84	84	81.3	0	0.0	-3.1	0.0	0.4	0.0	0.0	0.0	0.0	6	6	63
WTG10	White Pines WTG10	125	330179	4863665	198.6	92	92	81.3	0	0.0	1.8	0.0	1.3	0.0	0.0	0.0	0.0	8	8	125
WTG10	White Pines WTG10	250	330179	4863665	198.6	98	98	81.3	0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	13	13	250
WTG10	White Pines WTG10	500	330179	4863665	198.6	100	100	81.3	0	0.0	-0.9	0.0	6.3	0.0	0.0	0.0	0.0	13	13	500
WTG10	White Pines WTG10	1000	330179	4863665	198.6	98	98	81.3	0	0.0	-0.9	0.0	12.0	0.0	0.0	0.0	0.0	6	6	1000
WTG10	White Pines WTG10	2000	330179	4863665	198.6	93	93	81.3	0	0.0	-0.9	0.0	31.6	0.0	0.0	0.0	0.0	--	--	2000
WTG10	White Pines WTG10	4000	330179	4863665	198.6	85	85	81.3	0	0.0	-0.9	0.0	107.1	0.0	0.0	0.0	0.0	--	--	4000
WTG10	White Pines WTG10	8000	330179	4863665	198.6	75	75	81.3	0	0.0	-0.9	0.0	382.1	0.0	0.0	0.0	0.0	--	--	8000
WTG11	White Pines WTG11	32	332017	4862468	194.0	0	0	76.0	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG11	White Pines WTG11	63	332017	4862468	194.0	84	84	76.0	0	0.0	-3.0	0.0	0.2	0.0	0.0	0.0	0.0	11	11	63
WTG11	White Pines WTG11	125	332017	4862468	194.0	92	92	76.0	0	0.0	1.8	0.0	0.7	0.0	0.0	0.0	0.0	14	14	125
WTG11	White Pines WTG11	250	332017	4862468	194.0	98	98	76.0	0	0.0	0.1	0.0	1.9	0.0	0.0	0.0	0.0	20	20	250
WTG11	White Pines WTG11	500	332017	4862468	194.0	100	100	76.0	0	0.0	-0.9	0.0	3.4	0.0	0.0	0.0	0.0	21	21	500
WTG11	White Pines WTG11	1000	332017	4862468	194.0	98	98	76.0	0	0.0	-0.9	0.0	6.5	0.0	0.0	0.0	0.0	17	17	1000
WTG11	White Pines WTG11	2000	332017	4862468	194.0	93	93	76.0	0	0.0	-0.9	0.0	17.1	0.0	0.0	0.0	0.0	0	0	2000
WTG11	White Pines WTG11	4000	332017	4862468	194.0	85	85	76.0	0	0.0	-0.9	0.0	58.0	0.0	0.0	0.0	0.0	--	--	4000

R018	Non-Participating		333443	4863514	102.9														
Src ID	Src Name	Band	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN	Band
WTG11	White Pines WTG11	8000	332017	4862468	194.0	75	75	76.0	0	0.0	-0.9	0.0	207.0	0.0	0.0	0.0	0.0	--	--	8000
WTG12	White Pines WTG12	32	330801	4861293	190.0	0	0	81.8	0	0.0	-3.3	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG12	White Pines WTG12	63	330801	4861293	190.0	84	84	81.8	0	0.0	-3.3	0.0	0.4	0.0	0.0	0.0	0.0	5	5	63
WTG12	White Pines WTG12	125	330801	4861293	190.0	92	92	81.8	0	0.0	1.7	0.0	1.4	0.0	0.0	0.0	0.0	7	7	125
WTG12	White Pines WTG12	250	330801	4861293	190.0	98	98	81.8	0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	13	13	250
WTG12	White Pines WTG12	500	330801	4861293	190.0	100	100	81.8	0	0.0	-1.0	0.0	6.7	0.0	0.0	0.0	0.0	12	12	500
WTG12	White Pines WTG12	1000	330801	4861293	190.0	98	98	81.8	0	0.0	-1.0	0.0	12.6	0.0	0.0	0.0	0.0	5	5	1000
WTG12	White Pines WTG12	2000	330801	4861293	190.0	93	93	81.8	0	0.0	-1.0	0.0	33.4	0.0	0.0	0.0	0.0	--	--	2000
WTG12	White Pines WTG12	4000	330801	4861293	190.0	85	85	81.8	0	0.0	-1.0	0.0	113.1	0.0	0.0	0.0	0.0	--	--	4000
WTG12	White Pines WTG12	8000	330801	4861293	190.0	75	75	81.8	0	0.0	-1.0	0.0	403.6	0.0	0.0	0.0	0.0	--	--	8000
WTG13	White Pines WTG13	32	331200	4861043	187.6	0	0	81.5	0	0.0	-3.2	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG13	White Pines WTG13	63	331200	4861043	187.6	84	84	81.5	0	0.0	-3.2	0.0	0.4	0.0	0.0	0.0	0.0	6	6	63
WTG13	White Pines WTG13	125	331200	4861043	187.6	92	92	81.5	0	0.0	1.7	0.0	1.4	0.0	0.0	0.0	0.0	8	8	125
WTG13	White Pines WTG13	250	331200	4861043	187.6	98	98	81.5	0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	13	13	250
WTG13	White Pines WTG13	500	331200	4861043	187.6	100	100	81.5	0	0.0	-1.0	0.0	6.4	0.0	0.0	0.0	0.0	13	13	500
WTG13	White Pines WTG13	1000	331200	4861043	187.6	98	98	81.5	0	0.0	-1.0	0.0	12.2	0.0	0.0	0.0	0.0	5	5	1000
WTG13	White Pines WTG13	2000	331200	4861043	187.6	93	93	81.5	0	0.0	-1.0	0.0	32.3	0.0	0.0	0.0	0.0	--	--	2000
WTG13	White Pines WTG13	4000	331200	4861043	187.6	85	85	81.5	0	0.0	-1.0	0.0	109.4	0.0	0.0	0.0	0.0	--	--	4000
WTG13	White Pines WTG13	8000	331200	4861043	187.6	75	75	81.5	0	0.0	-1.0	0.0	390.2	0.0	0.0	0.0	0.0	--	--	8000
WTG14	White Pines WTG14	32	331403	4861423	188.1	0	0	80.3	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG14	White Pines WTG14	63	331403	4861423	188.1	84	84	80.3	0	0.0	-3.0	0.0	0.4	0.0	0.0	0.0	0.0	7	7	63
WTG14	White Pines WTG14	125	331403	4861423	188.1	92	92	80.3	0	0.0	1.8	0.0	1.2	0.0	0.0	0.0	0.0	9	9	125
WTG14	White Pines WTG14	250	331403	4861423	188.1	98	98	80.3	0	0.0	0.1	0.0	3.1	0.0	0.0	0.0	0.0	14	14	250
WTG14	White Pines WTG14	500	331403	4861423	188.1	100	100	80.3	0	0.0	-0.9	0.0	5.6	0.0	0.0	0.0	0.0	15	15	500
WTG14	White Pines WTG14	1000	331403	4861423	188.1	98	98	80.3	0	0.0	-0.9	0.0	10.7	0.0	0.0	0.0	0.0	8	8	1000
WTG14	White Pines WTG14	2000	331403	4861423	188.1	93	93	80.3	0	0.0	-0.9	0.0	28.2	0.0	0.0	0.0	0.0	--	--	2000
WTG14	White Pines WTG14	4000	331403	4861423	188.1	85	85	80.3	0	0.0	-0.9	0.0	95.8	0.0	0.0	0.0	0.0	--	--	4000
WTG14	White Pines WTG14	8000	331403	4861423	188.1	75	75	80.3	0	0.0	-0.9	0.0	341.6	0.0	0.0	0.0	0.0	--	--	8000
WTG15	White Pines WTG15	32	331767	4861704	188.8	0	0	78.9	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG15	White Pines WTG15	63	331767	4861704	188.8	84	84	78.9	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	8	8	63
WTG15	White Pines WTG15	125	331767	4861704	188.8	92	92	78.9	0	0.0	1.8	0.0	1.0	0.0	0.0	0.0	0.0	11	11	125
WTG15	White Pines WTG15	250	331767	4861704	188.8	98	98	78.9	0	0.0	0.1	0.0	2.6	0.0	0.0	0.0	0.0	16	16	250
WTG15	White Pines WTG15	500	331767	4861704	188.8	100	100	78.9	0	0.0	-0.9	0.0	4.8	0.0	0.0	0.0	0.0	17	17	500
WTG15	White Pines WTG15	1000	331767	4861704	188.8	98	98	78.9	0	0.0	-0.9	0.0	9.0	0.0	0.0	0.0	0.0	11	11	1000
WTG15	White Pines WTG15	2000	331767	4861704	188.8	93	93	78.9	0	0.0	-0.9	0.0	23.9	0.0	0.0	0.0	0.0	--	--	2000
WTG15	White Pines WTG15	4000	331767	4861704	188.8	85	85	78.9	0	0.0	-0.9	0.0	80.9	0.0	0.0	0.0	0.0	--	--	4000
WTG15	White Pines WTG15	8000	331767	4861704	188.8	75	75	78.9	0	0.0	-0.9	0.0	288.5	0.0	0.0	0.0	0.0	--	--	8000
WTG16	White Pines WTG16	32	331776	4860976	185.0	0	0	80.7	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG16	White Pines WTG16	63	331776	4860976	185.0	84	84	80.7	0	0.0	-3.0	0.0	0.4	0.0	0.0	0.0	0.0	6	6	63
WTG16	White Pines WTG16	125	331776	4860976	185.0	92	92	80.7	0	0.0	1.8	0.0	1.3	0.0	0.0	0.0	0.0	9	9	125
WTG16	White Pines WTG16	250	331776	4860976	185.0	98	98	80.7	0	0.0	0.1	0.0	3.2	0.0	0.0	0.0	0.0	14	14	250
WTG16	White Pines WTG16	500	331776	4860976	185.0	100	100	80.7	0	0.0	-0.9	0.0	5.9	0.0	0.0	0.0	0.0	14	14	500
WTG16	White Pines WTG16	1000	331776	4860976	185.0	98	98	80.7	0	0.0	-0.9	0.0	11.1	0.0	0.0	0.0	0.0	7	7	1000
WTG16	White Pines WTG16	2000	331776	4860976	185.0	93	93	80.7	0	0.0	-0.9	0.0	29.4	0.0	0.0	0.0	0.0	--	--	2000
WTG16	White Pines WTG16	4000	331776	4860976	185.0	85	85	80.7	0	0.0	-0.9	0.0	99.5	0.0	0.0	0.0	0.0	--	--	4000
WTG16	White Pines WTG16	8000	331776	4860976	185.0	75	75	80.7	0	0.0	-0.9	0.0	355.0	0.0	0.0	0.0	0.0	--	--	8000
WTG17	White Pines WTG17	32	332089	4861211	185.0	0	0	79.5	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG17	White Pines WTG17	63	332089	4861211	185.0	84	84	79.5	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	7	7	63
WTG17	White Pines WTG17	125	332089	4861211	185.0	92	92	79.5	0	0.0	1.8	0.0	1.1	0.0	0.0	0.0	0.0	10	10	125
WTG17	White Pines WTG17	250	332089	4861211	185.0	98	98	79.5	0	0.0	0.1	0.0	2.8	0.0	0.0	0.0	0.0	16	16	250
WTG17	White Pines WTG17	500	332089	4861211	185.0	100	100	79.5	0	0.0	-0.9	0.0	5.2	0.0	0.0	0.0	0.0	16	16	500
WTG17	White Pines WTG17	1000	332089	4861211	185.0	98	98	79.5	0	0.0	-0.9	0.0	9.8	0.0	0.0	0.0	0.0	10	10	1000
WTG17	White Pines WTG17	2000	332089	4861211	185.0	93	93	79.5	0	0.0	-0.9	0.0	25.8	0.0	0.0	0.0	0.0	--	--	2000
WTG17	White Pines WTG17	4000	332089	4861211	185.0	85	85	79.5	0	0.0	-0.9	0.0	87.6	0.0	0.0	0.0	0.0	--	--	4000
WTG17	White Pines WTG17	8000	332089	4861211	185.0	75	75	79.5	0	0.0	-0.9	0.0	312.4	0.0	0.0	0.0	0.0	--	--	8000
WTG18	White Pines WTG18	32	334176	4861229	182.6	0	0	78.6	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG18	White Pines WTG18	63	334176	4861229	182.6	84	84	78.6	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	8	8	63
WTG18	White Pines WTG18	125	334176	4861229	182.6	92	92	78.6	0	0.0	1.8	0.0	1.0	0.0	0.0	0.0	0.0	11	11	125
WTG18	White Pines WTG18	250	334176	4861229	182.6	98	98	78.6	0	0.0	0.1	0.0	2.5	0.0	0.0	0.0	0.0	17	17	250

