Grand Valley Wind Farms Phase 3 Renewable Energy Approval Modification Report

FINAL REPORT

February 14, 2022

File: 160961132

Prepared for:

Grand Valley Wind Farms Phase 3 Inc.
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1.0 INTRODUCTION

Grand Valley Wind Farms Phase 3 Inc., a general partner of Grand Valley 2 Limited Partnership (GV2LP), received a Renewable Energy Approval (REA) (REA #6457-9L6QLC dated October 15, 2014) and two amendments to the Renewable Energy Approval (EBR Registry #012-4280 dated June 30, 2015 and EBR Registry #012-5985 dated December 14, 2015), from the Ministry of the Environment, Conservation and Parks (MECP) for the Grand Valley Wind Farms Phase 3 (the Project). The first amendment (date June 30, 2015) was to change the owner and operator of the company. The second amendment (dated December 14, 2015) was to change the approved turbine model information.

A third REA Amendment application was submitted to the Ministry of Environment, Conservation and Parks (MECP) on September 8, 2021, to revise the maximum power capacity of all 16 turbines to 2.772 MW to manage future potential power production obligations under the proponent's Feed-in Tariff (FIT) contract. Upon review of this application MECP has provided direction for GV2LP to submit a separate REA Amendment application for the completion of International Electrotechnical Commission (IEC) 61400-11 emission testing on two (2) wind turbines to qualify the noise impact assessment in support of the September REA Amendment application.

The Project is a Class 4 wind facility, which consists of a 40 MW wind farm located in the Town of Grand Valley and the Township of Amaranth, in the County of Dufferin, Ontario. A site plan map for the Project is provided in **Appendix A**.

2.0 SUMMARY AND RATIONALE FOR TECHNICAL CHANGE

In follow-up to the REA application and draft modification report submitted to the MECP on September 8, 2021, GV2LP is submitting a separate REA application and draft modification report as per the request of the MECP as detailed via email on January 4, 2022. The purpose of this revised Project amendment is to undertake IEC 61400-11 testing on two (2) wind turbines at the facility and submit the test results as well as providing technical information on the Next Generation (F-Type) DinoTails and the revised power curve.

Currently, 14 turbines have a maximum capacity of 2.483 MW and two have a maximum capacity of 2.648 MW. The overall nameplate capacity (40 MW) of the facility will not change as a result of the proposed testing and updated technical information. No physical design changes are required to the turbines associated with this Project as the noise-reducing Next Generation DinoTails have previously been installed on the turbines by the turbine manufacturer as part of ongoing regular maintenance. The only modifications required for this Project will be to temporarily revise the control system firmware so that turbines T101 and T117 operate under the 2.772 MW maximum power curve for noise emission testing purposes.

To support this Technical Change the IEC 61400-11 testing plan is outlined below and additional documentation from Siemens-Gamesa and supporting information pertaining to the Next Generation DinoTails has been provided (**Appendix B**).

2.1 EMISSIONS TESTING APPROACH

As was required by Condition F of REA Number 76457-9L6QLC issued by MECP, GV2LP retained HGC Engineering to complete Acoustic Noise Emission Testing in accordance with the IEC 61400 Standard for two project turbines, T101 (completed on 2019-11-01) and T117 (testing completed on 2020-08-25). Summary Reports detailing these tests and their conclusions are provided in **Appendix B**.

GV2LP proposes to again retain HGC Engineering to carry out Acoustic Noise Emission Testing on the same two turbines (T101, T117) in compliance with the temporary Approval requested in the present submission. GV2LP proposes that each turbine's test procedure be identical to the previous tests with the exception that the turbine will be operated in the Max Power 2,772 kW power curve (and acoustic) mode. Note that there will be no physical differences in the turbine configurations (with respect to the previous tests) with the exception of standard maintenance carried out between the time of the previous tests and the tests considered here. These differences would include normal blade surface maintenance, normal turbine maintenance, and normal DinoTails maintenance (which includes replacement with the Next Generation DinoTails as they became available and as maintenance was carried out on the turbines).

For information, all turbines in the GV2LP wind farm were originally constructed in the latter half of 2015 with D-type DinoTails. As noted in the previous paragraph, during regular turbine maintenance the D-type DinoTails were gradually replaced with Next Generation DinoTails until, at present, all turbines feature the more effective Next Generation DinoTails. A Siemens-Gamesa brochure, which accompanies this submission, describes the Next Generation DinoTails noise reduction hardware and technology.

GV2LP proposes that these tests be carried out in the spring of 2022, as soon as the probability of freezing precipitation becomes negligible.

3.0 PROJECT TECHNICAL CHANGE – CHANGE TO COMPLETE IEC TESTING

The proposed Technical Change entails conducting IEC 61400-11 emission testing on two (2) wind turbines at the facility and submitting the test result reports (E-test reports) (including all modifications such as Next Generation DinoTails and power upgrading) to the MECP. As stated above, no physical design changes are required to the turbines associated with the Project.

GV2LP has prepared an application to amend the REA for this change to conduct IEC 61400-11 emission testing on two wind turbines to support the original REA amendment application and draft modification report submitted to the MECP on September 8, 2021, which is also designated as a Technical Change.

4.0 RESULTS OF EFFECTS ASSESSMENT FOR THE PROJECT MODIFICATION

O. Reg 359/09 requires that any adverse environmental effects that may result from construction, installation, operation and maintenance activities be described. The term “environment” in O. Reg 359/09 has the same meaning as in the *Environmental Protection Act*, and includes the natural, physical, cultural, and socio-economic environment.

