Grand Valley Wind Farms Phase 3 Renewable Energy Approval Modification Report

Final Report

September 22, 2025

Prepared for:
Grand Valley 2 Limited Partnership
120 Adelaide Street West, Suite 425
Toronto, ON M5H 1T1

Prepared by:
Stantec Consulting Ltd.

Project/File:
160901137

Limitations and Sign-off

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Prepared by ____

Dominique Zeldin
Environmental Consultant

Digitally signed by Greener, Leslie
Date: 2025.09.24 20:41:48 -04'00'

Reviewed by ____
(signature)

Leslie Greener, B.Sc., EP
Principal, Environmental Assessment Planner
Business Center Practice Leader

Knight, Mark
2025.09.25
09:05:40 -04'00'

Approved by ____
(signature)

Mark Knight, MA, MCIP, RPP
Principal Environmental Planner, Business Center Practice Leader

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1 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 temporary REA Amendment was issued on September 7, 2022, for the completion of an International Electrotechnical Commission (IEC) 61400-11 emission testing on two (2) wind turbines to qualify the noise impact assessment related to proposed operation of the wind turbines at 2.772 MW. This temporary REA Amendment expired on September 7, 2023.

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 Summary and Rationale for Technical Change

The proposed Project change is to revise the maximum power capacity of the 14 turbines operating at 2.483 MW to 2.648 MW to manage power production obligations under the proponents Feed-in Tariff (FIT) contract and an anticipated new contract with the Independent Electricity System Operator (IESO). Additionally, technical information on the Next Generation (F-Type) DinoTails is provided within this Modification Report. Currently, 14 turbines have a maximum capacity of 2.483 MW and two have a maximum capacity of 2.648 MW, and all turbines are equipped with Next Generation (F-Type) DinoTails.

The overall nameplate capacity (40 MW) of the facility will increase to 42.368 MW as a result of proposed increased maximum power capacity for each turbine. Currently, 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 as the noise-reducing Next Generation DinoTails have previously been installed on the turbines by the turbine manufacturer as part of ongoing regular maintenance; however, operational (software) changes will be made.

To support this technical change, a Noise Impact Assessment Report prepared by Zephyr North (2025) has been prepared to demonstrate compliance with the MECP's *Noise Guideline for Windfarms* (2016) and Ontario Regulation (O. Reg) 359/09.

For information, all turbines in the GV2LP wind farm were originally constructed in the latter half of 2015 with D-type DinoTails. 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.

Appendix B provides technical documentation to support the proposed Project change. In addition, several older reports have been included in Appendix B at the request of MECP. Appendix B is organized as follows:

- Appendix B.1 Noise Impact Assessment Report
- Appendix B.2 Grand Valley Wind Farms Phase 3, WTG T101 Emission Acoustic Report Summary and Acoustic Test Report (December 3, 2019)
- Appendix B.3 Grand Valley Wind Farms Phase 3 Acoustic Report Summary and Acoustic Report, WTG T101 (2648 KW) (December 22, 2023)
- Appendix B.4 Siemens Contract Acoustic Emission, SWT-3.2 113, Hub Height 99.5 m
- Appendix B.5 DinoTails® Next Generation World-leading Noise Reduction Technology

3 Project Technical Change – Change to Maximum Rate Capacity of Wind Turbines

The proposed Project change entails an increase in the maximum rated capacity for the 14 approved turbines to better manage power production within the requirements of the FIT contract and an anticipated new contract with the IESO. As stated above, no physical design changes are required to the turbines associated with the Project. The Noise Impact Assessment Report prepared by Zephyr North (Appendix B.1) has determined that the estimated sound pressure levels at all qualified receptors and vacant lot surrogate receptors (VLSRs) in the wind farm area will comply with current Ontario MECP sound level limits at points of reception (Zephyr North 2025).

GV2LP has prepared an application to amend the REA for this change to the maximum power capacity of each of the 14 turbines to 2.648 MW and to increase the nameplate capacity to 42.368 MW which is designated as a Technical Change.

4 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 operational change and software upgrade to the Project turbines will result in no physical changes to the turbines or the Project and no change in previously identified impacts related to noise and vibration; therefore no new adverse environmental impacts are expected.

5 Potential Changes in Impacts as Reported in 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.

GV2LP completed a Noise Impact Assessment Report (Appendix B.1) to assess the proposed operational change to increase the maximum power capacity to 2.648 MW for the 14 turbines, noting that two turbines are already operating at 2.648MW. This assessment concluded that the increase in maximum power capacity would not result in any new adverse environmental impacts nor result in changes to the REA Assessment.

Table 1 and 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). Note: 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 Summary of Revisions to the REA Technical Assessments

As outlined in Section 3 above, the overall nameplate capacity (40 MW) of the facility will increase to 42.368 MW as a result of proposed increased maximum power capacity for each turbine. The REA technical assessments describe the Project as having an overall nameplate capacity of 40 MW which will no longer align with the description of the Project should this Modification Report be approved by the MECP. However, administrative changes to the reports are assumed to have been addressed by issuance of this Modification Report and its appendices and, in the absence of any material changes, further updates to the reports have not been made. Further, references to “Appendix C Noise Assessment Report” of the Design and Operations Report are assumed to be considered obsolete with the issuance of this Modification Report and the documentation provided in Appendix B of this report supersedes any of the previous information provided related to noise and turbine details.

Table 3 identifies the revisions to the REA technical assessments submitted with the original REA application and reviewed by the MECP that are required to address the proposed Project change.

Table 3 Summary of Revisions to the REA Supporting Technical Assessments

Technical Assessment	Section	Original Text	Revised Text
Noise Impact Assessment Report	-	Described existing conditions, potential impacts, and mitigation measures.	Full replacement of the previous Noise Assessment Report.
Project Description Report*	-	No revisions proposed	N/A
Construction Plan Report*	-	No revisions proposed	N/A
Design and Operations Report*	-	No revisions proposed	N/A
Environmental Effects Monitoring Plan*	-	No revisions proposed	N/A
Decommissioning Plan Report*	-	No revisions proposed	N/A
Wind Turbine Specification Report	1.1	Grand Valley 2 Limited Partnership (GV2LP) is proposing to develop, construct, operate and decommission the 40-megawatt (MW) Grand Valley Wind Farms - Phase 3 Wind Project (the Project) in the Town of Grand Valley and Township of Amaranth, Dufferin County in response to the Government of Ontario’s initiative to promote the development of renewable electricity in the province.	Grand Valley 2 Limited Partnership (GV2LP) is proposing to develop, construct, operate and decommission the 42.368 megawatt (MW) Grand Valley Wind Farms - Phase 3 Wind Project (the Project) in the Town of Grand Valley and Township of Amaranth, Dufferin County in response to the Government of Ontario’s initiative to promote the development of renewable electricity in the province.

Technical Assessment	Section	Original Text	Revised Text
	1.1	The proposed Project Location and Project Study Area are shown in Figures 1 and 2, Appendix A.	Text has been removed to correct an administrative error (i.e., there was no Appendix A in the previous submission)
	1.1	Sixteen (16) wind turbine generators (SWT 3.2-113 turbine) with a total maximum installed nameplate capacity of 40 MW.	Sixteen (16) wind turbine generators (SWT 3.2-113 turbine) with a total maximum installed nameplate capacity of 42.368 MW.
	1.1	N/A	• noise-reducing Next Generation DinoTails;
	1.1	GV2LP retained Stantec Consulting Ltd. (Stantec) to prepare the REA application with input from Zephyr North Ltd., and Archaeological Services Inc. The REA application is a requirement under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the *Environmental Protection Act* (O. Reg. 359/09), as amended.	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 for 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.
	1.2	Please see Noise Assessment Report, an Appendix of the Design and Operations Report.	Please see Noise Assessment Report, an Appendix of the Modification Report.
	2.1	The Project consists of sixteen (16) wind turbine generators (SWT 3.2-113) with a total maximum installed nameplate capacity of 40 MW. The turbine would be 'de-rated', generating less electricity per turbine to meet the contracted nameplate capacity. A Noise Assessment Report has been completed as part of the REA process and is provided in the Design and Operations Report.	The Project consists of sixteen (16) wind turbine generators (SWT 3.2-113) with a total maximum installed nameplate capacity of 42.368 MW. The turbine would be 'de-rated', generating less electricity per turbine to meet the contracted nameplate capacity. A Noise Assessment Report has been completed as part of the REA process and is provided in the Modifications Report.
	2.1	A complete description of the general specifications for the turbine model is found in the manufacturer's information provided as Attachment A. Acoustic data is also provided in the Noise Assessment Report contained within the Design and Operations Report.	A complete description of the general specifications for the turbine model is found in the manufacturer's information provided as Appendix B in the Modification Report. Acoustic data is also provided in the Noise Assessment Report contained within the Modification Report.

Technical Assessment	Section	Original Text	Revised Text
	-	Attachment A	Removal of Attachment A
Consultation Report*	-	No revisions proposed	N/A
Natural Heritage Assessment and Environmental Impact Study*	-	No revisions proposed	N/A
Water Assessment and Water Body Report*	-	No revisions proposed	N/A
Stage 1 and Stage 2 Archaeology Reports*	-	No revisions proposed	N/A
Heritage Assessment Report*	-	No revisions proposed	N/A

* No material changes are proposed, however sections describing the nameplate capacity of the Project may differ from the revised description provided in this Modification Report.

A copy of the Noise Impact Assessment Report, dated July 21, 2025, is provided in Appendix B.1.

7 Consultation and Notification

Pre-consultation regarding the proposed REA Amendment submitted on July 3, 2024, was undertaken with the MECP via an in-person meeting held on February 29, 2024. Additional emails with various contacts at the MECP were received July 8, 2024, August 28, 2024, October 4, 2024, November 1, 2024 and November 19, 2024.

A Notice of Proposed Change to an Approved Renewable Energy Project (Notice) was mailed/emailed out to Project stakeholders, on July 8, 2024, notifying them of the proposed Technical Change and directing them to review the Modification Report (July 3, 2024) available on the Project website. The notice was distributed to the public in accordance with Section 32.3(1) of O. Reg. 359/09.

Table 4 lists which Indigenous communities were circulated on the Notice. There were no comments received regarding the content of the Notice.

Table 4 Indigenous Community List

Community	Name	Title	Email
Métis Nation of Ontario	Linda Norheim	Director of Lands, Resources and Consultation	LindaN@metisnation.org
Métis Nation of Ontario		Consultations Office	consultations@metisnation.org
Beausoleil First Nation	Joanne P. Sandy	Chief	council@chimnissing.ca
Beausoleil First Nation	Whitney Walsh	Chief Councillor	council@chimnissing.ca
Six Nations of the Grand River Elected Council	Sherri-Lyn Hill	Chief	cngr.chief@sixnations.ca
Six Nations of the Grand River	Clairissa Pietron	Strategic Advisor and Systems Analyst	htpa@sixnations.ca
Six Nations of the Grand River Elected Council	Peter Graham	Consultation Supervisor	lrcs@sixnations.ca
Chippewas of Rama First Nation	Evelyn Ball	Chief Administrative Officer (CAO)	evelynb@ramafirstnation.ca
Chippewas of Rama First Nation		Administration (General Intake)	admin@ramafirstnation.ca
Chippewas of Rama First Nation		Community Consultation	consultation@ramafirstnation.ca
Chippewas of Georgina Islands First Nation	Donna Big Canoe	Chief	donna.bigcanoe@georginaisland.com

Community	Name	Title	Email
Chippewas of Georgina Islands First Nation	Natasha Charles	Community Consultation	natasha.charles@georginaisland.com
Saugeen First Nation	Conrad Ritchie (Chi-Nimkii)	Chief	conrad.ritchie@saugeen.org
Saugeen Ojibway Nation	Riel Warrilow	Environment Office, Interim Executive Administrative Officer	manager@saugeenojibwaynation.ca
Saugeen Ojibway Nation	Bob Nickel	Environment Office, Energy Associate	bnickel.energy@saugeenojibwaynation.ca
Saugeen First Nation		Saugeen Band Office (General Contact)	sfn@saugeen.org
Chippewas of Nawash Unceded First Nation	Gregory Nadjiwon	Ogimaa (Chief)	chief@nawash.ca
Chippewas of Nawash Unceded First Nation	Michael Earl	Senior Administrative Officer, Band Office	sao@nawash.ca
Great Lakes Métis Council	Peter Coture	President	peterc1908@hotmail.com
Great Lakes Métis Council		General Contact	GreatLakesMetis@gmail.com
Six Nations Haudenosaunee Confederacy Chiefs Council (HCCC) c/o Haudenosaunee Development Institute	Hohahes Leroy Hill		info@hdi.land

Appendix C.1 provides a list of property owners within 550 m of the Project location and to which a notice was mailed. Appendix C.2 provides dated letters/emails that were distributed to other stakeholders and Indigenous communities. In addition, a Notification was published on two separate occasions in the Orangeville Banner newspaper during the weeks of July 8, 2024, and July 15, 2024. A copy of the notice is presented in Appendix C.3.

A copy of this Modification Report was submitted to the Ministry of Natural Resources and the Ministry of Citizenship and Multiculturalism for their information via email (Appendix C.2). 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 on July 3, 2024. Appendix C.4 provides evidence of the date when the materials were posted on the Project website.

8 Closure

The proposed operational modifications have been assessed in accordance with O. Reg 359/09 and the MECP's Technical Guide. It has been determined that the proposed operational modifications 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.

Appendices

Appendix A Site Layout

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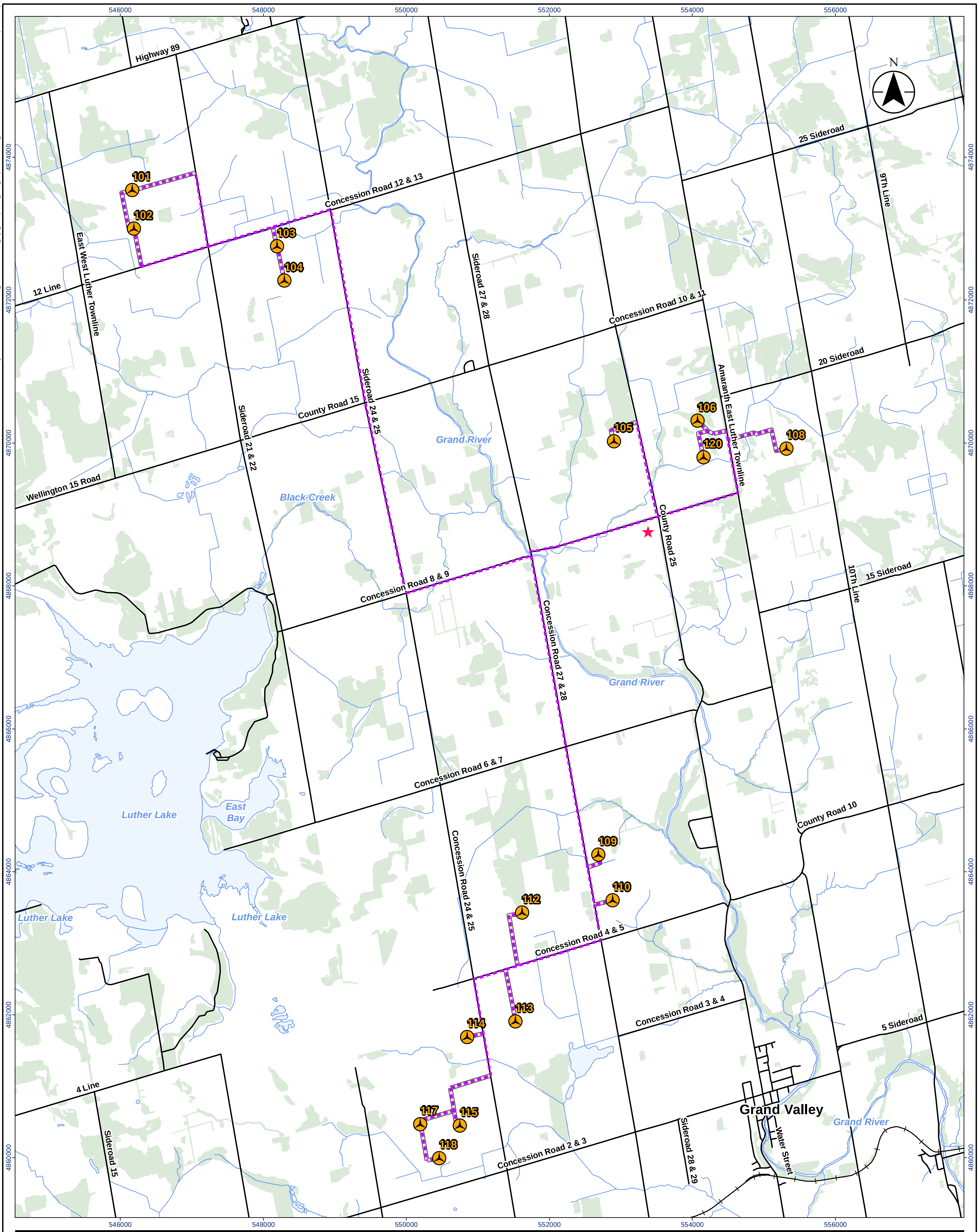

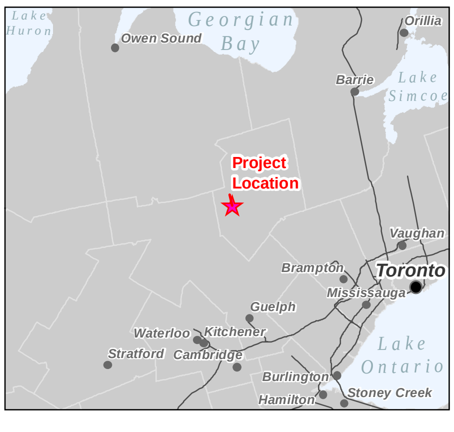

Legend

- 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 Supporting Technical Documents

Appendix B.1 Noise Impact Assessment Report

Grand Valley Wind Farms – Phase 3 Wind Farm

NOISE IMPACT ASSESSMENT REPORT — SWT-3.2-113 (MP2,648 kW)

Revision 2

Proponent:

GRAND VALLEY WIND FARMS
ENERGY PROJECTS

G. Cholakis

Prepared by:

Dr. J. Salmon

2025 July 21

Zephyr North Ltd.

850 LEGION ROAD UNIT 20
BURLINGTON ON L7S 1T5
CANADA

Phone: 905-335-9670
Email: Info@ZephyrNorth.com

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1 INTRODUCTION

1.1 Purpose

Grand Valley 2 Limited Partnership (GV2LP) has tasked Zephyr North with the determination of whether the Grand Valley Wind Farms – Phase 3 (GVWF-P3) Wind Farm would be noise compliant to current Ontario regulations with the following prospective change:

1. Software conversion of all existing GVWF-P3 Wind Farm turbines to the Siemens Gamesa SWT-3.2-113 (Max Power 2,648 kW) model.

This Noise Impact Assessment (NIA) Report is provided to demonstrate that the GVWF-P3 Wind Farm will meet the required compliance.

While some previous NIA reporting on the GVWF-P3 Wind Farm was based on previous versions of Ontario O. Reg 359/09 and the 2008 version of the Ontario Ministry of Environment, Conservation and Parks' (MECP) *Noise Guidelines for Wind Farms* and this report uses some data and calculations from those previous reports (referenced in Section 10), the present report is fully compliant with the current O.Reg 359/09 and the current version (2016) of the *Noise Guidelines for Wind Farms.*

1.2 Revision 0

Revision 0 was the original version of this Noise Impact Assessment Report.

1.3 Revision 1

Revision 1 included the following changes from Revision 0.

1. During the revision of the original (Revision 0) report, it was discovered that the "positive uncertainty value" defined in O.Reg. 359/09 for the Siemens SWT-3.2-113 (Max Power 2,648 KW) turbine, the Grand Valley Wind Farms – Phase 3 turbine subject of this report, had erroneously been applied twice in the determination of the "maximum sound power level" source sound power level spectrum. This was corrected in the Revision 1. All results which include this turbine were updated.

Note that this resulted in sound pressure levels at all receptors which are equal to or lower than those reported in Revision 0 of the report.

2. The locations of the Melancthon Wind Farm turbines were corrected using Google Earth © satellite imagery. The non-existent Melancthon turbine T359 was removed from the analysis.

3. Using Google Earth © and Microsoft Bing Maps Platform satellite imagery, the complement of residences within 2.0 km of any project wind turbine was updated. This included removal of at least one residence that no longer existed or was originally erroneously specified, adjustment of residence coordinates (generally by less than about 50 m) where appropriate, and inclusion of additional residences which were either missed in previous surveys or were built within approximately the last four years.

4. Updated cadastral lot parcel fabric for the project area was obtained from TerraNet (via First Base Solutions). Using these data, mapping was updated to include all (non-public) parcels. This rendered the parcel mapping current to approximately January 2025. A complete re-analysis of residences, turbines, transformers and parcels was undertaken in order to update the inventory of non-participating receptors (receptors), participating receptors (participants), vacant lot surrogate receptors (VLSRs) and participating vacant lot surrogate receptors (PVLSRs). This included generation of additional VLSRs on new parcels that did not host an actual residence.

5. Typographical errors were corrected and text updates were included that were consistent with the changes made in this revision.

1.4 Revision 2

Revision 2 (this revision) includes the following changes.

1. At the suggestion of MECP, the specification for the source sound power level of the subject turbine (Siemens Gamesa SWT-3.2-113 (Max Power 2,648 kW)) has been taken from Siemens Gamesa published documentation (SGRE 2021, SGRE 2019) rather than from the field-measured emission study used in previous revisions. This specification is described in Section 4.2.1.1 .

2. Tables and figures have been updated as required.3. Typographical errors have been corrected and text updates have been included that are consistent with the changes made in this revision.

1.5 Brief Description

The Grand Valley Wind Farms – Phase 3 Wind Farm is located to the northwest of the town of Grand Valley in Dufferin County. It was commissioned in 2015 and features 16 wind turbines. Turbines from the Grand Valley Wind Farms – Phase 1 & 2 Wind Farms are interspersed with turbines of the subject wind farm. Melancthon Wind Facility turbines are located to the northeast.

It should be noted that the Grand Valley 2 Limited Partnership (GV2LP, owner of the GVWF-P3 Wind Farm) and the Grand Valley 1 Limited Partnership (GV1LP, owner of the GVWF-P1&2 Wind Farms) are affiliated companies.

Figure 1-1 shows the location of the wind farm within the province of Ontario.

Figure 1-1 Location map.

1.6 Reporting Details

This report has been prepared to meet all reporting requirements related to wind farm noise as listed in Ontario O. Reg 359/09 (Government of Ontario, 2009b) as accessed at https://www.ontario.ca/laws/regulation/r09359#BK0 on 2025-07-09. The assessment methodology and calculations conform to the ISO 9613-2 International Standard (ISO, 1996) and include an extension which considers nine, rather than eight, source sound power level octave bands. Results of the analysis have been interpreted using Ministry of Environment, Conservation and Parks (MECP) *Noise Guidelines for Wind Farms* (MECP, 2016). This latter document generally provides guidelines and clarifications for the application of MECP regulations document NPC-300 (MECP, 2013) to wind farms.

The MECP (2016) *Guidelines* document prescribes receptor noise level limits based on an analysis of typical wind-induced background noise levels, and tabulates these limits as functions of the ambient 6, 7, 8, 9, and 10 ms^{-1} wind speeds measured at 10 m above ground level (a.g.l.) or equivalent hub-height wind speeds. Note that the receptor noise level limits must be met for noise produced by other wind farm hardware such as substation transformers in addition to noise produced by the wind turbines.

This report shows that the estimated noise levels generated by the subject wind farm and adjacent wind farm turbines and other hardware will meet the MECP (2016) prescribed limits at all qualified receptors.

1.7 Sound Level Limits for Wind Farms

MECP (2016) lists the sound level limits for wind farms (based on the NPC-300 publication and a consideration of the background ambient wind-induced sound level) as follows. Note that noise contributions from wind farm switching, transformer, and substations must be included.

Summary of Sound Level Limits for Wind Turbines							
Wind speed (ms^{-1}) at 10 m height	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Wind turbine sound level limits Class 3 Area, dBA	40.0	40.0	40.0	43.0	45.0	49.0	51.0
Wind turbine sound level limits Class 1 Area, dBA	45.0	45.0	45.0	45.0	45.0	49.0	51.0
Reference wind induced background sound level L_{90}, dBA	30.0	31.0	33.0	36	38.0	42.0	44.0

2 WIND FARM LAYOUT

2.1 Wind Farm Site

Figure 2-1 shows the Grand Valley Wind Farms – Phase 3 (GVWF-P3) Wind Farm. Typical topographic map features along with wind farm details are shown on the map.

Within the wind farm domain, the topography can be characterized as gently rolling with a topographic elevation in the wind farm area of approximately 490 m above sea level (a.s.l).

The surface roughness of the wind farm domain is typical of Ontario rural terrain with a heterogeneous mixture of agricultural fields, woodlots, farm buildings, dwellings, and rural settlements.

The primary activity in this area is agriculture.

The GVWF-P3 site features a population density typical of southern Ontario rural communities — a relatively sparse population in the countryside except for a small number of settlement clusters (villages and towns). The Town of Grand Valley lies to the southeast of the wind farm site.Wind Farm Details

Figure 2-1 shows the wind farm's leased properties along with turbine, point of reception (receptor), vacant lot surrogate receptor (VLSR), participating point of reception (participant), participant vacant lot surrogate receptor (PVLSR) and cadastral lot locations. Turbine numbers are designated with the prefix 'T', receptors with 'R', VLSRs with 'V', participants with 'P', and PVLSRs with 'Q'.

As specified by O.Reg 359/09, the Grand Valley Wind Farms – Phase 3 Wind Farm is a Class 4 Wind Facility.

Presently, the GVWF-P3 Wind Farm consists of 16 Siemens noise and power derated SWT-3.2-113 turbines. The specific turbine models are two SWT-3.2-113 (Max Power 2,648 kW) and 14 SWT-3.2-113 (Max Power 2,483kW). Turbines T101 and T102 are the former model. The "Max Power" designation indicates that the turbines are noise and power limited versions of the standard SWT-3.2-113 turbine which has a power rating of 3,200 kW.

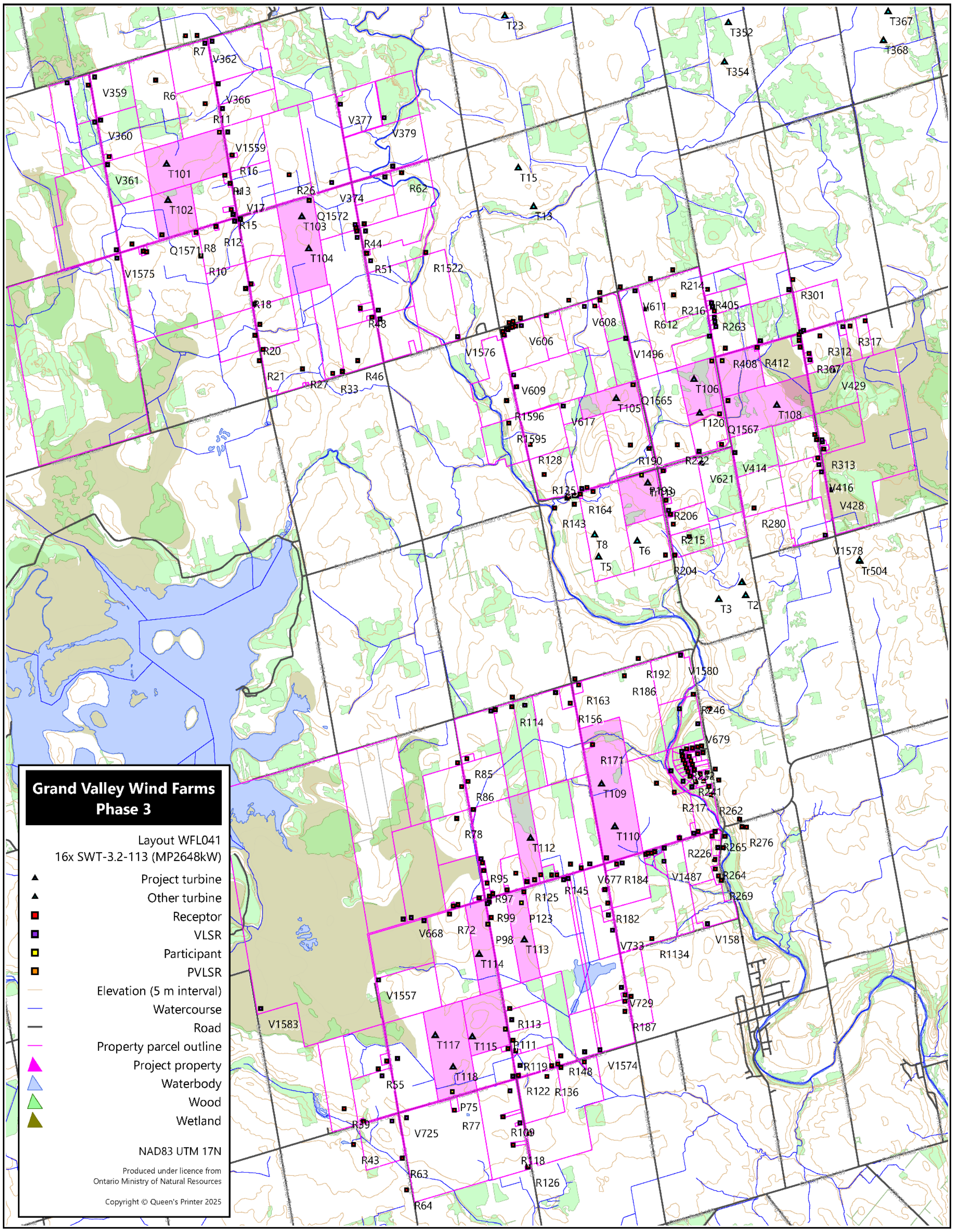

Figure 2-1 Site map.

Zephyr North

The updated/proposed GVWF-P3 Wind Farm described in this report will consist of 16 Siemens Gamesa SWT-3.2-113 (Max Power 2,648 kW) turbines. As before, this turbine model is power limited in order to facilitate noise reduction.

Wind farm turbines are numbered T101 through T120 in Figure 2-1. Note that there are gaps in the numbering series and that Tr119 is power transformer. A listing of all GVWF-P3 turbine locations can be found in Section 11 (Appendix A).

The wind farm stretches for a distance of about 12 km east-to-west and about 15 km north-to-south.

The turbines of the Grand Valley Wind Farms – Phase 1&2 Wind Farms are interspersed with a portion of the GVWF-P3 turbines in the same general area.

The Ontario NPC designation for the wind farm properties would generally be Class 3 — Rural. Typical background sound levels for these areas would be generated by residential, agricultural, and small commercial activities, ambient sound from wind, and vehicle noise from regional roads. For the purpose of this report, all areas are considered to be NPC Class 3.

2.2 Municipal Zoning

Typically, the wind farm area is zoned as Agricultural.

2.3 Adjacent Wind Farms

2.3.1 Grand Valley Wind Farms – Phase 1 & Phase 2 Wind Farms

Figure 2-1 also shows the locations of existing turbines in the Grand Valley 1 Limited Partnership's Grand Valley Wind Farms – Phase 1 & Phase 2 (GVWF-P1&2) Wind Farms. These turbines are located generally to the north and on the eastern side of the GVWF-P3 Wind Farm. The GVWF-P1&2 Wind Farms are comprised of nine Siemens noise and power derated SWT-2.3-101 turbines. The specific models are as follows. Turbines T2 and T3 are the SWT-2.3-101 (Max Power 2,126kW) model; turbines T5, T6 and T8 are the SWT-2.3-101 (Max Power 2,221 kW, DT) model; turbines T13, T15, T23 and T24 are the SWT-2.3-101 (Max Power 2,221kW) model. Note that there are gaps in the turbine numbering scheme.

As explanation, the SWT-2.3-101 (Max Power 2,221 kW, DT) model turbines in the GVWF-P1&2 Wind Farms are fitted with Siemens Gamesa noise-reducing "DinoTails Next Generation" trailing edge devices.

All turbines in the GVWF-P1&2 Wind Farms within 5 km of any receptor of the GVWF-P3 Wind Farm have been included in the present noise impact assessment report.

2.3.2 Melancthon Wind Facility

Figure 2-1 also shows the locations of some of the existing turbines in the Trans-Alta Melancthon Wind Facility (MWF). These turbines are located mainly to the northeast. There is a total of 133 GE-1.5sle turbines in the MWF. Of these, 6 lie within 5 km of any receptor for the GVWF-P3 Wind Farm. The MWF turbines are numbered T352 to T503 in Figure 2-1.

All Melancthon Wind Facility turbines within 5 km of any receptor of the GVWF-P3 Wind Farm have been included in this noise impact assessment.