R018	Non-Participating		333443	4863514	102.9														
Src ID	Src Name	Band	X	Y	Z	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD	LrN	Band
WTG18	White Pines WTG18	500	334176	4861229	182.6	100	100	78.6	0	0.0	-0.9	0.0	4.6	0.0	0.0	0.0	0.0	17	17	500
WTG18	White Pines WTG18	1000	334176	4861229	182.6	98	98	78.6	0	0.0	-0.9	0.0	8.8	0.0	0.0	0.0	0.0	12	12	1000
WTG18	White Pines WTG18	2000	334176	4861229	182.6	93	93	78.6	0	0.0	-0.9	0.0	23.2	0.0	0.0	0.0	0.0	--	--	2000
WTG18	White Pines WTG18	4000	334176	4861229	182.6	85	85	78.6	0	0.0	-0.9	0.0	78.7	0.0	0.0	0.0	0.0	--	--	4000
WTG18	White Pines WTG18	8000	334176	4861229	182.6	75	75	78.6	0	0.0	-0.9	0.0	280.6	0.0	0.0	0.0	0.0	--	--	8000
WTG19	White Pines WTG19	32	334338	4861685	185.0	0	0	77.2	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG19	White Pines WTG19	63	334338	4861685	185.0	84	84	77.2	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	10	10	63
WTG19	White Pines WTG19	125	334338	4861685	185.0	92	92	77.2	0	0.0	1.8	0.0	0.8	0.0	0.0	0.0	0.0	13	13	125
WTG19	White Pines WTG19	250	334338	4861685	185.0	98	98	77.2	0	0.0	0.1	0.0	2.1	0.0	0.0	0.0	0.0	19	19	250
WTG19	White Pines WTG19	500	334338	4861685	185.0	100	100	77.2	0	0.0	-0.9	0.0	3.9	0.0	0.0	0.0	0.0	19	19	500
WTG19	White Pines WTG19	1000	334338	4861685	185.0	98	98	77.2	0	0.0	-0.9	0.0	7.5	0.0	0.0	0.0	0.0	14	14	1000
WTG19	White Pines WTG19	2000	334338	4861685	185.0	93	93	77.2	0	0.0	-0.9	0.0	19.7	0.0	0.0	0.0	0.0	--	--	2000
WTG19	White Pines WTG19	4000	334338	4861685	185.0	85	85	77.2	0	0.0	-0.9	0.0	66.8	0.0	0.0	0.0	0.0	--	--	4000
WTG19	White Pines WTG19	8000	334338	4861685	185.0	75	75	77.2	0	0.0	-0.9	0.0	238.2	0.0	0.0	0.0	0.0	--	--	8000
WTG20	White Pines WTG20	32	334828	4862019	185.0	0	0	77.2	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG20	White Pines WTG20	63	334828	4862019	185.0	84	84	77.2	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	10	10	63
WTG20	White Pines WTG20	125	334828	4862019	185.0	92	92	77.2	0	0.0	1.8	0.0	0.8	0.0	0.0	0.0	0.0	12	12	125
WTG20	White Pines WTG20	250	334828	4862019	185.0	98	98	77.2	0	0.0	0.1	0.0	2.1	0.0	0.0	0.0	0.0	19	19	250
WTG20	White Pines WTG20	500	334828	4862019	185.0	100	100	77.2	0	0.0	-0.9	0.0	3.9	0.0	0.0	0.0	0.0	19	19	500
WTG20	White Pines WTG20	1000	334828	4862019	185.0	98	98	77.2	0	0.0	-0.9	0.0	7.5	0.0	0.0	0.0	0.0	14	14	1000
WTG20	White Pines WTG20	2000	334828	4862019	185.0	93	93	77.2	0	0.0	-0.9	0.0	19.7	0.0	0.0	0.0	0.0	--	--	2000
WTG20	White Pines WTG20	4000	334828	4862019	185.0	85	85	77.2	0	0.0	-0.9	0.0	66.8	0.0	0.0	0.0	0.0	--	--	4000
WTG20	White Pines WTG20	8000	334828	4862019	185.0	75	75	77.2	0	0.0	-0.9	0.0	238.4	0.0	0.0	0.0	0.0	--	--	8000
WTG21	White Pines WTG21	32	335897	4863241	185.0	0	0	78.9	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG21	White Pines WTG21	63	335897	4863241	185.0	84	84	78.9	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	8	8	63
WTG21	White Pines WTG21	125	335897	4863241	185.0	92	92	78.9	0	0.0	1.8	0.0	1.0	0.0	0.0	0.0	0.0	11	11	125
WTG21	White Pines WTG21	250	335897	4863241	185.0	98	98	78.9	0	0.0	0.1	0.0	2.6	0.0	0.0	0.0	0.0	16	16	250
WTG21	White Pines WTG21	500	335897	4863241	185.0	100	100	78.9	0	0.0	-0.9	0.0	4.8	0.0	0.0	0.0	0.0	17	17	500
WTG21	White Pines WTG21	1000	335897	4863241	185.0	98	98	78.9	0	0.0	-0.9	0.0	9.0	0.0	0.0	0.0	0.0	11	11	1000
WTG21	White Pines WTG21	2000	335897	4863241	185.0	93	93	78.9	0	0.0	-0.9	0.0	23.9	0.0	0.0	0.0	0.0	--	--	2000
WTG21	White Pines WTG21	4000	335897	4863241	185.0	85	85	78.9	0	0.0	-0.9	0.0	81.0	0.0	0.0	0.0	0.0	--	--	4000
WTG21	White Pines WTG21	8000	335897	4863241	185.0	75	75	78.9	0	0.0	-0.9	0.0	288.8	0.0	0.0	0.0	0.0	--	--	8000
WTG22	White Pines WTG22	32	336233	4862927	182.4	0	0	80.1	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--	32
WTG22	White Pines WTG22	63	336233	4862927	182.4	84	84	80.1	0	0.0	-3.0	0.0	0.4	0.0	0.0	0.0	0.0	7	7	63
WTG22	White Pines WTG22	125	336233	4862927	182.4	92	92	80.1	0	0.0	1.8	0.0	1.2	0.0	0.0	0.0	0.0	9	9	125
WTG22	White Pines WTG22	250	336233	4862927	182.4	98	98	80.1	0	0.0	0.1	0.0	3.0	0.0	0.0	0.0	0.0	15	15	250
WTG22	White Pines WTG22	500	336233	4862927	182.4	100	100	80.1	0	0.0	-0.9	0.0	5.5	0.0	0.0	0.0	0.0	15	15	500
WTG22	White Pines WTG22	1000	336233	4862927	182.4	98	98	80.1	0	0.0	-0.9	0.0	10.4	0.0	0.0	0.0	0.0	8	8	1000
WTG22	White Pines WTG22	2000	336233	4862927	182.4	93	93	80.1	0	0.0	-0.9	0.0	27.6	0.0	0.0	0.0	0.0	--	--	2000
WTG22	White Pines WTG22	4000	336233	4862927	182.4	85	85	80.1	0	0.0	-0.9	0.0	93.5	0.0	0.0	0.0	0.0	--	--	4000
WTG22	White Pines WTG22	8000	336233	4862927	182.4	75	75	80.1	0	0.0	-0.9	0.0	333.4	0.0	0.0	0.0	0.0	--	--	8000
WTG23	White Pines WTG23	32	337875	4861966	176.4	0	0	84.4	0	0.0	-4.0	0.0	0.2	0.0	0.0	0.0	0.0	--	--	32
WTG23	White Pines WTG23	63	337875	4861966	176.4	84	84	84.4	0	0.0	-4.0	0.0	0.6	0.0	0.0	0.0	0.0	3	3	63
WTG23	White Pines WTG23	125	337875	4861966	176.4	92	92	84.4	0	0.0	1.5	0.0	1.9	0.0	0.0	0.0	0.0	4	4	125
WTG23	White Pines WTG23	250	337875	4861966	176.4	98	98	84.4	0	0.0	-0.2	0.0	4.9	0.0	0.0	0.0	0.0	9	9	250
WTG23	White Pines WTG23	500	337875	4861966	176.4	100	100	84.4	0	0.0	-1.2	0.0	9.1	0.0	0.0	0.0	0.0	7	7	500
WTG23	White Pines WTG23	1000	337875	4861966	176.4	98	98	84.4	0	0.0	-1.2	0.0	17.2	0.0	0.0	0.0	0.0	--	--	1000
WTG23	White Pines WTG23	2000	337875	4861966	176.4	93	93	84.4	0	0.0	-1.2	0.0	45.4	0.0	0.0	0.0	0.0	--	--	2000
WTG23	White Pines WTG23	4000	337875	4861966	176.4	85	85	84.4	0	0.0	-1.2	0.0	153.9	0.0	0.0	0.0	0.0	--	--	4000
WTG23	White Pines WTG23	8000	337875	4861966	176.4	75	75	84.4	0	0.0	-1.2	0.0	548.8	0.0	0.0	0.0	0.0	--	--	8000

Where: LrD = LxD - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + CmetD + ReflD
LrN = LxN - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + CmetN + ReflN

The column headings in this table follow the terminology of standard ISO 9613-2. LxD is the daytime A-weighted one-hour energy-equivalent source sound power level, and LxN is the corresponding nighttime level. These quantities include penalties for distictive source character if applicable. LrD is the daytime A-weighted one-hour energy-equivalent sound pressure level at a receptor, and LrN is the corresponding nighttime level.