A screening to identify any new adverse environmental effects that would require additional mitigation or monitoring measures beyond those outlined in the REA documents as a result of the proposed modifications to the Project has been completed. Through this screening process it has been determined that the proposed IEC testing will result in no physical to the turbines or the Project, with an operational change resulting in the two selected turbines being programmed to operate at the maximum power output of 2.772 MW for the duration of the IEC 61400-11 emission testing. As this is a temporary operational change that will be short in duration, and no change in previously identified impacts related to the environment, including noise and vibration were identified, no new adverse environmental impacts are expected.

5.0 POTENTIAL IMPACTS TO REA TECHNICAL ASSESSMENT AND STUDIES

GV2LP and their general partners previously completed all the required REA technical assessments (including the Natural Heritage Assessment, Noise Assessment, Water Assessment, Heritage Assessment, as well as Stage 1 and Stage 2 Archaeological Assessments) for the Project which encompasses the installation and maintenance of the turbines, construction of access roads and other related infrastructure.

Table 1 and Table 2 below outline any potential negative impacts on environmental components due to the Technical Change and any new mitigation and/or monitoring measures proposed (where applicable). The change in operating mode (from current to max power 2.772 MW) of the tested turbines will change the turbines' source sound power level profiles for the duration of the testing. However, the impacts are expected to be nominal since the testing will occur at a single turbine (out of 16) at a time and, typical testing duration is 1 to 2 days in length. Additionally, since there is no proposed physical change to the turbines, there is no potential for new adverse environmental impacts because of the Technical Change.

Table 1 Potential Negative Impacts on Natural Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation Measures	Monitoring Requirements
Air Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Soil Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Soil Quantity	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Groundwater	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Surface Water Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Surface Water Quantity	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Aquatic Habitat and Biota	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Woodlands	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wetlands	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wildlife Habitat	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wildlife	No additional negative impact.	No additional mitigation required.	No new monitoring required.

Table 2 Potential Negative Impacts on Socio-Economic Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation Measures	Monitoring Requirements
Noise	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Public and Facility Safety	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Change in Visual Landscape	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Property Values	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Availability of Resources	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Recreational Land Use	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Infrastructure	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Traffic	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Archaeological and Heritage Resources	No additional negative impact.	No additional mitigation required.	No new monitoring required.

6.0 SUMMARY OF REVISIONS TO THE REA TECHNICAL ASSESSMENTS

As the purpose of this REA Amendment is to perform new IEC 61400-11 emission testing, no technical reports that have been previously submitted will be amended at this point in time.

7.0 CONSULTATION AND NOTIFICATION

Consultation regarding the proposed REA Amendment submitted on September 8, 2021 was undertaken with the MECP via email on March 11, 2021, October 5, 2021, October 21, 2021 and via teleconference on October 21, 2021. Additionally, consultation on this proposed REA Amendment was undertaken with the MECP via email December 16, 2021, December 21, 2021 and January 4, 2022.

Previously, the Notice of Proposed Change to an Approved Renewable Energy Project was mailed/emailed out to Project stakeholders, on September 9, 2021, notifying them of the proposed Technical Change and directing them to review the Modification Report (September 1, 2021) available on the Project website. The notice was distributed to the public in accordance with Section 32.3(1) of O. Reg. 359/09. In addition, a Notification was published on two separate occasions in the Orangeville Banner newspaper during the weeks of September 13, 2021, and September 20, 2021. A copy of the notice is presented in **Appendix C**.

A copy of this Modification Report was submitted to the Ministry of Northern Development, Mines, Natural Resources and Forestry and the Ministry of Heritage, Sport, Tourism and Culture Industries for their information via email. As there are no unassessed areas, and no new adverse environmental impacts, we do not anticipate the need for new confirmation letters from these ministries.

A copy of this Modification Report was placed on the Project website – www.gvwf3.ca.

8.0 CLOSURE

The proposed requested IEC 61400-11 emission testing impacts have been assessed in accordance with O. Reg 359/09 and the MECP's Technical Guide. It has been determined that the proposed Technical Change will not result in new adverse environmental impacts or require additional associated mitigation measures beyond those identified as part of the original REA Application submitted for the Project.