2.4 Substations

2.4.1 Grand Valley Wind Farms – Phase 3 Wind Farm

The GVWF-P3 Wind Farm includes a substation consisting of a relatively small power transformer and reactor. This substation will convert the wind farm collection-level voltage to transmission system voltage (230 kV). This transformer is shown as Tr119 in Figure 2-1.

Noise from this transformer has been included in all the reported noise calculations.

2.4.2 Grand Valley Wind Farms – Phase 1 & 2 Wind Farms

The GVWF-P1&2 Wind Farms are served by a single substation comprised of two relatively small power transformers for conversion of the collection voltage to distribution-level voltage. These transformers are shown as Tr25 and Tr26 in Figure 2-1. They are located about 200 m north of turbine T2.

Noise from these transformers has been included in all the reported noise calculations.

2.4.3 Melancthon Wind Facility

The Melancthon Wind Facility contains one substation with two large power transformers. These convert the wind farm collection-level voltage to transmission system voltage (230 kV). They are shown in Figure 2-1 as Tr504 and Tr505.

Noise from these transformers has been included in all the reported noise calculations.

3 DESCRIPTION OF RECEPTORS

3.1 Definitions

Receptors (non-participating points of reception), vacant lot surrogate receptors (VLSRs), and participants (participating points of reception) are defined in Ontario MECP NPC-300 (MECP, 2013), the Ontario *Noise Guidelines for Wind Farms* (MECP, 2016), and in Ontario O.Reg. 359/09 (Government of Ontario, 2009).

This report also includes participating vacant lot surrogate receptors (PVLSRs). These are surrogate points of reception (analogous to vacant lot surrogate receptors) located on vacant properties which participate in the wind farm project.

3.2 Determination

Initial receptor and participant data (location, type, dwelling height, *etc.*) were taken from pre-construction and post-construction noise impact assessment reports by Zephyr North (2015, 2016, 2021) previously submitted to the MECP. Receptors and participants were originally identified through mapping, aerial photographs, satellite imagery and on-site surveys in the project area by a third party on behalf of the Grand Valley 2 Limited Partnership.

To account for noise receptor changes in the interim between those dates and April 2024, a field survey was carried out by GVLP2 to determine whether any new residences had been built. GVLP2 reported to Zephyr North that no new residences had been constructed.

As a further check and based on a request by the MECP, Zephyr North carried out a desktop residence survey in February 2025 to try to determine whether the previously acquired residence data were consistent with recent satellite imagery. Zephyr North used Google Earth © and Bing Maps Platform satellite imagery to try to confirm existing residences and to discover any additional residences that may have been constructed or demolished in the interim. It is important to note that such a survey cannot unambiguously identify buildings as residences (*i.e.*, potential receptors). Nor can it find residences that might be hidden by tree cover.

3.3 Results

Typically, for this area receptors are residential dwellings of individuals and families not associated with the subject wind farm. Section 11 (Appendix A) lists the locations and details of all known receptors and participants situated within the wind farm area. Their locations are also shown in Figure 2-1. All receptors, VLSRs, participants, and PVLSRs within 2.0 km of any GVWF-P3 wind turbine or within 1.0 km of any GVWF-P3 transformer have been identified. All of those within 1.5 km of a wind farm turbine or 1.0 km of the wind farm transformer have been included and reported in this noise impact analysis. All receptors have been considered to be designated as rural (NPC Class 3).

For the purpose of this noise impact assessment, participants have been defined as dwellings occupied by landowners who receive financial compensation for the placement of wind farm hardware (turbines, cables, roads, substations, *etc.*) on their properties.

For information, Table 3-1 summarizes the number of receptors, VLSRs, participants, PVLSRs, and vacant lots identified for the wind farm.

Table 3-1 Summary of numbers of receptors, VLSRs, participants, PVLSRs and vacant lots.

	Within 1.5 km of any subject turbine or 1.0 km of any subject transformer	Within 2.0 km of any subject turbine or 1.0 km of any subject transformer
Number of receptors (R)	119	208
Number of VLSRs (V)	71	n/a
Number of participants (P)	6	6
Number of PVLSRs (Q)	9	n/a
Total	205	n/a
Number of vacant lots	108	n/a

3.4 Vacant Lots

The MECP (2016) *Noise Guidelines* also require prediction of noise levels on “noise sensitive zoned lots”. These are defined in the *Guidelines* in the list of definitions and in Section 6.3.5 of that document and include lots which do not host dwellings. Therefore, all vacant lots within 1.5 km of any turbine or 1.0 km of the substation in the GVWF-P3 Wind Farm were identified as those lots defined by the complete set of cadastral parcel fabric which did not contain a receptor dwelling, nor a participant dwelling, nor wind farm infrastructure (turbine, cable, substation, *etc.*), and were obviously not road rights-of-way, public property, industrial or commercial property, *etc.* A 1 ha area “having regard to the existing zoning by-law(s), Minimum Distance Separation(s) Formulae or setbacks (as applicable), the typical building pattern in the area and an appropriate or likely future use of the vacant lot” was therefore identified for each of the vacant lots. A ‘vacant lot surrogate receptor’ (VLSR) located in the 1 ha area and designated with a height of 4.5 m was created for the purpose of noise estimation. The VLSRs are listed in Section 11 (Appendix A).

Vacant lot surrogate receptors were also created for properties that hosted project infrastructure (turbines, transformers, *etc.*) and did not host a participant dwelling.

These were termed participant vacant lot surrogate receptors – PVLSRs. These are also listed in Section 11 (Appendix A).

Note that for this report (and a revision of a previous report), Zephyr North obtained updated (as of 2025-02-13) Teranet (www.teranet.ca) parcel fabric for the project area from First Base Solutions (www.firstbasesolutions.com) to ensure, in particular, that all vacant lots were identified. The disposition of receptors, participants and property parcels was fully re-analyzed to ensure proper identification of vacant lots and subsequent assignment of VLSRs and PVLSRs.

3.5 Methodology

ISO 9613-2 modelling was carried out for all receptors, VLSRs, participants and PVLSRs.

Typically, a resultant sound pressure level for each receptor/ VLSR/participant /PVLSR was determined as stipulated in Section 6.3.1 of MECP (2016) where there is no qualifying transformer within the wind farm, and as stipulated in Section 6.3.2 where there is a qualifying transformer. In the case of this wind farm, which includes a substation, Section 6.3.2 was used.

The heights of dwellings designated as 1-, 2-, and 3-storeys were set to be 1.5, 4.5, and 7.5 m respectively.

As noted above, participating receptors (referred to herein as participants) have also been surveyed and are shown in Figure 2-1 and listed in Section 11 (Appendix A). Estimates of sound pressure levels were made for the participant locations.

It should be noted that the receptors, VLSRs, participants and PVLSRs listed in Section 11 include those that are closer than or equal to 2,000 m from any wind farm turbine or closer than or equal to 1,000 m from any qualifying substation transformer (if existent) noise source.

3.6 Concordance Table

Section 6.4.5 of the *Noise Guidelines for Wind Farms* (MECP, 2016) describes the purpose of a "concordance table" that rationalizes the identification of receptors and VLSRs between the subject wind farm and any qualifying nearby wind farm. In the present case, the GVWF-P1&2 Wind Farms include receptors which are shared with the GVWF-P3 Wind Farm. Table 3-2 lists receptors and VLSRs which are located mutually within 2.0 km of any wind turbine in GVWF-P3 and GVWF-P1&2. Note that there were no mutual receptors with the neighbouring Melancthon Wind Facility.

The next paragraphs describe the concordance table's columns.

The first pair of columns in the table lists the UTM coordinates (NAD83, UTM17N) of the receptor or VLSR as determined for the GVWF-P3 Wind Farm. The second pair of columns lists the coordinates as provided by HGC Engineering (2013) and listed in the GVWF-P1&2 noise impact assessment report. Note that for receptors, the values in these pairs of columns are generally only slightly different. The differences can be attributed to the choice of the exact location of the dwelling in question and the precision of the GIS data including base mapping and air or satellite photography. However, in the case of VLSRs, the locations can be significantly different since the VLSR need only be located on the vacant property in question, although it must be surrounded by at least 1 ha of available land, zoned to permit residential or similar uses, conform with local building codes, and be consistent with the typical building pattern in the area. In some instances, it is possible for the two wind farm designers to reasonably choose two VLSRs which are hundreds of metres apart but still located on the same vacant lot property. Note that there are some receptors and VLSRs in each of the wind farms that do not appear to have matches in the other wind farm. These have been indicated by 'n/a' in the table.

The fifth column in the table lists the distance between the two locations (GVWF-P3–designated or GVWF-P1&2–designated) determined for the receptor or VLSR.

The next pair of columns lists the receptor or VLSR identifier — first as used for GVWF-P3, and second as used for GVWF-P1&2. Naturally, these would not be expected to be the same. As noted above, there are some receptors/VLSRs that are found in one wind farm and not in the other. Again, this is indicated by 'n/a'.

The next pair of columns lists the distances from the receptor or VLSR to the nearest noise source in their respective wind farms — first for the GVWF-P3-identified receptor/VLSR (to the nearest noise source in the GVWF-P3 Wind Farm), and second for the GVWF-P1&2-identified receptor/VLSR (to the nearest noise source in the GVWF-P1&2 Wind Farms.

The next three columns list the receptor/VLSR sound pressure levels — the first for the case where only GVWF-P3 noise sources are included, the second where only GVWF-P1&2 noise sources are included, and the third where noise sources from both wind farms are included. Note that the sound pressure levels are listed for the GVWF-P3 receptor/VLSR locations. They have not been determined for the GVWF-P1&2 receptor/VLSR locations. In most cases, these should be quite similar but there could be significant differences where there is a substantial separation between GVWF-P3/GVWF-P1&2 receptor/VLSR pairs. This would more likely occur in the case of the VLSRs. Note that the 'Total combined sound level' has been determined from a full analysis including both the GVWF-P3 and the GVWF-P1&2 noise sources at GVWF-P3 receptors/VLSRs.

Table 3-2 GVWF-P3 and GVWF-P1&2 receptor and VLSR concordance table.

Receptor UTM coordinates GVWF-P3		Receptor UTM coordinates GVWF-P1&2			Point of reception ID		Distance to nearest noise source (m)		Nearest noise source ID		Noise level (dBA)		Total combined sound level (dBA)
Easting (m)	Northing (m)	Easting (m)	Northing (m)	Difference (m)	GVWF-P3	GVWF-P1&2	GVWF-P3	GVWF-P1&2	GVWF-P3	GVWF-P1&2	GVWF-P3	GVWF-P1&2	
549,689	4,873,413	549,692	4,873,416	4	R62	R136	1636	1748	T103	T5	27.8	30.9	32.7
551,620	4,869,335	551,622	4,869,337	3	R128	R056	1460	1666	T105	T8	28.0	30.3	32.3
551,828	4,868,884	551,831	4,868,882	4	R135	R050	1558	1177	Tr119	T8	27.6	33.2	34.3
551,983	4,868,383	551,980	4,868,385	4	R143	R161	1446	729	Tr119	T8	26.6	37.4	37.8
552,171	4,868,532	552,171	4,868,531	1	R152	R160	1230	691	Tr119	T8	27.6	37.8	38.2
552,194	4,871,500	552,193	4,871,501	1	R154	R092	1639	1498	T105	T13	27.7	31.6	33.4
552,278	4,868,564	552,280	4,868,563	3	R158	R051	1118	660	Tr119	T8	28.1	38.2	38.6
552,280	4,868,438	552,285	4,868,439	5	R159	R047	1145	550	Tr119	T8	27.6	39.7	40.0
552,287	4,865,817	552,287	4,865,821	4	R160	R004	1629	1860	T109	T5	27.9	29.9	32.1
552,310	4,868,572	552,311	4,868,570	2	R161	R166	1058	653	Tr119	T8	28.2	38.3	38.8
552,342	4,865,726	552,343	4,865,726	1	R163	R003	1528	1944	T109	T5	28.4	29.6	32.1
552,370	4,868,591	552,372	4,868,591	2	R164	R159	1023	650	Tr119	T8	28.5	38.5	38.9
552,467	4,868,692	552,467	4,868,681	11	R169	RV07	915	714	Tr119	T8	29.4	37.6	38.3
552,560	4,868,630	552,561	4,868,629	1	R173	R031	829	652	Tr119	T8	29.5	38.6	39.1
552,584	4,871,414	552,584	4,871,413	1	R174	R090	1427	1749	T105	T13	29.2	30.5	33.2
552,661	4,871,613	552,663	4,871,613	2	R176	R091	1608	1629	T105	T13	28.4	31.0	33.2
552,664	4,871,501	552,665	4,871,502	1	R177	R089	1497	1720	T105	T13	29.0	30.6	33.2
552,969	4,871,700	552,970	4,871,701	2	R185	R088	1677	1772	T105	T13	28.6	30.4	33.0
553,030	4,865,863	553,029	4,865,860	3	R186	R005	1660	1824	T109	T3	27.7	31.7	33.2
553,121	4,869,328	553,119	4,869,327	2	R190	R083	629	1448	Tr119	T6	35.9	32.7	37.6
553,236	4,866,124	553,237	4,866,120	4	R192	R006	1964	1400	T109	T3	26.4	33.4	34.3
553,287	4,868,876	553,287	4,868,875	1	P193	R081	153	994	Tr119	T6	37.0	35.6	39.4
553,612	4,868,939	553,611	4,868,939	1	R202	R032	297	1125	Tr119	T6	34.8	34.3	37.7
553,653	4,868,500	553,658	4,868,496	6	R206	R033	373	752	Tr119	T6	32.2	37.4	38.6
553,721	4,868,286	553,722	4,868,284	2	R210	R034	579	640	Tr119	T6	30.2	38.7	39.3
553,762	4,868,139	553,810	4,868,149	49	R215	R035	725	644	Tr119	T6	29.2	39.4	39.8
553,824	4,869,330	553,820	4,869,332	4	R222	R029	578	1567	T120	T6	38.0	31.7	39.0
554,063	4,865,586	n/a	n/a	n/a	R246	n/a	1926	n/a	T109	n/a	26.5	32.5	33.6
554,299	4,865,371	554,299	4,865,374	3	R260	R011	1070	1642	T109	T3	26.3	31.4	32.8
554,486	4,869,335	554,487	4,869,339	4	R270	R028	569	1928	T120	T6	38.4	30.8	39.2
554,973	4,868,382	554,946	4,868,374	28	R280	R027	1577	1123	T108	Tr26	29.4	34.2	36.2
554,686	4,869,215	n/a	n/a	n/a	V414	n/a	788	n/a	T120	n/a	35.9	30.5	37.2
551,485	4,871,119	n/a	n/a	n/a	V606	n/a	1795	n/a	T105	n/a	26.6	30.0	31.7
551,823	4,871,216	551,863	4,871,266	64	R607	R093	1611	1649	T105	T13	27.5	30.6	32.7
552,428	4,871,405	n/a	n/a	n/a	V608	n/a	1462	n/a	T105	n/a	28.8	30.8	33.2
553,188	4,871,642	n/a	n/a	n/a	V611	n/a	1599	n/a	T106	n/a	29.2	29.5	32.9
552,114	4,869,910	n/a	n/a	n/a	V617	n/a	801	n/a	T105	n/a	33.6	29.5	35.0
554,149	4,869,233	n/a	n/a	n/a	V620	n/a	568	n/a	T120	n/a	37.9	31.4	38.8
554,194	4,869,054	n/a	n/a	n/a	V621	n/a	748	n/a	T120	n/a	35.6	32.2	37.3
554,131	4,865,145	n/a	n/a	n/a	V679	n/a	1704	n/a	T109	n/a	27.5	30.0	32.2
550,051	4,872,217	n/a	n/a	n/a	R1522	n/a	1755	n/a	T104	n/a	27.4	30.8	32.4
553,853	4,865,371	n/a	n/a	n/a	V1543	n/a	1625	n/a	T109	n/a	28.0	30.9	32.9
553,400	4,869,276	n/a	n/a	n/a	R1555	n/a	522	n/a	Tr119	n/a	35.7	32.7	37.5
553,692	4,868,347	553,617	4,868,755	415	V1563	RV09	513	957	Tr119	T6	30.7	38.4	39.2
552,193	4,868,552	n/a	n/a	n/a	R1584	n/a	1204	n/a	Tr119	n/a	27.7	n/a	38.2
551,471	4,871,232	n/a	n/a	n/a	R1585	n/a	1877	n/a	T105	n/a	26.3	n/a	32.1
551,361	4,871,183	n/a	n/a	n/a	R1586	n/a	1932	n/a	T105	n/a	26.1	n/a	31.6
551,301	4,871,165	n/a	n/a	n/a	R1587	n/a	1970	n/a	T105	n/a	25.9	n/a	31.5
551,396	4,871,110	n/a	n/a	n/a	R1588	n/a	1861	n/a	T105	n/a	26.3	n/a	31.5
551,350	4,871,097	n/a	n/a	n/a	R1589	n/a	1891	n/a	T105	n/a	26.2	n/a	31.4
551,319	4,871,088	n/a	n/a	n/a	R1590	n/a	1912	n/a	T105	n/a	26.1	n/a	31.3
551,286	4,871,059	n/a	n/a	n/a	R1591	n/a	1923	n/a	T105	n/a	26.1	n/a	31.2
551,260	4,871,071	n/a	n/a	n/a	R1592	n/a	1952	n/a	T105	n/a	26.0	n/a	31.1
551,208	4,871,031	n/a	n/a	n/a	R1593	n/a	1975	n/a	T105	n/a	25.9	n/a	31.0
551,225	4,870,979	n/a	n/a	n/a	R1594	n/a	1934	n/a	T105	n/a	26.0	n/a	30.9
554,000	4,867,951	n/a	n/a	n/a	R1597	n/a	1014	n/a	Tr119	n/a	28.1	n/a	39.1
549,557	4,873,511	n/a	n/a	n/a	V1602	n/a	1562	n/a	T103	n/a	28.2	n/a	32.4
552,391	4,868,673	n/a	n/a	n/a	V1611	n/a	992	n/a	Tr119	n/a	29.0	n/a	38.2
n/a	n/a	553,350	4,869,419	n/a	n/a	RV08	n/a	1541	n/a	T6	n/a	n/a	n/a
n/a	n/a	554,783	4,868,061	n/a	n/a	RV10	n/a	800	n/a	Tr26	n/a	n/a	n/a
n/a	n/a	551,882	4,871,407	n/a	n/a	RV27	n.a	1512	n/a	T13	n/a	n/a	n/a
n/a	n/a	553,028	4,869,160	n/a	n/a	R030	n/a	1264	n/a	T8	n/a	n/a	n/a
n/a	n/a	551,481	4,871,227	n/a	n/a	R094	n/a	1688	n/a	T13	n/a	n/a	n/a

4 DESCRIPTION OF SOURCES

4.1 Turbine Noise Definition Standard

The commonly accepted and current global wind turbine noise definition Standard is IEC-61400-11:2012/AMD1:2018 (IEC, 2018). Note that there is a Corrigendum (1) dated 2019, as well. The MECP (2016) *Guidelines* require that, "The noise impact assessment report must include the acoustic emissions of the wind turbine, as specified by the manufacturer in accordance to the CAN/CSA standard, References [3] [4]...". These references are listed in the MECP "Guideline References" as CAN/CSA-61400-11-07 and CAN/CSA-IEC 61400-11:13 respectively. However, both are listed by CSA as "Withdrawn". The active CSA Standard for wind turbine acoustic noise measurements is CSA IEC 61400-11:19 (CSA, 2019) and is described by CSA as "Adopted IEC 61400-11:2012, third edition, 2012-11, including amendment 1:2018)".

Further, the "CSA Preface" to the CSA IEC 61400-11:19 Standard version (CSA, 2019) is as follows.

"**CSA Preface**

This is the second edition of CSA IEC 61400-11, Wind turbines — Part 11: Acoustic noise measurement techniques, which is an adoption without modification of the identically titled IEC (International Electrotechnical Commission) Standard 61400-11 (third edition, 2012-11), including IEC Amendment 1:2018. It supersedes the previous edition, published in 2013 as CAN/CSA-IEC 61400-11 (adopted IEC 61400-11:2012)."

Therefore, in this report the IEC-61400-11:2012/AMD1:2018 (IEC, 2018) and CSA IEC 61400-11:19 (CSA, 2019) Standards have been used interchangeably.

4.2 Wind Turbines

4.2.1 Grand Valley Wind Farms – Phase 3 Wind Farm

The GVWF-P3 turbines were manufactured by Siemens Wind Systems A/S (www.siemens.com) of Germany. (Note that the Siemens wind turbine division has since changed its company name to Siemens Gamesa Renewable Energy.) The specific turbine model and variants currently used in the GVWF-P3 Wind Farm are the Siemens SWT-3.2-113 (Max Power 2,648 kW) and the Siemens SWT-3.2-113 (Max Power 2,483 kW). These are noise- and power-reduced variants of the base (full power, full noise) SWT-3.2-113 (Max Power 3,200 kW) turbine. As noted previously, the Grand Valley 2 Limited Partnership wishes to convert all turbines to the single SWT-3.2-113 (Max Power 2,648 kW) variant. This would be accomplished through a turbine control system software change. This NIA report uses this latter turbine in its noise calculations.

4.2.1.1 Siemens SWT-3.2-113 (Max Power 2,648 kW)

The Siemens SWT-3.2-113 (Max Power 2,648 kW) is a noise- and power-reduced member of the Siemens SWT-3.2-113 turbine family.

The following table summarizes this turbine's characteristics.

Siemens SWT-3.2-113 (Max Power 2,648 KW)	
Type, number of blades, rotor orientation	horizontal-axis, 3-bladed, upwind wind turbine
Rated power	2,648 kW
Rotor diameter; swept area	113.0 m; 10,000 m^2
Blade treatment	OEM DinoTails for noise reduction
Operational rotation rate	6.0 to 15.5 rpm; variable speed
Hub height; tower type	99.5 m; steel tubular tower
Power regulation	pitch regulation with variable speed
Cut-in wind speed	3 to 5 ms^{-1}
Cut-out wind speed	25 ms^{-1}
Rated wind speed	12 to 13 ms^{-1}
Gearbox	no gearbox
Generator; speed	synchronous permanent magnet generator
Turbine transformer	external transformer; step-up transformer on concrete pad at the base of the turbine
Braking system	aerodynamic primary brake by full-span pitching with hydraulic activation
Yaw system	active, externally geared, passive friction brake

There is no Siemens Gamesa published noise specification for the Siemens Gamesa SWT-3.2-113 (Max Power 2,648 kW) variant. In previous revisions of this noise impact assessment, results from a field study of noise emissions (HGE Engineering, 2019) were used. However, for this revision, MECP has recommended that published noise specifications be substituted. Since there is no published specification for the project's Max Power 2,648 kW turbine variant, it was suggested that the noise specification for the Max Power 2,772 variant (Mode 3) would be acceptable. Therefore, turbine source sound power level broadband, octave band, and 1/3 octave band data for hub-height wind speeds of 8 to 14 ms^{-1} were taken from SGRE (2021) using the Mode 3 (103.0 dBA maximum) specification. It should be noted that MECP has recommended that a similar Acoustic Emissions document (SGRE, 2019) can be referenced for source sound power levels. However, this latter document includes no information on tonality or uncertainty. In addition, the source sound power levels in both documents are identical for the MECP "predictable worst case" for Mode 3 (Max Power 2,648 kW) operation. For these reasons, the 2021 version has been used. For reference, both documents are included in Section 12 (Appendix B).

Sensitivity tests of the impact of hub-height wind speed on resultant sound pressure levels with distance from the turbine were performed with the data from the SGRE (2021) report. Figure 4-1 shows the results of these tests for a series of 4.5 m height receptors placed at 50 m intervals between 550 and 1500 m from a single SWT-3.2-113 (Max Power 2,648 kW) turbine. The graph shows the receptor sound pressure level as a function of distance from the turbine using each of the octave band (9 bands) source sound power level sets corresponding to the hub height 8 to 14 ms^{-1} wind speeds. (Note that the source sound power levels for wind speeds 12 to 14 ms^{-1} were identical. The "predictable worst case" for all distances occurs for the hub height 8 ms^{-1} wind speed. As a consequence of these tests, for this turbine the hub-height 8 ms^{-1} wind speed set of octave band source sound power levels (the "maximum sound power level spectrum") has been used for all noise impact assessment calculations in the ISO 9613-2 modelling.

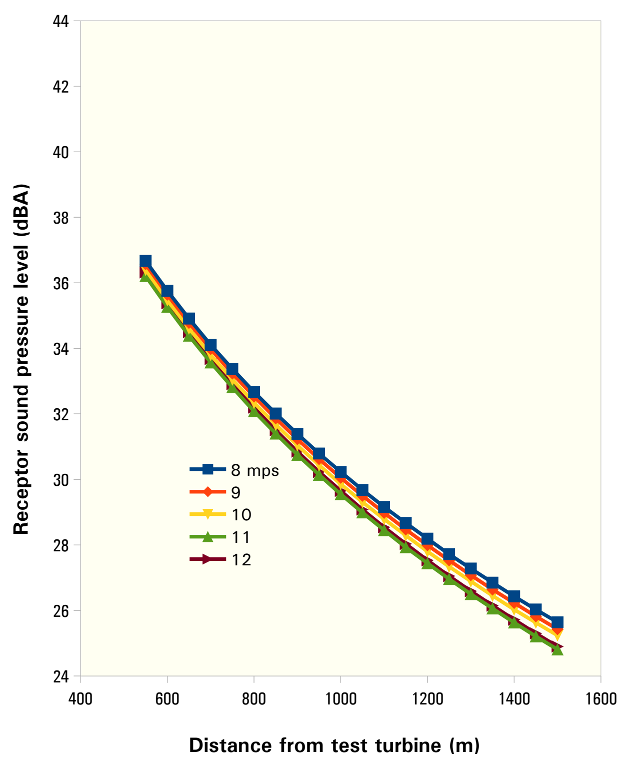

Figure 4-1 SWT-3.2-113 (Max Power 2,648 kW) wind speed sensitivity test.

In the SGRE (2021) documentation, it is stated that the tonal audibility is less than 2.0 dB for all wind speeds. No tonal penalty has been applied to this turbine.

SGRE (2021) report lists the calculated uncertainty for all wind speeds. As required by O.Reg.359/09, this uncertainty (for the 8 ms^{-1} "predictable worst case") has been added to each of the (9) octave band source sound power levels as shown in Table 4-1. This maximum sound power level spectrum has been used in all calculations.

The hub-height broadband and octave band linear source sound power levels for the Siemens SWT-3.2-113 (Max Power 2,648 kW) turbine are shown in Table 4-1. Note that the "A+B Maximum Sound Power Level" (the maximum sound power level spectrum) for *all* wind speeds have all been set to those corresponding to the hub-height 8 ms^{-1} wind speed set of octave band source sound power levels since these correspond to the MECP-defined "predictable worst case" and "maximum sound power level spectrum".

Table 4-1 Siemens SWT-3.2-113 (Max Power 2,648 kW) — Wind turbine acoustic emissions summary.

Make and Model: Siemens SWT-3.2-113 Max Power 2,648 kW)										
Electrical Rating: 2,648 kW										
Hub Height (m): 99.5										
	Octave band sound power level (dBLin)									
	Manufacturer's Emission Levels at bin centre wind speeds at hub height							(A) Manufac-turer's Worst Case Spectrum	(B) Positive Overall Un-certainty, U_c / Fixed Value	(A+B) Maximum Sound Power Level
Wind speed at hub height (ms^{-1})	8.0	9.0	10.0	11.0	12.0	13.0	14.0			
Frequency (Hz)										
31.5	116.0	116.5	116.4	114.9	115.1	115.1	115.1	116.0	1.0	117.0
63	112.9	113.2	113.4	112.4	112.9	112.9	112.9	112.9	1.0	113.9
125	107.2	107.5	107.1	105.6	105.7	105.7	105.7	107.2	1.0	108.2
250	102.2	101.6	101.4	100.8	100.8	100.8	100.8	102.2	1.0	103.2
500	98.0	97.3	97.0	96.8	96.7	96.7	96.7	98.0	1.0	99.0
1000	96.7	96.7	96.5	96.7	96.8	96.8	96.8	96.7	1.0	97.7
2000	95.4	96.1	96.1	96.5	96.8	96.8	96.8	95.4	1.0	96.4
4000	94.0	93.6	93.8	93.9	93.7	93.7	93.7	94.0	1.0	95.0
8000	86.9	88.3	90.1	90.7	89.6	89.6	89.6	86.9	1.0	87.9
Overall A-weighted (dBA)	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0		104.0
Overall Uncer-tainty, U_c (dB)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		

4.2.2 Grand Valley Wind Farms – Phase 1 & 2 Wind Farms

There are seven Siemens SWT-2.3-101 (Max Power 2,221 kW) and two Siemens SWT-2.3-101 (Max Power 2,126k W) turbines (T2, T3) in the GV2LP GVWF-P1&2 Wind Farms. Information on the rating and noise characteristics of these turbines has been supplied by Grand Valley 2 Limited Partnership.

In addition, GV2LP has fitted Siemens Gamesa original equipment manufacturer (OEM) "DinoTails Next Generation" to the blades of three of the existing turbines in the GVWF-P1&2 Wind Farms – T5, T6 and T8. The DinoTails Next Generation further reduce this turbine's noise characteristics. For the purposes of this NIA report, these DinoTails-fitted turbines are designated as Siemens SWT-2.3-101 (Max Power 2,221 kW, DT).

All of the GVWF-P1&2 turbines have been included in the present noise impact assessment.

4.2.2.1 Siemens SWT-2.3-101 (Max Power 2,221 kW)

The Siemens SWT-2.3-101 (Max Power 2,221 kW) is a noise- and power-reduced member of the Siemens SWT-2.3-101 turbine family.

The following table summarizes this turbine's characteristics.

Siemens SWT-2.3-101 (Max Power 2,221 kW)	
Type, number of blades, rotor orientation	horizontal-axis, 3-bladed, upwind wind turbine
Rated power	2,221 kW
Rotor diameter; swept area	101.0 m; 8,000 m^2
Blade treatment	OEM DinoTails for noise reduction
Operational rotation rate	6.0 to 16.0 rpm; variable speed
Hub height; tower type	80.0 m; steel tubular tower
Power regulation	pitch regulation with variable speed
Cut-in wind speed	4 ms^{-1}
Cut-out wind speed	25 ms^{-1}
Rated wind speed	12 to 13 ms^{-1}
Gearbox	3 stage planetary/helical
Generator; speed	asynchronous with squirrel-cage rotor, without slip rings; variable speed
Turbine transformer	internal transformer
Braking system	aerodynamic primary brake by full-span feathering of individual blades; mechanical disk brake on high-speed shaft which has two hydraulic calipers
Yaw system	active electric externally geared slewring; passive friction brake

Siemens Gamesa has included the following data in documentation (Siemens Gamesa, 2019) provided to Zephyr North by the Grand Valley 2 Limited

Partnership: broadband source sound power level data for hub-height integer wind speeds from 5 ms^{-1} to cut-out; octave band (63 to 8000 Hz) source sound power level data for integer wind speeds from 8 ms^{-1} to 15 ms^{-1}: 1/3 octave band (10 to 160 Hz) source sound power level data for wind speeds of 8, 9, 11, and 12 ms^{-1}. The documentation confirms that, "The sound power levels are presented with reference to the code IEC 61400-11 ed. 3.0 (2012) based on hub height." This documentation is included in Section 12 (Appendix B).

Sensitivity tests of the impact of hub-height wind speed on resultant sound pressure levels with distance from the turbine were performed with the data provided. Figure 4-2 shows the results of these tests for a series of 4.5 m height receptors placed at 50 m intervals between 550 and 1500 m from a single SWT-2.3-101 (Max Power 2,221 kW) turbine. The graph shows the receptor sound pressure level as a function of distance from the turbine using each of the raw octave band (9 bands) source sound power level sets corresponding to the hub height 8 to 15 ms^{-1} wind speeds. The "predictable worst case" for all distances occurs for the hub height 10 ms^{-1} wind speed. As a consequence of these tests, for this turbine the hub-height 10 ms^{-1} wind speed set of octave band source sound power levels (the maximum sound power level spectrum) has been used for all noise impact assessment calculations in the ISO 9613-2 modelling.

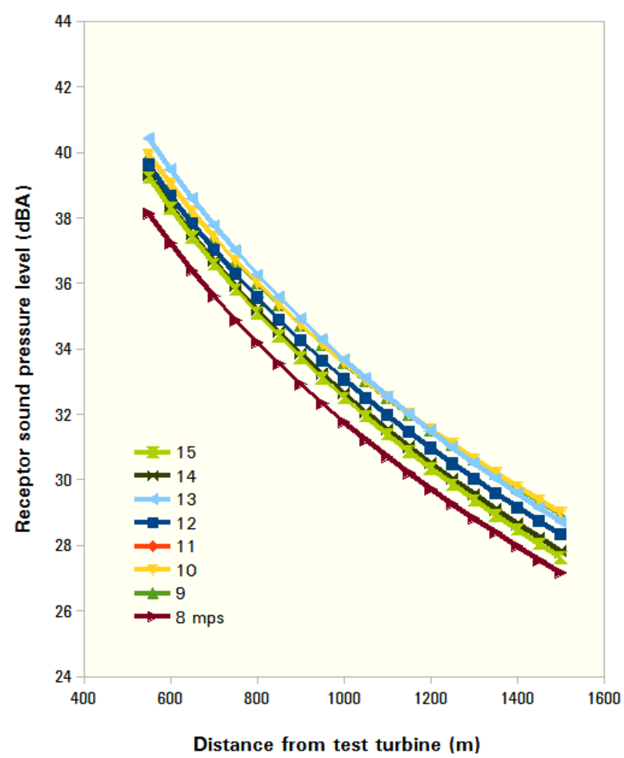

Figure 4-2 SWT-2.3-103 (Max Power 2,221 kW) wind speed sensitivity test.