X and Y are UTM coordinates in metres. Z is the elevation in metres

Proposed Transformer - White Pines

Lw = NEMA + 10*log S

1 Ft ONAN / 6 Ft ONAF LwA	NEMA		
95.5	**77**	MVA rating =	65
		10log S =	18.53

	31.5	63	125	250	500	1000	2000	4000	8000	A
Adjustment Value	-3	3	5	0	0	-6	-11	-16	-23	
Sound Power Level	93	99	101	96	96	90	85	80	73	**96**
									Tonal Penalty:	5
									Penalized A-Weighted Sum:	101

Crocker, Malcolm, J., Sound *Power Level Predictions for Industrial Machinery* , In Encyclopedia of Acoustics (Vol. 2, pp. 1049 - 1057), John Wiley & Sons, Inc., 1997

APPENDIX F:
WIND SHEAR COEFFICIENT SUMMARY

11 month data evaluation White Pines / Wilmers mast

Shear exponent

	Day	**Night**	**All**
Spring	0.245	0.466	0.347
Summer	0.215	0.485	0.333
Autumn	0.275	0.423	0.341
Winter	0.252	0.305	0.278
all	0.245	0.422	0.322

Appendix C

Property Line Setback Assessment

WHITE PINES WIND PROJECT

PROPERTY LINE SETBACK
ASSESSMENT REPORT

File No. 160960594
September 2012

Prepared for:

wpd Canada Corporation
2233 Argentia Road, Suite 102
Mississauga, ON L5N 2X7

Prepared by:

Stantec Consulting Ltd.
Suite 1 - 70 Southgate Drive
Guelph ON N1G 4P5

Table of Contents

List of Attachments

1.0 Introduction

1.1 PROJECT OVERVIEW

wpd Canada Corporation (wpd) is a renewable energy development company based in Mississauga, Ontario and is dedicated to providing renewable energy for Ontario. Further information can be found on the company website at http://www.canada.wpd.de. wpd is proposing to develop, construct and operate the White Pines Wind Project (the Project) in Prince Edward County, Ontario, in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province. The Project was awarded an Ontario Feed-In-Tariff (FIT) contract with the Ontario Power Authority (OPA) in May, 2010 (FIT Contract No. F-000675-WIN-130-601).

The wind turbine Study Area is generally bounded by i) Brummell Road/Bond Road to the North; ii) Lighthall Road to the West; iii) Gravelly Bay Road to the East; and iv) Lake Ontario to the South (**Figure 1, Appendix A**). The proposed Project Location includes all parts of the land in, on or over which the Project is proposed. The Project Location (**Figure 2, Appendix A**), including all Project infrastructure, is on privately owned land and municipal road right-of-way, where landowners have entered into a lease agreement with wpd. The legal descriptions of the parcels of land that will contain Project infrastructure is provided as an appendix to the Project Description Report.

The basic components of the Project include 29 REpower MM92-2.05 MW wind turbine generators with a total maximum installed nameplate capacity of 59.45 MW (FIT Contract maximum of 60 MW), step-up transformers located adjacent to each turbine, an electrical power line system, two transformer substations (substation), turbine access roads, and a fenced storage area. Temporary components during construction include work and storage areas at the turbine locations and along access roads and laydown areas (**Figure 2, Appendix A**). The collector system will transport the electricity generated from each turbine to a substation located near Turbine 7 (T07) off Royal Road east of Dainard Road.

An interconnection line will connect the substation near T07 to a substation to be built near the Picton Transformer Station (TS) on County Road 5. While the potential interconnection line's location is depicted on the maps in Appendix A, the actual location of the line is still under negotiation between wpd and Hydro One Networks Inc. (HONI). If HONI is responsible for construction and operation of the interconnection line the County Road 5 substation, assessment of potential effects of the line will be outside the REA process and will be covered under HONI's own Class Environmental Assessment for Minor Transmission Facilities. It is known at this time that wpd will be responsible for construction and operation of portions of the interconnection line along May Road and Fry Road; those portions of the line will therefore be assessed as part of the current REA process.

wpd 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, the Project is classified as a Class 4 Wind Facility and will follow the requirements identified in O.Reg.359/09 for such a facility.

This Property Line Setback Assessment Report has been prepared in accordance with O. Reg. 359/09, and is one component of the REA application for the Project.

1.2 REPORT REQUIREMENTS

Under O. Reg. 359/09, Class 3, 4, and 5 wind projects are subject to property line setback requirements that require turbines to be located a distance equal to the hub height from a non-participating property line. A turbine may be sited closer to the property line (to a limit of the length of the turbine blade plus ten metres from the property line) if the applicant submits a Property Line Setback Assessment Report to fulfil the requirement of subsection 53 (3) of O. Reg. 359/09.

The purpose of the Property Line Setback Assessment Report is to provide a review of potential adverse impacts and preventative measures for wind turbines located within the prescribed setback from non-participating parcels of land (i.e. where there is no agreement with the land owner specifically permitting a closer setback).

Of the twenty nine proposed locations for the White Pines Wind Project, six (T1, T2, T3, T4, T5, T17) are closer to a non-participating property line than the hub height of the turbine (100 metres), but greater than the length of the tubine blades plus 10 meters from the non-participating property line. All six proposed turbine sites meet the minimum setback requirement of at least 550 metres from the nearest noise receptor. The Property Line Setback Assessment Report has been prepared in accordance with s.53 of O. Reg. 359/09, which sets out specific content requirements:

- Demonstrate that the proposed location of the wind turbine would not result in adverse impacts on nearby business, infrastructure, properties or land use activities, and
- Describe any preventative measures that are required to be implemented to address the possibility of any adverse impacts.

2.0 Summary of Property Line Setback Analysis

This section summarizes the features over which the turbines overlap the 100 m setback, potential adverse impacts on those features, and preventative measures to address potential adverse impacts. Mapping of the proposed locations are provided in **Attachment A**.

The detailed analysis for the turbines, including the distance from the non-participating property lines, and the distance of overlap, is provided in **Attachment B**.

2.1 DESCRIPTION OF FEATURES WITHIN OVERLAP

No infrastructure, such as agricultural buildings, roads, railways or electrical transmission lines is present. Turbines 1, 2, and 3 overlap with agricultural land utilized for crops. No livestock or grazing land is known to be present. Turbines 2 and 3 overlap with hedgerows. Turbines 4, 5 and 17 overlap with natural heritage features (T4 with a woodland, T5 with a woodland, migratory landbird stopover area and amphibian breeding habitat, and T17 with a woodland and migratory landbird stopover area).

2.2 POTENTIAL ADVERSE IMPACTS

As no infrastructure is present, no adverse impacts will occur and no preventative measures are necessary. Adverse impacts to agricultural land, including crop damage and soil compaction, may occur in the unlikely event of turbine collapse. As there are no livestock or grazing land known to be present, there is no potential for impacts to livestock or livestock operations. Adverse impacts to hedgerows, including vegetation damage and disturbance to related wildlife, may occur in the unlikely event of turbine collapse.

Information on potential adverse impacts and preventative measures for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study, and provided under separate cover as a component of the Renewable Energy Approval application.

2.3 PREVENTATIVE MEASURES

The turbines would be constructed and designed by professional engineers, undergo regular maintenance and monitoring by operational staff, and contain shutdown mechanisms in instances such as extreme weather. In the unlikely event of damage to agricultural land due to turbine collapse, landowners would be compensated by wpd for any crop damage. Measures are outlined in the Renewable Energy Approval reports to mitigate soil compaction and impacts to vegetation, including disturbance to related wildlife habitat.

3.0 Closure

This Property Line Setback Assessment Report for the White Pines Wind Project has been prepared by Stantec for wpd in accordance with Ontario Regulation 359/09.

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

STANTEC CONSULTING LTD.

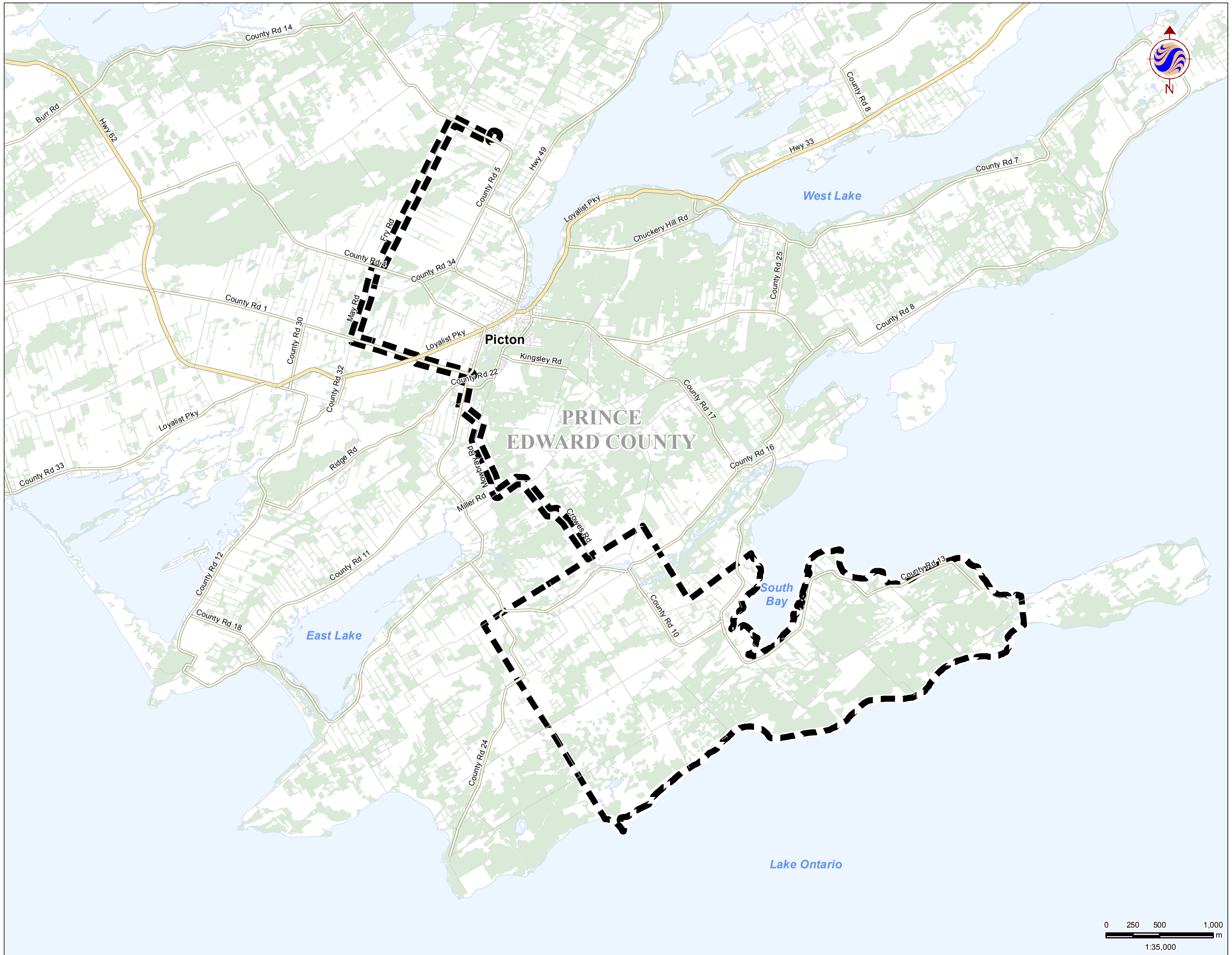
Mark Knight, MA, MCIP, RPP
Project Manager