APPENDIX A
Site Layout

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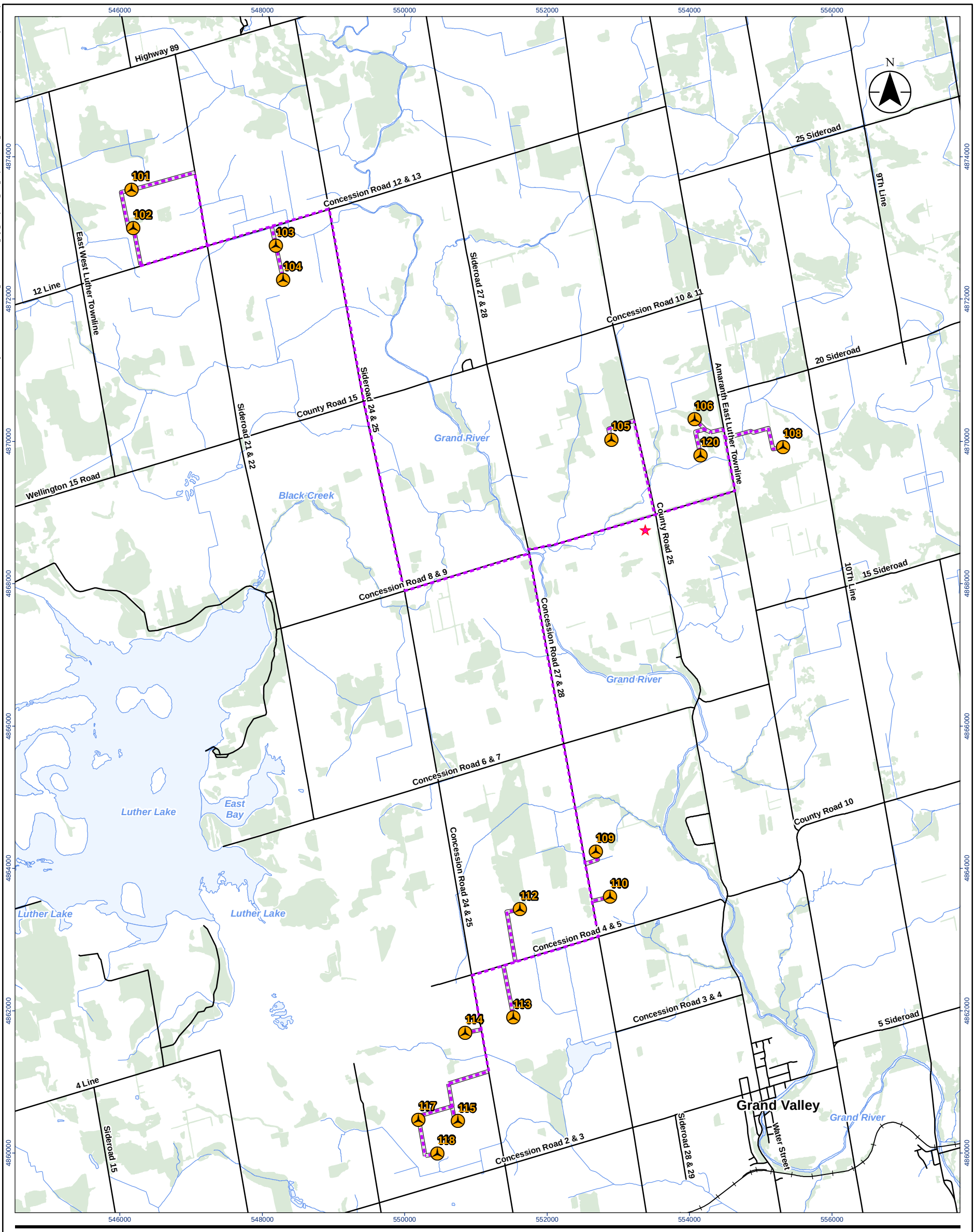

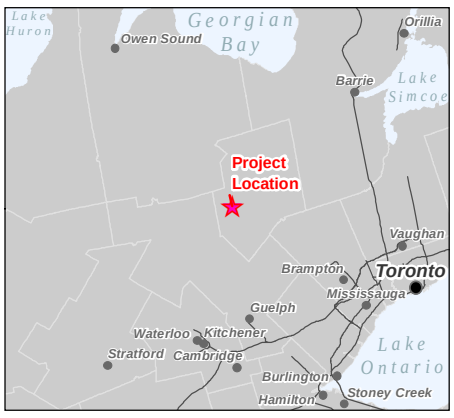

Legend

- Turbines
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Collector Lines
- Access Roads
- Road
- Railway
- Watercourse
- Waterbody
- Wooded Area

0 0.5 1 km

1:55,000 (At Original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Stantec

Project Location
Grand Valley

160961132 REVA
Prepared by DH on 2021-03-26

Client/Project
GRAND VALLEY PHASE 3
VERESSEN INC.

Figure No.
1

Title
Project Location

APPENDIX B

Additional Documentation from Siemens-Gamesa and Supporting Information Pertaining to the Next Generation Dinotails

APPENDIX B.1

Simens Gamesa – Grand Valley 3 Wind Farm - Clarification on the Sound Level Emission Document for the SWT-3.2-113 Turbine at 2.772 MW Rating with F-Type Dinotail

December 12th, 2021
Siemens Gamesa Renewable Energy
4400 Alafaya Trail
Orlando, FL 32826

Ontario Ministry of the Environment, Conservation and Parks
College Park 5th Floor
777 Bay St.
Toronto, ON M7A 2J3

Subj: Grand Valley 3 Wind Farm - Clarification on the Sound Level Emission Document for the SWT-3.2-113 Turbine at 2.772 MW Rating with F-Type Dinotail.

To Whom it May Concern:

In 2016, Siemens Gamesa Renewable Energy (SGRE) introduced a new generation of serrated trailing edges known as F-type Dinotails or DTFs. The goal of the new design was to improve the acoustic performance of SGRE wind turbines. The technology has become commercially available both as a retrofit for the installed fleet as well as most new SGRE turbine models.

The new Dinotails are equipped with fine brushes in between the major teeth, made via a proprietary manufacturing process. Such fine brushes can effectively alter the diffraction of sound waves and further reduce the low-frequency noise by breaking up larger turbulent eddies into smaller eddies at the trailing edge of the blades.

Based on all near-field measurements completed by SGRE, the DTF add-on solution has consistently demonstrated decreased aerodynamic sound power levels in the range of 0.7-1.5 dBA (broadband) on B55 blade types. Also, due to significant shift in sound power spectra from low to high frequency bands, further reductions of sound pressure levels, *i.e.* greater than 1.5 dBA, can be expected at the receptor locations depending on the distance from the receptor as well as specific site/terrain conditions.

