



Stantec

SPRINGWIND WIND PROJECT
WIND TURBINE SPECIFICATIONS REPORT

File No. 160960606
January 2012

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 our website at <http://wpd-canada.ca>. wpd is proposing to develop the Springwood Wind Project (the Project) in the Township of Centre Wellington, in Wellington 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) on May 3, 2010 (FIT Contract NO. F-000666-WIN-130-601).

The basic components of the Project include four REpower MM92-2.05 MW wind turbine generators with a total maximum installed nameplate capacity of 8.2 MW (FIT Contract maximum of 9.2 MW), step-up transformers located adjacent to the base of each turbine, a 44 kV underground electrical power line system, a switching station, and turbine access roads. Temporary components during construction include work and storage areas at the turbine locations and along access roads and laydown areas. The underground collector system will transport the electricity generated from each turbine to a switching station located on private property adjacent to the municipal road allowance on 3rd Line. A copy of the Project Location and Project Study Area map is provided within the Project Description Report.

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.

1.2 REPORT REQUIREMENTS

This Wind Turbine Specifications Report is one component of the REA Application for the Project, and has been prepared in accordance with Item 13, Table 1 of O. Reg. 359/09 which sets out specific content requirements as provided in the following table (Table 1.1).

Table 1.1: Wind Turbine Specifications Report Requirements: O.Reg. 359/09

Requirements	Completed	Section Reference
Provide specifications of each wind turbine, including make, model, name plate capacity, hub height above grade, rotational speeds and acoustic emissions data, including the sound power level and frequency spectrum, in terms of octave-band power levels.	✓	2.1

2.0 Wind Turbines

2.1 SPECIFICATIONS

The Project consists of four wind turbine generators (2.05 MW each) with a total nameplate capacity of 9.2 MW. The following table (**Table 2.1**) provides a description of the REpower MM92 wind turbine which will be used for the Project. Additional turbine specifications are provided in **Appendix A**.

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 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 to where the blades attach);
- Power convertor;
- Step-up transformer; and
- Electrical wiring and grounding.

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The tower would be supported by a concrete foundation, approximately 3 m deep, depending upon subsurface conditions. The turbine tower consists of tubular towers with flange connections. The tower height is 100 m.

The tower supports the nacelle which houses the main components of the wind turbine (comprised of gearbox, electrical generator and housing). The nacelle cover is made of glass-fibre reinforced plastic and is accessible from the tower via a hatch in the base frame. A step-up transformer, located adjacent to the base of each wind turbine, is required to transform the electricity created in the nacelle to a standard operating power line voltage (i.e. 690 V to 44 kV). The converter is located within the nacelle and controls the energy conversion in the generator by feeding power to and from the grid.

The 92.5 m rotor supports three blades and a hub. The blade design comprises a strong structure to face high wind loads but also lightweight construction to minimize the load transmission of the nacelle. This is achieved by the use of glass-fibre reinforced plastic sandwich construction. The blades are 45.2 m in length. The pitch of the blades is adjustable, allowing maximum energy input from the wind and also acting as a braking system.

Electrical wiring includes a high voltage cable which runs down the turbine tower to the 44 kV switchgear located at the bottom of the tower. From the switchgear, underground 44 kV collector lines would carry the electricity from the turbines to the switching station.

Turbine tower lighting would be in accordance with Transport Canada Regulations and Standards as described in the Design and Operations Report.

3.0 Closure

The Springwood Wind Project Wind Turbines Specifications Report has been prepared by Stantec Consulting Ltd. for wpd in accordance with Item 13, Table 1 of O.Reg 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.



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4.0 References

O.Reg.359/09 - Ontario Regulation 359/09 - Renewable Energy Approvals Under Part V.0.1 of the Act under the Environmental Protection Act.

Appendix A

Turbine Specifications from Manufacturer