Shawna Peddle, MSc.
Senior Project Manager

rpt_60594_plsa_20120911_fnl

Attachment A

Individual Turbine Location and Property Line Setbacks



Legend

- Project Study Area
- Highway
- Major Road
- Local Road
- Waterbody (MNR)
- Woodland (MNR)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2011.

Stantec

September, 2012
160960594

Client/Project

WPD CANADA CORP
WHITE PINES WIND PROJECT

Figure No.

1.0

Title

Project Study Area

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Revised: 2012-09-11 By: dharvey

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Revised: 2012-09-11 By: dharvey

September 2012
160960594

Stantec

Legend

- Wind Turbine (Blade Sweep)
- Access Road
- Collector Line
- Buildable Area
- Construction Area
- Turbine Laydown Area
- Optioned Properties
- Blade Tips (45.2m) Plus 10m Buffer
- Turbine Hub 100m Buffer

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
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   Imagery Date: 2008

Client/Project

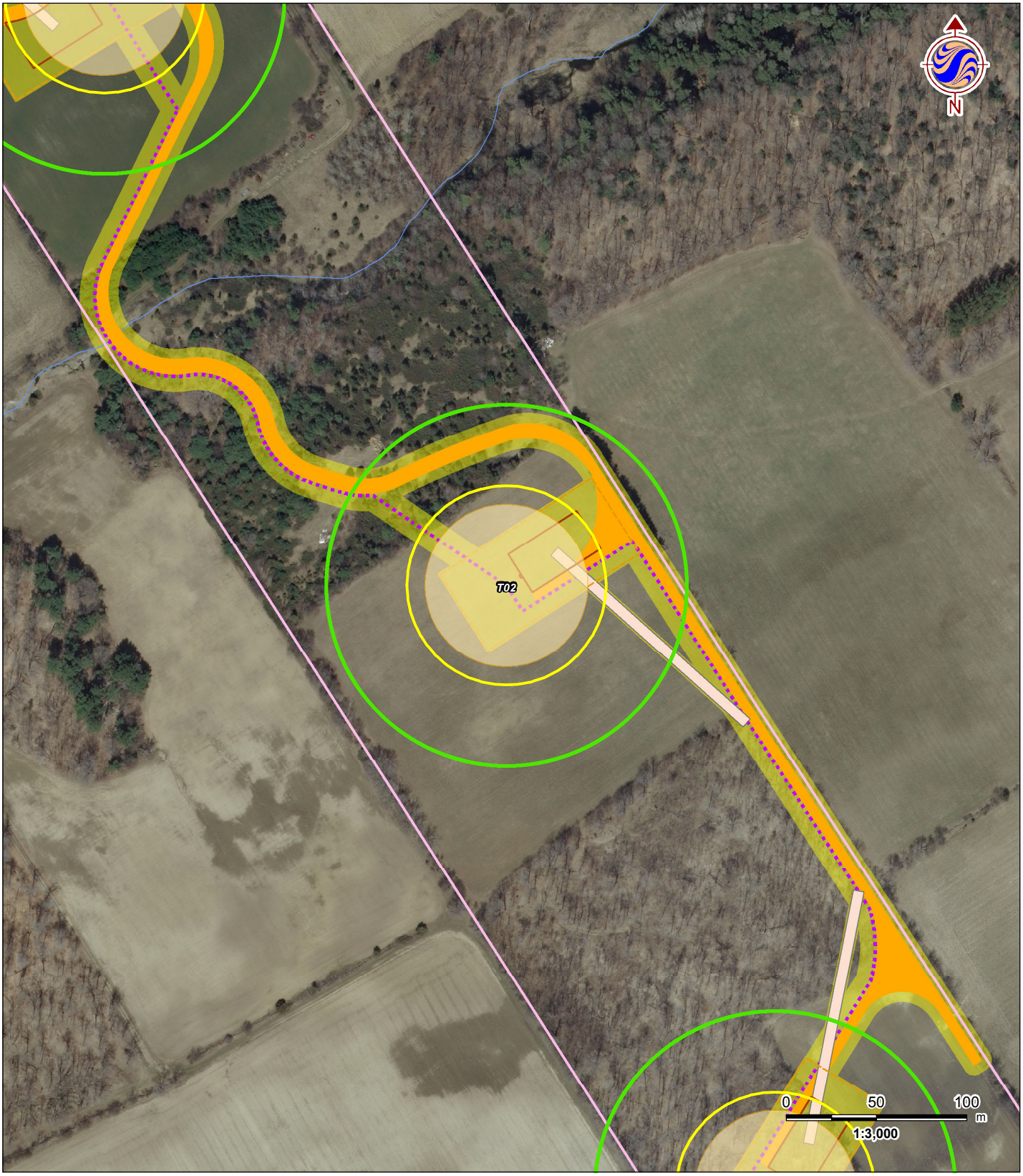
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T1

Title

Property Line Assessment Mapbook



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Revised: 2012-09-11 By: dharvey

September 2012
160960594

Stantec

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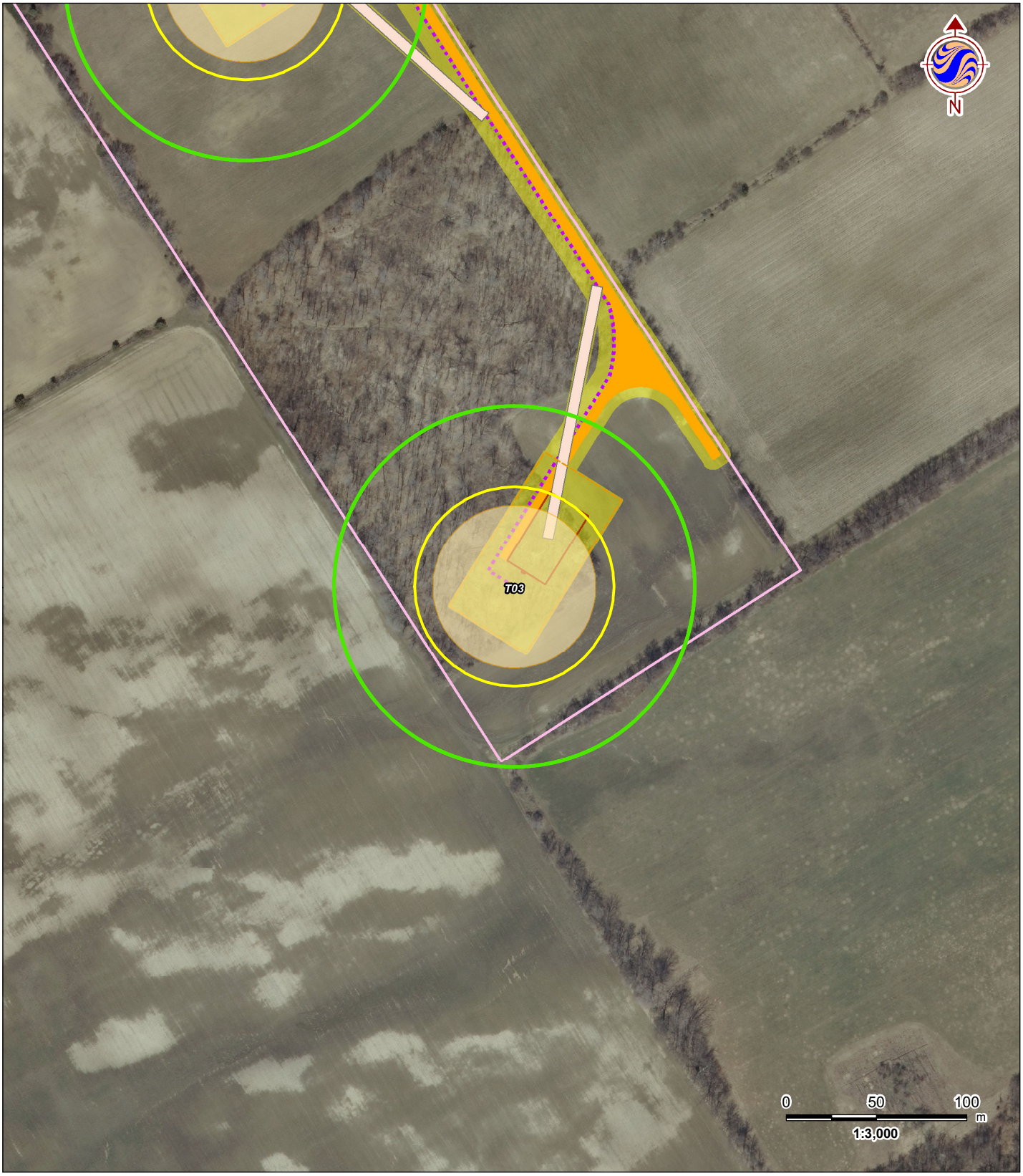
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T2

Title

Property Line Assessment Mapbook



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Revised: 2012-09-11 By: dharvey