Siemens states in a private communication (A. Jensen, 2011-01-10), "The Wind test Report WT 4498/05 [see Windtest, 2005 in References] for the SWT 2.3-93 wind turbine generator is relevant for assessment of the SWT 2.3-101 wind turbine generator tonality as the nacelle and frequency converter are identical for both the SWT 2.3-93 and the SWT 2.3-101. There are no other components on the SWT 2.3-101 that result in ascertainable tonalities determined in accordance with IEC 61400-11". No tonal penalty has been applied to this turbine.

Presumably because this is an older turbine model, the Siemens Gamesa documentation does not include a value for the Total Measurement Uncertainty

($U_{LWA,k}$). Therefore, as required by O.Reg.359/09, a value of 2.0 dB has been used in the present calculations. This uncertainty has been added to each of the (9) octave band source sound power levels as shown in Table 4-2. This augmented source sound power level profile (maximum sound power level spectrum) has been used in all calculations.

Table 4-2 Siemens SWT-2.3-101 (Max Power 2,221 kW) — Wind turbine acoustic emissions summary.

Make and Model: Siemens SWT-2.3-103 (max power 2,221 kW)											
Electrical Rating: 2,221 kW											
Hub Height (m): 80.0											
	Octave band sound power level (dBLin)										
	Manufacturer's Emission Levels at bin centre wind speeds at hub height								(A) Manufac-turer's Worst Case Spectrum	(B) Positive Overall Un-certainty, U_c / Fixed Value	(A+B) Maximum Sound Power Level
Wind speed at hub height (ms^{-1})	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0			
Frequency (Hz)											
31.5	114.0	115.8	116.4	116.5	116.5	116.4	116.4	116.4	116.4	2.0	118.4
63	111.4	113.2	112.2	111.0	111.0	111.1	110.8	110.5	112.2	2.0	114.2
125	105.3	107.1	107.7	107.2	107.2	106.6	105.9	105.3	107.7	2.0	109.7
250	104.1	105.9	106.1	105.0	105.0	104.3	103.7	103.2	106.1	2.0	108.1
500	99.8	101.6	101.5	100.4	100.4	100.2	99.9	99.6	101.5	2.0	103.5
1000	98.1	99.9	99.9	100.1	100.1	100.0	100.2	100.3	99.9	2.0	101.9
2000	94.2	96.0	96.0	97.7	97.7	97.9	98.1	98.4	96.0	2.0	98.0
4000	90.1	91.9	92.5	92.6	92.6	94.4	94.5	94.6	92.5	2.0	94.5
8000	77.1	78.9	79.0	81.9	81.9	81.8	81.7	81.5	79.0	2.0	81.0
Overall A-weighted (dBA)	103.1	104.9	105.0	105.0	105.0	105.0	105.0	105.0	105.0		107.0
Overall Un-certainty, U_c (dB)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		

The hub-height broadband and octave band source sound power levels for the Siemens SWT-2.3-101 (Max Power 2,221 kW) turbine for a hub height of 80.0 m are shown in Table 4-2. Note that for the 31.5 Hz octave band, sound pressure levels for wind speeds 10, 13, 14 and 15 ms^{-1} have been interpolated/extrapolated with values from 8, 9, 11 and 12 ms^{-1} since values for the former winds speeds were not included in data from Siemens Gamesa.

4.2.2.2 Siemens SWT-2.3-101 (Max Power 2,126 kW)

The following table describes this turbine's major characteristics.

Siemens SWT-2.3-101 (Max Power 2,126 kW)	
Type, number of blades, rotor orientation	horizontal-axis, 3-bladed, upwind wind turbine
Rated power	2,126 kW
Rotor diameter; swept area	101.0 m; 8,000 m^2
Blade treatment	OEM DinoTails for noise reduction
Operational rotation rate	6.0 to 16.0 rpm; variable speed
Hub height; tower type	80.0 m; steel tubular tower
Power regulation	pitch regulation with variable speed
Cut-in wind speed	4 ms^{-1}
Cut-out wind speed	25 ms^{-1}
Rated wind speed	12 to 13 ms^{-1}
Gearbox	3 stage planetary/helical
Generator; speed	asynchronous with squirrel-cage rotor, without slip rings; variable speed
Turbine transformer	internal transformer
Braking system	aerodynamic primary brake by full-span feathering of individual blades; mechanical disk brake on high-speed shaft which has two hydraulic calipers
Yaw system	active electric externally geared slewring; passive friction brake

Siemens Gamesa has included the following data in documentation (Siemens Gamesa, 2019) provided to Zephyr North by the Grand Valley 2 Limited Partnership: broadband source sound power level data for hub-height integer wind speeds from 5 ms^{-1} to cut-out; octave band (63 to 8000 Hz) source sound power level data for integer wind speeds from 8 ms^{-1} to 15 ms^{-1}: 1/3 octave band (10 to 160 Hz) source sound power level for wind speeds of 8, 9, 11, and 12 ms^{-1}. The documentation confirms that, "The sound power levels are presented with reference to the code IEC 61400-11 ed. 3.0 (2012) based on hub height." This documentation is included in Section 12 (Appendix B).

Sensitivity tests of the impact of hub-height wind speed on resultant sound pressure levels with distance from the turbine were performed with the data provided. Figure 4-3 shows the results of these tests for a series of 4.5 m height receptors placed at 50 m intervals between 550 and 1500 m from a single SWT-2.3-101 (Max Power 2,126 kW) turbine. The graph shows the receptor sound pressure level as a function of distance from the turbine using each of the octave band (9 bands) source sound power level sets corresponding to the hub height 8 to 15 ms^{-1} wind speeds. The "predictable worst case" for all distances occurs for the hub height 10 ms^{-1} wind speed. As a consequence of these tests, for this turbine the hub-height 10 ms^{-1} wind speed set of octave band source sound power levels has been used for all noise impact assessment calculations in the ISO 9613-2 modelling.

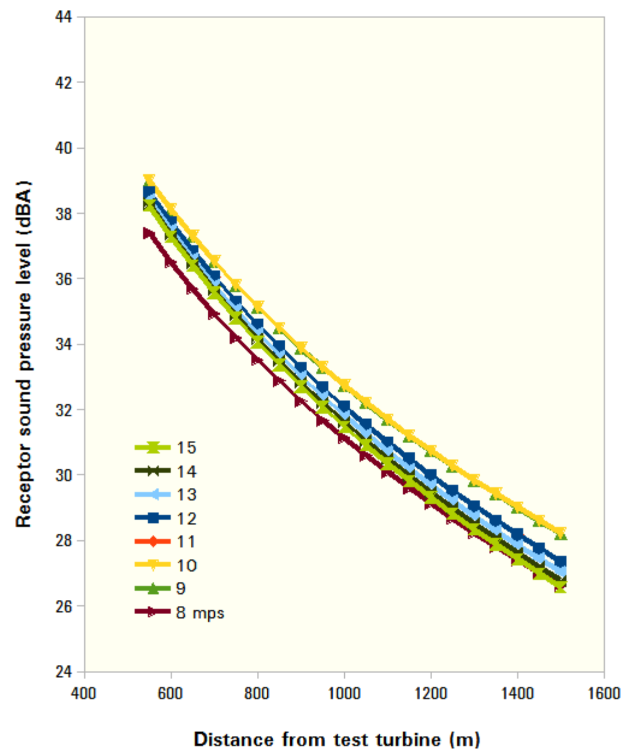

Figure 4-3 SWT-2.3-101 (Max Power 2,126 kW) wind speed sensitivity test.

Siemens states in a private communication (A. Jensen, 2011-01-10), "The Wind test Report WT 4498/05 [see Windtest, 2005 in References] for the SWT 2.3-93 wind turbine generator is relevant for assessment of the SWT 2.3-101 wind turbine generator tonality as the nacelle and frequency converter are identical for both the SWT 2.3-93 and the SWT 2.3-101. There are no other components on the SWT 2.3-101 that result in ascertainable tonalities determined in accordance with IEC 61400-11". No tonal penalty has been applied to this turbine.

Presumably because this is an older turbine model, the Siemens Gamesa documentation does not include a value for the Total Measurement Uncertainty ($U_{LWA,k}$). Therefore, as required by O.Reg.359/09, a value of 2.0 dB has been substituted in the present calculations. This uncertainty has been added to each of the (9) octave band source sound power levels as shown in Table 4-3. This augmented source sound power level profile (the maximum sound power level spectrum) has been used in all calculations.

The hub-height broadband and octave band source sound power levels for the Siemens SWT-2.3-101 (Max Power 2,126 kW) turbine for a hub height of 80.0 m are shown in Table 4-3. Note that for the 31.5 Hz octave band, sound pressure levels for wind speeds 10, 13, 14 and 15 ms^{-1} have been interpolated/extrapolated with values from 8, 9, 11 and 12 ms^{-1} since values for the former winds speeds were not included in data from Siemens Gamesa.

Table 4-3 Siemens SWT-2.3-101 (Max Power 2,126 kW) — Wind turbine acoustic emissions summary.

Make and Model: Siemens SWT-2.3-103 (max power 2,126 kW)											
Electrical Rating: 2,126 kW											
Hub Height (m): 80.0											
	Octave band sound power level (dBLin)										
	Manufacturer's Emission Levels at bin centre wind speeds at hub height								(A) Manufac-turer's Worst Case Spectrum	(B) Positive Overall Un-certainty, U_c / Fixed Value	(A+B) Maximum Sound Power Level
Wind speed at hub height (ms^{-1})	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0			
Frequency (Hz)											
31.5	113.9	115.5	116.4	116.4	116.4	116.4	116.4	116.4	116.4	2.0	118.4
63	111.2	112.8	111.8	110.8	110.8	110.8	110.5	110.2	111.8	2.0	113.8
125	105.0	106.6	107.1	106.9	106.9	106.2	105.5	104.9	107.1	2.0	109.1
250	104.0	105.6	105.8	103.3	103.3	102.6	101.9	101.3	105.8	2.0	107.8
500	99.3	100.9	100.8	99.5	99.5	99.2	98.9	98.6	100.8	2.0	102.8
1000	96.7	98.3	98.3	99.3	99.3	99.2	99.3	99.4	98.3	2.0	100.3
2000	92.9	94.5	94.5	96.6	96.6	96.8	97.1	97.5	94.5	2.0	96.5
4000	89.6	91.2	91.8	91.5	91.5	93.3	93.4	93.5	91.8	2.0	93.8
8000	77.1	78.7	78.8	80.4	80.4	80.3	80.2	80.0	78.8	2.0	80.8
Overall A-weighted (dBA)	102.3	103.9	104.0	104.0	104.0	104.0	104.0	104.0	104.0		106.0
Overall Un-certainty, U_c (dB)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		

4.2.2.3 Siemens SWT-2.3-101 (Max Power 2,221 kW, DT)

As noted above, GV2LP has installed the most recent generation of DinoTails (DinoTails Next Generation) on three of the GVWF-P1&2 turbines (T5, T6, T8) in order to facilitate the overall compliance of both the GVWF-P3 and GVWF-P1&2 Wind Farms. This report references these three turbines as Siemens Gamesa SWT-2.3-101 (Max Power 2,221 kW, DT) models to draw attention to the difference between these three turbines and the balance of the 2,221 kW models in GVWF-P1&2.

To determine the noise characteristics of the proposed Siemens Gamesa SWT-2.3-101 (Max Power 2,221 kW, DT) turbine, GV2LP has commissioned a full acoustic test in accordance with the IEC 61400-11:2018-06 Standard. The results of this test are reported in HGC Engineering (2020). Acoustic data for the present NIA report are taken from the HGC report.

The Siemens SWT-2.3-101 (Max Power 2,221 kW, DT) is a noise- and power-reduced member of the Siemens SWT-2.3-101 turbine family.

The following table summarizes this turbine's characteristics.

Siemens SWT-2.3-101 (Max Power 2,221 kW, DT)	
Type, number of blades, rotor orientation	horizontal-axis, 3-bladed, upwind wind turbine
Rated power	2,221 kW
Rotor diameter; swept area	101.0 m; 8,000 m^2
Blade treatment	OEM DinoTails Next Generation for noise reduction
Operational rotation rate	6.0 to 16.0 rpm; variable speed
Hub height; tower type	80.0 m; steel tubular tower
Power regulation	pitch regulation with variable speed
Cut-in wind speed	4 ms^{-1}
Cut-out wind speed	25 ms^{-1}
Rated wind speed	12 to 13 ms^{-1}
Gearbox	3 stage planetary/helical
Generator; speed	asynchronous with squirrel-cage rotor, without slip rings; variable speed
Turbine transformer	internal transformer
Braking system	aerodynamic primary brake by full-span feathering of individual blades; mechanical disk brake on high-speed shaft which has two hydraulic calipers
Yaw system	active electric externally geared slewring; passive friction brake

The following data have been provided in the HGC Engineering (2020) report: broadband source sound power level data for hub-height half-integer wind speeds from 7.5 ms^{-1} to 13.0 ms^{-1}; 1/3 octave band (20 to 10,000 Hz) source sound power level data for hub-height half-integer wind speeds from 7.5 ms^{-1} to 13.0 ms^{-1}; tonal audibility data for hub-height half-integer wind speeds from 7.5 ms^{-1} to 13.0 ms^{-1}; and total uncertainty data for hub-height half-integer wind speeds from 7.5 ms^{-1} to 13.0 ms^{-1}.

Sensitivity tests of the impact of hub-height wind speed on resultant sound pressure levels with distance from the turbine were performed with the data provided. Figure 4-4 shows the results of these tests for a series of 4.5 m height receptors placed at 50 m intervals between 550 and 1500 m from a single SWT-2.3-101 (Max Power 2,221 kW, DT) turbine. The graph shows the receptor sound pressure level as a function of distance from the turbine using each of the raw octave band (9 bands) source sound power level sets corresponding to the hub height 10.0 to 13.0 ms^{-1} wind speeds. The "predictable worst case" for all distances occurs for the hub height 10.5 ms^{-1} wind speed. As a consequence of these tests, for this turbine the hub-height 10.5 ms^{-1} wind speed set of octave band source sound power levels has been used for all noise impact assessment calculations in the ISO 9613-2 modelling.

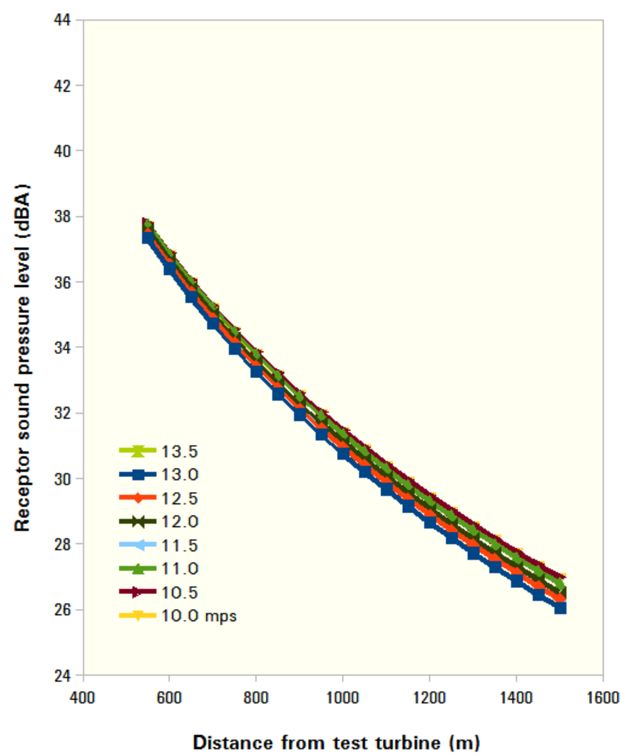

Figure 4-4 SWT-2.3-101 (Max Power 2,221 kW, DT) wind speed sensitivity test.

The HGC Engineering (2020) report lists tonal audibility for the "predictable worst case" wind speed (10.5 ms^{-1}) as 1.9 dB. Therefore, no tonal penalty has been applied to this turbine.

The Total Measurement Uncertainty ($U_{LWA,k}$) for the "predictable worst case" wind speed of 10.5 ms^{-1} is listed in HGC Engineering as 0.8 dB. As required by O.Reg.359/09, this uncertainty has been added to each of the (9) octave band source sound power levels as shown in Table 4-4. This augmented source sound power level profile (the maximum sound power level spectrum) has been used in all calculations.

The hub-height broadband and octave band source sound power levels for the Siemens SWT-2.3-101 (Max Power 2,221 kW, DT) turbine for a hub height of 80.0 m are shown in Table 4-4. As required by the MECP Guidelines (2016), the maximum sound power level spectrum has been used for all SWT-2.3-101 (Max Power 2,221 kW, DT) turbine calculations.

Table 4-4 Siemens SWT-2.3-101 (Max Power 2,221 kW, DT) — Wind turbine acoustic emissions summary.

Make and Model: Siemens SWT-2.3-103 (Max Power 2,221 kW, DT)															
Electrical Rating: 2,221 kW															
Hub Height (m): 80.0															
	Octave band sound power level (dBLin)														
	Manufacturer's Emission Levels at bin centre wind speeds at hub height												(A) Manufac-turer's Worst Case Spectrum	(B) Positive Overall Un-certainty, U_c / Fixed Value	(A+B) Maximum Sound Power Level
Wind speed at hub height (ms^{-1})	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0			
Frequency (Hz)															
31.5	112.9	113.3	113.8	114.4	113.9	114.5	114.7	115.2	115.5	116.0	115.6	115.1	114.7	0.8	115.5
63	110.0	110.8	111.0	111.4	111.0	111.4	111.4	112.1	112.3	112.7	112.9	111.9	111.4	0.8	112.2
125	105.9	106.5	107.8	109.8	110.8	111.6	111.5	110.9	109.0	109.2	108.9	108.4	111.5	0.8	112.3
250	99.6	100.5	101.3	101.9	102.1	102.3	102.1	102.3	102.1	102.1	102.0	101.8	102.1	0.8	102.9
500	96.6	97.6	99.2	100.4	100.9	101.0	101.0	100.4	100.2	99.9	99.7	99.5	101.0	0.8	101.8
1000	93.7	94.7	95.7	95.9	96.3	96.3	96.5	97.4	97.6	97.7	97.8	97.7	96.5	0.8	97.3
2000	93.5	94.1	94.8	95.2	95.6	95.7	95.9	96.7	96.8	96.8	96.9	97.4	95.9	0.8	96.7
4000	91.4	92.2	93.0	93.4	93.7	93.8	93.8	94.2	94.1	93.9	93.7	93.8	93.8	0.8	94.6
8000	82.3	83.1	83.8	84.3	85.0	84.8	84.5	85.3	85.3	85.1	84.9	84.9	84.5	0.8	85.3
Overall A-weighted (dBA)	**100.7**	**101.6**	**102.6**	**103.3**	**103.7**	**103.9**	**104.0**	**104.2**	**104.0**	**104.0**	**103.9**	**104.0**	**104.0**		**104.8**
Overall Un-certainty, U_c (dB)	**0.8**	**0.7**	**0.7**	**0.7**	**0.8**	**0.7**	**0.8**	**0.7**	**0.7**	**0.8**	**0.7**	**0.7**	**0.8**		

4.2.3 Melancthon Wind Facility

There are 6 GE Wind 1.5sle turbines in the Melancthon Wind Facility within 5,000 m of any Grand Valley Wind Farms – Phase 3 Wind Farm receptor. All of these turbines have been included in the present assessment. The following table describes this turbine's major characteristics.

GE Wind 1.5sle	
Type, number of blades, rotor orientation	horizontal-axis, 3-bladed, upwind wind turbine
Rated power	1,500 kW
Rotor diameter; swept area	77.0 m; 4,657 m^2
Blade treatment	none
Operational rotation rate	10.1 to 20.4 rpm; variable speed
Hub height; tower type	80.0 m; steel tubular tower
Power regulation	Individual full span pitch control; variable speed with pulse-width modulated IGBT frequency converter
Cut-in wind speed	3.5 ms^{-1}
Cut-out wind speed	25 ms^{-1}
Rated wind speed	12 ms^{-1}
Gearbox	3 stage planetary/helical
Generator; speed	Asynchronous; double fed induction; 1,500 to 1,800 rpm
Turbine transformer	External transformer; step-up transformer on concrete pad at the base of the turbine
Braking system	aerodynamic primary brake by feathering blades; emergency hydraulic disc brake
Yaw system	electro-mechanical

The noise documentation of the GE Wind 1.5sle turbine is summarized in GE Wind document *07.2_Noise Emission Characteristics_NO.pdf*. It should be noted that the following statement is included with the documentation: "*The data here provided is calculated from simulations and has been confirmed by several measurements, including those performed by independent institutes*." The documentation also states, "*If a wind turbine noise performance test is carried out, it needs to be done in accordance with the regulations of the international standard IEC 61400-11: 2002 (abstract available upon request)*.", but does not state that the sound power levels provided in the document were determined in accordance with the standard. This documentation is shown in Section 12 (Appendix B).

The GE Wind documentation (shown in Section 12) provides broadband source sound power levels for hub-height wind speeds from 3 ms^{-1} to "cut-out" (25 ms^{-1}). The document also includes octave and 1/3 octave band source sound power levels for a single, equivalent broadband sound level of 104.0 dBA. The GE Wind documentation states that the maximum source sound power level is 104 dBA for all wind speeds up to cutout. As a consequence, Zephyr North has chosen the 104 dBA source sound power level profile (provided in the GE documentation) as the "predictable worst case".

Table 4-5 GE Wind 1.5sle — Wind turbine acoustic emissions summary.

Make and Model: GE Wind 1.5sle							
Electrical Rating: 1,500 kW							
Hub Height (m): 80.0							
	Octave band sound power level (dBLin)						
	Manufacturer's Emission Levels at bin centre wind speeds at hub height				(A) Manufac-turer's Worst Case Spectrum	(B) Positive Overall Un-certainty, U_c / Fixed Value	(A+B) Maximum Sound Power Level
Wind speed at hub height (ms^{-1})	6.0	7.0	8.0	9.0 to cut-out			
Frequency (Hz)							
31.5	105.1	108.3	111.2	112.6	112.6	2.0	114.6
63	103.9	107.1	110.0	111.3	111.3	2.0	113.3
125	102.7	105.9	108.8	110.1	110.1	2.0	112.1
250	98.4	101.6	104.5	105.8	105.8	2.0	107.8
500	94.4	97.6	100.5	101.8	101.8	2.0	103.8
1000	90.5	93.7	96.6	97.9	97.9	2.0	99.9
2000	85.9	89.1	92.0	93.3	93.3	2.0	95.3
4000	78.9	82.1	85.0	86.3	86.3	2.0	88.3
8000	71.8	75.0	77.9	79.2	79.2	2.0	81.2
Overall A-weighted (dBA)	96.6	99.8	102.7	104.0	104.0		106.0
Overall Un-certainty, U_c (dB)	2.0	2.0	2.0	2.0	2.0		

With regard to tonality, the GE Wind documentation states, "At the reference measuring point Ro, a ground distance from the turbine base equal to hub height plus half the rotor diameter, the GE 1.5sl/sle turbine has a value for tonality of (ΔLa) $\leq$ 4 dB, irrespective of wind speed, turbine type, hub height, and grid frequency. Ro and ΔLa are defined here according to IEC 61400-11:2002". As a consequence, no tonality penalty has been assigned to this turbine.

The GE Wind documentation states the following with respect to noise measurement uncertainty. "Mean uncertainty levels for the sound power, or K-factors, are derived from independent measurements." Also, "For all 1.5sl and 1.5sle turbines an uncertainty band of (K) = ±2.0 dB is defined." As required by O.Reg.359/09, a positive value of this uncertainty has been added to each of the (9) octave band source sound power levels as shown in Table 4-5. This augmented source sound power level profile (the maximum sound power level spectrum) has been used in all calculations.

The hub-height broadband and octave sound power levels for the GE Wind 1.5sle turbine (under normal operation, with a hub height of 80 m) are shown in Table 4-5. Note that the 31.5 Hz octave band value has been synthesized/extrapolated from the existing sound levels as the GE Wind documentation is relatively old and did not include the 31.5 Hz octave band source sound power level.

4.3 Transformer Substations

4.3.1 Grand Valley Wind Farms – Phase 3 Wind Farm

There is a single transformer and reactor pair at the substation servicing the GVWF-P3 Wind Farm. The substation location is shown in Figure 2-1 as Tr119. A report (HGC Engineering, 2016) on the determination of the sound power levels of the substation (transformer and reactor) was prepared in 2016 to satisfy Condition E3 of the Renewable Energy Approval (REA) Number 6457-9L6QLC issued to the site by the Ontario Ministry of Environment and Climate Change dated 2014-10-16 and amended on 2015-06-30 and 2015-12-14.

The substation consists of a transformer manufactured by Pennsylvania Transformer Technology Inc and a reactor manufactured by Virginia Transformer Corp. The substation is nominally rated at 45 MVA. The transformer utilizes cooling fans and the reactor is convectively cooled without fans. Transformer dimensions, including the radiators are approximately 6.4 m wide by 6.7 m long by 3.9 m high. The reactor is approximately 1.5 m wide by 2.2 m long by 2.3 m high including radiators. As expected, the acoustic nature of both the transformer and reactor were determined to be tonal.

Measurements of the transformer and reactor sound intensity were carried out (HGC Engineering, 2016) in compliance with IEC Standard 60076-10. The octave band source sound power level results of this exercise are shown in Table 4-6 along with source sound power levels that include a 5 dB tonal penalty (for all octave bands, for an overall penalty of 5 dB). The tonal penalty was included in this noise impact assessment. It should be noted that the 31.5 Hz octave band source sound power level was conservatively estimated from data supplied in HGC Engineering (2016) as that report did not explicitly list this value.

No attenuation due to sound barriers has been included in this assessment.

As noted above, noise (including the tonal penalty) from this substation transformer and reactor was used in all calculations.

Table 4-6 GVWF-P3 transformer acoustic emissions summary.

Make and Model: Pennsylvania Transformer (transformer) and Virginia Transformer (reactor)			
Operating voltage: 34.5 / 230 kV			
Rating: 45 MVA			
Core tank size: n/a			
Source height (m): 3.9 m and 2.3 m			
Source location: outside			
Sound characteristics: steady, tonal			
Noise control measures: uncontrolled			
Frequency (Hz)	**Source sound power level (dBLin)**	**Tonal penalty (dB)**	**Net source sound power level (dBLin)**
31.5	73.1	5.0	78.1
63	78.1	5.0	83.1
125	87.8	5.0	92.8
250	84.1	5.0	89.1
500	85.2	5.0	90.2
1000	77.0	5.0	82.0
2000	65.0	5.0	70.0
4000	59.4	5.0	64.4
8000	53.6	5.0	58.6
Broadband (dBA)	84.2		89.2

4.3.2 Grand Valley Wind Farms – Phase 1 & 2 Wind Farms

There is a pair of Northern Transformer Incorporated 7.5/10.0 MVA ONAN/ONAF transformers located at the GVWF-P1&2 substation. These are shown in Figure 2-1 as Tr25 and Tr26.

Only limited noise information with respect to those transformers is available from that wind farm's noise impact assessment report (HGC Engineering, 2011). However, it is known that it was designed to a limiting broadband source sound power level of approximately 88.4 dBA. A summary of the acoustic emissions characteristics as provided in that wind farm's noise impact assessment report is contained in Table 4-7. Note that the 31.5 Hz octave band SPoL has been extrapolated/estimated for the purposes of the present NIA report.

No attenuation due to sound barriers has been included in this assessment.

Noise (including the tonal penalty) from these transformers was used in all calculations.

Table 4-7 GVWF-P1&2 transformer acoustic emissions summary.

Make and Model: Northern Transformer Incorporated. ONAN/ONAF Sealed Transformer			
Operating voltage: 34.5 / 44 kV			
Rating: 7.5 / 10 MVA			
Core tank size: 5,978 l			
Source height (m): Unknown (4.0 used)			
Source location: outside			
Sound characteristics: steady, tonal			
Noise control measures: uncontrolled			
Frequency (Hz)	Source sound power level (dBLin)	Tonal penalty (dB)	Net source sound power level (dBLin)
31.5	87.0	5.0	92.0
63	91.0	5.0	96.0
125	93.0	5.0	98.0
250	88.0	5.0	93.0
500	88.0	5.0	93.0
1000	82.0	5.0	87.0
2000	77.0	5.0	82.0
4000	72.0	5.0	77.0
8000	65.0	5.0	70.0
Broadband (dBA)	88.4		93.4

4.3.3 Melancthon Wind Facility

There are two collocated transformers at one substation in the Melancthon Wind Facility (MWF). These are shown in Figure 2-1 as Tr504 and Tr505.

There are only limited details available in the wind farm noise impact assessment reports (Helimax Energy Inc., 2006, 2007) for the MWF. However, it has been determined that both transformers are presently 100 MVA Siemens TP-720 models. (The initially installed transformer model had been replaced in 2008.) It is also understood that both transformers are now surrounded by a single, continuous acoustic barrier. The operating voltages of the transformers are 34.5 kV (low side) and 230 kV (high side). The transformers are each rated at 100 MVA.

It is known (Helimax Energy Inc., 2006) that the original design of the wind farm included a transformer broadband source sound power level specification of 83 dBA. However, this appears to be an optimistic broadband source sound power level for a transformer of this size so, for the purpose of this report, a broadband source sound power level of 98 dBA was assigned and typical octave band source sound power levels were estimated using the methodology of Stevens and Hung (2010). These are listed in Table 4-8 along with source sound power levels that include a 5 dB tonal penalty (for all octave bands, for an overall penalty of 5 dB and overall broadband source sound power level of 103 dBA). The tonal penalty was included in this assessment.

Table 4-8 Melancthon Wind Facility transformer acoustic emissions summary.

Make and Model: Siemens TP-720 AC power transformer			
Operating voltage: 34.5 kV / 230 kV			
Rating: 100 MVA			
Core tank size: unknown			
Source height (m): unknown (4.0 used)			
Source location: outside			
Sound characteristics: steady, tonal			
Noise control measures: acoustic barrier			
Frequency (Hz)	**Source sound power level (dBLin)**	**Tonal penalty (dB)**	**Net source sound power level (dBLin)**
31.5	92.8	5.0	97.8
63	96.8	5.0	101.8
125	99.8	5.0	104.8
250	97.8	5.0	102.8
500	97.8	5.0	102.8
1000	91.8	5.0	96.8
2000	86.8	5.0	91.8
4000	81.8	5.0	86.8
8000	73.8	5.0	78.8
Broadband (dBA)	98.0		103.0

No attenuation due to sound barriers for these transformers has been included in this assessment.

Noise from these transformers was used in all calculations.

5 NOISE IMPACT ASSESSMENT

5.1 Methodology

Cumulative turbine and transformer sound levels were estimated at each of the receptors using the methodology of the ISO 9613-2 Standard (ISO, 1996). Wind turbine and transformer octave band and A-weighted sound power values (the maximum sound power level profile for turbines), standardized meteorological conditions, turbine/transformer locations, receptor / VLSR / participant / PVLSR locations and characteristics were used to determine the predicted A-weighted sound pressure levels at all receptors.

5.2 Specific Parameters

a)

Analysis was carried out for turbine "predictable worst case" source sound power levels in nine octave bands (31.5 to 8,000 Hz). These are referenced as the "maximum sound power level profile" in the MECP (2016) *Noise Guidelines.*

b)

ISO 9613-2 parameters, as prescribed in the MECP (2016) *Noise Guidelines* were set as follows:

Ambient air temperature: 10 C

Ambient humidity: 70 %

The atmospheric attenuation coefficients to be used in the ISO 9613-2 modelling of noise propagation are prescribed in MECP (2016). These have been used in the present assessment, and are shown in the following table.

Atmospheric Absorption Coefficients									
Centre Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000
Atmospheric Absorption Coefficient (dB/km) from MECP (2016)	0.0	0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

c)

The ISO 9613-2 Standard term for Ground Attenuation was calculated using the "General" Method (Section 7.3.1 of the Standard). As per Section 6.4.10c of the Ontario *Noise Guidelines for Wind Farms* (MECP, 2016) ground factors were assigned the following values.