For the Grand Valley 3 project, the maximum broadband sound power level of the proposed 2.772 MW rating is expected to be 103 dBA when the original serrated edges (Rev.0) are replaced with the F-type Dinotails (Rev.1).

The acoustic emission document for the Rev.1 blade type at 2.772 MW together with the standard power curve are enclosed with this letter.

Best Regards,

K Habibi

Kaveh Habibi, Ph.D.

Sr. Aeroacoustics Engineer

APPENDIX B.2

Simens Gamesa – Grand Valley 3 – SWT-3.2-113 (mode 3, 2.772 MW) – Rev 1 Acoustic Emission

Grand Valley 3 - SWT-3.2-113 (Mode 3, 2.772 MW) - Rev1 Acoustic Emission

Typical Sound Power Levels

The sound power levels are presented with reference to the code IEC 61400-11 ed. 3.0 (2012) based on hub height. The sound power levels (L_{WA}) presented are valid for the corresponding wind speeds referenced to the hub height.

Wind Speed [m/s]	5	6	7	8	9	10	11	12	Up to cut-out
Mode 3 @ 2.772 MW L_{WA} [dB(A)]	92.6	96.5	99.5	103.0	103.0	103.0	103.0	103.0	103.0

Table 1: Acoustic Emission, LWA [dB(A) re 1 pW] (10 Hz – 10 kHz).

Low Noise Operations

The lower sound power level is also available and can be achieved by adjusting the turbines controller settings, i.e. an optimization of rpm and pitch. The noise settings are not static and can be applied to optimize the operational output of the turbine. Noise settings can be tailored to time of day as well as wind direction to offer the most suitable solution for a specific location. This functionality is controlled via the WebWPS SCADA system and is described further in the white paper on Noise Reduction Operations. Furthermore, tailored power curves can be provided which take wind speed into consideration allowing for management of the turbine output power and noise emission level to comply with site specific noise requirements. Tailored power curves are project and turbine specific and will therefore require Siemens Gamesa Siting involvement to provide the optimal solutions. The lower sound power levels may not be applicable to all tower variants. Please contact Siemens Gamesa for further information.

Typical Sound Power Frequency Distribution

Typical spectra for L_{WA} in dB(A) re 1 pW for the corresponding center frequencies are tabulated below for 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 m/s referenced to hub height.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	63.0	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2

Table 2: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 5 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	68.7	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3

Table 3: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 6 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	72.5	81.9	87.9	90.6	91.5	92.5	92.8	92.2	82.5

Table 4: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 7 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	76.6	86.7	91.1	93.6	94.8	96.7	96.6	95.0	85.8

Table 5: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 8 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	77.1	87.0	91.4	93.0	94.1	96.7	97.3	94.6	87.2

Table 6: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 9 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	77.0	87.2	91.0	92.8	93.8	96.5	97.3	94.8	89.0

Table 7: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 10 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	75.5	86.2	89.5	92.2	93.6	96.7	97.7	94.9	89.6

Table 8: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 11 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	75.7	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5

Table 9: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 12 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	75.7	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5

Table 10: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 13 m/s.

1/1 oct. band, center freq.	31.5	63	125	250	500	1000	2000	4000	8000
Mode 3 @ 2.772 MW [dB(A)]	75.7	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5

Table 11: Typical 1/1 Octave Band Spectrum for 31.5 Hz to 8 kHz at 14 m/s.

Tonality

Typical tonal audibility for the Siemens wind turbine generators has not exceeded 2.0 dB as determined in accordance with IEC 61400-11 ed. 3.0 (2012).

Measurement Uncertainty

A measurement uncertainty of +1.0 dB(A) is applicable to the sound power data.

Power Curve

The calculated power curve data for Mode 3 (2.772 MW) are valid for standard air density conditions of 15 deg.C air temperature, 1013 hPa air pressure and 1,218 kg/m³ air density, clean rotor blades, substantially horizontal, undisturbed air flow, normal turbulence intensity and normal wind shear.

horizontal hub height wind speed [m/s]	electrical power output [kW]		horizontal hub height wind speed [m/s]	electrical power output [kW]
0	0		11.5	2757
1.0	0		12.0	2768
1.5	0		12.5	2771
2.0	0		13.0	2772
2.5	0		13.5	2772
3.0	63		14.0	2772
3.5	109		14.5	2772
4.0	168		15.0	2772
4.5	248		15.5	2772
5.0	348		16.0	2772
5.5	471		16.5	2772
6.0	619		17.0	2772
6.5	794		17.5	2772
7.0	998		18.0	2772
7.5	1233		18.5	2772
8.0	1494		19.0	2772
8.5	1782		19.5	2772
9.0	2068		20.0	2772
9.5	2339		20.5	2772
10.0	2546		21.0	2772
10.5	2665		21.5	2772
11.0	2732		22.0	2772

Table 12: SG 3.2-113 (Mode 3, 2.772 MW) Power Curve Table for 1,218 kg/m³ Air Density.

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APPENDIX B.3

Simens Gamesa – Grand Valley 3 Power Curve
SWT-3.2-113 2A, Rev. 1

Grand Valley 3
Power Curve
SWT-3.2-113 2A, Rev. 1

The calculated power curve data are valid for standard air density conditions of 15 deg.C air temperature, 1013 hPa air pressure and 1,186 kg/m³ air density, clean rotor blades, substantially horizontal, undisturbed air flow, normal turbulence intensity and normal wind shear.