September 2012
160960594

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Client/Project

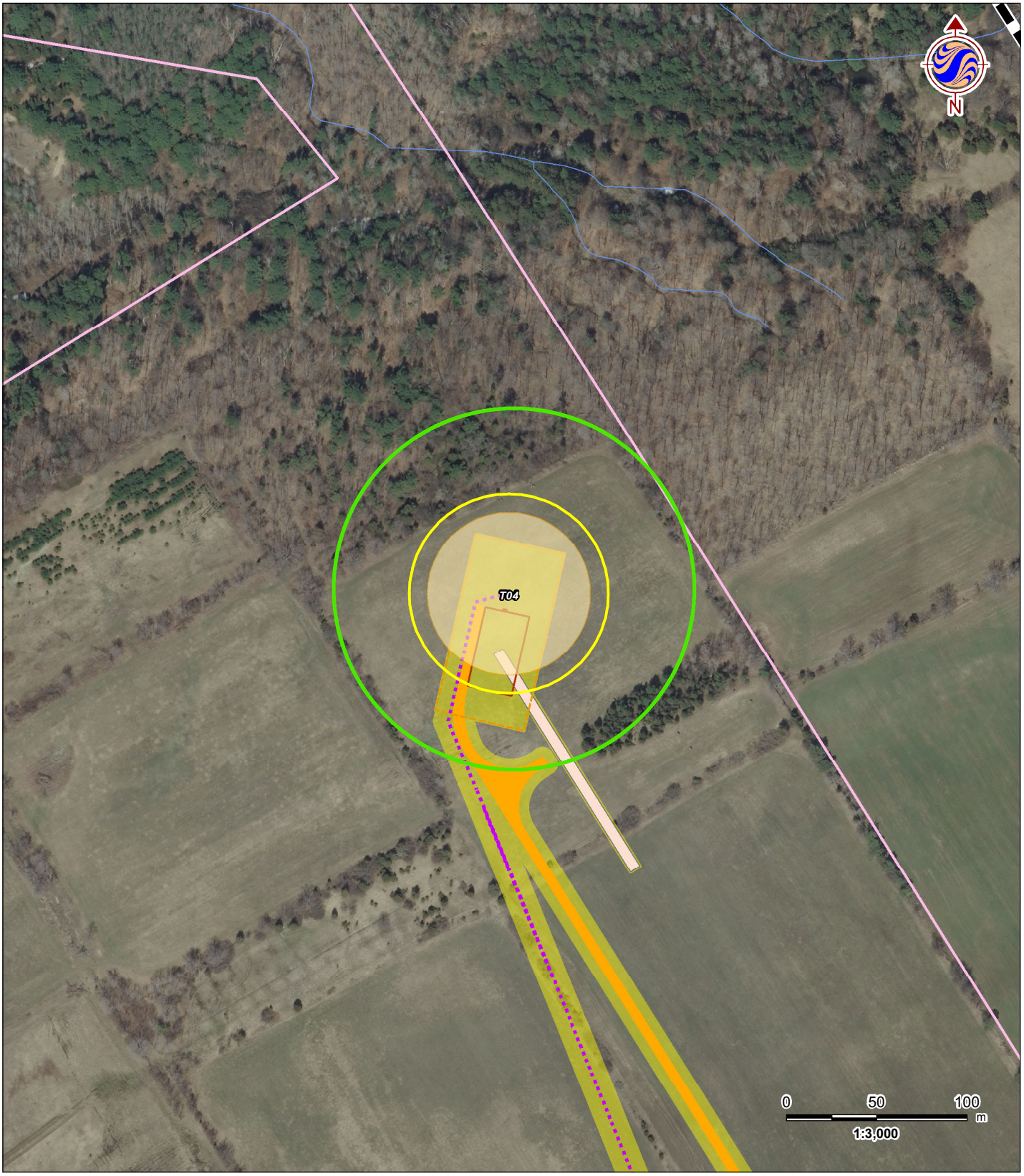
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T3

Title

Property Line Assessment Mapbook



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Revised: 2012-09-11 By: dharvey

September 2012
160960594

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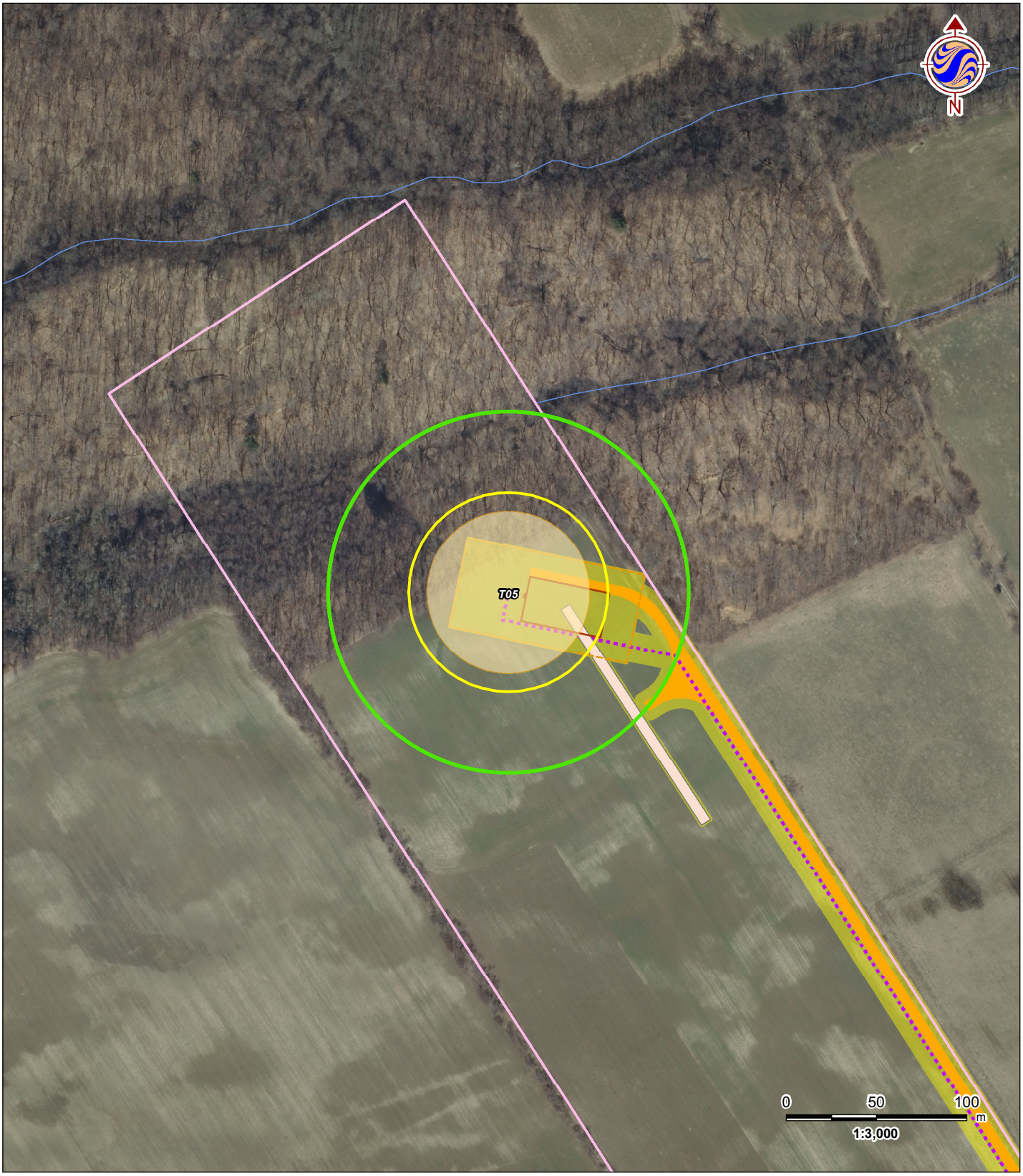
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T4

Title

Property Line Assessment Mapbook



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Revised: 2012-09-11 By: dharvey

September 2012
160960594

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Client/Project

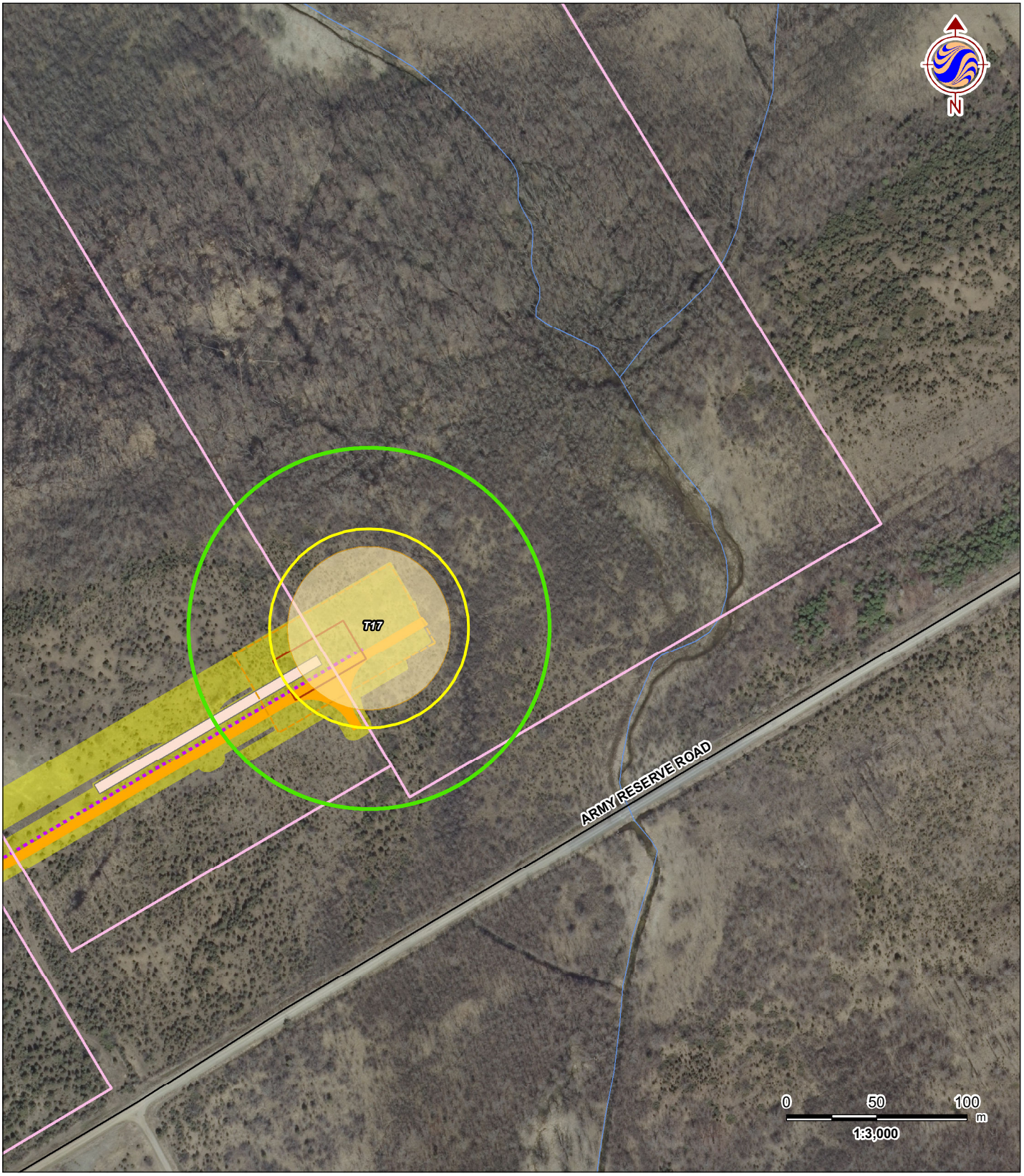
WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T5

Title

Property Line Assessment Mapbook



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Revised: 2012-09-11 By: dharvey

September 2012
160960594

Stantec

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Client/Project

WPD CANADA CORP.
WHITE PINES WIND PROJECT

Figure No.