Source ground factor: 0.5 (hard/soft ground)

Middle ground factor: 0.5 (hard/soft ground)

Receptor ground factor: 0.5 (hard/soft ground)

d)

Section 4.3.9 of *The Good Practice Guide* of the Institute of Acoustics (IoA, 2013) recommends that the topography between a turbine and a receptor be defined as (significantly) concave if the following criterion is fulfilled.

$$h_m \geq 1.5 \frac{|h_s - h_r|}{2} \quad \text{Equation 1}$$

The variables in Equation 1 are defined in Figure 3 and Section 7.3.2 (Alternative method of calculation for A-weighted sound pressure level) of the ISO 9613-2 Standard (ISO, 1996) as follows.

h_m is the mean height of the propagation path above the ground, in metres,

h_s is the height of the source (turbine) above the ground, in metres,

h_r is the height of the receiver (receptor) above the ground, in metres.

Should the criterion be met (*i.e.*, should the propagation path be defined as significantly concave), *The Good Practice Guide* recommends that 3 dB "...should be added to the calculated overall A-weighted noise level...".

Zephyr North carried out analyses of the propagation paths between all wind farm turbines and receptors (including VLSRs) within 1,500 m of each other. The highest value of h_m encountered was 58 m — between turbine T109 (base elevation 479 m, hub height 99.5 m) and receptor R244 (base elevation 486 m, height 4.5 m). The concavity criterion (right hand of Equation 1) for this turbine/receptor pair is 73.5 m. By this criterion, the "worst case" topography between the turbines and receptors is not significantly concave.

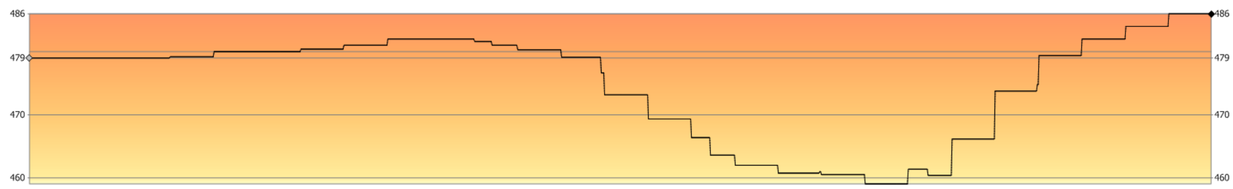

Figure 5-1 Topography profile from turbine to receptor.

For illustration, Figure 5-1 shows the (vertically exaggerated) topography between turbine T109 (left of graph) and receptor R244 (right of graph). The horizontal separation is 1,470 m.

5.3 Additional parameters and conditions

Sound pressure levels were calculated only for noise receivers for which there was a GVWF-P3 turbine closer than or equal to 1,500 m or a GVWF-P3 transformer closer than or equal to 1,000 m.

For any receptor, all turbines or transformers within 5,000 m were included in the calculations. Turbines or transformers further than 5,000 m away were not included

No additional adjustments were made for wind speed or direction since the ISO 9613-2 Standard assumes worst-case conditions for these parameters with respect to noise impact.

5.4 Noise modelling results

Results are reported in Tables 6-1, 6-2, 6-3, and 6-4 found in Section 6 and the noise level isopleth map of Section 7 . As a brief summary, Table 5-1 is a sorted list of the receptors and VLSRs with the 25 highest sound pressure levels determined in the analysis.

Table 5-1 Highest noise levels at receptors.

Receptor ID	SPrL (dBA)	Height (m)	Nearest turbine or transformer	Project or Other	Distance (m)
R215	39.8	4.5	T6	O	597
R101	39.6	1.5	T114	P	581
R210	39.3	4.5	Tr119	P	579
V1563	39.2	4.5	Tr119	P	513
R270	39.2	7.5	T120	P	569
R173	39.1	1.5	T8	O	653
R222	39.0	4.5	T120	P	578
V620	38.8	4.5	T120	P	568
R112	38.8	4.5	T115	P	560
R206	38.6	4.5	Tr119	P	373
R134	38.3	4.5	T112	P	568
R169	38.3	1.5	T8	O	725
V1611	38.2	4.5	T8	O	722
R120	38.2	1.5	T112	P	569
R117	38.0	4.5	T115	P	610
V727	38.0	4.5	T115	P	645
R113	37.9	4.5	T115	P	706
V1556	37.9	4.5	T110	P	555
R184	37.9	1.5	T110	P	561
R125	37.7	1.5	T112	P	652
R202	37.6	1.5	Tr119	P	297
R190	37.6	1.5	Tr119	P	630
R139	37.6	1.5	T112	P	634
R1555	37.5	4.5	Tr119	P	522
R124	37.5	1.5	T113	P	720
V693	37.5	4.5	T117	P	662
WindFarm layout file: VGV11-Trbn-WFL041.csv					

6 NOISE LEVEL SUMMARY TABLES

Table 6-1 Receptor (R) noise level summary table.

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
R2	Receptor	4.5	872	T101	33.8	40.0	Yes
R3	Receptor	4.5	851	T102	33.6	40.0	Yes
R4	Receptor	4.5	847	T102	33.6	40.0	Yes
R5	Receptor	4.5	836	T102	33.7	40.0	Yes
R6	Receptor	4.5	1276	T101	29.4	40.0	Yes
R8	Receptor	4.5	637	T102	36.7	40.0	Yes
R10	Receptor	7.5	967	T102	33.7	40.0	Yes
R11	Receptor	4.5	1080	T101	31.8	40.0	Yes
R12	Receptor	1.5	817	T102	35.4	40.0	Yes
R13	Receptor	1.5	890	T101	35.6	40.0	Yes
R14	Receptor	4.5	964	T102	35.3	40.0	Yes
R15	Receptor	4.5	956	T102	35.3	40.0	Yes
R16	Receptor	4.5	991	T101	34.1	40.0	Yes
R18	Receptor	1.5	1120	T104	32.3	40.0	Yes
R19	Receptor	4.5	1013	T104	33.1	40.0	Yes
R22	Receptor	1.5	1350	T104	30.0	40.0	Yes
R26	Receptor	4.5	660	T103	36.4	40.0	Yes
R44	Receptor	1.5	775	T104	36.4	40.0	Yes
R45	Receptor	1.5	768	T104	36.3	40.0	Yes
R48	Receptor	1.5	1180	T104	31.4	40.0	Yes
R50	Receptor	4.5	913	T104	35.1	40.0	Yes
R51	Receptor	4.5	872	T104	34.6	40.0	Yes
R52	Receptor	1.5	1397	T104	30.4	40.0	Yes

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
R55	Receptor	1.5	989	T117	33.9	40.0	Yes
R58	Receptor	4.5	822	T117	35.5	40.0	Yes
R72	Receptor	4.5	747	T114	35.8	40.0	Yes
R76	Receptor	4.5	820	T114	35.3	40.0	Yes
R77	Receptor	1.5	646	T118	36.8	40.0	Yes
R78	Receptor	4.5	1145	T112	31.7	40.0	Yes
R80	Receptor	1.5	808	T114	35.5	40.0	Yes
R86	Receptor	1.5	1268	T112	30.9	40.0	Yes
R89	Receptor	4.5	960	T112	33.0	40.0	Yes
R93	Receptor	4.5	845	T114	36.2	40.0	Yes
R95	Receptor	4.5	810	T112	35.2	40.0	Yes
R97	Receptor	1.5	936	T112	35.7	40.0	Yes
R99	Receptor	1.5	773	T113	37.2	40.0	Yes
R100	Receptor	1.5	836	T113	36.6	40.0	Yes
R101	Receptor	1.5	581	T114	39.6	40.0	Yes
R103	Receptor	4.5	837	T113	36.6	40.0	Yes
R109	Receptor	4.5	1054	T118	33.0	40.0	Yes
R112	Receptor	4.5	560	T115	38.8	40.0	Yes
R113	Receptor	4.5	706	T115	37.9	40.0	Yes
R117	Receptor	4.5	610	T115	38.0	40.0	Yes
R118	Receptor	4.5	1474	T118	29.7	40.0	Yes
R119	Receptor	1.5	681	T115	37.2	40.0	Yes
R120	Receptor	1.5	569	T112	38.2	40.0	Yes
R122	Receptor	4.5	902	T115	35.2	40.0	Yes
R124	Receptor	1.5	720	T113	37.5	40.0	Yes
R125	Receptor	1.5	652	T112	37.7	40.0	Yes
R128	Receptor	4.5	1460	T105	32.3	40.0	Yes
R134	Receptor	4.5	568	T112	38.3	40.0	Yes
R136	Receptor	1.5	1266	T115	32.1	40.0	Yes
R139	Receptor	1.5	634	T112	37.6	40.0	Yes
R140	Receptor	1.5	1265	T115	32.1	40.0	Yes
R145	Receptor	1.5	675	T112	37.2	40.0	Yes
R146	Receptor	4.5	1343	T115	31.6	40.0	Yes
R148	Receptor	1.5	1356	T115	31.7	40.0	Yes
R149	Receptor	4.5	1405	T115	31.2	40.0	Yes
R156	Receptor	4.5	1302	T109	32.2	40.0	Yes
R157	Receptor	4.5	715	T112	37.4	40.0	Yes
R165	Receptor	1.5	798	T110	36.7	40.0	Yes
R169	Receptor	1.5	725	T8	38.3	40.0	Yes

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
R171	Receptor	4.5	609	T109	37.1	40.0	Yes
R173	Receptor	1.5	653	T8	39.1	40.0	Yes
R174	Receptor	4.5	1427	T105	33.2	40.0	Yes
R177	Receptor	1.5	1497	T105	33.2	40.0	Yes
R179	Receptor	1.5	955	T110	34.4	40.0	Yes
R182	Receptor	4.5	1152	T110	33.3	40.0	Yes
R184	Receptor	1.5	561	T110	37.9	40.0	Yes
R190	Receptor	1.5	630	Tr119	37.6	40.0	Yes
R194	Receptor	4.5	637	T110	36.5	40.0	Yes
R198	Receptor	4.5	705	T110	35.7	40.0	Yes
R199	Receptor	4.5	824	T109	35.7	40.0	Yes
R202	Receptor	1.5	297	Tr119	37.6	40.0	Yes
R206	Receptor	4.5	373	Tr119	38.6	40.0	Yes
R210	Receptor	4.5	579	Tr119	39.3	40.0	Yes
R215	Receptor	4.5	597	T6	39.8	40.0	Yes
R216	Receptor	1.5	1305	T106	32.9	40.0	Yes
R217	Receptor	4.5	1030	T110	33.8	40.0	Yes
R222	Receptor	4.5	578	T120	39.0	40.0	Yes
R226	Receptor	1.5	986	T110	33.1	40.0	Yes
R231	Receptor	4.5	1283	T109	32.3	40.0	Yes
R232	Receptor	1.5	1277	T109	32.3	40.0	Yes
R233	Receptor	4.5	1292	T109	32.3	40.0	Yes
R235	Receptor	4.5	1296	T109	32.2	40.0	Yes
R236	Receptor	1.5	1379	T109	32.0	40.0	Yes
R238	Receptor	1.5	1309	T109	32.2	40.0	Yes
R239	Receptor	1.5	1377	T109	32.0	40.0	Yes
R241	Receptor	1.5	1333	T109	32.1	40.0	Yes
R243	Receptor	1.5	1385	T109	31.9	40.0	Yes
R244	Receptor	1.5	1465	T109	31.8	40.0	Yes
R245	Receptor	1.5	1393	T109	31.8	40.0	Yes
R248	Receptor	4.5	1406	T109	31.7	40.0	Yes
R249	Receptor	4.5	1389	T110	31.7	40.0	Yes
R253	Receptor	4.5	1252	T110	31.3	40.0	Yes
R254	Receptor	1.5	1486	T109	31.4	40.0	Yes
R258	Receptor	4.5	1495	T110	31.2	40.0	Yes
R263	Receptor	4.5	1070	T106	33.6	40.0	Yes
R270	Receptor	7.5	569	T120	39.2	40.0	Yes
R304	Receptor	1.5	1031	T108	33.1	40.0	Yes
R305	Church	1.5	1114	T108	32.6	40.0	Yes

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
R306	Receptor	4.5	942	T108	33.6	40.0	Yes
R307	Receptor	4.5	916	T108	33.6	40.0	Yes
R308	Receptor	1.5	716	T108	35.9	40.0	Yes
R310	Receptor	4.5	785	T108	35.3	40.0	Yes
R311	Receptor	4.5	998	T108	34.5	40.0	Yes
R312	Receptor	4.5	1227	T108	31.6	40.0	Yes
R313	Receptor	1.5	960	T108	34.4	40.0	Yes
R405	Dwelling	4.5	1366	T106	32.4	40.0	Yes
R408	Dwelling	4.5	664	T106	37.3	40.0	Yes
R412	Receptor	1.5	921	T108	35.4	40.0	Yes
R612	Dwelling	4.5	1278	T106	33.4	40.0	Yes
R671	Receptor	4.5	1293	T112	30.8	40.0	Yes
R673	Receptor	1.5	852	T112	35.2	40.0	Yes
R674	Receptor	4.5	793	T113	37.0	40.0	Yes
R1136	Dwelling	4.5	620	T110	36.8	40.0	Yes
R1137	Receptor	1.5	677	T110	36.0	40.0	Yes
R1529	Dwelling	4.5	1464	T110	30.1	40.0	Yes
R1555	Receptor	4.5	522	Tr119	37.5	40.0	Yes

Table 6-2 Vacant lot surrogate receptor (VLSR, V) noise level summary table.

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
V17	VLSR	4.5	1017	T103	35.1	40.0	Yes
V360	VLSR	4.5	1191	T101	30.3	40.0	Yes
V361	VLSR	4.5	884	T101	33.9	40.0	Yes
V366	VLSR	4.5	1434	T101	29.6	40.0	Yes
V367	VLSR	4.5	1187	T101	31.5	40.0	Yes
V374	VLSR	4.5	684	T103	36.3	40.0	Yes
V409	VLSR	4.5	1001	T108	34.6	40.0	Yes
V410	VLSR	4.5	1163	T108	32.4	40.0	Yes
V411	VLSR	4.5	1197	T108	32.1	40.0	Yes
V414	VLSR	4.5	788	T120	37.2	40.0	Yes
V415	VLSR	4.5	1091	T108	34.4	40.0	Yes
V416	VLSR	4.5	1201	T108	34.5	40.0	Yes
V429	VLSR	4.5	1001	T108	32.6	40.0	Yes

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
V446	VLSR	4.5	844	T108	34.2	40.0	Yes
V481	VLSR	4.5	1382	T103	32.5	40.0	Yes
V482	VLSR	4.5	892	T104	35.0	40.0	Yes
V483	VLSR	4.5	945	T104	33.9	40.0	Yes
V484	VLSR	4.5	1392	T104	30.6	40.0	Yes
V528	VLSR	4.5	745	T104	36.3	40.0	Yes
V608	VLSR	4.5	1462	T105	33.2	40.0	Yes
V614	VLSR	4.5	691	T106	36.7	40.0	Yes
V617	VLSR	4.5	801	T105	35.0	40.0	Yes
V620	VLSR	4.5	568	T120	38.8	40.0	Yes
V621	VLSR	4.5	748	T120	37.3	40.0	Yes
V668	VLSR	4.5	1158	T114	32.3	40.0	Yes
V672	VLSR	4.5	803	T112	35.1	40.0	Yes
V677	VLSR	4.5	673	T110	37.3	40.0	Yes
V687	VLSR	4.5	970	T114	33.6	40.0	Yes
V692	VLSR	4.5	1001	T117	34.0	40.0	Yes
V693	VLSR	4.5	662	T117	37.5	40.0	Yes
V725	VLSR	4.5	1030	T118	33.0	40.0	Yes
V726	VLSR	4.5	833	T115	35.7	40.0	Yes
V727	VLSR	4.5	645	T115	38.0	40.0	Yes
V733	VLSR	4.5	1328	T113	31.8	40.0	Yes
V734	VLSR	4.5	1315	T113	32.6	40.0	Yes
V735	VLSR	4.5	794	T112	36.4	40.0	Yes
V1138	VLSR	4.5	806	T110	34.6	40.0	Yes
V1433	VLSR	4.5	1220	T118	31.5	40.0	Yes
V1436	VLSR	4.5	1306	T118	31.2	40.0	Yes
V1487	VLSR	4.5	901	T110	33.6	40.0	Yes
V1493	VLSR	4.5	1059	T109	33.6	40.0	Yes
V1496	VLSR	4.5	915	T105	35.1	40.0	Yes
V1512	VLSR	4.5	1250	T101	29.9	40.0	Yes
V1519	VLSR	4.5	1072	T102	31.4	40.0	Yes
V1521	VLSR	4.5	922	T103	35.4	40.0	Yes
V1526	VLSR	4.5	1297	T109	32.3	40.0	Yes
V1527	VLSR	4.5	1301	T110	32.1	40.0	Yes
V1528	VLSR	4.5	1223	T109	32.7	40.0	Yes
V1531	VLSR	4.5	924	T118	35.0	40.0	Yes
V1546	VLSR	4.5	766	T114	37.3	40.0	Yes
V1556	VLSR	4.5	555	T110	37.9	40.0	Yes
V1557	VLSR	4.5	1192	T117	32.4	40.0	Yes

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)	Sound level limit (dBA)	Compliance (Yes/No)
V1558	VLSR	4.5	874	T108	34.7	40.0	Yes
V1559	VLSR	4.5	1037	T101	33.0	40.0	Yes
V1560	VLSR	4.5	996	T102	35.2	40.0	Yes
V1561	VLSR	4.5	1158	T104	31.6	40.0	Yes
V1562	VLSR	4.5	1010	T103	35.1	40.0	Yes
V1563	VLSR	4.5	513	Tr119	39.2	40.0	Yes
V1564	VLSR	4.5	1189	T110	31.7	40.0	Yes
V1573	VLSR	4.5	828	T112	36.3	40.0	Yes
V1575	VLSR	4.5	1156	T102	30.7	40.0	Yes
V1582	VLSR	4.5	1253	T114	31.7	40.0	Yes
V1601	VLSR	4.5	785	T104	36.4	40.0	Yes
V1603	VLSR	4.5	857	T106	35.1	40.0	Yes
V1604	VLSR	4.5	922	T106	34.7	40.0	Yes
V1605	VLSR	4.5	978	T106	34.2	40.0	Yes
V1606	VLSR	4.5	1127	T106	33.3	40.0	Yes
V1607	VLSR	4.5	1179	T106	33.1	40.0	Yes
V1608	VLSR	4.5	846	T115	35.9	40.0	Yes
V1610	VLSR	4.5	849	T108	34.8	40.0	Yes
V1611	VLSR	4.5	722	T8	38.2	40.0	Yes

Table 6-3 Participant (P) noise level summary table.

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)
P75	Receptor	4.5	365	T118	41.9
P98	Receptor	4.5	472	T114	40.7
P111	Receptor	4.5	508	T115	39.5
P123	Receptor	1.5	557	T113	38.7
P193	Receptor	4.5	153	Tr119	39.4
P271	Receptor	4.5	507	T106	39.5

Table 6-4 Participant vacant lot surrogate receptor (PVLSR, Q) noise level summary table.

Point of Reception ID	Description	Height (m)	Distance to nearest turbine/ transformer (m)	Nearest turbine/ transformer ID	Maximum calculated sound Level (dBA)
Q1565	PVLSR	4.5	327	T105	42.8
Q1566	PVLSR	4.5	383	T106	41.6
Q1567	PVLSR	4.5	298	T120	44.1
Q1568	PVLSR	4.5	465	T120	41.5
Q1569	PVLSR	4.5	485	T110	39.2
Q1570	PVLSR	4.5	930	T101	33.7
Q1571	PVLSR	4.5	525	T102	38.0
Q1572	PVLSR	4.5	272	T103	44.6
Q1609	PVLSR	4.5	626	T112	37.8

7 NOISE LEVEL ISOPLETH MAP

Figure 7-1 is a noise-level isopleth map of the A-weighted 40 dBA sound pressure levels (dBA) generated by all qualified sources over the wind farm region. MECP "predictable worst case" octave band source sound power levels (maximum sound power level profile) have been used for the wind farm and neighbouring turbine types (see Section 4.2).

The noise levels are calculated for receptors with 1.5 m (1 storey) and 4.5 m (2 storey) heights.

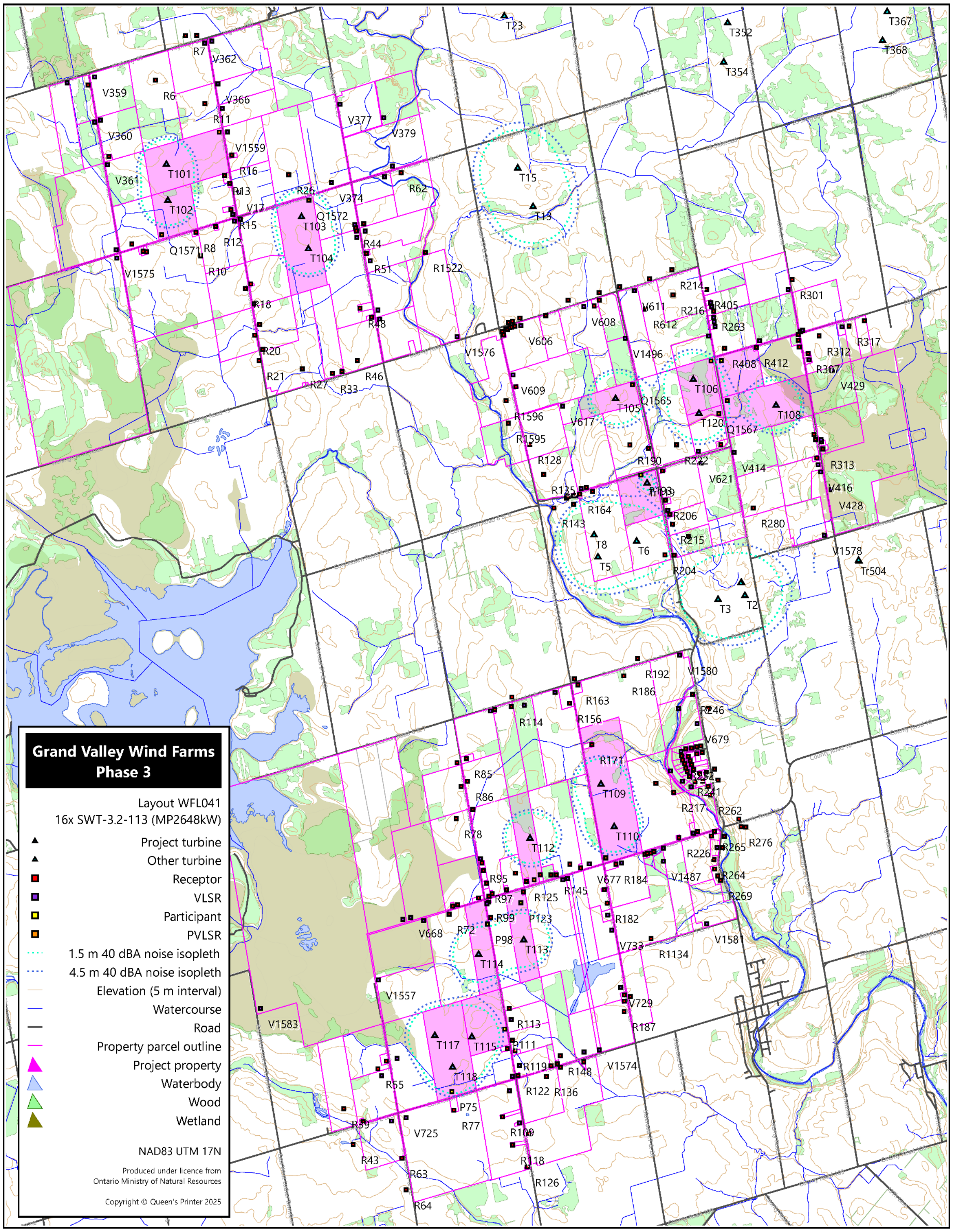

Figure 7-1 40 dBA noise isopleth map for 1.5 and 4.5 m receptor heights.

8 EXAMPLE CALCULATION

8.1 Method of calculation

The calculation of cumulative receptor noise levels from turbines and transformers uses the methodology of ISO 9613-2 (ISO, 1996).

The calculation is based on equation (5) from ISO 9613-2 shown here:

$$L_{AT}(DW) = 10\log_{10}\left\{\sum_{i=1}^{n}\left[\sum_{j=1}^{9} 10^{0.1\left[L_{fT}(ij)+A_f(j)\right]}\right]\right\}$$

where

$L_{AT}(DW)$ is the equivalent continuous A-weighted downwind sound pressure level at a receptor location,

i is an index for the n turbines,

n is the number of turbines,

$A_f(j)$ is the standard A-weighting for octave band j,

j is an index indicating nine octave-band mid-band frequencies from 31.5 Hz to 8 kHz (Note that the Standard uses eight octave bands),

$L_{fT}(ij) \equiv L_{fT}(DW)$ is the equivalent continuous downwind octave-band sound pressure level at a receptor location for turbine i and octave band j, and is given by

$$L_{ft}(DW) = L_W + D_C - A$$

where

L_W is the octave-band sound power level, in decibels, produced by the point sound source relative to a reference sound power of one picowatt,

D_C is the directivity correction in decibels,

A is the octave-band attenuation, in decibels, that occurs during propagation from the turbine to receptor, and is given by

$$A = A_{\text{div}} + A_{atm} + A_{gr} + A_{\text{bar}} + A_{misc}$$

where

A_{div} is the attenuation due to geometrical divergence,

A_{atm} is the attenuation due to atmospheric absorption,

A_{gr} is the attenuation due to the ground effect,

A_{bar} is the attenuation due to a barrier,

A_{misc} is the attenuation due to miscellaneous other effects,

A_{atm} is given by

$$A = \frac{\alpha d}{1000}$$

where

α is the atmospheric attenuation coefficient, in decibels per kilometre, for each octave band at the midband frequency,

d is the distance from the turbine to the receptor.

Note that A_{bar} and A_{misc} are not used here.

8.2 Example

The following sample calculation presents intermediate octave-band results of calculations for A-weighted sound pressure levels. All model parameters are the same as previously tabulated.

Table 8-1 lists the intermediate sound pressure levels calculated at receptor R222 due to the single turbine T120. Receptor and turbine are separated by 578 m. Note that the resultant A-weighted sound pressure level at R222 due to turbine T120 alone is 36.1 dBA.

In the table:

L_W is the octave-band sound power level, in decibels, produced by the point sound source relative to a reference sound power of one picowatt,

A_{div} is the attenuation due to geometrical divergence,

Table 8-1 Sample calculation for receptor and turbine.

Intermediate calculations for receptor R222 and turbine T120					
Mid-band frequency (Hz)	L_W (dBA)	A_{div} (dB)	A_{atm} (dB)	A_{gr} (dB)	L_{fT}(DW) (dBA)
31.5	77.6	66.2	0.0	-3.0	14.4
63	87.7	66.2	0.1	-3.0	24.4
125	92.1	66.2	0.2	0.2	25.4
250	94.6	66.2	0.6	-0.8	28.6
500	95.8	66.2	1.1	-1.5	30.0
1000	97.7	66.2	2.1	-1.5	30.8
2000	97.6	66.2	5.6	-1.5	27.3
4000	96.0	66.2	19.0	-1.5	12.3
8000	86.8	66.2	67.6	-1.5	-45.6

A_{atm} is the attenuation due to atmospheric absorption,

A_{gr} is the attenuation due to the ground effect, $L_{fT}(DW)$ is the equivalent continuous downwind octave-band sound pressure level.

Table 8-2 shows intermediate octave band values of the calculations for the A-weighted sound pressure levels at receptor R222 due to all turbines and transformers within 5,000 m of the receptor. The resultant A-weighted sound pressure level at R222 due to all relevant turbines is 39.0 dBA.

Table 8-2 Sample calculation for single receptor and multiple turbines.

Intermediate calculations for R222 and multiple turbines											
Turbine (T) / Transformer (Tr) ID	Distance (m)	Turbine L_{ft} contribution (dB) in frequency band (Hz)									T / Tr L_{AT} (dBA)
		31.5	63	125	250	500	1000	2000	4000	8000	
T2	2483	42.5	37.7	28.8	27.2	20.7	13.7	-5.0	-65.0	-287.1	22.7
T3	2403	42.8	37.9	29.1	27.6	21.1	14.3	-3.9	-62.1	-277.4	23.1
T5	2056	41.2	37.7	33.8	24.4	22.1	13.9	1.0	-48.6	-231.0	23.4
T6	1567	43.6	40.1	36.4	27.2	25.4	18.1	8.1	-30.2	-171.4	26.5
T8	1835	42.2	38.7	34.9	25.6	23.5	15.7	4.1	-40.4	-204.2	24.7
T13	4173	39.3	34.6	24.8	21.9	14.2	5.1	-23.8	-123.7	-488.6	17.2
T15	4789	38.3	33.5	23.5	20.2	12.0	1.8	-30.9	-145.0	-561.7	15.5
Tr25	2286	15.7	19.5	14.9	13.1	13.4	3.4	-15.3	-73.1	-273.6	12.2
Tr26	2287	15.7	19.5	14.9	13.1	13.4	3.4	-15.3	-73.1	-273.7	12.2
T105	1150	47.8	44.6	35.1	30.6	26.1	22.7	14.5	-13.4	-117.4	28.7
T106	1012	48.9	45.7	36.3	31.9	27.5	24.3	17.0	-7.8	-100.2	30.1
T108	1605	44.9	41.6	32.0	27.3	22.3	18.2	7.2	-31.2	-173.5	24.9
Tr119	727	14.8	19.8	23.1	20.8	23.1	13.6	-2.8	-25.2	-92.2	21.5
T120	578	53.8	50.6	41.5	37.2	33.2	30.8	26.1	11.3	-44.5	36.1
Tr504	3248	22.3	26.0	21.2	19.5	18.3	6.4	-18.1	-98.1	-379.5	17.3
Tr505	3234	22.4	26.0	21.3	19.5	18.3	6.5	-17.9	-97.6	-377.9	17.3

9 CONCLUSIONS

This noise impact assessment for the Grand Valley Wind Farms – Phase 3 Wind Farm has determined that the estimated sound pressure levels at all qualified receptors and vacant lot surrogate receptors (VLSRs) in the wind farm area will comply with current Ontario Ministry of Environment, Conservation and Parks sound level limits at points of reception.

All calculations and results in this noise impact assessment have been carried out in compliance with the most recent (2016) version of the Ontario Ministry of Environment, Conservation and Parks' (MECP) *Noise Guidelines for Wind Farms* and the current version (February, 2024) of Ontario Regulation O.Reg 359/09.

10 REFERENCES

Canadian Standards Association (CSA), 2019: *CSA IEC 61400-11:19 – Wind Turbines – Part 11: Acoustic Noise Measurement Techniques* (Adopted IEC 61400-11:2012, third edition, 2012-11, including amendment 1:2018). https://store.csagroup.org/ccrz__ProductDetails?viewState=DetailView&cartID=&portalUser=&store=&cclcl=en_US&sku=CSA%20IEC%2061400-11%3A19&format=PDF (Note that the MECP website refers to two other versions of this Standard which have been "withdrawn" by CSA. This is the most recent and active version.)

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11 APPENDIX A — PROJECT LOCATIONS

This appendix contains lists of turbine, receptor, vacant lot surrogate receptor (VLSR), participant, and participant vacant lot surrogate receptor (PVLSR) locations. Coordinates are given in the Universal Transverse Mercator (UTM) Zone 17 North projection. The datum is North American Datum 1983 (NAD83, Canada).