Wind	Power values [-] at different modes					
[m/s]	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6
1.0	0	0	0	0	0	0
1.5	0	0	0	0	0	0
2.0	0	0	0	0	0	0
2.5	0	0	0	0	0	0
3.0	61	61	61	61	61	61
3.5	106	106	106	106	106	106
4.0	163	163	163	163	163	163
4.5	241	241	241	241	241	241
5.0	338	338	338	338	338	338
5.5	458	458	458	458	458	459
6.0	602	602	602	602	602	602
6.5	773	773	773	773	773	771
7.0	971	971	971	971	970	960
7.5	1,200	1,200	1,200	1,198	1,193	1,165
8.0	1,458	1,456	1,454	1,447	1,432	1,375
8.5	1,745	1,738	1,734	1,716	1,681	1,580
9.0	2,047	2,027	2,014	1,979	1,916	1,769
9.5	2,360	2,312	2,281	2,222	2,124	1,933
10.0	2,647	2,555	2,495	2,409	2,282	2,063
10.5	2,892	2,736	2,633	2,522	2,379	2,155
11.0	3,062	2,854	2,716	2,586	2,435	2,214
11.5	3,144	2,907	2,750	2,612	2,458	2,240
12.0	3,184	2,933	2,766	2,623	2,469	2,252
12.5	3,195	2,939	2,770	2,626	2,472	2,256
13.0	3,199	2,942	2,772	2,627	2,473	2,257
13.5	3,200	2,942	2,772	2,628	2,473	2,257
14.0	3,200	2,942	2,772	2,628	2,473	2,257
14.5	3,200	2,942	2,772	2,628	2,473	2,257
15.0	3,200	2,942	2,772	2,628	2,473	2,257
15.5	3,200	2,942	2,772	2,628	2,473	2,257
16.0	3,200	2,942	2,772	2,628	2,473	2,257
16.5	3,200	2,942	2,772	2,628	2,473	2,257
17.0	3,200	2,942	2,772	2,628	2,473	2,257
17.5	3,200	2,942	2,772	2,628	2,473	2,257
18.0	3,200	2,942	2,772	2,628	2,473	2,257
18.5	3,200	2,942	2,772	2,628	2,473	2,257
19.0	3,200	2,942	2,772	2,628	2,473	2,257
19.5	3,200	2,942	2,772	2,628	2,473	2,257
20.0	3,200	2,942	2,772	2,628	2,473	2,257
20.5	3,200	2,942	2,772	2,628	2,473	2,257
21.0	3,200	2,942	2,772	2,628	2,473	2,257
21.5	3,200	2,942	2,772	2,628	2,473	2,257
22.0	3,200	2,942	2,772	2,628	2,473	2,257

The annual energy production data for different annual mean wind speeds in hub height are calculated from the above power curve assuming a Rayleigh wind speed distribution, 100 percent availability, and no reductions due to array losses, grid losses, or other external factors affecting the production.

Wind [m/s]	Energy [MWh]	Energy [MWh]	Energy [MWh]	Energy [MWh]	Energy [MWh]	Energy [MWh]
5.0	5,287	5,193	5,132	5,056	4,949	4,738
5.5	6,653	6,494	6,389	6,268	6,106	5,801
6.0	8,042	7,802	7,644	7,472	7,246	6,842
6.5	9,409	9,079	8,860	8,631	8,340	7,834
7.0	10,721	10,293	10,011	9,724	9,366	8,762
7.5	11,951	11,425	11,078	10,732	10,310	9,613
8.0	13,081	12,458	12,047	11,646	11,164	10,381
8.5	14,097	13,383	12,912	12,459	11,920	11,059
9.0	14,992	14,193	13,665	13,165	12,575	11,646
9.5	15,759	14,883	14,305	13,763	13,129	12,141
10.0	16,399	15,456	14,833	14,254	13,582	12,544

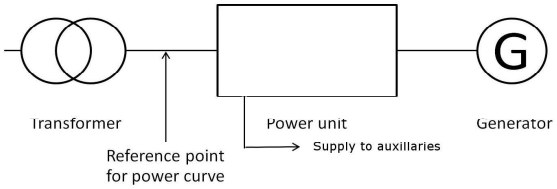

Diagram 1: Reference point for power curve

Siemens Gamesa and its affiliates reserve the right to change the above specifications without prior notice.

APPENDIX B.4

HGC Engineering – 01900425.003 - GV3 T101 Emission Testing Summary - 3Dec2019

HGC ENGINEERING

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

GRAND VALLEY WIND FARMS PHASE 3, WTG T101 EMISSION ACOUSTIC REPORT SUMMARY

Version 01

Grand Valley Wind Farms, Phase 3

Grand Valley, Ontario

Report Number: 01900425.003

Project Number: 01900425

Prepared for:

Grand Valley 2 Limited Partnership
2275 Upper Middle Road E.
Suite 700
Oakville, ON
L6H 0C3

Prepared by:

Nathan Gara

Digitally signed by Nathan Gara
Date: 2019.12.03 13:42:35 -05'00'

Nathan Gara, C.E.T.

Reviewed by:

Ian Bonsma

Digitally signed by Ian Bonsma
Date: 2019.12.03 11:46:36 -07'00'

Ian R. Bonsma, PEng

December 3, 2019

VERSION CONTROL

Version	Date	Version Description
01	December 3, 2019	Original Report

EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership, to complete Acoustic Noise testing in accordance with IEC 61400-11 of one wind turbine generator at the Grand Valley Wind Farms Phase 3 project near Grand Valley, Ontario. The Acoustic Emission Audit is required as a Condition F of Renewable Energy Approval number 76457-9L6QLC issued by the Ontario Ministry of the Environment, Conservation and Parks. This report represents measurements of the test wind turbine generator completed on November 22, 2019.