T17

Title

Property Line Assessment Mapbook

Attachment B

Individual Property Line Setback Assessment

Attachment B: Property Line Assessment

Turbine ID	Distance to Property Line (m)	Distance of Overlap (m)	Features Within Overlap	Potential Adverse Impacts	Preventative Measures
1	92.8 m	7.2 m	Infrastructure: ☐ Agricultural Land: ☒ Hedgerows: ☐ Natural Heritage: ☐ Watercourses: ☐	Adverse impacts to agricultural land, including crop damage and soil compaction, may occur in the unlikely event of turbine collapse.	The turbines would be constructed and designed by professional engineers, undergo regular maintenance and monitoring by operational staff, and contain shutdown mechanisms in instances such as extreme weather. In the unlikely event of damage to agricultural land due to turbine collapse, landowners would be compensated by wpd for any crop damage. Measures are outlined in the Renewable Energy Approval reports to mitigate soil compaction.
2	80.1 m	19.9 m	Infrastructure: ☐ Agricultural Land: ☒ Hedgerows: ☒ Natural Heritage: ☐ Watercourses: ☐	Adverse impacts to agricultural land, including crop damage and soil compaction, may occur in the unlikely event of turbine collapse. Adverse impacts to hedgerows, including vegetation damage and disturbance to related wildlife, may occur in the unlikely event of turbine collapse.	The turbines would be constructed and designed by professional engineers, undergo regular maintenance and monitoring by operational staff, and contain shutdown mechanisms in instances such as extreme weather. In the unlikely event of damage to agricultural land due to turbine collapse, landowners would be compensated by wpd for any crop damage. Measures are outlined in the Renewable Energy Approval reports to mitigate soil compaction and impacts to vegetation, including disturbance to related wildlife habitat.

Attachment B: Property Line Assessment

Turbine ID	Distance to Property Line (m)	Distance of Overlap (m)	Features Within Overlap	Potential Adverse Impacts	Preventative Measures
3	SE Side – 76.5 m SW Side – 58.3 m	SE Side – 23.5 m SW Side – 41.7 m	Infrastructure: ☐ Agricultural Land: ☒ Hedgerows: ☒ Natural Heritage: ☐ Watercourses: ☐	Adverse impacts to agricultural land, including crop damage and soil compaction, may occur in the unlikely event of turbine collapse. Adverse impacts to hedgerows, including vegetation damage and disturbance to related wildlife, may occur in the unlikely event of turbine collapse.	The turbines would be constructed and designed by professional engineers, undergo regular maintenance and monitoring by operational staff, and contain shutdown mechanisms in instances such as extreme weather. In the unlikely event of damage to agricultural land due to turbine collapse, landowners would be compensated by wpd for any crop damage. Measures are outlined in the Renewable Energy Approval reports to mitigate soil compaction and impacts to vegetation, including disturbance to related wildlife habitat.
4	97.8 m	2.2 m	Infrastructure: ☐ Agricultural Land: ☐ Hedgerows: ☐ Natural Heritage: ☒ Watercourses: ☐	Information on potential adverse impacts for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study provided under separate cover as a component of the Renewable Energy Approval application.	Information on preventative measures for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study provided under separate cover as a component of the Renewable Energy Approval application.

Attachment B: Property Line Assessment

Turbine ID	Distance to Property Line (m)	Distance of Overlap (m)	Features Within Overlap	Potential Adverse Impacts	Preventative Measures
5	68.6 m	32.4 m	Infrastructure: ☐ Agricultural Land: ☐ Hedgerows: ☐ Natural Heritage: ☒ Watercourses: ☐	Information on potential adverse impacts for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study provided under separate cover as a component of the Renewable Energy Approval application.	Information on preventative measures for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study provided under separate cover as a component of the Renewable Energy Approval application.
17	57.2 m	42.8 m	Infrastructure: ☐ Agricultural Land: ☐ Hedgerows: ☐ Natural Heritage: ☒ Watercourses: ☐	Information on potential adverse impacts for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study, and provided under separate cover as a component of the Renewable Energy Approval application.	Information on preventative measures for natural heritage features are outlined in the Natural Heritage Assessment/Environmental Impact Study, and provided under separate cover as a component of the Renewable Energy Approval application.

Appendix D

Environmental Effects Monitoring Plan

WHITE PINES WIND PROJECT
ENVIRONMENTAL EFFECTS MONITORING PLAN

File No. 160960594
May 2012

Prepared for:

wpd Canada Corporation
2233 Argentia Road, Suite 102
Mississauga, ON L5N 2X7

Prepared by:

Stantec Consulting Ltd.
Suite 1 - 70 Southgate Drive
Guelph ON N1G 4P5

Table of Contents

1.0 Introduction

1.1 PROJECT OVERVIEW

A description of the Project is provided in Section 1.1 of the Design and Operations Report.

1.2 REPORT REQUIREMENTS

This Post-Construction Monitoring Plan is one component of the Mitigation and Environmental Effects Monitoring Plan (EEMP) of the REA application for the Project, and has been prepared in accordance with O. Reg. 359/09, the Ontario Ministry of Natural Resources' (MNR's) *Approval and Permitting Requirements Document for Renewable Energy Projects* (September 2009), the *MOE's Technical Guide to Renewable Energy Approvals* (2011), 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).

As discussed in the Natural Heritage Assessment and Environmental Impact Study (NHA/EIS), primary data were collected through bird and wildlife baseline studies in the Project area pre-construction. These data were augmented with secondary data from published and unpublished sources to generate a dataset from which to assess the potential effects of the Project.

The potential environmental effects to wildlife and wildlife habitat and associated mitigation measures, based upon this dataset, ornithological advice, and professional opinion, among other factors, are provided in **NHA/EIS Section 6**. Additionally, wildlife and wildlife habitat post-construction monitoring commitments are summarized in **Table 6.8, Appendix B** of the **NHA/EIS**. These commitments provide the first step of confirming the predictions of the EIS and provide the basis from which actions contained in the EEMP may stem.

The purpose of this EEMP is to assess the effectiveness of the proposed mitigation measures and to verify compliance of the Project with applicable provincial and federal legislation and guidelines. This monitoring plan provides details on the post-construction wildlife monitoring program for mortality monitoring of birds and bats, the post-construction monitoring plan for shrub/successional breeding birds, migratory landbirds and the vegetation monitoring plan.

2.0 Post-Construction Monitoring Program

2.1 PURPOSE AND TIMING

The purpose of the wildlife post-construction monitoring program is to identify performance objectives, assess the effectiveness of the proposed mitigation measures and to identify contingency measures that will be implemented if performance objectives cannot be met. Furthermore, any unanticipated potentially significant adverse environmental effects discovered during the post-construction monitoring program will be mitigated as described in **Section 3.0**. Post-construction monitoring for wildlife and wildlife habitat includes the following:

- *mortality monitoring:* twice weekly (3-4 day intervals) mortality monitoring at 10 turbines from May 1 to October 31. Weekly monitoring for raptors will continue during November. Monitoring of all 29 turbines for raptor fatalities will take place once monthly from May through November. Monitoring will be conducted for a period of three years. Searcher efficiency and scavenger trials will be conducted each year according to current guidance documents.
- *potential disturbance effects to shrubland/successional breeding birds:* Pre-construction point count stations and area searches will be conducted in shrubland habitat within the seven features considered to be significant habitat for declining shrub/successional breeding bird species using the same methods as the pre-construction surveys. In addition, paired point counts consisting of two 10-minute point counts; one half circle, 100m-radius point count at the WTG base and one full circle, 100m-radius point count 200m from the base of the WTG will be conducted. Surveys will be conducted twice in June, annually for at least three years.
- *potential disturbance effects to migrating birds:* Surveys will be conducted to assess use of the Project area by spring and fall migrating landbirds. The number of species and the number of individual migratory landbirds will be monitored across a transect through variety of habitats and compared to pre-construction conditions, weekly in May and in mid-August through October, for at least three years.
- *monitoring of restoration and invasive species management*: The monitoring program will track the success of restoration and invasive species management efforts and provide adaptive management contingencies where targets are not met. The program will continue for a full growing season post management, or until no additional effort is required to achieve management objectives.

2.2 PRIMARY DATA COLLECTION

To the extent possible, the same field personnel who carried out the pre-construction baseline studies will carry out the post-construction monitoring works to assist in standardizing the datasets. All data collection will be conducted by qualified field personnel.

The detailed monitoring methods, including duration, frequency and survey locations are discussed below.

2.2.1 Bird Mortality Monitoring

Background

Data from wind projects currently operating in Ontario and around the world indicates that very low numbers of bird fatalities occur as result of wind power projects (MNR 2011a). Data from Ontario and the United States indicates that approximately two birds per year are killed by individual turbines, which is very low compared to other existing sources of human caused avian mortality (MNR 2011a). Birds can be killed through collisions with turbine blades and towers, guy wires, meteorological towers and maintenance vehicles. Mortality rates and patterns are affected by density and behavior of birds found in the area, the presence of landscape features such as ridges, valleys, peninsulas and shorelines and weather conditions.

Monitoring

Bird mortality monitoring will be conducted according to MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNR, 2011a).

Mortality monitoring within minimally-vegetated portions (i.e., Visibility Classes 1 and 2 [MNR, 2011a]) of a 50 m search area radius from the base of 10 wind turbines (at least 30% of the total number of turbines contained within the project, with a minimum of 10 turbines must be surveyed). Surveys will be conducted twice-weekly (3-4 day intervals) between May 1 and October 31. Monitoring for raptor fatalities will take place once monthly from May through November. This will occur for a three year period.

The 10 turbines will be selected to provide representative coverage of the habitats and layout of the project area and will exclude any turbines where vegetation cover precludes searches (i.e. Visibility Classes 3 and 4 [MNR, 2011a]).

Although all reasonable effort will be made to conduct surveys as scheduled, surveys will not be conducted if weather (e.g. lightning, severe fog) presents safety concerns. Weather conditions will be noted when surveys were not conducted as scheduled, and every attempt will be made to complete the missed survey(s) as soon as possible.