Turbines, Transformers

Identifier	Equipment Make & Model	UTM X (m)	UTM Y (m)	Remarks
T2	Siemens SWT-2.3-101 (MP2126kW)	554848	4867068	GVWF-P1&2
T3	Siemens SWT-2.3-101 (MP2126kW)	554445	4867009	GVWF-P1&2
T5	Siemens SWT-2.3-101 (MP2221kW,DT)	552643	4867647	GVWF-P1&2
T6	Siemens SWT-2.3-101 (MP2221kW,DT)	553223	4867883	GVWF-P1&2
T8	Siemens SWT-2.3-101 (MP2221kW,DT)	552584	4867977	GVWF-P1&2
T13	Siemens SWT-2.3-101 (MP2221kW)	551669	4872904	GVWF-P1&2
T15	Siemens SWT-2.3-101 (MP2221kW)	551439	4873483	GVWF-P1&2
T23	Siemens SWT-2.3-101 (MP2221kW)	551236	4875764	GVWF-P1&2
T24	Siemens SWT-2.3-101 (MP2221kW)	551201	4876193	GVWF-P1&2
Tr25	Transformer - GV1&2	554789	4867258	GVWF-P1&2
Tr26	Transformer - GV1&2	554798	4867261	GVWF-P1&2
T101	Siemens SWT-3.2-113 (MP2648kW)	546165	4873538	GVWF-P3
T102	Siemens SWT-3.2-113 (MP2648kW)	546188	4872997	GVWF-P3
T103	Siemens SWT-3.2-113 (MP2648kW)	548193	4872750	GVWF-P3
T104	Siemens SWT-3.2-113 (MP2648kW)	548297	4872271	GVWF-P3
T105	Siemens SWT-3.2-113 (MP2648kW)	552907	4870024	GVWF-P3
T106	Siemens SWT-3.2-113 (MP2648kW)	554074	4870311	GVWF-P3
T108	Siemens SWT-3.2-113 (MP2648kW)	555316	4869921	GVWF-P3
T109	Siemens SWT-3.2-113 (MP2648kW)	552688	4864238	GVWF-P3
T110	Siemens SWT-3.2-113 (MP2648kW)	552887	4863599	GVWF-P3
T112	Siemens SWT-3.2-113 (MP2648kW)	551622	4863426	GVWF-P3
T113	Siemens SWT-3.2-113 (MP2648kW)	551529	4861903	GVWF-P3
T114	Siemens SWT-3.2-113 (MP2648kW)	550852	4861687	GVWF-P3

Identifier	Equipment Make & Model	UTM X (m)	UTM Y (m)	Remarks
T115	Siemens SWT-3.2-113 (MP2648kW)	550750	4860447	GVWF-P3
T117	Siemens SWT-3.2-113 (MP2648kW)	550194	4860468	GVWF-P3
T118	Siemens SWT-3.2-113 (MP2648kW)	550461	4859993	GVWF-P3
Tr119	Transformer - GV3	553380	4868754	GVWF-P3
T120	Siemens SWT-3.2-113 (MP2648kW)	554159	4869801	GVWF-P3
T352	GE Wind 1.5sle	554589	4875661	Melancthon WF
T354	GE Wind 1.5sle	554531	4875073	Melancthon WF
T355	GE Wind 1.5sle	557134	4876614	Melancthon WF
T356	GE Wind 1.5sle	554409	4876444	Melancthon WF
T357	GE Wind 1.5sle	554202	4876712	Melancthon WF
T360	GE Wind 1.5sle	555670	4877011	Melancthon WF
T361	GE Wind 1.5sle	555264	4876696	Melancthon WF
T364	GE Wind 1.5sle	556824	4877447	Melancthon WF
T365	GE Wind 1.5sle	556695	4876882	Melancthon WF
T366	GE Wind 1.5sle	556746	4876499	Melancthon WF
T367	GE Wind 1.5sle	556984	4875828	Melancthon WF
T368	GE Wind 1.5sle	556914	4875396	Melancthon WF
T369	GE Wind 1.5sle	558231	4875729	Melancthon WF
T370	GE Wind 1.5sle	558383	4876344	Melancthon WF
T371	GE Wind 1.5sle	558270	4876953	Melancthon WF
T377	GE Wind 1.5sle	554005	4876115	Melancthon WF
T401	GE Wind 1.5sle	550962	4878521	Melancthon WF
T402	GE Wind 1.5sle	551099	4878876	Melancthon WF
T502	GE Wind 1.5sle	550427	4878466	Melancthon WF
T503	GE Wind 1.5sle	550715	4878204	Melancthon WF
Tr504	Transformer - MWF	556561	4867582	Melancthon WF
Tr505	Transformer - MWF	556555	4867597	Melancthon WF

Points of Reception (Receptors, R)

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R1	Receptor	544990	4874727	1.5	3
R2	Receptor	545301	4873655	4.5	3
R3	Receptor	545645	4872342	4.5	3
R4	Receptor	545816	4872236	4.5	3
R5	Receptor	545868	4872225	4.5	3
R6	Receptor	546000	4874803	4.5	3
R7	Receptor	546450	4875470	1.5	3
R8	Receptor	546606	4872516	4.5	3
R9	Receptor	546621	4875474	1.5	3
R10	Receptor	546679	4872164	7.5	3
R11	Receptor	546743	4874450	4.5	3
R12	Receptor	546905	4872606	1.5	3
R13	Receptor	547040	4873373	1.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R14	Receptor	547118	4873251	4.5	3
R15	Receptor	547134	4872861	4.5	3
R16	Receptor	547146	4873678	4.5	3
R18	Receptor	547350	4871673	1.5	3
R19	Receptor	547432	4871744	4.5	3
R20	Receptor	547491	4870973	4.5	3
R21	Receptor	547555	4870593	4.5	3
R22	Receptor	547564	4871137	1.5	3
R26	Receptor	548002	4873382	4.5	3
R27	Receptor	548203	4870469	1.5	3
R33	Receptor	548657	4870401	4.5	3
R38	Receptor	548799	4870430	1.5	3
R39	Receptor	548826	4859372	4.5	3
R43	Receptor	548969	4858833	4.5	3
R44	Receptor	549005	4872585	1.5	3
R45	Receptor	549017	4872539	1.5	3
R46	Receptor	549030	4870594	1.5	3
R48	Receptor	549071	4871380	1.5	3
R49	Cemetery	549117	4859179	4.5	3
R50	Receptor	549129	4872646	4.5	3
R51	Receptor	549166	4872202	4.5	3
R52	Receptor	549244	4871244	1.5	3
R55	Receptor	549340	4859970	1.5	3
R58	Receptor	549466	4860086	4.5	3
R62	Receptor	549689	4873413	1.5	3
R63	Receptor	549701	4858628	4.5	3
R64	Receptor	549763	4858152	4.5	3
R72	Receptor	550409	4862288	4.5	3
R76	Receptor	550463	4862409	4.5	3
R77	Receptor	550480	4859347	1.5	3
R78	Receptor	550516	4863722	4.5	3
R79	Receptor	550528	4864562	1.5	3
R80	Receptor	550535	4862430	1.5	3
R85	Receptor	550667	4864621	4.5	3
R86	Receptor	550685	4864280	1.5	3
R89	Receptor	550765	4863858	4.5	3
R93	Receptor	550852	4862532	4.5	3
R95	Receptor	550901	4863056	4.5	3
R97	Receptor	550972	4862752	1.5	3
R99	Receptor	551002	4862468	1.5	3
R100	Receptor	551007	4862556	1.5	3
R101	Receptor	551033	4862239	1.5	3
R103	Receptor	551057	4862594	4.5	3
R105	Receptor	551093	4865356	1.5	3
R109	Receptor	551208	4859250	4.5	3
R112	Receptor	551282	4860273	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R113	Receptor	551311	4860876	4.5	3
R114	Receptor	551343	4865401	1.5	3
R115	Receptor	551350	4865543	4.5	3
R117	Receptor	551358	4860398	4.5	3
R118	Receptor	551362	4858827	4.5	3
R119	Receptor	551399	4860240	1.5	3
R120	Receptor	551401	4862902	1.5	3
R122	Receptor	551442	4859869	4.5	3
R124	Receptor	551524	4862623	1.5	3
R125	Receptor	551568	4862776	1.5	3
R126	Receptor	551582	4858497	1.5	3
R127	Receptor	551600	4859001	1.5	3
R128	Receptor	551620	4869335	4.5	3
R134	Receptor	551776	4862879	4.5	3
R135	Receptor	551828	4868884	1.5	3
R136	Receptor	551868	4859854	1.5	3
R139	Receptor	551937	4862876	1.5	3
R140	Receptor	551939	4860015	1.5	3
R143	Receptor	551983	4868383	1.5	3
R145	Receptor	552016	4862878	1.5	3
R146	Receptor	552031	4860043	4.5	3
R148	Receptor	552076	4860165	1.5	3
R149	Receptor	552079	4859992	4.5	3
R152	Receptor	552171	4868532	4.5	3
R154	Receptor	552194	4871500	4.5	3
R156	Receptor	552218	4865452	4.5	3
R157	Receptor	552222	4863038	4.5	3
R158	Receptor	552278	4868564	4.5	3
R159	Receptor	552280	4868438	4.5	3
R160	Receptor	552287	4865817	4.5	3
R161	Receptor	552310	4868572	4.5	3
R163	Receptor	552342	4865726	1.5	3
R164	Receptor	552370	4868591	1.5	3
R165	Receptor	552383	4862980	1.5	3
R166	Receptor	552429	4860072	4.5	3
R169	Receptor	552467	4868692	1.5	3
R171	Receptor	552551	4864831	4.5	3
R173	Receptor	552560	4868630	1.5	3
R174	Receptor	552584	4871414	4.5	3
R176	Receptor	552661	4871613	4.5	3
R177	Receptor	552664	4871501	1.5	3
R179	Receptor	552737	4862656	1.5	3
R182	Receptor	552782	4862452	4.5	3
R184	Receptor	552913	4863039	1.5	3
R185	Receptor	552969	4871700	1.5	3
R186	Receptor	553030	4865863	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R187	Receptor	553036	4860831	4.5	3
R188	Receptor	553039	4861079	1.5	3
R189	Receptor	553039	4860984	1.5	3
R190	Receptor	553121	4869328	1.5	3
R191	Receptor	553129	4861056	4.5	3
R192	Receptor	553236	4866124	4.5	3
R194	Receptor	553384	4863200	4.5	3
R195	Receptor	553418	4871822	4.5	3
R198	Receptor	553484	4863224	4.5	3
R199	Receptor	553512	4864253	4.5	3
R202	Receptor	553612	4868939	1.5	3
R206	Receptor	553653	4868500	4.5	3
R210	Receptor	553721	4868286	4.5	3
R214	Receptor	553752	4871956	4.5	3
R215	Receptor	553762	4868139	4.5	3
R216	Receptor	553768	4871580	1.5	3
R217	Receptor	553778	4864116	4.5	3
R222	Receptor	553824	4869330	4.5	3
R226	Receptor	553859	4863433	1.5	3
R231	Receptor	553899	4864662	4.5	3
R232	Receptor	553913	4864597	1.5	3
R233	Receptor	553942	4864548	4.5	3
R235	Receptor	553961	4864482	4.5	3
R236	Receptor	553961	4864768	1.5	3
R238	Receptor	553983	4864426	1.5	3
R239	Receptor	554001	4864653	1.5	3
R241	Receptor	554016	4864357	1.5	3
R243	Receptor	554027	4864591	1.5	3
R244	Receptor	554049	4864780	1.5	3
R245	Receptor	554050	4864532	1.5	3
R246	Receptor	554063	4865586	4.5	3
R248	Receptor	554077	4864457	4.5	3
R249	Receptor	554100	4864275	4.5	3
R252	Receptor	554127	4864694	1.5	3
R253	Receptor	554137	4863527	4.5	3
R254	Receptor	554166	4864393	1.5	3
R255	Receptor	554188	4864809	1.5	3
R257	Receptor	554210	4864711	4.5	3
R258	Receptor	554214	4864287	4.5	3
R259	Receptor	554297	4864204	4.5	3
R260	Receptor	554299	4865371	4.5	3
R262	Receptor	554333	4864074	4.5	3
R263	Receptor	554380	4871336	4.5	3
R264	Receptor	554383	4863106	7.5	3
R265	Receptor	554389	4863530	1.5	3
R266	Receptor	554392	4864465	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R267	Receptor	554439	4862862	4.5	3
R268	Receptor	554443	4864299	1.5	3
R269	Receptor	554483	4862797	4.5	3
R270	Receptor	554486	4869335	7.5	3
R273	Receptor	554513	4863285	1.5	3
R274	Receptor	554538	4863454	1.5	3
R275	Receptor	554758	4863715	4.5	3
R276	Receptor	554790	4863599	4.5	3
R279	Receptor	554861	4863594	1.5	3
R280	Receptor	554973	4868382	4.5	3
R301	Receptor	555557	4871810	4.5	3
R304	Receptor	555648	4870897	1.5	3
R305	Receptor	555651	4870983	1.5	3
R306	Receptor	555663	4870797	4.5	3
R307	Receptor	555798	4870700	4.5	3
R308	Receptor	555884	4869485	1.5	3
R310	Receptor	555910	4869408	4.5	3
R311	Receptor	555929	4869134	4.5	3
R312	Receptor	555961	4870965	4.5	3
R313	Receptor	556018	4869266	1.5	3
R317	Receptor	556412	4871113	1.5	3
R318	Receptor	556641	4871192	4.5	3
R405	Receptor	554272	4871663	4.5	3
R408	Receptor	554543	4870781	4.5	3
R412	Receptor	555019	4870793	1.5	3
R530	Receptor	547612	4870761	4.5	3
R607	Receptor	551862	4871268	4.5	3
R610	Receptor	551412	4870200	4.5	3
R612	Receptor	553355	4871368	4.5	3
R671	Receptor	550588	4864202	4.5	3
R673	Receptor	550921	4862942	1.5	3
R674	Receptor	551270	4862653	4.5	3
R1134	Receptor	553441	4861924	4.5	3
R1136	Receptor	553349	4863185	4.5	3
R1137	Receptor	553437	4863204	1.5	3
R1522	Receptor	550051	4872217	4.5	3
R1529	Receptor	554344	4863460	4.5	3
R1555	Receptor	553400	4869276	4.5	3
R1584	Receptor	552193	4868552	4.5	3
R1585	Receptor	551471	4871232	4.5	3
R1586	Receptor	551361	4871183	4.5	3
R1587	Receptor	551301	4871165	4.5	3
R1588	Receptor	551396	4871110	4.5	3
R1589	Receptor	551350	4871097	4.5	3
R1590	Receptor	551319	4871088	4.5	3
R1591	Receptor	551286	4871059	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
R1592	Receptor	551260	4871071	4.5	3
R1593	Receptor	551208	4871031	4.5	3
R1594	Receptor	551225	4870979	4.5	3
R1595	Receptor	551298	4869657	4.5	3
R1596	Receptor	551264	4869993	4.5	3
R1597	Receptor	554000	4867951	4.5	3
R1598	Receptor	554391	4862965	4.5	3
R1599	Receptor	554126	4864797	4.5	3
R1600	Receptor	554271	4864410	4.5	3

Vacant Lot Surrogate Receptors (VLSR, V)

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
V17	VLSR	547246	4873121	4.5	3
V359	VLSR	545088	4874849	4.5	3
V360	VLSR	545175	4874201	4.5	3
V361	VLSR	545281	4873533	4.5	3
V362	VLSR	546737	4875357	4.5	3
V365	VLSR	546846	4875387	4.5	3
V366	VLSR	546938	4874746	4.5	3
V367	VLSR	547006	4874376	4.5	3
V374	VLSR	548642	4873266	4.5	3
V377	VLSR	548770	4874440	4.5	3
V379	VLSR	549428	4874239	4.5	3
V409	VLSR	555068	4870891	4.5	3
V410	VLSR	555678	4871026	4.5	3
V411	VLSR	555715	4871050	4.5	3
V414	VLSR	554686	4869215	4.5	3
V415	VLSR	555947	4869031	4.5	3
V416	VLSR	555983	4868922	4.5	3
V428	VLSR	556143	4868655	4.5	3
V429	VLSR	556167	4870449	4.5	3
V446	VLSR	555811	4870604	4.5	3
V447	VLSR	556305	4871102	4.5	3
V481	VLSR	549438	4873349	4.5	3
V482	VLSR	549148	4872537	4.5	3
V483	VLSR	549225	4872092	4.5	3
V484	VLSR	549341	4871351	4.5	3
V485	VLSR	549365	4871216	4.5	3
V528	VLSR	549022	4872442	4.5	3
V606	VLSR	551485	4871119	4.5	3
V608	VLSR	552428	4871405	4.5	3
V609	VLSR	551369	4870379	4.5	3
V611	VLSR	553188	4871642	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
V614	VLSR	554306	4870962	4.5	3
V617	VLSR	552114	4869910	4.5	3
V620	VLSR	554149	4869233	4.5	3
V621	VLSR	554194	4869054	4.5	3
V668	VLSR	549833	4862238	4.5	3
V672	VLSR	550880	4863118	4.5	3
V675	VLSR	551538	4865424	4.5	3
V676	VLSR	551998	4865613	4.5	3
V677	VLSR	552510	4863041	4.5	3
V679	VLSR	554131	4865145	4.5	3
V687	VLSR	550026	4862195	4.5	3
V692	VLSR	549395	4859865	4.5	3
V693	VLSR	549627	4860126	4.5	3
V725	VLSR	549763	4859236	4.5	3
V726	VLSR	551465	4860020	4.5	3
V727	VLSR	551340	4860707	4.5	3
V728	VLSR	552433	4860223	4.5	3
V729	VLSR	552984	4861190	4.5	3
V733	VLSR	552849	4862051	4.5	3
V734	VLSR	552791	4862274	4.5	3
V735	VLSR	552117	4862805	4.5	3
V1138	VLSR	553627	4863279	4.5	3
V1433	VLSR	549546	4859186	4.5	3
V1436	VLSR	551464	4859157	4.5	3
V1487	VLSR	553624	4863080	4.5	3
V1493	VLSR	553728	4864438	4.5	3
V1496	VLSR	553051	4870928	4.5	3
V1512	VLSR	545088	4874172	4.5	3
V1513	VLSR	544675	4874761	4.5	3
V1519	VLSR	545413	4872257	4.5	3
V1521	VLSR	547272	4872717	4.5	3
V1526	VLSR	553889	4864728	4.5	3
V1527	VLSR	554042	4864198	4.5	3
V1528	VLSR	553910	4864283	4.5	3
V1530	VLSR	554431	4863287	4.5	3
V1531	VLSR	551315	4859639	4.5	3
V1543	VLSR	553853	4865371	4.5	3
V1546	VLSR	550978	4862443	4.5	3
V1556	VLSR	552995	4863055	4.5	3
V1557	VLSR	549344	4861304	4.5	3
V1558	VLSR	555999	4869375	4.5	3
V1559	VLSR	547082	4874023	4.5	3
V1560	VLSR	547162	4872788	4.5	3
V1561	VLSR	547488	4871442	4.5	3
V1562	VLSR	547185	4872687	4.5	3
V1563	VLSR	553692	4868347	4.5	3

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
V1564	VLSR	554072	4863503	4.5	3
V1573	VLSR	552187	4862821	4.5	3
V1574	VLSR	552663	4860253	4.5	3
V1575	VLSR	545420	4872133	4.5	3
V1577	VLSR	555496	4871660	4.5	3
V1579	VLSR	551029	4865335	4.5	3
V1582	VLSR	549714	4862212	4.5	3
V1601	VLSR	548992	4872636	4.5	3
V1602	VLSR	549557	4873511	4.5	3
V1603	VLSR	554400	4871104	4.5	3
V1604	VLSR	554387	4871178	4.5	3
V1605	VLSR	554380	4871240	4.5	3
V1606	VLSR	554351	4871403	4.5	3
V1607	VLSR	554337	4871460	4.5	3
V1608	VLSR	551357	4859858	4.5	3
V1610	VLSR	555992	4869407	4.5	3
V1611	VLSR	552391	4868673	4.5	3

Participating Receptors (Participants, P)

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
P75	Participant	550448	4859628	4.5	3
P98	Participant	550983	4862140	4.5	3
P111	Participant	551244	4860564	4.5	3
P123	Participant	551486	4862458	1.5	3
P193	Participant	553287	4868876	4.5	3
P271	Participant	554497	4870591	4.5	3

Participating Vacant Lot Surrogate Receptors (PVLSR, Q)

Point of Reception ID	Description	UTM X (m)	UTM Y (m)	Height (m)	NPC Class
Q1565	PVLSR	553160	4870231	4.5	3
Q1566	PVLSR	554338	4870588	4.5	3
Q1567	PVLSR	554457	4869796	4.5	3
Q1568	PVLSR	554582	4869993	4.5	3
Q1569	PVLSR	552761	4863131	4.5	3
Q1570	PVLSR	546959	4874022	4.5	3
Q1571	PVLSR	546096	4872480	4.5	3
Q1572	PVLSR	548304	4872998	4.5	3
Q1609	PVLSR	551684	4862803	4.5	3

12 APPENDIX B — ADDITIONAL DOCUMENTATION

The following documents are included in Appendix B.

1. Siemens Gamesa: Grand Valley 3 – SWT-3.2-113 - Rev 1 Standard Acoustic Emission. (2021)

This OEM document summarizes the source sound power levels for this turbine for a variety of wind speeds and frequencies. Note that Mode 3 references the 2,772 kW max power variant of this turbine. This document includes statements with respect to measurement uncertainty and tonality.

2. Siemens Gamesa: Grand Valley 3 Standard Acoustic Emission SWT-3.2-113 2A, Rev. 1. (2019)

This OEM document summarizes the source sound power levels for this turbine for a variety of wind speeds and frequencies. Note that Mode 3 references the 2,772 kW max power variant of this turbine. This document does not include statements with respect to measurement uncertainty and tonality. In other respects, it appears that the Mode 3 sound power levels are identical to those published in the 2021 Acoustic Emission document (**1.**, above) for the MECP "predictable worst case" at 8 ms^{-1} wind speed.

3. Siemens Gamesa: Standard Acoustic Emission, SWT-2.3-101, Rev 4.

This OEM document summarizes the source sound power levels for this turbine for a variety of wind speeds and frequencies. Note that the -1 dB references the 2,221 kW max power variant and the -2 dB references the 2,126 kW max power variant of this turbine.

4. Siemens Energy Inc.: Letter from Anders J. Jensen

This letter provides a statement re. tonality for SWT-2.3-101 turbines.

5. Extract from HGC Engineering (2020)

This extract (page 3) is taken from the HGC Acoustic Test Report (HGC Engineering 2020) for GVWF-P1&2 turbine T8 which has been fitted with the Siemens Gamesa OEM "DinoTails Next Generation" and therefore represents the SWT-2.3-101 (Max Power 2,221 kW, DT) turbine model used in the present GVWF-P3 noise impact assessment. The extract summarizes the turbine's broadband source sound power level, total uncertainty, and tonality for a number of wind speeds. For brevity, the full report (128 pp.) has not been included here but has been submitted with the present NIA.

6. GE Energy: Technical Documentation Wind turbine Generator System GE 1.5sl/sle 50 & 60 Hz Noise emission characteristics Normal operation according to IEC

This document provides broadband, octave band, and tonality data for the Melancthon Wind Facility turbines. Note that for economy of space, three uninformative pages of this document have been omitted.

7. HGC Engineering, 2016 (see references): Determination of Sound Power Levels of A Transformer and Reactor.

This document details measured broadband and octave band sound power levels for the GVWF-P3 transformer/reactor pair located at the GVWF-P3 substation.

Appendix B.2 Grand Valley Wind Farms Phase 3, WTG T101 Emission Acoustic Report Summary and Acoustic Test Report (December 3, 2019)

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*.

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

ACOUSTIC TEST REPORT, WTG T101 (2648 KW)

Version 01

Grand Valley Wind Farms, Phase 3

Grand Valley, ON

Report Number: 01900425.002

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 13:41:42 -05'00'

Nathan Gara, C.E.T.

Reviewed by:

Ian Bonsma
Digitally signed by Ian Bonsma
Date: 2019.12.03 11:51:07 -07'00'

Ian R. Bonsma, PEng

December 3, 2019

Template QF 510-01 V09

ACOUSTICS NOISE VIBRATION

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 an Acoustic Noise test in accordance with IEC 61400-11 of Wind Turbine Generator ("WTG") T101, part of the Grand Valley Wind Farms Phase 3 project near Grand Valley, Ontario. The measurements were completed on November 22, 2019.

HGC Engineering has assessed the acoustic emissions of WTG T101, a Siemens SWT-3.2-113 wind turbine, rated at 2648 kW, in accordance with IEC 61400-11:2018-06. A summary of the acoustic results is provided in the following tables:

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)	**98.0**	**100.3**	**101.1**	**101.4**	**101.7**	**101.7**	**101.1**	**100.5**	**100.5**	**100.7**	**100.8**
Tonal Audibility, ΔL_{ak} in 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 $u_{LWA,k}$ in dB:	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8

* Above *allowed range* of power curve.

10 m Height Wind Speed [m/s]	**6**	**7***	**8***
Sound Power Level $L_{WA,k}$ in dB(A):	101.6	101.1	100.7
Total Uncertainty $u_{LWA,k}$ in dB:	0.7	0.7	0.8

* Above *allowed range* of power curve.

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APPENDIX D – Tonality Assessment Results
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1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership, to complete sound level measurements (Emission Audit) of Wind Turbine Generator ("WTG") T101 in order to determine the sound power level of the turbine. The turbine is part of the 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. Measurements were completed on November 22, 2019. Figure 1 shows the location of WTG T101.

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" [1].

2 WIND TURBINE GENERATOR

The wind turbine generator is manufactured by Siemens and is the SWT-3.2-113 model, rated at 2648 kW, with a rotor diameter of 113 m and a hub height of 99.5 m. This turbine is an upwind, pitch controlled, horizontal axis wind turbine with three blades. Specific details of the wind turbine generator are included in Table 1.

Table 1: Wind Turbine Generator Characteristics

Wind Turbine					
Manufacturer	Siemens				
Model Number	SWT 3.2-113				
Serial Number	3000929				
Hub Height	99.5 m				
Tower Type (lattice or tube)	Tubular				
Horizontal Distance from Rotor Centre to Tower Axis	5.5 m				
Rotor Diameter	113 m				
Speed (constant or variable)	Variable				
	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s
Pitch Angle	Confidential				
Rotational Speed	Confidential				
Rated Power Output	2648 kW				
Control Software Version	142.0.0.15				
Rotor Details					
Rotor Control Devices	Pitch Control				
Presence of Votex Generators, Stall Strips Trailing Edges	Vortex Generators and Dino Tails				
Blade Type	B55				
Serial Number	Blade A: 550244101 Blade B: 550243701 Blade C: 550332601				
Gearbox					
Manufacturer	N/A – Direct Drive				
Model Number	N/A – Direct Drive				
Serial Number	N/A – Direct Drive				
Generator					
Manufacturer	Siemens				
Model Number	DD22_02				
Serial Number	5100123892				
UTM Coordinates (Zone 17)					
Easting	546165				
Northing	4873540				

The electrical power curve utilized for the sound level measurements is shown in Figure 2. From the supplied power curve, 85% of maximum electrical power is reached at 2251 kW, which corresponds to a hub height wind speed of 9.6 m/s. The required minimum wind speeds for reporting is from 0.8 to 1.3 times the hub height wind speed at 85% electrical power, which is 7.5 to 12.5 m/s for this wind turbine generator.

3 TEST ENVIRONMENT

WTG T101 is part of the Grand Valley Wind Farms Phase 3 Project located near Grand Valley, Ontario. Figure 1 shows the specific location of WTG T101. The surrounding land is used mainly for agricultural crops and includes gently rolling terrain. The land surrounding WTG T101 is used mainly for agricultural crops and includes gently rolling terrain. The sound level measurement location was in an area with short grass.

There are a number of additional wind turbine generators located in the vicinity of the test turbine. WTG T102, part of the Grand Valley Wind Farms Phase 3 Project, is located approximately 540 m to the south of WTG T101. WTG T102 was parked during the testing of WTG T101. Sources of background sound included air traffic and occasional road traffic.

The sound level measurement location was established at 150 m from the base of the turbine. This distance was determined utilizing the reference distance calculation provided in IEC 61400; R_0 = H + D/2 ± 20% where H is the hub height and D is the rotor diameter. An R_1 distance of 186.4 m was determined for this test using the equation:

$$R_1 = \sqrt{(D_1 + D_2 + D_3)^2 + {H_{hub}}^2}$$

Where D_1 is the distance from turbine base to the microphone (150 m), D_2 is the tower radius (2.15 m), D_3 is the distance from rotor to tower axis (5.5 m) and H_{hub} is the hub height (99.5 m). Based on measurements taken during the testing, the difference in elevation between the turbine base and the microphone location was negligible.

Photos of the sound level measurement location, the test turbine, and wind mast location are included under Appendix A.

4 INSTRUMENTATION AND SETUP

A Wolfel RoBin measurement system was utilized to complete the IEC measurements. Sound pressure level measurements and recordings were completed using a 01 dB DUO Smart Noise Monitor. The microphone was mounted on a one metre diameter board with a primary and secondary windscreen. A standard Bruel & Kjaer 3” wind screen (half) was used on the microphone as well as a secondary Bruel & Kjaer UA-2133 wind screen. The influence of the secondary windscreen is shown in Table 2. The acoustic influence of the secondary windscreen contributes approximately 0.2 dBA to the overall sound level and the sound levels have been corrected herein.

Table 2: Frequency Dependent Influence for UA-2133 Windscreen

Frequency [Hz]	SPL Influence [dB]	Frequency [Hz]	SPL Influence [dB]
100	-0.07	1600	-0.3
125	0.06	2000	-0.03
160	0.01	2500	-0.12
200	0.18	3150	-0.25
250	-0.03	4000	-0.73
315	-0.25	5000	-0.5
400	-0.26	6300	-0.03
500	-0.18	8000	-0.99
630	0.04	10000	-0.77
800	-0.14	12500	-0.75
1000	-0.44	16000	-1.23
1250	-0.14	20000	-0.59

The RoBin and DUO systems were time synchronized prior to the start of the measurements (within 1 second).

During the measurements, the electrical power, rotor RPM, azimuth and hub height wind speeds were provided by the customer as analogue signals and were directly recorded by the RoBin system.

Wind speed and direction at 10 m height were measured using a Vaisala ultrasonic anemometer while a Reinhardt DFT485 sensor was utilized to measure air pressure, temperature and air humidity. Table 3 shows the weather conditions during the measurement periods.

Table 3: Weather Conditions

	October 24, 2019	
	Start of Test	**End of Test**
Air Temperature [°C]	-2	-2
Air Pressure [hPa]	950	953
Relative Humidity [%]	86	72
Sky Condition	Overcast	
Range of Azimuth (Yaw) Angle [°]	295 to 312	

The measurement equipment and the relevant calibration information are shown in Table 4.

Table 4: Instrumentation

Instrumentation	Manufacturer / Model / Serial Number	Calibration	
		Completed	**Due**
Measurement System	Wolfel / RoBin / ROBIN.00.0003	N/A	N/A
Sound Level Meter	01 dB-Metravib / DUO / 10815	10-Apr-19	10-Apr-20
Microphone	GRAS / 40CD / 154426	27-Mar-19	27-Mar-20
Anemometer	Vaisala / WMT701 / J3920012	8-Jul-19	8-Jul-21
Air Pressure / Temperature and Humidity	Reinhardt / DFT485 / 1027951	4-Jul-19	4-Jul-21
Acoustic Calibrator	Bruel & Kjaer / 4231 / 3010241	1-Feb-19	1-Feb-20
Primary Wind Screen	Bruel & Kjaer	N/A	N/A
Secondary Wind Screen and Ground Board	Bruel & Kjaer / UA 2133	N/A	N/A
Noisy Software	Wolfel / Noisy Version 2019-1	N/A	N/A

Correct calibration of the acoustic instrumentation was verified using an acoustic calibrator manufactured by Brüel & Kjær. Verification of calibration status was carried out at the start and end of the measurement period and when the microphone was disconnected from the sound level meter. Calibration certificates for the test equipment are provided in Appendix B. The same equipment was utilized during the entire test period unless otherwise indicated.

During testing, the anemometer was located 130 m southeast of the turbine at 10 m above grade.

The standard roughness length applicable for this site is 0.05 given the surrounding farmland with some vegetation.

Sound level measurements were completed with the turbine operational and with the turbine parked. Significant interfering sound from road traffic, aircraft, bird calls, local agricultural activity, etc. was not included in the analysis for either the turbine operational or ambient condition. The microphone position was maintained to be within +/- 15° of the downwind direction through visual inspection and the recording of the azimuth position. The azimuth angle of the turbine ranged between 240° and 330°.

4.1 Type B Uncertainties

The uncertainty components of Type B are provided in Table 5. Additional one-third octave Type B uncertainty components for the instrument and wind screen insertion loss can be provided upon request. These uncertainty components are provided by the instrument manufacturers.

Table 5: Type B Uncertainty Components

Component	Value
Calibration, u_{B1}	0.2 dB
Instrument, u_{B2}	0.2 - 0.5 dB
Board, u_{B3}	0.3 dB
Wind screen insertion loss, u_{B4}	0.1 - 0.5 dB
Distance and Direction, u_{B5}	0.1 dB
Air Absorption, u_{B6}	0.2 dB
Weather Conditions, u_{B7}	0.5 dB
Wind Speed, Measured, u_{B8}	0.7 m/s
Wind Speed Derived, u_{B8}	0.3 m/s
Wind Speed, Power Curve, u_{B9}	0.2 m/s

The uncertainty associated with the electrical power transducer (derived wind speed, u_{B8}) has been increased to 0.3 m/s as the electrical power signal was provided by the manufacturer. The manufacturer has indicated a measurement chain uncertainty of 1% on the measured electrical power, which corresponds to approximately 0.05 m/s. An increase of 0.1 m/s, over the typical standard uncertainty, has been included for the derived wind speed uncertainty.

5 MEASUREMENTS AND RESULTS

Sound level measurements were conducted of WTG T101 on November 22, 2019, between 10:00 and 15:00. Temperature and other weather characteristics are reported in Table 3 above.