HGC Engineering has assessed a Siemens SWT 3.2-113 wind turbine generator ("WTG"), designated T101, in accordance with IEC 61400-11:2018-06. WTG T101 has a rated electrical power of 2648 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 Acoustic Test Report.

Sound Power Levels, $L_{WA,k}$ [dBA] as Measured by HGC Engineering vs Hub Height Wind Speed [m/s]											**Sound Power Level Specified in REA [dBA]**
7.5	**8**	**8.5**	**9**	**9.5**	**10**	**10.5**	**11***	**11.5***	**12***	**12.5***	
98.0	100.3	101.1	101.4	101.7	101.7	101.1	100.5	100.5	100.7	100.8	**102.5**

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ATTACHED:

REPORT 01900425.002 – ACOUSTIC TEST REPORT, WTG T101 (2648 kW)

1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership to complete sound level measurements (Emission Audit) of a Siemens SWT 3.0-113 Wind Turbine Generator ("WTG") with a rated capacity of 2648 kW, to determine the sound power level of the WTG. These WTGs are part of Grand Valley Wind Farms Phase 3 project which includes 16 Siemens WTGs, each rated at either 2483 kW or 2648 kW and each with a hub height of 99.5 m. The Acoustic Emission Audit is required as a Condition F of Renewable Energy Approval number 76457-9L6QLC ("REA") [1] issued by the Ontario Ministry of the Environment, Conservation and Parks. This report represents measurements of the test wind turbine generator completed on November 22, 2019.

This report summarizes measurements that were completed in accordance with IEC Standard 61400-11:2018-06 "Wind turbine generator systems – Part 11: Acoustic Noise Measurement Techniques" [2].

2 MEASUREMENTS AND RESULTS

Sound level measurements were conducted at WTG T101 on November 22, 2019, between 10:00 and 15:00. Additional details related to instrumentation, measurement procedures, and detailed results are provided in the attached Acoustic Test Report. The overall results are shown in Table 1 below.

Table 1: Emission Testing Summary Results

Hub Height Wind Speed [m/s]	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
Sound Power Level $L_{WA,K}$ [dB(A)]	**100.3**	**101.1**	**101.4**	**101.7**	**101.7**	**101.1**	**100.5**	**100.5**	**100.7**	**100.8**	**100.4**
Tonal Audibility, ΔL_{ak} [dB]	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0
Total Uncertainty $u_{LWA,k}$ [dB]	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8

The sound power level specified in the REA for WTG T101 is shown in Table 2.

Table 2: Manufacturers Sound Power Level

Turbine ID	Rated Electrical Output [kW]	Sound Power Level Specified in REA [dBA]
T101	2648	102.5

The sound power levels presented in Table 1 meet the maximum sound power levels in the REA.

3 CONCLUSIONS

The results of the acoustic measurements and analysis indicate that, for all measured wind speeds, the wind turbine generator meets the specified sound power level in Renewable Energy Approval Number 76457-9L6QLC [1].

Detailed results are provided in the attached Acoustic Test Report

REFERENCES

1. Ontario Ministry of the Environment Renewable Energy Approval Number 6457-9L6QLC, dated October 15, 2014.
2. International Electrotechnical Commission, 61400-11:2018-06 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.

APPENDIX B.5

HGC Engineering – 01900425.005 - GV3 T117 Emission Testing Summary - 4Sep2020

HGC ENGINEERING

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GRAND VALLEY WIND FARMS PHASE 3, WTG T117 EMISSION ACOUSTIC REPORT SUMMARY

Version 01

Grand Valley Wind Farms, Phase 3

Grand Valley, Ontario

Report Number: 01900425.005

Project Number: 01900425

Prepared for:

Grand Valley 2 Limited Partnership
2275 Upper Middle Road E.
Suite 700
Oakville, ON
L6H 0C3

Prepared by:

Nathan Gara

Digitally signed by Nathan Gara
Date: 2020.09.04 15:34:49 -04'00'

Nathan Gara, C.E.T.

Reviewed by:

Ian Bonsma

Digitally signed by Ian Bonsma
Date: 2020.09.04 13:51:40 -06'00'

Ian R. Bonsma, PEng

September 4, 2020

VERSION CONTROL

Version	Date	Version Description
01	September 4, 2020	Original Report

EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership, to complete Acoustic Noise testing in accordance with IEC 61400-11 of one wind turbine generator at the Grand Valley Wind Farms Phase 3 project near Grand Valley, Ontario. This report represents measurements of the test wind turbine generator completed on August 25, 2020.

HGC Engineering has assessed a Siemens SWT 3.0-113 wind turbine generator ("WTG"), designated T117, in accordance with IEC 61400-11:2018-06. WTG T117 has a rated electrical power of 2483 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 Acoustic Test Report.

Sound Power Levels, $L_{WA,k}$ [dBA] as Measured by HGC Engineering vs Hub Height Wind Speed [m/s]											**Sound Power Level Specified in REA [dBA]**
7.5	**8**	**8.5**	**9**	**9.5**	**10**	**10.5**	**11**	**11.5**	**12**	**12.5**	
99.8	100.2	100.4	100.7	100.5	100.3	100.1	100.1	99.8	100.0	99.4	**101.5**

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ATTACHED:

REPORT 01900425.004 – ACOUSTIC TEST REPORT, WTG T117 (2483 kW)

1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership to complete sound level measurements (Emission Audit) of a Siemens SWT 3.0-113 Wind Turbine Generator ("WTG") with a rated capacity of 2483 kW, to determine the sound power level of the WTG. The WTG is part of Grand Valley Wind Farms Phase 3 project which includes 16 Siemens WTGs, each rated at either 2483 kW or 2648 kW and each with a hub height of 99.5 m. The applicable sound power level limit for this turbine is provided in Condition F of Renewable Energy Approval number 76457-9L6QLC ("REA") [1] issued by the Ontario Ministry of the Environment, Conservation and Parks. This report represents measurements of the test wind turbine generator completed on August 25, 2020.

