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AMHERST ISLAND EMISSION ACOUSTIC REPORTS

Version 02

Amherst Island Wind Project

Amherst Island, Ontario

Report Number: 01800287.005

Project Number: 01800287

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January 9, 2019

VERSION CONTROL

Version	Date	Version Description
01	December 14, 2018	Original Report
02	January 9, 2019	Typographical corrections to Table 2 and report references.

EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Windlectric Inc., on behalf of the Amherst Island Wind Project, to complete Acoustic Noise testing in accordance with IEC 61400-11 of two wind turbine generators at the Amherst Island Wind Project near Stella, Ontario. The Acoustic Emission Audit is required as a Condition F of Renewable Energy Approval number 7123-9W9NH2 issued by the Ontario Ministry of the Environment, Conservation and Parks on August 24, 2015. This report represents measurements of the two test turbines completed on November 7, November 8, and December 6, 2018.

HGC Engineering has assessed two Siemens SWT 3.2-113 wind turbines, designated S29 and S33, in accordance with CAN/CSA-C61400-11:13 (IEC 61400-11:2012). Turbine S29 has a rated electrical power of 2772 kW and turbine S33 has a rated electrical power of 2942 kW. A summary of the sound power levels as measured by HGC Engineering and provided by the manufacturer are outlined in the following table. Detailed results are provided in the attached turbine reports.

ID	Sound Power Levels, $L_{WA,k}$ [dBA] as Measured by HGC Engineering vs Hub Height Wind Speed [m/s]												Manufacturer's Rated Sound Power [dBA]
	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	
S29	102.0	103.6	104.1	104.4	104.3	104.2	103.7	103.7	104.0	103.6	103.6	N/A	**104.0**
S33	101.7	103.1	104.4	104.5	104.5	104.3	104.3	104.4	104.4	104.5	104.5	104.3	**105.0**

TABLE OF CONTENTS

ATTACHED:

REPORT 01800287.007 – ACOUSTIC TEST REPORT, WTG S29 (2772 kW)

REPORT 01800287.006 – ACOUSTIC TEST REPORT, WTG S33 (2942 kW)

1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Windlectric Inc. to complete sound level measurements (Emission Audit) of two Siemens SWT 3.0-113 Wind Turbine Generators ("WTG") with rated capacities of 2942 kW and 2772 kW, to determine the sound power level of each turbine. These WTGs are part of Amherst Island Wind Project which includes 26 Siemens turbines, with an overall project nameplate capacity of 74.3 MW. The Acoustic Emission Audit is required as a Condition F of Renewable Energy Approval number 7123-9W9NH2 [1] issued by the Ontario Ministry of the Environment, Conservation and Parks ("MECP") on August 24, 2015. This report represents measurements of the two test turbines completed on November 7, November 8, and December 6, 2018.

This report summarizes measurements that were completed in accordance with IEC Standard 61400-11 "Wind turbine generator systems – Part 11: Acoustic Noise Measurement Techniques". The CAN/CSA-C61400-11:13 standard is an adoption without modification of the identically titled IEC Standard IEC 61400-11:2012 [2].

2 MEASUREMENTS AND RESULTS

Sound level measurements were conducted at each turbine as listed in Table 1 below.

Table 1: Measurement Periods and UTM Coordinates

Turbine ID	Measurement Date	Turbine UTM Coordinates	
		Easting	Northing
S29 (2772 kW)	December 6, 2018	359562	4889909
S33 (2942 kW)	November 7 and November 8, 2018	369337	4892806

Additional details related to instrumentation, measurement procedures, and detailed results are provided in the attached reports for each turbine. The overall results are shown in Table 2 below.

Table 2: Emission Testing Summary Results

WTG ID	Parameters Measured by HGC Engineering	Hub Height Wind Speed [m/s]											
		7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
WTG S29 (2772 kW)	Sound Power Level $L_{WA,k}$ [dBA]	**102.0**	**103.6**	**104.1**	**104.4**	**104.3**	**104.2**	**103.7**	**103.7**	**104.0**	**103.6**	**103.6**	**N/A**
	Tonal Audibility, ΔL_{ak} [dB]	<-3.0	-1.7	-0.7	-0.2	-0.1	-1.3	-2.7	-2.7	<-3.0	-2.6	-1	N/A
	Total Uncertainty U_C [dB]	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	N/A
WTG S33 (2942 kW)	Sound Power Level $L_{WA,k}$ [dBA]	**101.7**	**103.1**	**104.4**	**104.5**	**104.5**	**104.3**	**104.3**	**104.5**	**104.4**	**104.5**	**104.5**	**104.3**
	Tonal Audibility, ΔL_{ak} [dB]	<-3.0	-0.9	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0
	Total Uncertainty U_C [dB]	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9

The manufacturer's rated sound power level for each turbine, shown in Table 3, was provided in the Noise Assessment Report [3] and included in the Renewable Energy Approval.

Table 3: Manufacturers Sound Power Level

Turbine ID	Rated Electrical Output [kW]	Manufacturer's Rated Sound Power Level [dBA]
S29 (2772 kW)	2772	104.0
S33 (2942 kW)	2942	105.0

The sound power levels presented in Table 2 meet the maximum sound power levels in the Renewable Energy Approval when considering the allowable 0.5 dBA tolerance under the MECP's Compliance Protocol for Wind Turbine Noise [4].

3 CONCLUSIONS

The results of the acoustic measurements and analysis indicate that, for all measured wind speeds, the wind turbine generators meet the specified sound power levels in Renewable Energy Approval Number 7123-9W9NHS [1] when considering the allowable 0.5 dBA tolerance under the MECP's Compliance Protocol for Wind Turbine Noise [4]. Additionally, the acoustic measurements and analysis indicate that the tonal audibility is less than the maximum tonal audibility noted in the Noise Assessment Report [3].

Detailed results are provided in the attached turbine reports.

REFERENCES

1. Ontario Ministry of the Environment Renewable Energy Approval Number 7123-9W9NH2, dated August 24, 2015.
2. International Electrotechnical Commission, 61400-11: 2012 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.
3. Hatch, *Noise Assessment Report for Amherst Island Wind Project*, dated May 4, 2015.
4. Ontario Ministry of the Environment, Conservation, and Parks, *Compliance Protocol for Wind Turbine Noise*, dated April, 2017.