The data points where the turbine was operating within the allowed power curve range are identified as the *allowed range* (intervals on the electrical power curve where no duplicated values exist and the slope of the power curve including the uncertainty is positive). In accordance with Equation (3) of Section 8.2.1.1 of IEC 61400-11, and using a typical tolerance on the power curve (P_{tol}) of 3%, the allowed range of the power curve was determined. The slope of the power curve was calculated to be positive at integer wind speeds between 4 and 10 m/s. The allowed range of the power curve was therefore determined to be between 166 kW and 2450 kW.

For data within the allowed range of the electrical power curve the wind speed ($V_{\mathrm{P,n}}$) is determined. The average value of the ratio between the derived wind speed from the electrical power curve and the measured nacelle wind speed ($V_{\mathrm{nac,m}}$), k_{nac} is determined. $k_{\mathrm{nac}} = \frac{V_{\mathrm{nac,n}}}{V_{\mathrm{nac,m}}}$. For this data set the k_{nac} value of 0.92 was applied to the measured nacelle wind speed to derive the normalized wind speed outside the allowed range.

For background noise measurements, the measured 10 m wind speed ($V_{Z,m}$) and the wind speed derived from the power curve $V_{\mathrm{P,n}}$ are used to determine k_{Z}. $k_{\mathrm{Z}} = \frac{V_{\mathrm{P,n}}}{V_{Z,\mathrm{m}}}$. For this data set, the k_Z value of 1.23, was applied to the measured 10 m wind speed ($V_{Z,m}$) to derive the normalised wind speed at hub height ($V_{\mathrm{B,n}}$) during background noise measurements.

Figure 3 shows the sound pressure level at the measurement location versus the hub height wind speed. Blue circles represent sound level data points collected with the turbine operating in the allowed range, above this point the sound levels are shown as black squares. Magenta triangles indicate data points of the background sound level (turbine off).

Figure 4 shows the measured total noise versus electrical power. Figure 5 plots the wind speed determined from the electrical power curve (V_p) relative to the measured nacelle wind speed ($V_{nac,m}$) and 10 m met mast wind speed ($V_{z,m}$).

Table 6 summarizes the analysis of the measured results.

Table 6: Sound Level Data

Hub Height Wind Speed [m/s]	**7.5**	**8**	**8.5**	**9**	**9.5**	**10**	**10.5**	**11***	**11.5***	**12***	**12.5***
Collected Data Points, Total	17	13	29	34	21	36	51	53	31	38	21
Collected Data Points, Background	12	29	25	31	33	27	29	27	18	16	13
Average Wind Speed, V_K [m/s]	7.6	8.0	8.6	9.0	9.5	10.0	10.5	10.9	11.5	12.0	12.5
Total Noise, $L_{V,T,}$ [dB(A)]	50.2	51.0	51.2	51.6	51.5	51.0	50.5	50.6	50.7	50.8	50.4
Background Noise, $L_{V,B}$ [dB(A)]	39.2	39.0	38.7	39.4	39.3	39.9	40.1	40.6	40.2	40.4	40.5
Difference T-B [dB(A)]	11.0	12.0	12.5	12.1	12.2	11.2	10.5	10.0	10.5	10.4	9.9
Corrected L_{Aeq} [dB(A)]	49.9	50.7	51.0	51.3	51.3	50.7	50.1	50.1	50.3	50.3	50.0

* Above *allowed range* of power curve.

Table 6 shows that at least 180 measurements were collected for both total noise and background noise and at least 10 measurements are included in the analysis for each wind speed bin, as required by IEC 61400-11.

Table 7 shows the calculated sound level data, the resulting sound power levels, tonality and measurement uncertainty at hub height, while Table 8 shows the apparent sound power levels at a reference height of 10 m. Figure 6 presents the apparent sound power level at hub height wind speeds.

Table 7: Apparent Sound Power Level of WTG T101 at Hub Height

Hub Height Wind Speed [m/s]	**7.5**	**8**	**8.5**	**9**	**9.5**	**10**	**10.5**	**11***	**11.5***	**12***	**12.5***
Corrected L_{Aeq} [dB(A)]	49.9	50.7	51.0	51.3	51.3	50.7	50.1	50.1	50.3	50.3	50.0
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**
Theoretical Active Power [kW]	1208	1446	1719	1991	2221	2450	2533	2616	2631	2645	2647
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

* Above *allowed range* of power curve.

Table 8: Apparent Sound Power Level at 10 m Height

10 m Height Wind Speed [m/s]	6	7*	8*
Sound Power Level $L_{WA,k}$ in dB(A):	101.6	101.1	100.7
Total Uncertainty $u_{LWA,k}$ in dB:	0.7	0.7	0.8

* Above *allowed range* of power curve.

A table and plot of the sound pressure spectrum in third octaves for each integer wind speed are included under Appendix C.

The tonality assessment indicates no tonal audibility greater than or equal to -3.0 dB. The detailed results of the tonality assessment are included under Appendix D.

6 CONCLUSIONS

The measurements and analysis, performed in accordance with the methods prescribed in IEC Standard 61400-11:2018-06 indicate that WTG T101, rated at 2648 kW and part of the Grand Valley Wind Farms, Phase 3, has the following sound power levels:

Table 9: Sound Power Level Summary

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)	**98.0**	**100.3**	**101.1**	**101.4**	**101.7**	**101.7**	**101.1**	**100.5**	**100.5**	**100.7**	**100.8**
Tonal Audibility, ΔL_{ak} in 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 $u_{LWA,k}$ in dB:	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8

* Above *allowed range* of power curve.

The sound levels presented above are relevant for Siemens SWT-3.2-113 turbine WTG T101 given the environmental conditions and the operating parameters of the turbine during the testing periods.

REFERENCES

1. International Electrotechnical Commission, 61400-11:2018-06 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.
2. Google Maps Aerial Imagery, Internet Application: *maps.google.com*

Figure 1 - Location of Test Turbine T101

Figure 2: Reference Electrical Power Curve
T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

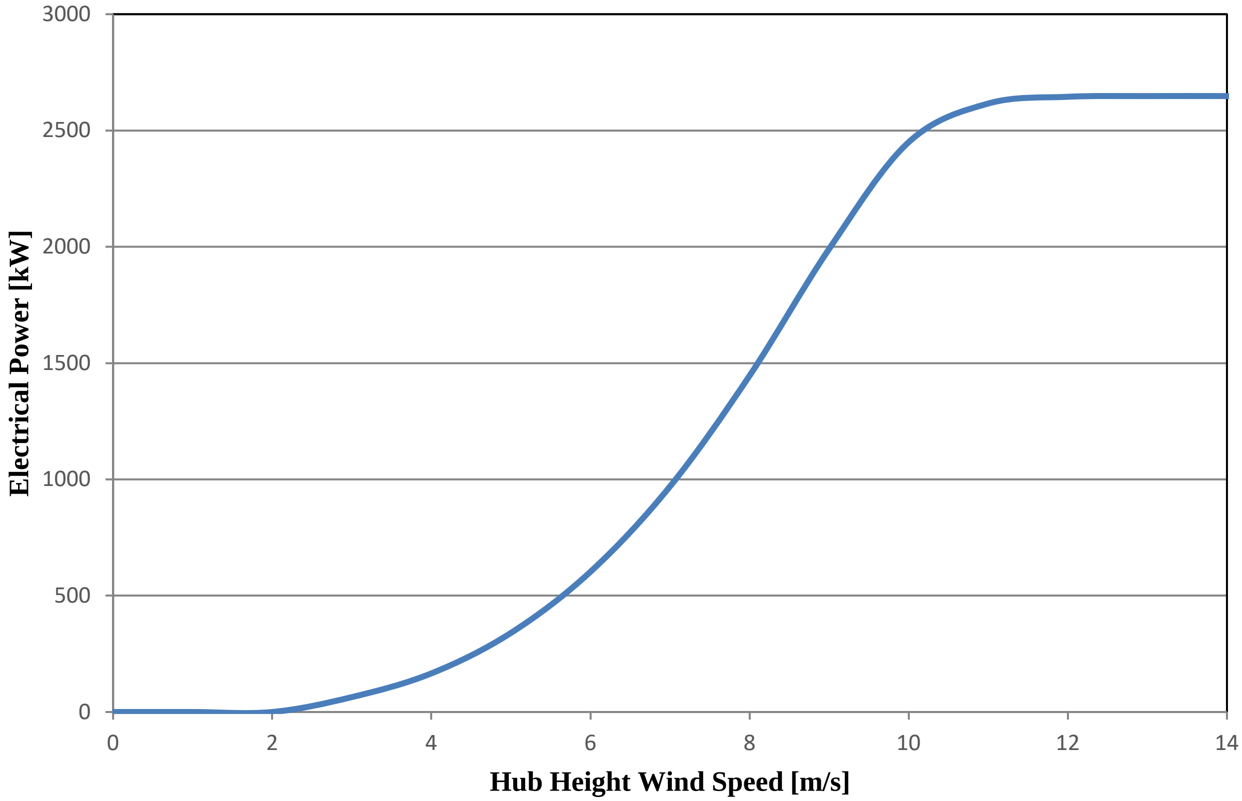


Figure 3: Acoustic Noise Measurements of the Wind Turbine Generator T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

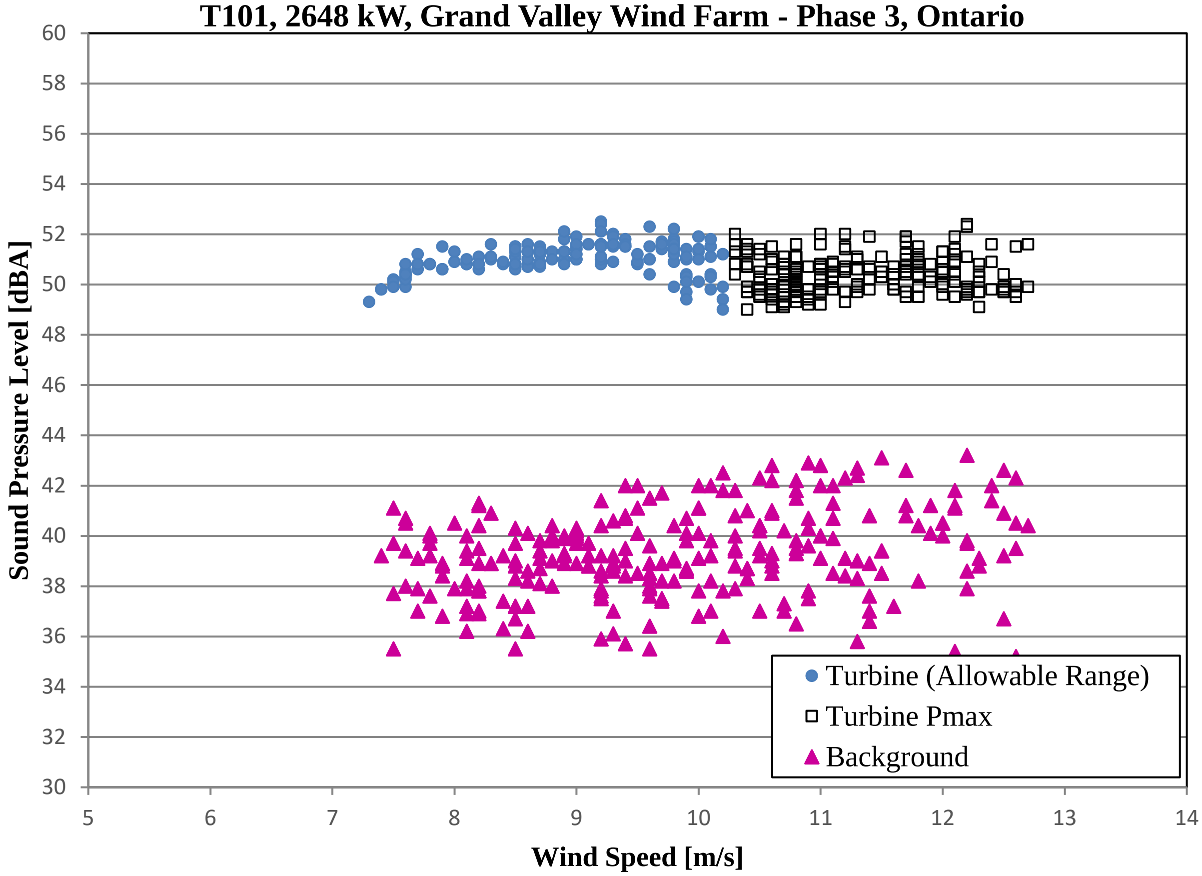


Figure 4: Total Sound Level [dBA] vs Electrical Power [kW]
T101, 2648kW, Grand Valley Wind Farm - Phase 3, Ontario

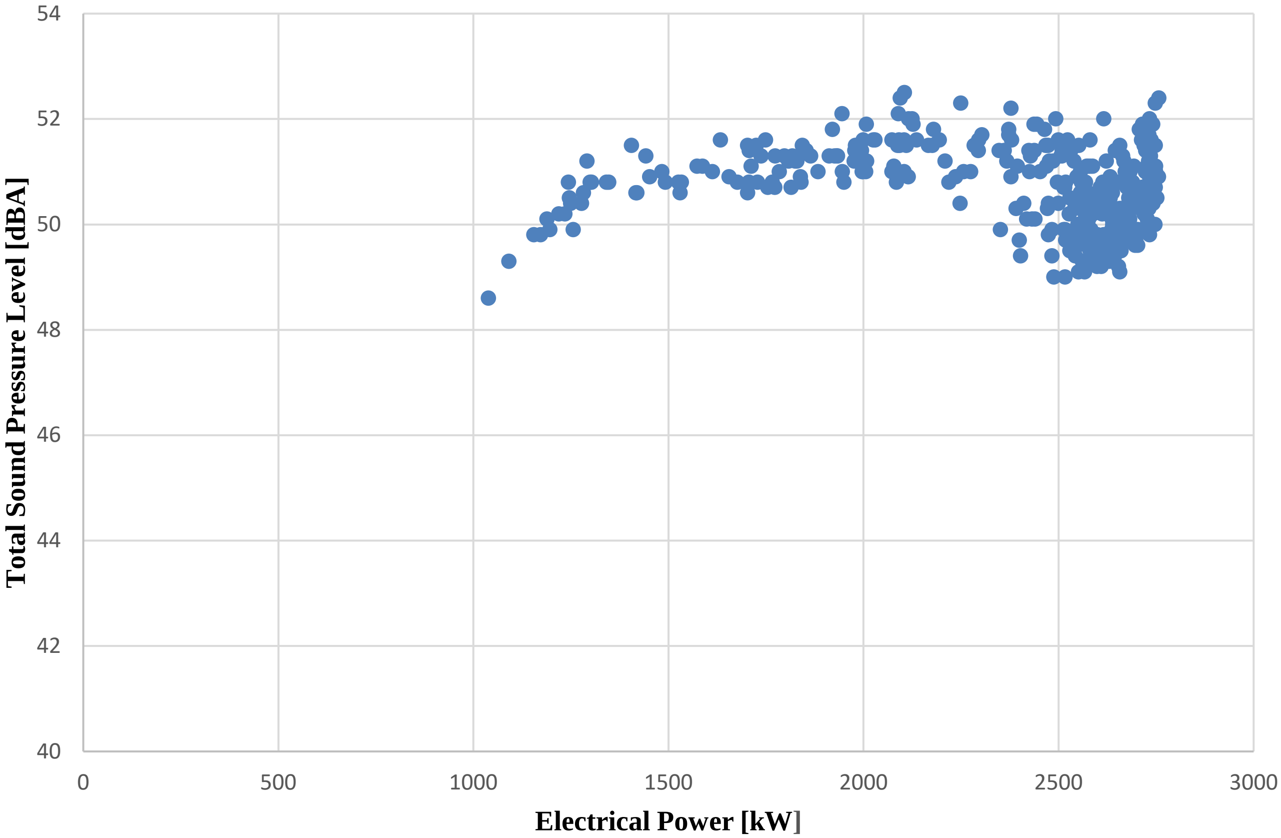


Figure 5: Measured Wind Speed (Nacelle and 10m) vs Derived Wind Speed, T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

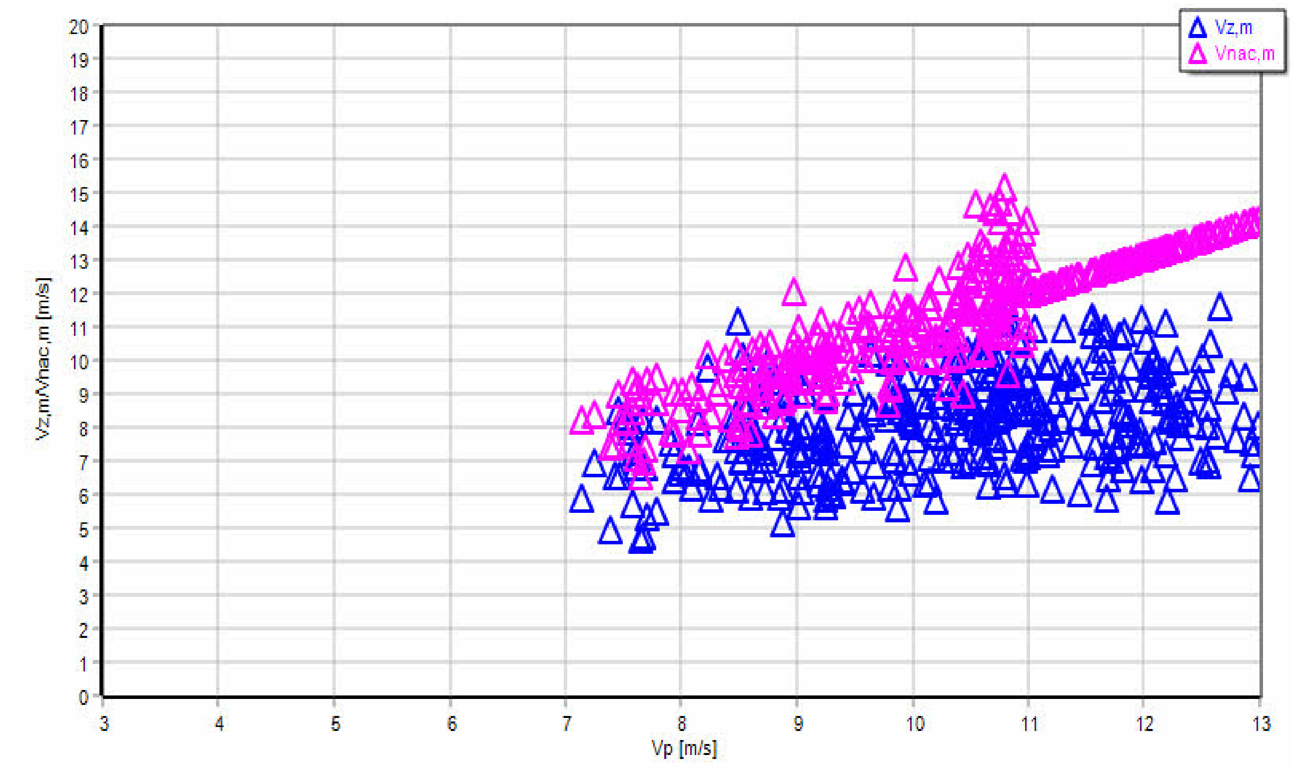
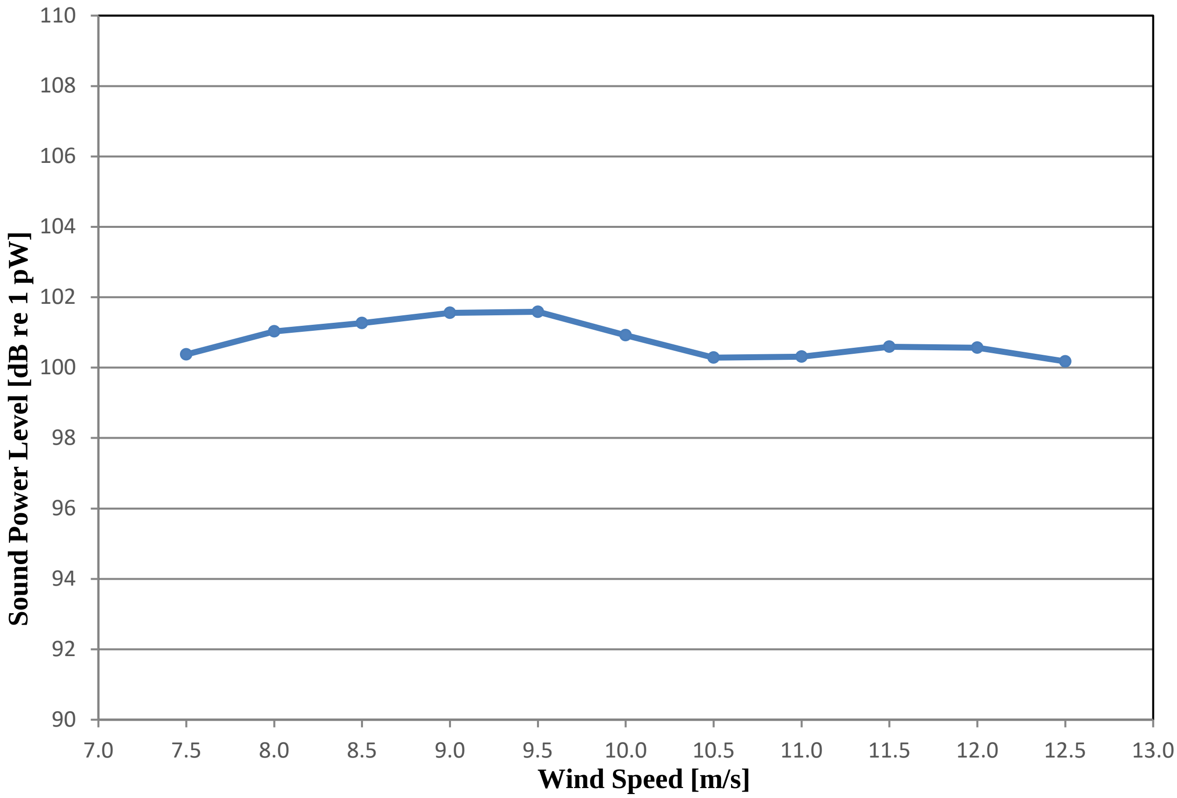


Figure 6: Apparent Sound Power Level vs. Wind Speed
T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario



APPENDIX A:

LOCATION PHOTOS

Meteorological Tower Location – November 22, 2019

Sound Level Measurement Location – November 22, 2019

Sound Level Microphone on Board – November 22, 2019

Photos of Sound Level Meter and Meteorological Tower Taken from the Base of WTG T101 - November 22, 2019

APPENDIX B:

CALIBRATION CERTIFICATES

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42548

Instrument:	**Sound Level Meter**
Model:	**Duo**
Manufacturer:	**01dB**
Serial number:	**10815**
Tested with:	**Microphone 40CD s/n 154426** **Preamplifier PRE21 s/n 16453**
Type (class):	**1**
Customer:	**HGC Engineering**
Tel/Fax:	**905-826-4044 /**

Date Calibrated: **4/10/2019** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __ **Yes** _X_ **No**
Calibration service: __ **Basic** _X_ **Standard**
Address: **2000 Argentia Road, Plaza One**
Suite 203 Mississauga, Ontario
Canada L5N 1P7

MG Rec'd Apr 17, 2019

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 30, 2018	Scantek, Inc./ NVLAP	Jul 30, 2019
DS-360-SRS	Function Generator	61646	Sep 7, 2018	ACR Env./ A2LA	Sep 7, 2020
34401A-Agilent Technologies	Digital Voltmeter	MY47022043	Sep 17, 2018	ACR Env./ A2LA	Sep 17, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 11, 2018	Scantek, Inc./ NVLAP	Nov 11, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.4	99.75	35.6

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	Steven E Marshall
Date	4/10/19	Date	4/11/2019

Document stored Z:\Calibration Lab\SLM 2019\01dBDuo_10815_M1.doc

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42549

Instrument:	**Microphone**	*Date Calibrated:* **3/27/2019** *Cal Due:*		
Model:	**40CD**	*Status:*	**Received**	**Sent**
Manufacturer:	**GRAS**	*In tolerance:*	X	X
Serial number:	**154426**	*Out of tolerance:*		
Composed of:		*See comments:*		
		Contains non-accredited tests: __Yes _X_ No		
Customer:	**HGC Engineering**	*Address:* **2000 Argentia Road, Plaza One Suite 203 Mississauga, Ontario Canada L5N 1P7**		
Tel/Fax:	**905-826-4044/**			

NG Rec'd Apr 17, 2019

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 30, 2018	Scantek, Inc./ NVLAP	Jul 30, 2019
DS-360-SRS	Function Generator	61646	Sep 7, 2018	ACR Env./ A2LA	Sep 7, 2020
34401A-Agilent Technologies	Digital Voltmeter	MY47022043	Sep 17, 2018	ACR Env./ A2LA	Sep 17, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 11, 2018	Scantek, Inc./ NVLAP	Nov 11, 2019
1203-Norsonic	Preamplifier	21270	Aug 3, 2018	Scantek, Inc./ NVLAP	Aug 3, 2019
4180-Brüel&Kjær	Microphone	2246115	Oct 24, 2017	DANAK / DPLA	Oct 24, 2019

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	Steven E Marshall
Date	3/27/19	Date	4/11/2019

Document stored as: Z:\Calibration Lab\Mic 2019\GRAS40CD_154426_M1.doc

REINHARDT
System- und Messelectronic GmbH

23 July 2019

Kalibrierprotokoll / Calibration Protocol
Sensoren und Wetterstationen / Sensors and Weather Stations

Sensor/Wetterstation Sensor/Weather Station	DFT-485 (RS-422)			
Seriennummer Serial Number	1027951	**Seriennummer Platine/n** Serial Number (Board/s)		- - -
Abgleichnummer Calibration Number	025	**Datum** Date	04/07/2019	
Firmware-Version Firmware Version	1.40	**Prüfer** Calibrated by	Harald Stiegelmayer	

at	ABWEICHUNG / DEVIATION												
	Temperatur Temperature [° C] +/-0,3°C	**Druck** Pressure bei/at [hPa] +/-0,8hPa		**Feuchte** Humidity [%] +/-2%		**Globalstrahlung** Global Radiation Offset [W/m²] +/-40W bei 25°C	**Wind-richtung** Wind Direction 0–360° [°] +/-5°	**Windgeschwindigkeit** Wind Speed [km/h] +/-2,5km/h von 5–50°C	**Zusatz Sensor 1** Additional Sensor 1 [ ] +/-3mV	**Zusatz Sensor 2** Additional Sensor 2 [ ] +/-3mV	**Zusatz Sensor 3** Additional Sensor 3 [ ] +/-3mV	at [mV]	TD [°C]
		900	- - -	20 %	n.A.*							2000	
-28.0°C	0.0	1000	-0.2	50 %	n.A. *		< 5	< 3.5				4000	+1.6
		1100	- - -	70 %	n.A. *							6000	
		900	- - -	20 %	n.A.*							2000	
0.0 °C	-0.1	1000	-0.4	50 %	n.A. *		< 5	< 3.0				4000	+1.2
		1100	- - -	70 %	n.A. *							6000	
		900	- - -	20 %	-1.8							2000	
5.0 °C	-0.1	1000	-0.4	50 %	-1.2		< 5	< 2.5				4000	+1.1
		1100	- - -	70 %	-1.7							6000	
		900	- - -	20 %	-0.9							2000	
10.0 °C	-0.1	1000	-0.3	50 %	-0.5		< 5	< 2.5				4000	+1.1
		1100	- - -	70 %	-0.8							6000	
		900		20 %	+0.3							2000	
25.0 °C	0.0	1000	-0.1	50 %	+1.2		< 5	< 2.5				4000	+1.0
		1100		70 %	+0.4							6000	
		900	- - -	20 %	+0.5							2000	
30.0 °C	0.0	1000	0.0	50 %	+1.3		< 5	< 2.5				4000	+0.8
		1100	- - -	70 %	+0.6							6000	
		900	- - -	20 %	+0.3							2000	
40.0 °C	+0.2	1000	-0.1	50 %	+0.9		< 5	< 2.5				4000	+0.8
		1100	- - -	70 %	+0.3							6000	
		900	- - -	20 %	+0.2							2000	
50.0 °C	+0.3	1000	-0.2	50 %	+0.9		< 5	< 2.5				4000	+0.7
		1100	- - -	70 %	+0.1							6000	

Niederschlagssensor [mm], kalibriert mit 100 ml Wasser: max. Abweichung +/-0,5 mm ☐
Precipitation Sensor [mm], calibrated with 100 ml water: max. deviation +/-0.5 mm
Die Windgeschwindigkeit wurde bei 15 km/h und 25 °C geprüft. ☑

Gerät hält Spezifikationen ein / Device meets the specifications ja/yes ☑ nein/no ☐

REINHARDT
System- und Messelectronic GmbH

23 July 2019

Kalibrierzertifikat   Calibration Certificate

Typ/Gegenstand *Type/Object*	DFT-485 (RS-422)
Hersteller *Manufacturer*	**REINHARDT** System- und Messelectronic GmbH
Seriennummer *Serial Number*	1027951
Inventarnummer *Inventory Number*	- - -
Auftraggeber *Customer*	HGC Engineering 2000 Argentia Road, Plaza 1, Suite 203 Mississauga, ON L5N 1P7 - CANADA

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Sie wurde in Übereinstimmung mit den Normen DIN EN ISO 9000ff und DIN ISO 10012 durchgeführt.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certficate documents the traceability to national standards which realize the units of measurement according to the International System of Units (SI).
The calibration is performed according to the standards DIN EN ISO 9000ff and DIN ISO 10012.
The user is obliged to have the object recalibrated at appropriate intervals.

Kalibrierdatum *Date of Calibration*	04/07/2019

Nächste Kalibrierung in 24 Monaten
Recalibration in months

Prüfer *person in charge*	Harald Stiegelmayer
Unterschrift	....