Searcher efficiency trials will typically be conducted once in each of spring, summer and fall, but will be repeated if searchers change during the year. Searcher efficiency trials are designed to

correct for carcasses that may be overlooked by surveyors during the survey periods. Searcher efficiency trials involve a "tester" that places bird and bat carcasses under turbines prior to the standard carcass searches to test the searcher's detection rate. Each trial will consist of a minimum of 10 carcasses per searcher per visibility class. No more than 3 trial carcasses would be placed at any one time.

Searcher efficiency (Se) is calculated for each searcher as follows:

$$Se = \frac{\text{number of test carcasses found}}{\text{number of test carcasses placed} - \text{number of test carcasses scavenged}}$$

A weighted average, or "overall Se", will be calculated to account for varying survey effort between searchers. The overall Se will be calculated as follows:

$$Se_o = Se_1(n_1/T) + Se_2(n_2/T) + Se_3(n_3/T) + Se_4(n_4/T)$$

where:

Se_o	is the overall searcher efficiency;
$Se_1 – Se_4$	are individual searcher efficiency ratings;
$n_1 – n_4$	is quantity of search days completed by each searcher; and
T	is the total number of search days completed by all searchers.

Scavenger trials will be conducted once a month (May-Oct) and will involve 10 carcasses of bird and bat turbine fatalities, if available, or dark-coloured poultry chicks. If available, at least one raptor carcass will be used for some trials. Test carcasses will be place out singly at turbines and distributed across the project area. Scavenger trials are designed to correct for carcasses that are removed by predators before the search period. These trials involve the distribution of carcasses in habitat types being searched, at known locations at each wind turbine generator, followed by periodic checking to determine the rate of removal. Proportions of carcasses remaining after each search interval are pooled to calculate the overall scavenger correction factors:

$$Sc = \frac{n_{visit1} + n_{visit2} + n_{visit3} + n_{visit4},,}{n_{visit0} + n_{visit1} + n_{visit2} + n_{visit3}} \quad \text{where}$$

Sc is the proportion of carcasses not removed by scavengers over the search period

$\mathbf{n_{visit0}}$ is the total number of carcasses placed

$\mathbf{n_{visit1} – n_{visit4}}$ are the numbers of carcasses remaining on visits 1 through 4

There are numerous published and unpublished approaches to incorporating these corrective factors into an overall assessment of total bird and bat mortality. The estimated mortality will be calculated as follows:

$C = c / (S_e \times S_c \times P_s)$, where

C is the corrected number of bird or bat fatalities

c is the number of carcasses found

S_e is the proportion of carcasses expected to be found by searchers (searcher efficiency)

S_c is the proportion of carcasses not removed by scavengers over the search period

P_s is the percent of the area searched.

Most birds and bats will fall within 50 m of the turbine base (MNR 2011a). This value will be used to determine the percent of area searched (P_s). When the entire 50 m radius search area is searched, P_s will equal 100%. If portions of the 50 m radius search area are impossible or futile to search due to site conditions, P_s will be adjusted accordingly based on the searchers' ongoing estimates of the proportion of the search area that was physically searched. If feasible, a GPS will be used to delineate the search area and calculate the P_s.

The area searched will be determined for each turbine by mapping searchable areas on a grid (by visibility class) and counting the number of searched grid cells within 50 m. Maps of the varying search areas will be made available to review agencies. The summed area of those cells will be divided by the total area within a 50 m radius circle to determine the percent area searched for that turbine (Ps_x, where x is the turbine number).

$$Ps_x = \frac{\text{area searched within 50 m radius circle}}{7854\ m^2}$$

The overall Ps for the facility will be calculated as the average of Ps_1 through Ps_{10}.

Observed fatalities will be photographed, and the species, GPS coordinates, substrate, carcass conditions, possible injuries, sex (if possible) and distance and direction to the nearest turbine will be recorded along with the date, time and searcher. This approach to mortality monitoring will facilitate any potential correlation between mortality occurrences, turbine location, habitat/land use features, weather conditions and season.

Bird carcasses in good condition may be collected and stored in a freezer for future use in searcher efficiency and/or scavenger removal trials. Persons handling bird carcasses will take reasonable precautions (e.g. gloves, tools etc.) to protect their personal health. Bird carcasses will be placed in heavy-duty plastic bags and transported that day to a freezer, where they will be stored until required for the trials.

Authorization under the *Migratory Bird Convention Act, 1994* ("MBCA") will be required for handling carcasses of migratory birds. Likewise, carcasses of threatened or endangered species are covered under the *Endangered Species Act, 2007* ("ESA") or the federal *Species at Risk Act* ("SARA") and raptor carcasses are covered under the *Fish and Wildlife Conservation Act* ("FWCA").

wpd and its agents will consult with MNR and CWS prior to commencing the field program to ensure proper permits and/or procedure are in place to collect, possess and utilize wildlife carcasses for scientific purposes.

2.2.2 Bat Mortality Monitoring

Background

Bat mortality has been documented at wind power facilities in a variety of habitats across North America. Nearly every monitored wind power facility in the United States and Canada has reported bat mortality with minimum annual mortality varying from < 1 to 50 bat fatalities/ turbine/year (MNR 2006). The majority of bat fatalities at wind power facilities occur in the late summer and fall, and the long-distance migratory bats (i.e., hoary bat, eastern red bat, silver-haired bat) appear to be most vulnerable to collisions with moving turbine blades. Specific factors causing bat mortality and affecting species vulnerability to wind turbine mortality remain unclear, although recent evidence from Alberta suggests that air pressure differences in the blade vortices may contribute to bat mortality.

Monitoring

Bat mortality monitoring will be conducted according to MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (2011b. In general, the mortality monitoring requirements for bats will be captured in conjunction with bird mortality monitoring (described above).

- Bat mortality monitoring will be conducted twice-weekly (3-4 day intervals) within minimally-vegetated portions (i.e., Visibility Classes 1 and 2 [MNR, 2011b]) of a 50 m search area radius from the base of 10 turbines between May 1 and October 31st for a three-year period in accordance with MNR guidelines. This time period includes the core season when resident and migratory bats are active. Bat mortality monitoring will be conducted in conjunction with other monitoring activities (birds) for efficiency.
- Searcher efficiency trials will be conducted seasonally and carcass removal trials will be conducted monthly between May 1 and October 31st. Searcher efficiency and carcass removal rates are known to be more variable for bats than for birds throughout the year and depending on habitat (in part due to the relative size of the species).

As with birds, trial carcasses will be discreetly marked so they can be identified as study carcasses. Each trial will consist of a minimum of 10 carcasses per searcher per visibility class (for searcher efficiency trials) or per trial (for scavenger removal trials). At least one-third of the trial carcasses should be bats.

Bat carcasses in good condition may be collected and stored in a freezer for future use in searcher efficiency and/or scavenger removal trials. Persons handling bat carcasses will take reasonable precautions (e.g., gloves, tools etc.) to protect their personal health. All searchers will ensure they have updated rabies pre-exposure vaccinations. Biological material will be disposed of in a way to ensure that it does not pose a public or environmental health risk and in accordance with any applicable federal, provincial, and municipal laws.

2.2.3 Shrub-successional Breeding Bird Surveys

Background

As a result of site investigations, eight features were identified as candidate significant wildlife habitat for shrub/successional breeding birds. Of the seven features assessed, six met the criteria for significance; ssbb1, ssbb2, ssbb3, ssbb5, ssbb6 and ssbb7. These features were determined to provide significant wildlife habitat (SWH) in the form of habitat for species of conservation concern (shrub/successional breeding species) (**NHA/EIS, Section 5.3.4.7**).

A post-construction study will be implemented to assess any actual disturbance effects to breeding shrub/successional bird species. The study will incorporate pre-construction point count stations, area searches and paired point counts.

Monitoring

Pre-construction point count stations that were located in shrub/successional habitat will be resurveyed using the same protocols used during the pre-construction surveys as described in the **NHA/EIS (Section 5.1.4.7)**. Stations will occur either within 120 m of the project location or more than 120 m outside of the project location. Those located more than 120 m from the Project Location will be considered ‘control’ sites.

In addition, paired point counts will be conducted at turbines that are sited in features ssbb1-ssbb7. An equal number of paired point counts will be located in shrub/successional habitat more than 120 m from the Project Location. Paired point counts will consist of two 10-minute point counts; one half circle, 100m-radius point count at the turbine base and one full circle, 100m-radius point count 200m from the base of the turbine. During both point counts, birds will be recorded at 100m intervals allowing bird occurrences to be mapped in 100m bands from 0-300 m from the turbine’ s base.

Each of the surveys will include a ten-minute point count at each location and each point will be surveyed twice in June, during the peak of the breeding season, for a minimum of three years. Breeding pair density is a standard measure that will be used to compare among years or between control (> 120 m) and impact sites (< 120 m) as well as between paired point count bands from turbine base.

The species observed will be compared to pre-construction conditions. Particular attention will be paid to dominant species or those species identified as shrub/successional indicator or common species (as per the Ecoregion Criteria; MNR, 2012).

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 is occurring, and whether such an effect is attributable to the wind turbines and not external factors. These discussions will determine if and when contingency measures will be undertaken. The best available science and information should be considered when determining appropriate mitigation.

2.2.4 Migratory Landbirds

Background

As a result of site investigations, two features were determined to provide significant wildlife habitat (SWH) in the form of a seasonal concentration area (migratory landbird stopover and staging) (**NHA/EIS, Section 5.3.4.1**).

A post-construction study will be implemented to assess any actual disturbance effects to migratory landbirds. The study will incorporate transect surveys.

Monitoring

Transect survey routes for migrating landbirds will be conducted in features mlsa1 and mlsa2. The route locations and survey methods will be the same as during pre-construction (**NHA/EIS, Section 5.1.4.1**), providing technical and statistical validity to assess disturbance effects. The number of individuals of each species observed on the surveys is recorded and the results will be compared to pre-construction data. The surveys will be conducted weekly in spring (during the month of May) and fall (between mid-August and October) for a minimum of three years.

MNR, along with the proponent and other relevant agencies, will be asked to collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect is occurring, and whether such an effect is attributable to the wind turbines and not external factors. These discussions will determine if and when the response and contingency plan will be implemented and if any additional measures are warranted. The best available science and information will be considered when determining appropriate mitigation.

2.2.5 Natural Habitat

Background

Twenty alvar "features" were identified in and within 120 m of the Project Location. Alvar ecosite communities documented for the study area represent alvar-like conditions, controlled largely by cultural influences. Regardless of origin and maintenance factors, MNR considers all alvar habitat (ALO, ALT and ALS vegetation types) in Ecoregion 6E to be provincially rare; as a result all Alvar Ecosites (AL) were considered significant wildlife habitat. In addition, nine of the woodlands found in the Project Location and Zone of Investigation met at least one of the evaluation of significance criteria and were considered significant woodland. Given the complexity of vegetation community types, the anthropogenic influence on the development of the natural heritage features, and the overlap of the delineation of natural features found within the Project Location, habitat to be removed is often classified under more than one natural feature type (i.e. woodland is also alvar habitat which is also significant wildlife habitat).