This report summarizes measurements that were completed in accordance with IEC Standard 61400-11:2018-06 "Wind turbine generator systems – Part 11: Acoustic Noise Measurement Techniques" [2].

2 MEASUREMENTS AND RESULTS

Sound level measurements were conducted at WTG T117 on August 25, 2020, between 13:20 and 17:00. Additional details related to instrumentation, measurement procedures, and detailed results are provided in the attached Acoustic Test Report. The overall results are shown in Table 1 below.

Table 1: Emission Testing Summary Results

Hub Height Wind Speed [m/s]	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5
Sound Power Level $L_{WA,K}$ in dB(A)	**99.8**	**100.2**	**100.4**	**100.7**	**100.5**	**100.3**	**100.1**	**100.1**	**99.8**	**100.0**	**99.4**
Tonal Audibility, ΔL_{ak} in dB:	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	-2	-1.7	-1.3
Total Uncertainty $u_{LWA,k}$ in dB:	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.9	0.8	0.8	0.8

The sound power level specified in the REA for WTG T117 is shown in Table 2.

Table 2: Manufacturers Sound Power Level

Turbine ID	Rated Electrical Output [kW]	Sound Power Level Specified in REA [dBA]
T117	2483	101.5

The sound power levels presented in Table 1 meet the maximum sound power levels in the REA.

3 CONCLUSIONS

The results of the acoustic measurements and analysis indicate that, for all measured wind speeds, the wind turbine generator meets the specified sound power level in Renewable Energy Approval Number 76457-9L6QLC [1].

Detailed results are provided in the attached Acoustic Test Report.

REFERENCES

1. Ontario Ministry of the Environment Renewable Energy Approval Number 6457-9L6QLC, dated October 15, 2014.
2. International Electrotechnical Commission, 61400-11:2018-06 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.

APPENDIX B.6
DinoTails Type F Information

Siemens Gamesa technological solutions

DinoTails® Next Generation World-leading noise reduction technology

As your trusted onshore wind energy technology provider, we are continuously innovating and developing new technologies to improve the performance, sustainability and quality of our products. We are strongly committed to developing best-in-class turbine solutions and setting new industry standards, backed by more than 40 years of experience and over 117 GW installed across the globe. We maximize the efficiency of our wind turbines through proven technologies and solutions adapted to each project and its varying site conditions. One of these technologies is DinoTails® Next Generation.

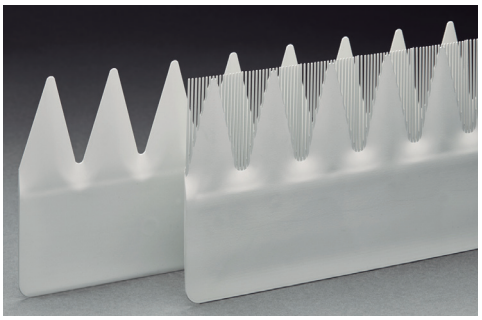
Operation of turbines within certain noise levels is crucial for a significant percentage of onshore wind projects. To comply with local noise regulations, many wind turbines must run at curtailed power outputs, thus producing less energy (typically 2-4% AEP per dB). However, silent wind turbines can produce more power, which results in lower LCoE.

Siemens Gamesa introduced the DinoTails® concept in 2000. As an aerodynamic blade add-on, it reduces the sound power levels by using a serrated trailing edge mounted at the blade.

SIEMENS Gamesa
RENEWABLE ENERGY

Inspired by nature

As a result of continuous innovation, Siemens Gamesa has recently pushed this concept even further through DinoTails® Next Generation, which uses a new approach. Inspired by the silent flight of the owl, this state-of-the-art technological solution improves the beneficial effect of the serrated edge by adding finer combs in between the teeth. These fine combs generate small flow structures, which further reduces the noise.



Proven technology

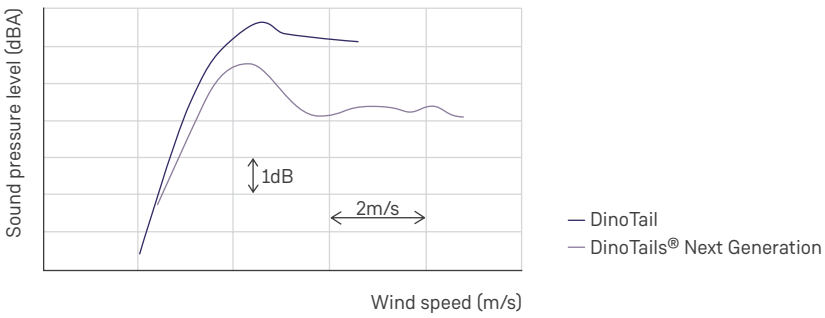
Siemens Gamesa has tested DinoTails® Next Generation using advanced validation methods, combining acoustic and aerodynamic wind tunnel tests with highly accelerated lifetime and power/noise curve measurements in the field. The results have shown robust performance with a significant noise reduction at all wind speeds without losing power.