Messeinrichtungen
measuring equipment

Referenz **Reference**	**Bezeichnung** **Name**	**Rückführung** **Traceability**	**Zertifikat-Nr.** **Certificate No.**	**Rekalibrierung** **Recalibration**	**Seriennummer** **Serial Number**
Klimakammer/ Climatic Chamber	Weiss SB111 Typ 1005				95032
Multimeter/ Multimeter Temperaturreferenz/ Temperature Reference	Keysight HP 3458A PT100 Typ W60/1, 1/10 DIN	Keysight	1-104849309331	20/10/2020	MY45051675
Feuchtereferenz/ Humidity Reference	DFT 485	REINHARDT	F40421/F40381	19/09/2020	1019737
Druck/ Pressure Transmitter	Digiquarz 1030A	TESTO	D26248	17/09/2020	30840
Windgeschwindigkeit/ Wind Speed Sensor	WDS 55	REINHARDT	S19592	30/08/2020	1034340
Pyranometer/ Pyranometer	Kipp & Zonen CMP6	Kipp & Zonen	2850071	28/08/2020	112383

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42243

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/1/2019**	*Cal Due:*		
Model:	**4231**	*Status:*		**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*		X	X
Serial number:	**3010241**	*Out of tolerance:*			
Class (IEC 60942):	**1**	*See comments:*			
Barometer type:		*Contains non-accredited tests:* __Yes _X_ No			
Barometer s/n:					
Customer:	**HGC Engineering**	*Address:*	**2000 Argentia Road**		
Tel/Fax:	**905-826-4044 /**		**Plaza One, Suite 203**		
			Mississauga, Ontario		
			Canada L5N 1P7		

NG 6 Feb 2019

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 30, 2018	Scantek, Inc./ NVLAP	Jul 30, 2019
DS-360-SRS	Function Generator	61646	Sep 7, 2018	ACR Env./ A2LA	Sep 7, 2020
34401A-Agilent Technologies	Digital Voltmeter	MY47022043	Sep 17, 2018	ACR Env./ A2LA	Sep 17, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
140-Norsonic	Real Time Analyzer	1403978	Mar 22, 2018	Scantek, Inc. / NVLAP	Mar 22, 2019
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4192-Brüel&Kjær	Microphone	2854675	Nov 11, 2018	Scantek, Inc. / NVLAP	Nov 11, 2019
1203-Norsonic	Preamplifier	21270	Aug 3, 2018	Scantek, Inc./ NVLAP	Aug 3, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	Steven E Marshall
Date	2/1/19	Date	2/1/2019

Document stored as: Z:\Calibration Lab\Cal 2019\BNK4231_3010241_M1.doc

SOH Wind Engineering LLC
141 Leroy Road · Williston, VT 05495 · USA
Tel 802.316.4368 · Fax 802.735.9106 · www.sohwind.com

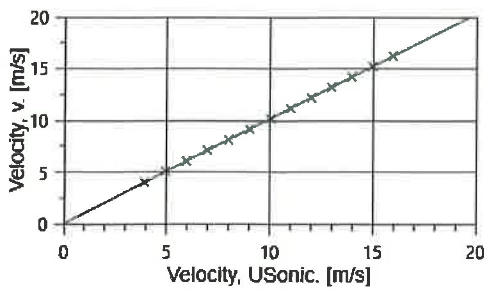
All Ok.
NG 16 Jul 2019

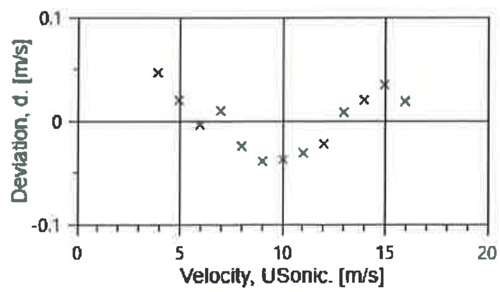
CERTIFICATE FOR CALIBRATION OF SONIC ANEMOMETER

Certificate number: 19.US2.06161 **Date of issue:** July 08, 2019
Type: Vaisala WMT700 with ROBIN Transmitter **Serial number:** J3920012
Manufacturer: Vaisala, Oyj, Pl 26, FIN-00421 Helsinki, Finland
Client: HGC Engineering, 2000 Argentia Road, Plaza One, Suite 203, Mississauga, ON L5N 1P7, Canada
Anemometer received: June 27, 2019 **Anemometer calibrated:** July 08, 2019
Calibrated by: MEJ **Procedure:** MEASNET, IEC 61400-12-1:2017 Annex F
Certificate prepared by: EJF **Approved by:** Calibration engineer, EJF

Calibration equation obtained: v [m/s] = 1.01250 · f [m/s] + 0.03913
Standard uncertainty, slope: 0.00216 **Standard uncertainty, offset:** 0.59605
Covariance: -0.0000477 (m/s)²/m/s **Coefficient of correlation:** ρ = 0.999974
Absolute maximum deviation: 0.046 m/s at 4.044 m/s
Barometric pressure: 1003.9 hPa **Relative humidity:** 46.8% **Avg. Direction Output:** 0.6

Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	Temperature in d.p. box [°C]	Wind velocity, v. [m/s]	Anemometer Output, f. [m/s]	Deviation, d. [m/s]	Uncertainty u_c (k=2) [m/s]
2	9.54	25.1	27.1	4.044	3.9097	0.046	0.023
4	14.95	25.2	27.1	5.064	4.9431	0.020	0.026
6	21.56	25.2	27.1	6.081	5.9717	-0.004	0.030
8	29.55	25.2	27.1	7.121	6.9847	0.010	0.035
10	38.54	25.2	27.1	8.132	8.0172	-0.024	0.039
12	48.74	25.2	27.1	9.145	9.0320	-0.039	0.043
13-last	60.12	25.2	27.1	10.157	10.0300	-0.037	0.048
11	72.61	25.2	27.1	11.163	11.0170	-0.031	0.052
9	86.46	25.2	27.1	12.180	12.0133	-0.022	0.056
7	101.53	25.2	27.1	13.200	12.9900	0.008	0.061
5	117.63	25.2	27.1	14.207	13.9737	0.020	0.065
3	135.12	25.1	27.1	15.226	14.9657	0.034	0.069
1-first	153.41	25.0	27.1	16.222	15.9643	0.019	0.074

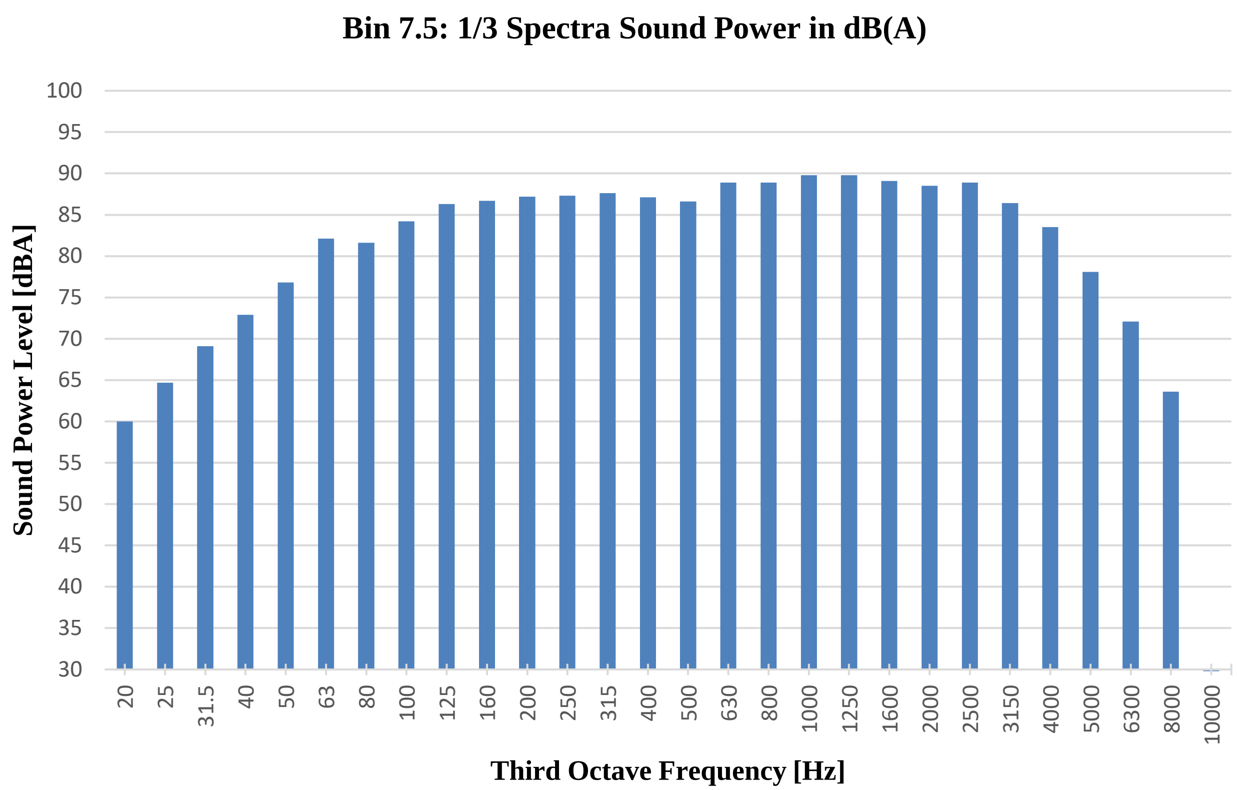




ilac-MRA
ANAB ACCREDITED CALIBRATION LABORATORY
AC-1746
SOH Wind Engineering LLC USA measnet

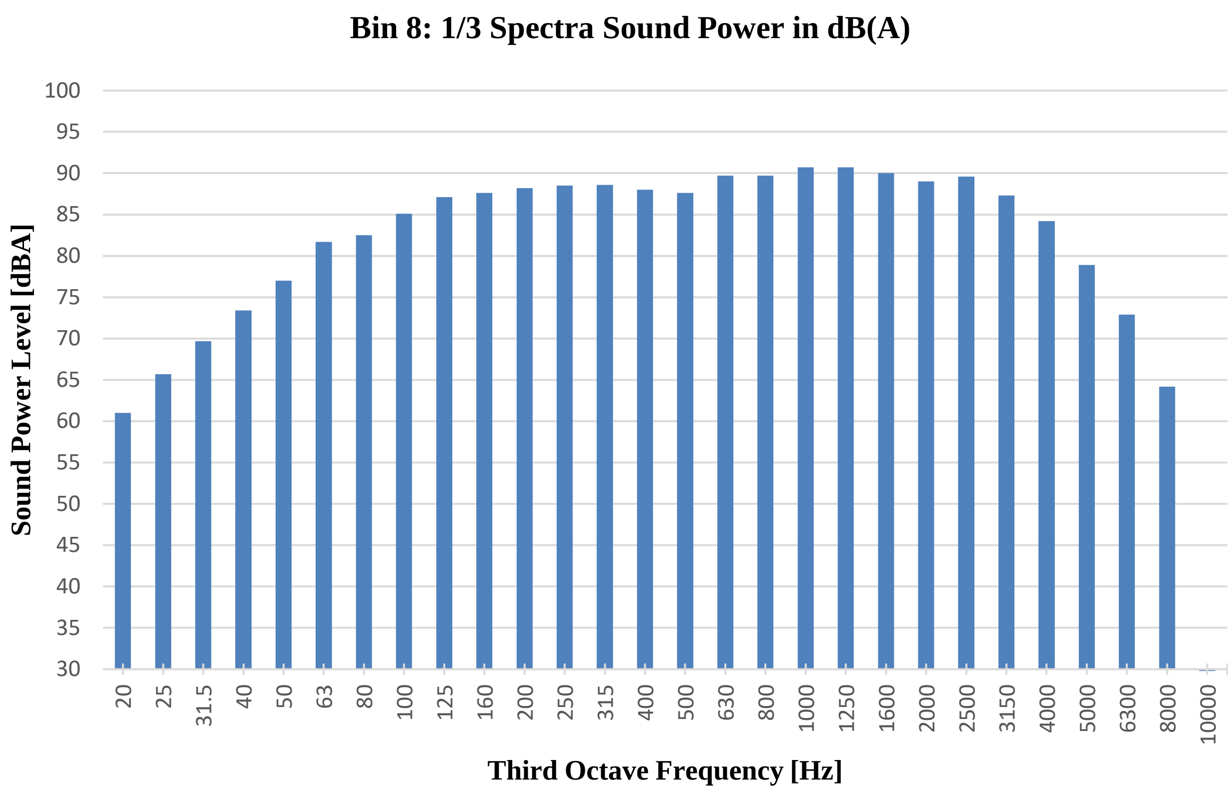
APPENDIX C:

OCTAVE BAND SOUND LEVEL RESULTS



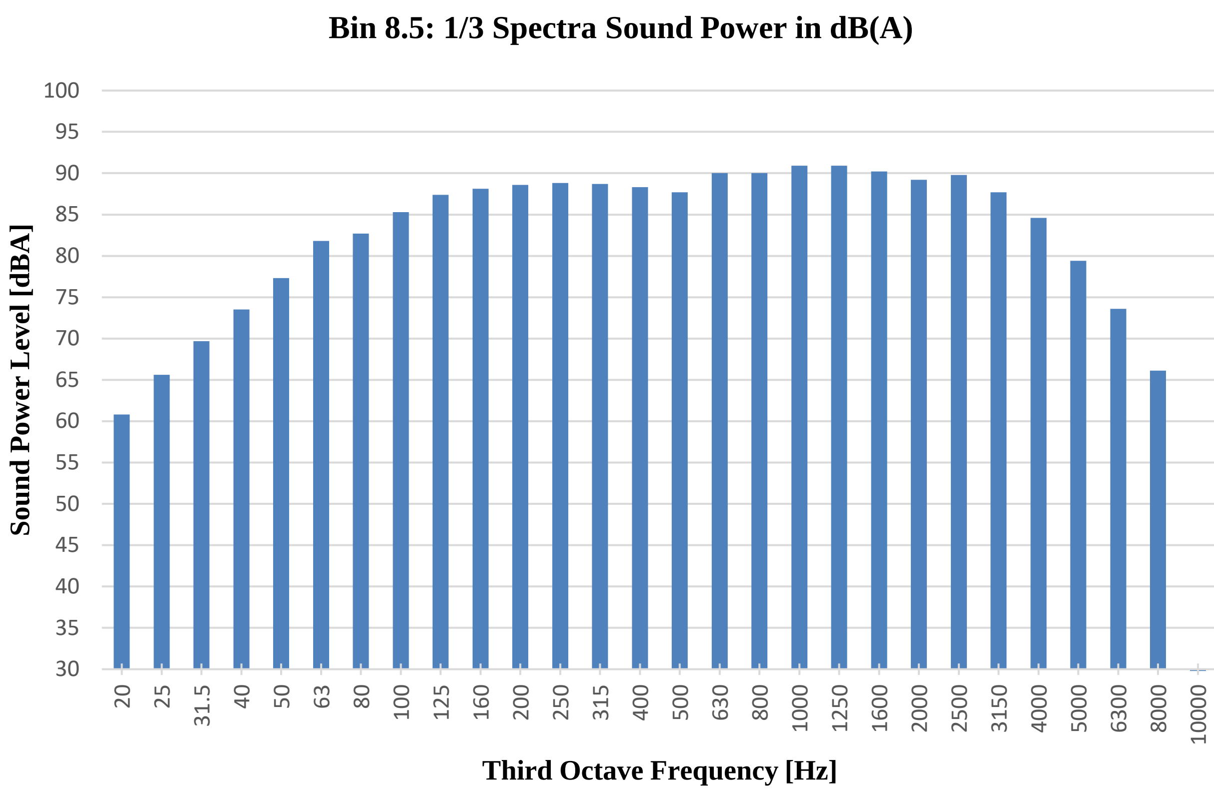
Bin 7.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.0	64.7	69.1	72.9	76.8	82.1	81.6	84.2	86.3	86.7	87.2	87.3	87.6	87.1
U_C	0.9	0.8	0.9	0.9	0.9	0.8	0.9	0.7	0.7	0.7	0.8	0.7	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.6	88.9	88.9	89.8	89.8	89.1	88.5	88.9	86.4	83.5	78.1	72.1	63.6	[56.1]
U_C	0.8	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.9	0.9	1.5	2.1

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



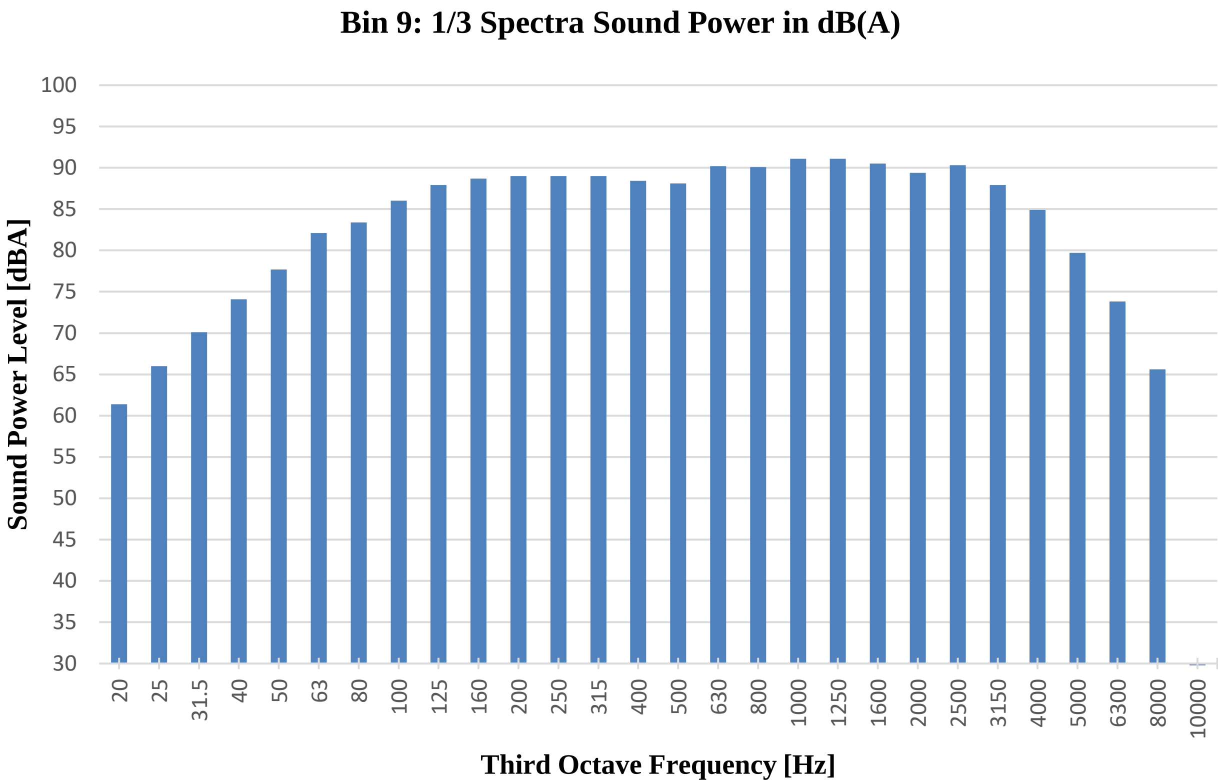
Bin 8: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	61.0	65.7	69.7	73.4	77.0	81.7	82.5	85.1	87.1	87.6	88.2	88.5	88.6	88.0
U_C	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	0.8	0.8	0.8	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.6	89.7	89.7	90.7	90.7	90.0	89.0	89.6	87.3	84.2	78.9	72.9	64.2	[56.5]
U_C	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.5	2.0

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



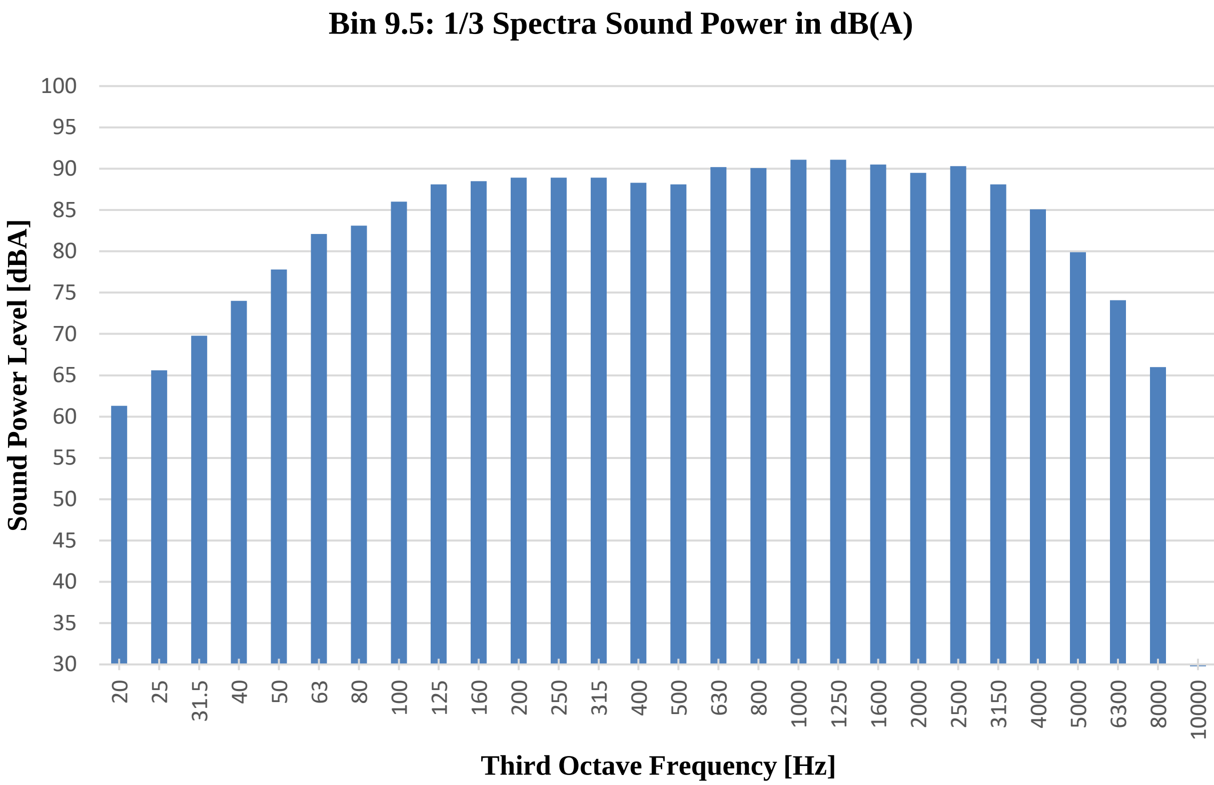
Bin 8.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.8	65.6	69.7	73.5	77.3	81.8	82.7	85.3	87.4	88.1	88.6	88.8	88.7	88.3
U_C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.7	90.0	90.0	90.9	90.9	90.2	89.2	89.8	87.7	84.6	79.4	73.6	66.1	[57.5]
U_C	0.8	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.9	0.9	1.0	1.8

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



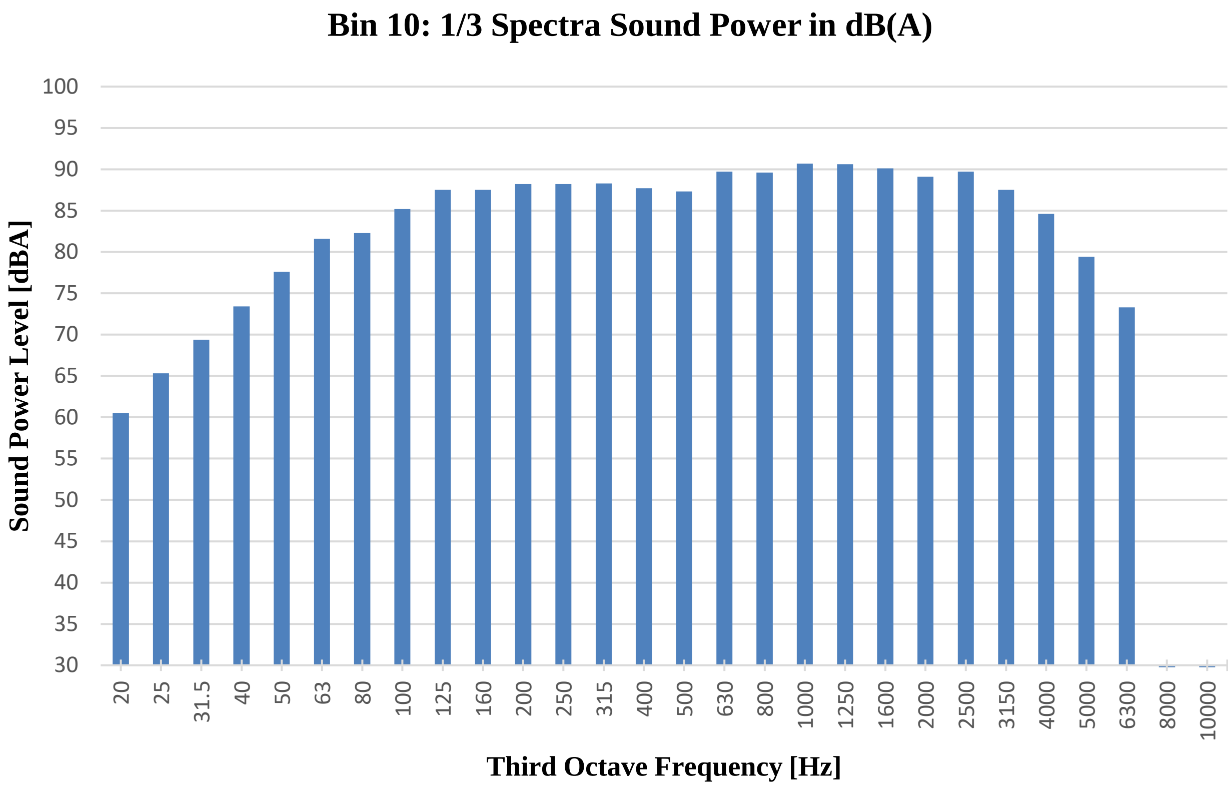
Bin 9: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	61.4	66.0	70.1	74.1	77.7	82.1	83.4	86.0	87.9	88.7	89.0	89.0	89.0	88.4
U_C	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.7	0.7	0.7	0.8	0.7	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	88.1	90.2	90.1	91.1	91.1	90.5	89.4	90.3	87.9	84.9	79.7	73.8	65.6	[57.4]
U_C	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.9	1.2	1.9

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



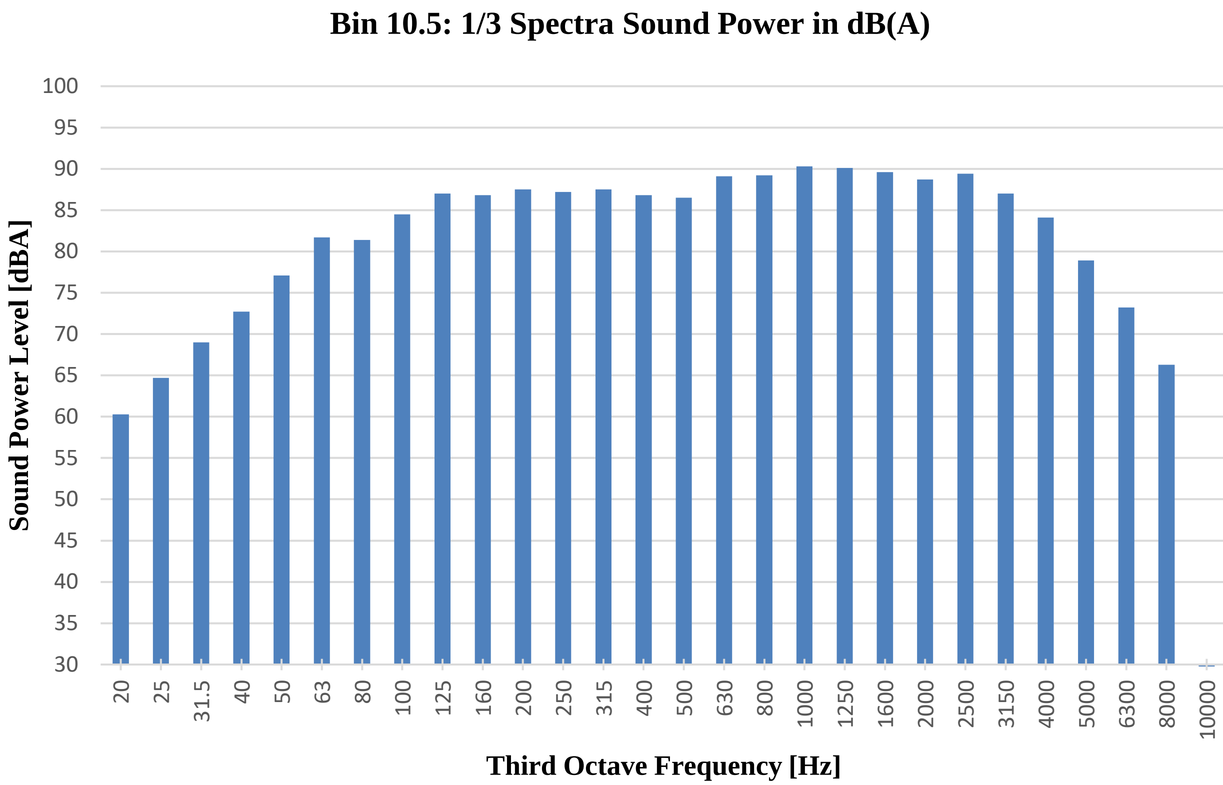
Bin 9.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	61.3	65.6	69.8	74.0	77.8	82.1	83.1	86.0	88.1	88.5	88.9	88.9	88.9	88.3
UC	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.8	0.8	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	88.1	90.2	90.1	91.1	91.1	90.5	89.5	90.3	88.1	85.1	79.9	74.1	66.0	[58.7]
UC	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.4	2.1

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



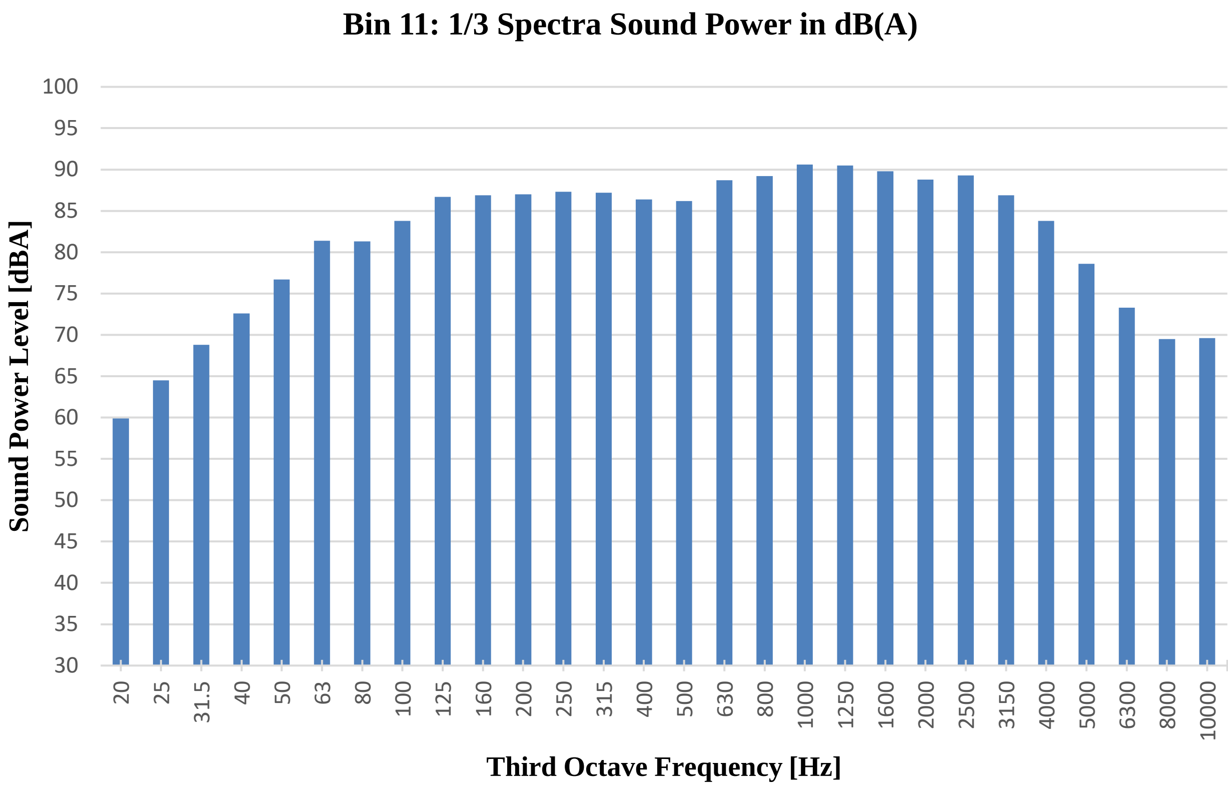
Bin 10: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.5	65.3	69.4	73.4	77.6	81.6	82.3	85.2	87.5	87.5	88.2	88.2	88.3	87.7
U_C	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	0.8	0.8	0.8	0.9	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.3	89.7	89.6	90.7	90.6	90.1	89.1	89.7	87.5	84.6	79.4	73.3	[64.2]	[58.1]
U_C	0.9	0.8	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.8	1.0	1.1	2.3	2.4

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



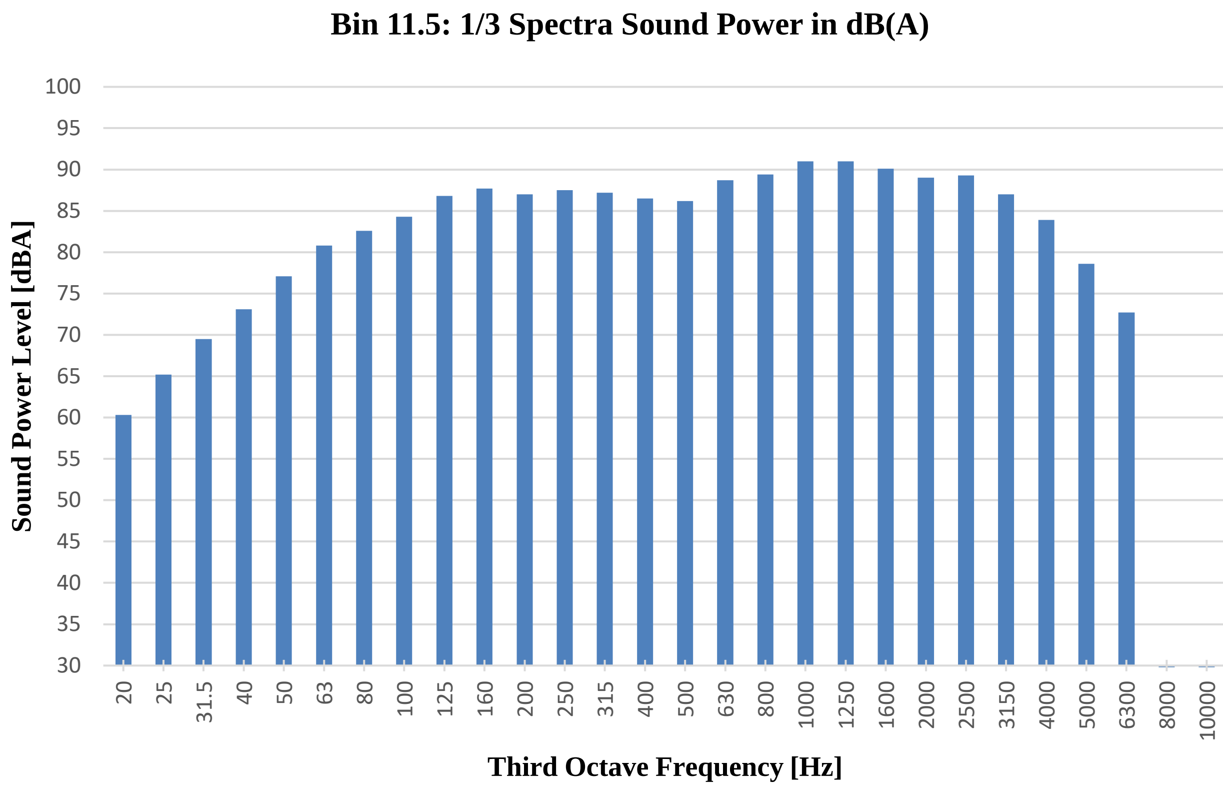
Bin 10.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.3	64.7	69.0	72.7	77.1	81.7	81.4	84.5	87.0	86.8	87.5	87.2	87.5	86.8
U_C	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.8	0.8	0.8	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.5	89.1	89.2	90.3	90.1	89.6	88.7	89.4	87.0	84.1	78.9	73.2	66.3	[62.6]
U_C	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.5	2.5