In order to mitigate for habitat lost temporarily for construction of the Project as well as habitat loss resulting from the installation of long-term infrastructure (i.e. turbine foundations and access roads) a Natural Areas Management Strategy will be developed for lands within the Project Location and 120 m Zone of Investigation. The strategy will be designed to restore as well as enhance and preserve the natural heritage qualities of the natural habitats currently found within the Project Location and Zone of Investigation, and will include consideration of all natural areas, such as woodlands, wetlands and alvar habitats. Restoration and enhancement efforts will include efforts to promote native biodiversity throughout the study area, and may include restoration of alvar habitats, woodland and/or meadow communities as appropriate. Using this approach, mitigation for all terrestrial heritage features and functions including woodlands and alvars will be coordinated to create healthy, self-sustaining ecosystems.

Monitoring

Monitoring of restoration and invasive species management areas will involve a complete ELC assessment, and quantitative visual inspections of reseeded or transplanted specimens. The monitoring will also include a botanical inventory to detect the presence of any new invasive species (defined as non-native species with a Weediness Index of -2 or -3). Surveys will be conducted twice yearly (i.e. spring/summer and fall).

The monitoring program will track the success of restoration and invasive species management efforts and provide adaptive management contingencies where targets are not met. The program will continue for a full growing season post management, or until no additional effort is required to achieve management objectives.

2.3 Reporting and Review of Results

Annual post-construction monitoring reports will summarize and analyze the results of all wildlife surveys. Reports will be submitted to the MOE within three months of the conclusion of the November mortality monitoring.

The monitoring program will be reassessed by MNR and wpd at the end of each monitoring year. Pending the reassessment results, the program methods, frequencies, and duration may be reasonably modified to better reflect the findings.

3.0 Adaptive Management Program

The adaptive management program described in this section outlines performance objectives, and contingency measures that will be implemented should the performance objectives not be met.

Contingency measures may include an adaptive management approach. An adaptive management program allows mitigation measures to be implemented in the event that unanticipated potentially significant adverse environmental effects are observed. Potentially significant adverse effects will be assessed through review of the annual report.

The following sections describe the procedures for notifications, reporting, and adaptive management for mortality and disturbance effects monitoring.

3.1 MORTALITY MONITORING

All bird and bat mortality will be reported in the annual report submission. Mortality rate is expressed as the number of fatalities per turbine per year (e.g. from May 1 to November 30). Mortality of priority species in Bird Conservation Region ("BCR") 13 and mortality of all species of conservation concern, such as raptors and declining woodland breeding bird species, will be highlighted in the annual post-construction monitoring reports. A threshold approach will be used to identify and mitigation potential negative effects resulting from the operation of wind turbines.

3.1.1 Birds

Post-construction mitigation, including operational controls, will be considered if annual mortality of birds exceeds any of the following thresholds defined by the MNR (2011a):

- 14 birds/ turbine/year at individual turbines or turbine groups;
- 0.2 raptors /turbine/year across a wind power project; or
- 0.1 raptors of provincial conservation concern/turbine/year across a wind power project.

Or if bird mortality during a single mortality monitoring survey exceeds:

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

Mortality levels maintained below these thresholds are considered unlikely to affect bird populations (MNR 2011a).

Any and all observed mortality of species at risk (i.e., a species listed as Endangered, Threatened or Special Concern under Schedule 1 of the federal SARA or a species listed on the Species at Risk in Ontario list as Extirpated, Endangered, Threatened, or Special Concern under the provincial ESA) that occurs will be reported immediately to EC and/or the MNR.

If with due consideration of seasonal abundance and species composition, annual mortality levels at turbines located outside 120 m of bird SWH exceed the thresholds noted above, two years of subsequent scoped mortality and cause and effects monitoring will be conducted. Following scoped monitoring, post-construction mitigation (e.g., operation mitigation) and effectiveness monitoring may be required at individual turbines where a mortality effect has been identified or significant annual mortality persists (MNR 2011a).

If significant annual mortality persists, or occurs at turbines located within 120 m of bird SWH MNR will be engaged to initiate an appropriate response plan as set out in the MNR's Bird Guidelines (2011a). The response plan would include an analysis of the species, timing and distribution of fatalities to determine potential risk factors leading to mortality. The analysis may include an evaluation of the mortality data and/or behavioral studies to better refine when and where species are most at risk of collision. The results of this analysis will be used to develop mitigation measures, which may include the following (or alternate plan reasonably agreed to between wpd and the MNR[1]):

- Periodic shut-down of select turbines at specific times of year (MNR 2011a)
- Blade feathering at specific times of year (MNR 2011a)

3.1.2 Bats

Operational mitigation is required where annual post-construction mortality monitoring exceeds 10 bats per turbine per year (MNR, 2011).

Operational mitigation to be implemented includes increasing cut-in speed to 5.5 m/s or feathering wind turbine blades when wind speeds are below 5.5 m/s between sunset and sunrise, from July 15 to September 30. This mitigation should continue for the duration of the project, as set out in the MNR's Bat Guidelines (2011).

3.1.3 Contingency Plan

3.1.3.1 Contingency Plan for Mass Mortality of Birds

To date, there have been no recorded events of mass mortality of birds at wind farms in Ontario. The various post-construction monitoring projects in Ontario typically record between 0 to 2 bird

[1] An alternate plan maintains flexibility within the Plan to consider alternative response ideas that may arise over the course of the Plan (e.g., new technologies that may reduce bird or bat fatalities).

fatalities at individual turbines during any one survey, with only a single record of 3 birds fatalities observed at one turbine during a single visit (Friesen, 2011). As such, the risk of a mass mortality event for birds is anticipated to be very low.

In the event of a mass mortality event, defined as 10 or more bird fatalities at any one turbine, or 33 or more bird fatalities at multiple turbines on a single survey, the following steps will be implemented:

1. MNR will be notified of the event immediately and will be provided with any available details (e.g. species, number and distribution of turbines involved).
2. An emergency search of all turbines in the project will be conducted as soon as feasibly possible to determine the extent and the distribution of the mortality event.
3. An analysis of the results of the emergency search will be completed to identify potential risk factors (e.g., weather conditions, proximity to natural heritage features) leading to the mortality event.
4. Based on the risk factors identified, additional mitigation and scoped monitoring recommendations will be developed in conjunction with MNR with the goal of avoiding future mortality events.

3.1.3.2 Contingency Plan for Continued Significant Bat Mortality

Additional mitigation measures may be implemented in the event of continued significant bat mortality (i.e., more than 10 bats/turbine/year) after the mitigation measures outlined in Section 3.1.2 have been implemented. Should the cut-in speed mitigation be implemented and the bat mortality threshold continue to be exceeded, wpd will work with the MNR to determine additional mitigation and scoped monitoring requirements.

3.2 DISTURBANCE EFFECTS

3.2.1 Wildlife

wpd and the MNR will review the post-construction monitoring results to determine if an ecologically significant effect on shrub/successional breeding birds or migratory landbirds is occurring, and whether such effect is attributed to the wind turbines and not external factors.

Should the performance objectives not be met, there are a number of contingency measures that may be implemented:

- Compare declines to population trends noted through province or continent-wide breeding bird and amphibian monitoring surveys
- Develop additional study to confirm that decline is due to turbine disturbance, and determine extent of disturbance effect

- Investigation of habitat management means to increase breeding density
- Additional post-construction monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance effects.

Discussions will determine whether mitigation is required to replace the habitat lost through displacement, and could include, for example:

- Expanding the survey to adjacent areas (e.g., to determine if the effects are localized)
- Mitigation banking, land donation, or conservation easements may be considered
- A reasonable financial contribution from wpd to an independent, qualified third party (e.g., university) to further expand the knowledge base related to bird or amphibian conservation through research
- Operational controls, such as periodic turbine shut-down and/or blade feathering

The best available science and information should be considered when determining appropriate mitigation.

3.2.2 Habitat

The performance objectives for the habitat management plan are:

- to restore disturbed areas of the construction site with appropriate habitat types;
- to reduce the overall amount of non-native species recorded to less than 24%; and
- no new invasive species recorded.

Management efforts will be coordinated with other interest groups willing to partner that have specific knowledge of alvar habitat management and the local natural heritage of the area. Records of the restoration and invasive species control work will be kept so that successes or failures can be communicated to the interest groups to contribute to the management of alvar and woodland habitats in Ontario.

Should the performance objectives not be met, there are a number of contingency measures that may be implemented

- seeding/restoration to be repeated;
- removal methods to be repeated; and/or
- develop a control and monitoring plan for any new species recorded.

Should the contingency measures be implemented and the performance objectives continue to not be met, wpd will work with the MNR to determine additional mitigation and scoped monitoring requirements.

4.0 Best Management Practices

wpd will include the following best management practices as part of the post-construction monitoring program (as outlined in MNR, 2011a and 2011b).

4.1 DATA MANAGEMENT

All pre- and post-construction data, collected in accordance with MNR guidance and reported to the MOE, will be submitted to the joint Canadian Wildlife Service – Canadian Wind Energy Association – Bird Studies Canada – Ontario Ministry of Natural Resources Wind Power and Birds Monitoring Database.

4.2 WHITE-NOSE SYNDROME

Carcasses of the following species found during bat mortality searches may be sent to the Canadian Cooperative Wildlife Health Centre for analysis of White-nose Syndrome and should not be used in carcass removal or searcher efficiency trials:

- *Myotis septentrionalis*
- *Myotis lucifugus*
- *Myotis leibii*
- *Perimyotis subflavus*
- *Eptesicus fuscus*

4.3 BAT TISSUE SAMPLES

Tissue samples from bat carcasses may be used in a number of DNA analyses to provide insight into population size and structure, as well as the geographic origin migrants. wpd will contact the local MNR office prior to disposing bat carcasses, to determine if this type of research is occurring in the area.

5.0 References

Friesen, L. 2011. No evidence of large-scale fatality events at Ontario wind projects in *Ontario Birds*, Volume 29, No. 3, December 2011: pages 149- 155.

Ontario Ministry of Natural Resources. 2010. Technical Bulletin Two: Guidance for preparing the Design and Operations Report (draft). 41 pp.

Ontario Ministry of Natural Resources. 2011a. Birds And Bird Habitats: Guidelines For Wind Power Projects. 32 pp.

Ontario Ministry of Natural Resources. 2011b. Bats And Bat Habitats: Guidelines For Wind Power Projects. 25 pp.