Siemens Gamesa portfolio

DinoTails® Next Generation technology is now offered for the onshore Siemens Gamesa wind turbine platforms with substantial improvements to noise levels.

With a layout tailored for each turbine type, this world-leading noise reduction technology enables us to create value for our customers by maximizing AEP and reducing the LCoE in sites with noise constraints.

Noise curves



Siemens Gamesa Renewable Energy, S.A.
Parque Tecnológico de Bizkaia, Edif. 222
48170, Zamudio, Vizcaya, Spain
Phone: +34 944 03 73 52
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11/2021

APPENDIX C

Notice of a Proposed Change to an Approved Renewable Energy Project

NOTICE OF PROPOSED CHANGE TO AN APPROVED RENEWABLE ENERGY PROJECT

Grand Valley Wind Farms Phase 3

REA Approval Number: 6457-9L6QLC

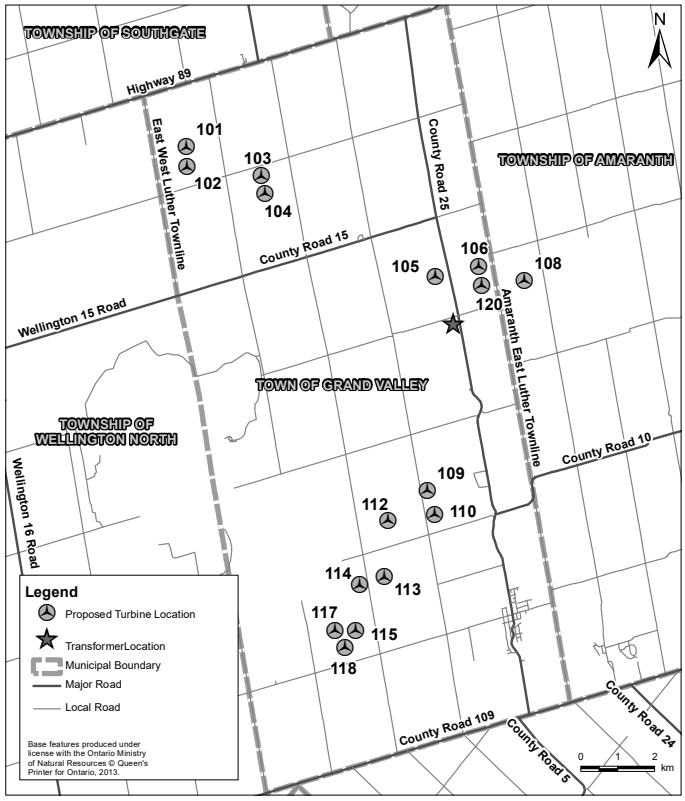
FIT Reference Number: FIT-002179-WIN-130-601

Project Location: The Project is generally bounded by Concession Road 2 & 3 to the south, East West Luther Townline to the west, 10th Line to the east, and Highway 89 to the north Township of Grand Valley and the Township of Amaranth, within the County of Dufferin, Ontario

Dated at: The Town of Grand Valley and the Township of Amaranth on this the 8th day of September 2021

Grand Valley Wind Farms Phase 3 Inc., a general partner of Grand Valley 2 Limited Partnership (GV2LP) was issued a Renewable Energy Approval on October 15, 2014 (EBR registry number 012-0827) and two Amendments to the Renewable Energy Approval on June 30, 2015 (EBR registry number 012-4280) and December 14, 2015 (EBR registry number 012-5985).

Grand Valley Wind Farms Phase 3 Inc. is proposing to make a change to the Project that is subject to Ontario Regulation 359/19. This notice is being distributed to make the public aware of the proposed change to the Project in accordance with Section 32.3(1) of the Regulation.



Project Description:
Pursuant to the Act and Regulation, the facility consists of a Class 4 wind facility with 16 turbines generating a maximum nameplate capacity of 40 MW. The Project also includes ancillary works including an electrical collector system, a substation, and access roads.

Proposed Change:
An application has been made to the Ministry of the Environment, Conservation and Parks to change the Project requiring an amendment to the existing Renewable Energy Approval. The proposed change consists of a revision to the maximum power capacity of all 16 turbines to 2.772 kW, where currently 14 of the turbines have a maximum capacity of 2.483 kW and two have a maximum capacity of 2.648 kW. This change is proposed to better manage production obligations of the applicants Feed-in Tariff (FIT) contract. The overall nameplate capacity (40 MW) of the facility will not change as a result of proposed increased maximum power capacity for each turbine. The turbines are operated at de-rated capacity levels to meet the contract nameplate capacity. No physical design changes are required to the turbines associated with this Project; however, operational (software) changes will be made.

The proposed change is considered to be a Technical Change. To support this Technical Change a Noise Impact Assessment study has been prepared to demonstrate compliance with MECP Noise Guideline for Windfarms (2016) and O. Reg. 359/09.

Documents for Public Inspection:
Further details regarding the proposed change to the Project are provided in a Modification Report (dated April 2021), a copy of which can be found on the Project website at: www.gvwf3.ca. The Noise Impact Assessment Report (2021) is also available on the Project website.

Information with respect to the decisions on this Project can be viewed on the Environmental Registry (including the archive) by searching for EBR registry numbers referenced above.

Project Contacts
To learn more about the Project, or to communicate questions or comments, please contact the Project team via email at information@gvwindfarms.com or by telephone at 519-216-5856.

Comments and questions can also be directed to:
GV2LP – Grand Valley Phase 3
2275 Upper Middle Road East., Suite 700
Oakville, ON L6H 0C3