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



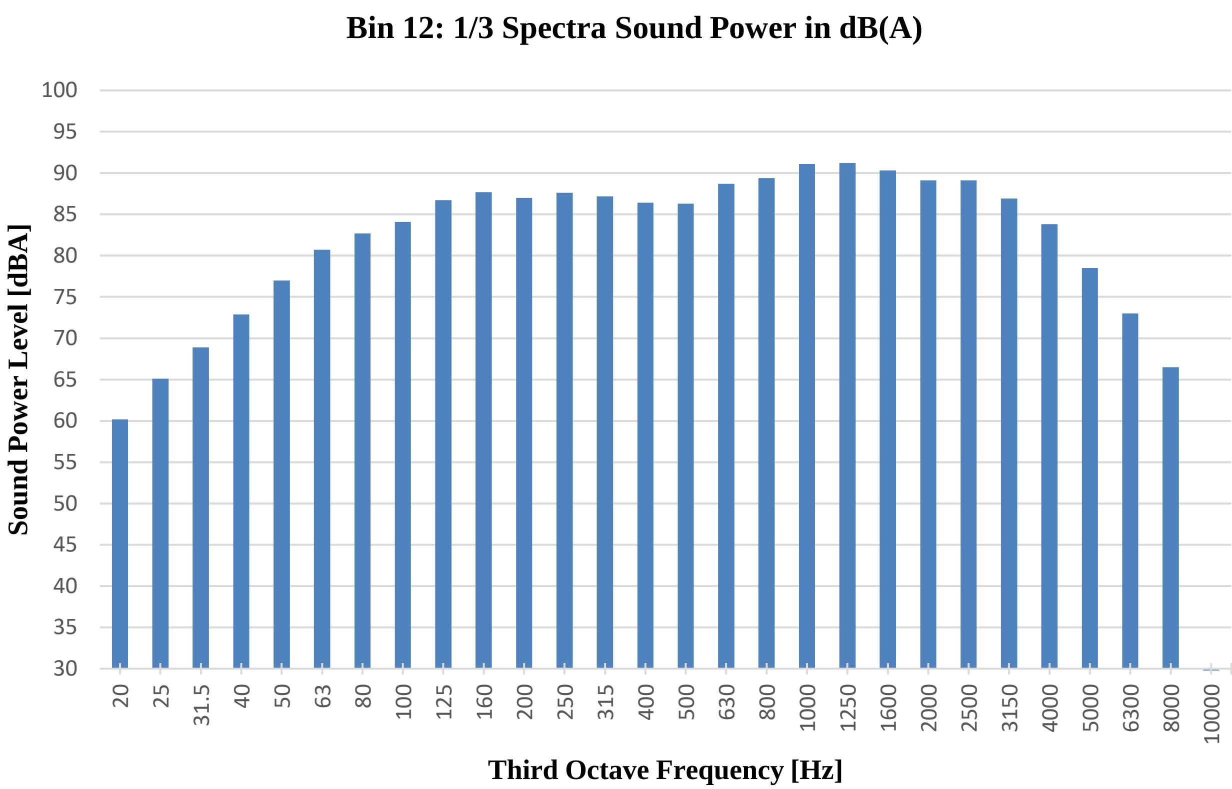
Bin 11: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.9	64.5	68.8	72.6	76.7	81.4	81.3	83.8	86.7	86.9	87.0	87.3	87.2	86.4
U_C	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.8	0.8	0.7	0.8	0.8	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.2	88.7	89.2	90.6	90.5	89.8	88.8	89.3	86.9	83.8	78.6	73.3	69.5	69.6
U_C	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	1.0	1.8	3.4

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



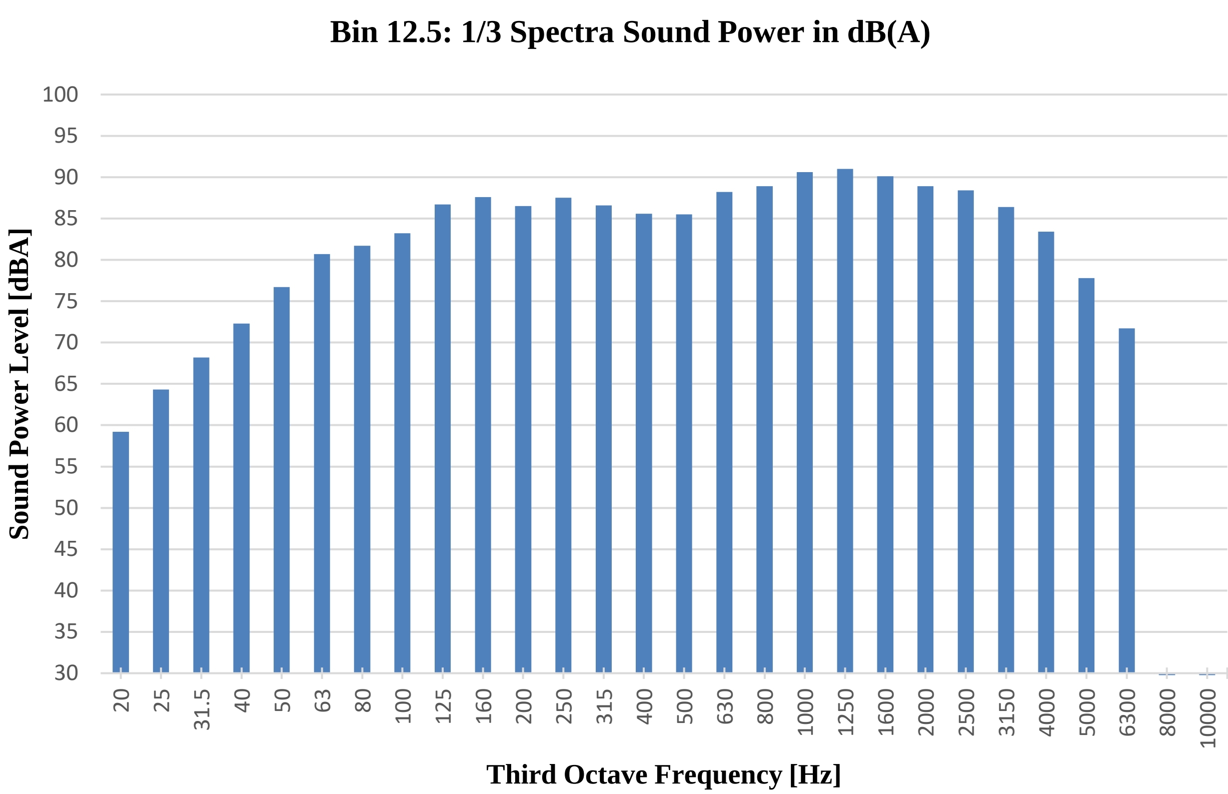
Bin 11.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.3	65.2	69.5	73.1	77.1	80.8	82.6	84.3	86.8	87.7	87.0	87.5	87.2	86.5
U_C	1.0	0.9	0.9	0.9	1.0	0.9	1.0	0.8	0.8	0.8	0.9	0.8	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.2	88.7	89.4	91.0	91.0	90.1	89.0	89.3	87.0	83.9	78.6	72.7	[64.2]	[58.6]
U_C	1.0	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.0	2.3	2.4

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



Bin 12: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	60.2	65.1	68.9	72.9	77.0	80.7	82.7	84.1	86.7	87.7	87.0	87.6	87.2	86.4
U_C	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.8	0.9	0.9	0.9	1.0	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.3	88.7	89.4	91.1	91.2	90.3	89.1	89.1	86.9	83.8	78.5	73.0	66.5	[63.8]
U_C	1.0	0.9	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.8	1.0	1.1	1.8	3.2

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



Bin 12.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.2	64.3	68.2	72.3	76.7	80.7	81.7	83.2	86.7	87.6	86.5	87.5	86.6	85.6
U_C	1.0	1.0	1.0	1.0	1.0	0.9	1.0	0.9	0.8	0.8	0.8	0.8	0.9	1.0
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	85.5	88.2	88.9	90.6	91.0	90.1	88.9	88.4	86.4	83.4	77.8	71.7	[64]	[60]
U_C	1.0	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	1.2	2.7	3.3

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).

APPENDIX D:

TONALITY ASSESSMENT

BIN 7.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,4,7.5}$:	56.3	1.56	23.1	29.3	39.3	-10.0	-2.0	-8.0
$dL_{t1,5,7.5}$:	56.3	1.56	24.3	32.9	40.5	-7.6	-2.0	-5.6
$dL_{t1,6,7.5}$:	56.3	1.56	24.5	32.4	40.7	-8.3	-2.0	-6.3
$dL_{t1,7,7.5}$:	56.3	1.56	23.8	30.8	40.0	-9.2	-2.0	-7.2
$dL_{t1,14,7.5}$:	62.5	1.56	22.8	29.6	39.1	-9.5	-2.0	-7.5

BIN 7.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**										
##	**[Hz]**	**[dB]**										
1	---	---										
2	---	---										
3	---	---										
4	56.3	-10.0										
5	56.3	-7.6										
6	56.3	-8.3										
7	56.3	-9.2										
8	---	---										
9	---	---										
10	---	---										
11	---	---										
12	---	---										
13	---	---										
14	62.5	-9.5										
15	---	---										
16	---	---										
17	---	---										
f_t[Hz] | dL_k[dB]	56.6	-12.6										
L_a[dB]		-2.0										
$dL_{a,k}$[dB]		-10.6										
K_{TN}[dB]		0										

BIN 8: Tonal components determined
No tonality detected!

BIN 8: Tonal components determined - Compact
No tonality detected!

BIN 8.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,2,8.5}$:	59.4	1.56	25.4	33.1	41.7	-8.6	-2.0	-6.6
$dL_{t1,10,8.5}$:	57.8	1.56	24.9	31.2	41.1	-9.9	-2.0	-7.9
$dL_{t2,11,8.5}$:	401.6	1.56	25.0	31.6	41.7	-10.1	-2.2	-7.9

BIN 8.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**								
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**								
1	---	---	---	---								
2	59.4	-8.6	---	---								
3	---	---	---	---								
4	---	---	---	---								
5	---	---	---	---								
6	---	---	---	---								
7	---	---	---	---								
8	---	---	---	---								
9	---	---	---	---								
10	57.8	-9.9	---	---								
11	---	---	401.6	-10.1								
12	---	---	---	---								
13	---	---	---	---								
14	---	---	---	---								
15	---	---	---	---								
16	---	---	---	---								
17	---	---	---	---								
18	---	---	---	---								
19	---	---	---	---								
20	---	---	---	---								
21	---	---	---	---								
22	---	---	---	---								
23	---	---	---	---								
24	---	---	---	---								
25	---	---	---	---								
26	---	---	---	---								
27	---	---	---	---								
28	---	---	---	---								
29	---	---	---	---								
f_t[Hz] | dL_k[dB]	59.3	-15.2	401.6	-16.3								
L_a[dB]		-2.0		-2.2								
$dL_{a,k}$[dB]		-13.2		-14.1								
K_{TN}[dB]		0		0								

BIN 9: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,13,9}$:	57.8	1.56	24.3	31.3	40.5	-9.2	-2.0	-7.2
$dL_{t1,18,9}$:	70.3	1.56	24.4	33.4	40.7	-7.3	-2.0	-5.3
$dL_{t2,18,9}$:	140.6	1.56	27.2	35.8	43.5	-7.7	-2.0	-5.7
$dL_{t2,25,9}$:	139.1	1.56	28.7	37.1	45.0	-7.9	-2.0	-5.9
$dL_{t2,27,9}$:	135.9	1.56	26.8	34.9	43.1	-8.2	-2.0	-6.2
$dL_{t3,5,9}$:	550.0	1.56	25.2	36.1	42.2	-6.1	-2.4	-3.8

BIN 9: Tonal components determined - Compact

Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]
1	---	---	---	---	---	---
2	---	---	---	---	---	---
3	---	---	---	---	---	---
4	---	---	---	---	---	---
5	---	---	---	---	550.0	-6.1
6	---	---	---	---	---	---
7	---	---	---	---	---	---
8	---	---	---	---	---	---
9	---	---	---	---	---	---
10	---	---	---	---	---	---
11	---	---	---	---	---	---
12	---	---	---	---	---	---
13	57.8	-9.2	---	---	---	---
14	---	---	---	---	---	---
15	---	---	---	---	---	---
16	---	---	---	---	---	---
17	---	---	---	---	---	---
18	70.3	-7.3	140.6	-7.7	---	---
19	---	---	---	---	---	---
20	---	---	---	---	---	---
21	---	---	---	---	---	---
22	---	---	---	---	---	---
23	---	---	---	---	---	---
24	---	---	---	---	---	---
25	---	---	139.1	-7.9	---	---
26	---	---	---	---	---	---
27	---	---	135.9	-8.2	---	---
28	---	---	---	---	---	---
29	---	---	---	---	---	---
30	---	---	---	---	---	---
31	---	---	---	---	---	---
32	---	---	---	---	---	---
33	---	---	---	---	---	---
34	---	---	---	---	---	---
f_t[Hz] | dL_k[dB]	58.2	-15.1	140.4	-14.5	550.0	-15.8
L_a[dB]		-2.0		-2.0		-2.4
$dL_{a,k}$[dB]		-13.1		-12.5		-13.5
K_{TN}[dB]		0		0		0

BIN 9.5: Tonal components determined

	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,3,9.5}$:	68.8	1.56	23.1	29.4	39.4	-9.9	-2.0	-7.9
$dL_{t1,9,9.5}$:	57.8	1.56	25.7	33.8	41.9	-8.1	-2.0	-6.1
$dL_{t2,6,9.5}$:	135.9	1.56	27.4	35.5	43.7	-8.2	-2.0	-6.2
$dL_{t2,8,9.5}$:	134.4	1.56	28.1	37.6	44.4	-6.7	-2.0	-4.7
$dL_{t3,3,9.5}$:	498.5	1.56	24.5	30.9	41.4	-10.5	-2.3	-8.2

BIN 9.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**						
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**						
1	---	---	---	---	---	---						
2	---	---	---	---	---	---						
3	68.8	-9.9	---	---	498.5	-10.5						
4	---	---	---	---	---	---						
5	---	---	---	---	---	---						
6	---	---	135.9	-8.2	---	---						
7	---	---	---	---	---	---						
8	---	---	134.4	-6.7	---	---						
9	57.8	-8.1	---	---	---	---						
10	---	---	---	---	---	---						
11	---	---	---	---	---	---						
12	---	---	---	---	---	---						
13	---	---	---	---	---	---						
14	---	---	---	---	---	---						
15	---	---	---	---	---	---						
16	---	---	---	---	---	---						
17	---	---	---	---	---	---						
18	---	---	---	---	---	---						
19	---	---	---	---	---	---						
20	---	---	---	---	---	---						
21	---	---	---	---	---	---						
f_t[Hz] | dL_k[dB]	68.2	-14.8	135.9	-14.2	498.5	-16.3						
L_a[dB]		-2.0		-2.0		-2.3						
$dL_{a,k}$[dB]		-12.8		-12.2		-14.0						
K_{TN}[dB]		0		0		0						

BIN 10: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,9,10}$:	65.6	1.56	22.8	29.0	39.0	-10.1	-2.0	-8.1
$dL_{t1,29,10}$:	51.6	1.56	23.9	30.0	40.1	-10.1	-2.0	-8.1
$dL_{t1,31,10}$:	51.6	1.56	25.4	31.5	41.7	-10.2	-2.0	-8.2
$dL_{t2,2,10}$:	139.1	1.56	28.1	34.3	44.4	-10.0	-2.0	-8.0
$dL_{t2,9,10}$:	128.1	1.56	25.4	32.8	41.7	-8.9	-2.0	-6.9
$dL_{t2,14,10}$:	137.5	1.56	28.6	35.1	44.9	-9.8	-2.0	-7.8
$dL_{t2,24,10}$:	134.4	1.56	26.6	33.0	42.9	-9.9	-2.0	-7.9
$dL_{t2,35,10}$:	129.7	1.56	24.9	31.1	41.2	-10.1	-2.0	-8.1

BIN 10: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**								
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**								
1	---	---	---	---								
2	---	---	139.1	-10.0								
3	---	---	---	---								
4	---	---	---	---								
5	---	---	---	---								
6	---	---	---	---								
7	---	---	---	---								
8	---	---	---	---								
9	65.6	-10.1	128.1	-8.9								
10	---	---	---	---								
11	---	---	---	---								
12	---	---	---	---								
13	---	---	---	---								
14	---	---	137.5	-9.8								
15	---	---	---	---								
16	---	---	---	---								
17	---	---	---	---								
18	---	---	---	---								
19	---	---	---	---								
20	---	---	---	---								
21	---	---	---	---								
22	---	---	---	---								
23	---	---	---	---								
24	---	---	134.4	-9.9								
25	---	---	---	---								
26	---	---	---	---								
27	---	---	---	---								
28	---	---	---	---								
29	51.6	-10.1	---	---								
30	---	---	---	---								
31	51.6	-10.2	---	---								
32	---	---	---	---								
33	---	---	---	---								
34	---	---	---	---								
35	---	---	129.7	-10.1								
36	---	---	---	---								
f_t[Hz] | dL_k[dB]	64.8	-15.3	138.3	-14.6								
L_a[dB]		-2.0		-2.0								
$dL_{a,k}$[dB]		-13.3		-12.6								
K_{TN}[dB]		0		0								

BIN 10.5: Tonal components determined								
	Frequency	**delta f**	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,1,10.5}$:	65.6	1.56	22.2	32.5	38.4	-5.9	-2.0	-3.9
$dL_{t1,4,10.5}$:	65.6	1.56	23.2	31.0	39.4	-8.5	-2.0	-6.5
$dL_{t1,5,10.5}$:	65.6	1.56	24.2	31.3	40.5	-9.2	-2.0	-7.2
$dL_{t1,10,10.5}$:	65.6	1.56	24.9	31.0	41.2	-10.1	-2.0	-8.1
$dL_{t1,15,10.5}$:	65.6	1.56	22.5	29.6	38.8	-9.1	-2.0	-7.1
$dL_{t1,20,10.5}$:	65.6	1.56	24.4	30.9	40.6	-9.7	-2.0	-7.7
$dL_{t1,23,10.5}$:	67.2	1.56	23.7	31.2	40.0	-8.7	-2.0	-6.7
$dL_{t1,26,10.5}$:	65.6	1.56	23.4	34.5	39.7	-5.1	-2.0	-3.1
$dL_{t1,27,10.5}$:	65.6	1.56	24.2	32.1	40.4	-8.3	-2.0	-6.3
$dL_{t1,29,10.5}$:	65.6	1.56	22.9	33.1	39.1	-6.0	-2.0	-4.0
$dL_{t1,31,10.5}$:	65.6	1.56	23.5	31.7	39.7	-8.0	-2.0	-6.0
$dL_{t1,34,10.5}$:	65.6	1.56	22.9	30.9	39.2	-8.3	-2.0	-6.3
$dL_{t1,36,10.5}$:	65.6	1.56	22.5	30.1	38.7	-8.6	-2.0	-6.6
$dL_{t1,38,10.5}$:	51.6	1.56	25.3	31.5	41.5	-10.0	-2.0	-8.0
$dL_{t1,39,10.5}$:	51.6	1.56	25.1	31.2	41.3	-10.1	-2.0	-8.1
$dL_{t1,40,10.5}$:	51.6	1.56	24.6	32.2	40.9	-8.6	-2.0	-6.6
$dL_{t1,41,10.5}$:	65.6	1.56	19.4	34.8	35.7	-0.9	-2.0	1.1
$dL_{t1,42,10.5}$:	65.6	1.56	21.1	27.5	37.4	-9.9	-2.0	-7.9
$dL_{t1,44,10.5}$:	65.6	1.56	22.1	31.8	38.3	-6.5	-2.0	-4.5
$dL_{t1,45,10.5}$:	65.6	1.56	22.3	30.9	38.5	-7.6	-2.0	-5.6
$dL_{t1,48,10.5}$:	65.6	1.56	19.7	33.8	35.9	-2.1	-2.0	-0.1
$dL_{t1,49,10.5}$:	65.6	1.56	20.0	31.9	36.2	-4.3	-2.0	-2.3
$dL_{t1,50,10.5}$:	65.6	1.56	20.0	35.9	36.3	-0.4	-2.0	1.6
$dL_{t2,14,10.5}$:	129.7	1.56	25.4	32.8	41.7	-8.9	-2.0	-6.9
$dL_{t2,16,10.5}$:	129.7	1.56	25.8	31.8	42.1	-10.3	-2.0	-8.2
$dL_{t2,17,10.5}$:	131.3	1.56	25.1	31.7	41.4	-9.7	-2.0	-7.6
$dL_{t2,22,10.5}$:	129.7	1.56	26.7	34.7	43.0	-8.4	-2.0	-6.3
$dL_{t2,36,10.5}$:	132.8	1.56	25.4	31.5	41.8	-10.2	-2.0	-8.2
$dL_{t2,41,10.5}$:	117.2	1.56	22.9	30.7	39.2	-8.5	-2.0	-6.4
$dL_{t2,48,10.5}$:	131.3	1.56	22.7	32.6	39.0	-6.4	-2.0	-4.4
$dL_{t2,49,10.5}$:	132.8	1.56	23.0	32.4	39.3	-6.9	-2.0	-4.9
$dL_{t2,50,10.5}$:	131.3	1.56	23.1	30.7	39.4	-8.7	-2.0	-6.7
$dL_{t3,1,10.5}$:	175.0	1.56	26.4	33.4	42.7	-9.3	-2.0	-7.3
$dL_{t3,2,10.5}$:	175.0	1.56	26.9	34.1	43.2	-9.1	-2.0	-7.0
$dL_{t4,6,10.5}$:	2523.6	1.56	15.0	21.2	37.1	-15.9	-3.8	-12.1

BIN 10.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
1	65.6	-5.9	---	---	175.0	-9.3	---	---				
2	---	---	---	---	175.0	-9.1	---	---				
3	---	---	---	---	---	---	---	---				
4	65.6	-8.5	---	---	---	---	---	---				
5	65.6	-9.2	---	---	---	---	---	---				
6	---	---	---	---	---	---	2523.6	-15.9				
7	---	---	---	---	---	---	---	---				
8	---	---	---	---	---	---	---	---				
9	---	---	---	---	---	---	---	---				
10	65.6	-10.1	---	---	---	---	---	---				
11	---	---	---	---	---	---	---	---				
12	---	---	---	---	---	---	---	---				

BIN 10.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
13	---	---	---	---	---	---	---	---				
14	---	---	129.7	-8.9	---	---	---	---				
15	65.6	-9.1	---	---	---	---	---	---				
16	---	---	129.7	-10.3	---	---	---	---				
17	---	---	131.3	-9.7	---	---	---	---				
18	---	---	---	---	---	---	---	---				
19	---	---	---	---	---	---	---	---				
20	65.6	-9.7	---	---	---	---	---	---				
21	---	---	---	---	---	---	---	---				
22	---	---	129.7	-8.4	---	---	---	---				
23	67.2	-8.7	---	---	---	---	---	---				
24	---	---	---	---	---	---	---	---				
25	---	---	---	---	---	---	---	---				
26	65.6	-5.1	---	---	---	---	---	---				
27	65.6	-8.3	---	---	---	---	---	---				
28	---	---	---	---	---	---	---	---				
29	65.6	-6.0	---	---	---	---	---	---				
30	---	---	---	---	---	---	---	---				
31	65.6	-8.0	---	---	---	---	---	---				
32	---	---	---	---	---	---	---	---				
33	---	---	---	---	---	---	---	---				
34	65.6	-8.3	---	---	---	---	---	---				
35	---	---	---	---	---	---	---	---				
36	65.6	-8.6	132.8	-10.2	---	---	---	---				
37	---	---	---	---	---	---	---	---				
38	51.6	-10.0	---	---	---	---	---	---				
39	51.6	-10.1	---	---	---	---	---	---				
40	51.6	-8.6	---	---	---	---	---	---				
41	65.6	-0.9	117.2	-8.5	---	---	---	---				
42	65.6	-9.9	---	---	---	---	---	---				
43	---	---	---	---	---	---	---	---				
44	65.6	-6.5	---	---	---	---	---	---				
45	65.6	-7.6	---	---	---	---	---	---				
46	---	---	---	---	---	---	---	---				
47	---	---	---	---	---	---	---	---				
48	65.6	-2.1	131.3	-6.4	---	---	---	---				
49	65.6	-4.3	132.8	-6.9	---	---	---	---				
50	65.6	-0.4	131.3	-8.7	---	---	---	---				
51	---	---	---	---	---	---	---	---				
f_t[Hz] | dL_k[dB]	64.8	-9.1	129.7	-13.5	175.0	-15.7	2523.6	-21.9				
L_a[dB]		-2.0		-2.0		-2.0		-3.8				
$dL_{a,k}$[dB]		-7.1		-11.5		-13.7		-18.2				
K_{TN}[dB]		0		0		0		0				

BIN 11: Tonal components determined								
	Frequency	**delta f**	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,3,11}$:	65.6	1.56	21.7	27.8	38.0	-10.2	-2.0	-8.1
$dL_{t1,5,11}$:	57.8	1.56	21.1	32.8	37.3	-4.6	-2.0	-2.6
$dL_{t1,6,11}$:	65.6	1.56	20.8	35.8	37.1	-1.3	-2.0	0.7
$dL_{t1,7,11}$:	65.6	1.56	22.1	37.0	38.4	-1.4	-2.0	0.6
$dL_{t1,8,11}$:	65.6	1.56	23.2	33.9	39.5	-5.5	-2.0	-3.5
$dL_{t1,9,11}$:	65.6	1.56	22.7	34.3	39.0	-4.7	-2.0	-2.7
$dL_{t1,12,11}$:	65.6	1.56	25.3	31.8	41.5	-9.7	-2.0	-7.7
$dL_{t1,13,11}$:	65.6	1.56	24.2	31.2	40.4	-9.2	-2.0	-7.2
$dL_{t1,14,11}$:	65.6	1.56	22.8	32.0	39.1	-7.1	-2.0	-5.1
$dL_{t1,21,11}$:	67.2	1.56	22.6	30.7	38.9	-8.2	-2.0	-6.2
$dL_{t1,25,11}$:	65.6	1.56	24.5	32.3	40.7	-8.4	-2.0	-6.4
$dL_{t1,26,11}$:	71.9	1.56	22.9	31.2	39.2	-8.1	-2.0	-6.0
$dL_{t1,27,11}$:	71.9	1.56	24.0	31.9	40.3	-8.3	-2.0	-6.3
$dL_{t1,41,11}$:	67.2	1.56	21.2	33.4	37.5	-4.1	-2.0	-2.1
$dL_{t1,47,11}$:	65.6	1.56	19.6	31.9	35.9	-4.0	-2.0	-2.0
$dL_{t1,50,11}$:	67.2	1.56	20.4	30.2	36.7	-6.5	-2.0	-4.5
$dL_{t1,51,11}$:	65.6	1.56	21.1	34.3	37.3	-3.0	-2.0	-1.0
$dL_{t2,5,11}$:	134.4	1.56	24.1	34.8	40.4	-5.5	-2.0	-3.5
$dL_{t2,6,11}$:	132.8	1.56	23.9	36.7	40.2	-3.5	-2.0	-1.5
$dL_{t2,7,11}$:	132.8	1.56	25.5	35.7	41.8	-6.1	-2.0	-4.0
$dL_{t2,9,11}$:	132.8	1.56	25.4	33.7	41.7	-7.9	-2.0	-5.9
$dL_{t2,17,11}$:	134.4	1.56	25.1	31.9	41.4	-9.5	-2.0	-7.5
$dL_{t2,21,11}$:	132.8	1.56	25.5	32.0	41.8	-9.9	-2.0	-7.8
$dL_{t2,28,11}$:	135.9	1.56	26.5	35.7	42.8	-7.1	-2.0	-5.1
$dL_{t2,43,11}$:	117.2	1.56	19.3	32.9	35.6	-2.7	-2.0	-0.6
$dL_{t2,44,11}$:	117.2	1.56	20.3	30.7	36.5	-5.8	-2.0	-3.8
$dL_{t2,45,11}$:	117.2	1.56	20.1	33.3	36.3	-3.0	-2.0	-1.0
$dL_{t2,47,11}$:	132.8	1.56	24.0	30.0	40.3	-10.3	-2.0	-8.3
$dL_{t2,50,11}$:	134.4	1.56	23.5	35.6	39.8	-4.2	-2.0	-2.2
$dL_{t2,51,11}$:	132.8	1.56	24.4	32.4	40.7	-8.3	-2.0	-6.3
$dL_{t2,52,11}$:	135.9	1.56	25.6	32.0	41.9	-9.9	-2.0	-7.9
$dL_{t3,5,11}$:	134.4	1.56	24.1	34.8	40.4	-5.5	-2.0	-3.5
$dL_{t3,6,11}$:	132.8	1.56	23.9	36.7	40.2	-3.5	-2.0	-1.5
$dL_{t3,7,11}$:	132.8	1.56	25.5	35.7	41.8	-6.1	-2.0	-4.0
$dL_{t3,9,11}$:	132.8	1.56	25.4	33.7	41.7	-7.9	-2.0	-5.9
$dL_{t3,17,11}$:	134.4	1.56	25.1	31.9	41.4	-9.5	-2.0	-7.5
$dL_{t3,20,11}$:	139.1	1.56	25.9	34.2	42.2	-8.0	-2.0	-6.0
$dL_{t3,21,11}$:	132.8	1.56	25.5	32.0	41.8	-9.9	-2.0	-7.8
$dL_{t3,23,11}$:	139.1	1.56	26.9	33.7	43.2	-9.5	-2.0	-7.5
$dL_{t3,27,11}$:	145.3	1.56	26.7	32.9	43.0	-10.2	-2.0	-8.2
$dL_{t3,28,11}$:	135.9	1.56	26.5	35.7	42.8	-7.1	-2.0	-5.1
$dL_{t3,32,11}$:	139.1	1.56	25.9	37.3	42.2	-4.9	-2.0	-2.9
$dL_{t3,43,11}$:	134.4	1.56	22.9	30.7	39.2	-8.5	-2.0	-6.5
$dL_{t3,44,11}$:	135.9	1.56	23.7	34.0	40.0	-5.9	-2.0	-3.9
$dL_{t3,45,11}$:	134.4	1.56	23.6	36.5	39.9	-3.4	-2.0	-1.4
$dL_{t3,46,11}$:	140.6	1.56	24.6	40.1	40.9	-0.7	-2.0	1.3
$dL_{t3,47,11}$:	132.8	1.56	24.0	30.0	40.3	-10.3	-2.0	-8.3
$dL_{t3,49,11}$:	139.1	1.56	23.6	31.5	39.9	-8.4	-2.0	-6.4
$dL_{t3,50,11}$:	134.4	1.56	23.5	35.6	39.8	-4.2	-2.0	-2.2
$dL_{t3,51,11}$:	132.8	1.56	24.4	32.4	40.7	-8.3	-2.0	-6.3
$dL_{t3,52,11}$:	135.9	1.56	25.6	32.0	41.9	-9.9	-2.0	-7.9

BIN 11: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t4,3,11}$:	175.0	1.56	25.7	33.4	42.0	-8.6	-2.0	-6.6

BIN 11: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
1	---	---	---	---	---	---	---	---				
2	---	---	---	---	---	---	---	---				
3	65.6	-10.2	---	---	---	---	175.0	-8.6				
4	---	---	---	---	---	---	---	---				
5	57.8	-4.6	134.4	-5.5	134.4	-5.5	---	---				
6	65.6	-1.3	132.8	-3.5	132.8	-3.5	---	---				
7	65.6	-1.4	132.8	-6.1	132.8	-6.1	---	---				
8	65.6	-5.5	---	---	---	---	---	---				
9	65.6	-4.7	132.8	-7.9	132.8	-7.9	---	---				
10	---	---	---	---	---	---	---	---				
11	---	---	---	---	---	---	---	---				
12	65.6	-9.7	---	---	---	---	---	---				
13	65.6	-9.2	---	---	---	---	---	---				
14	65.6	-7.1	---	---	---	---	---	---				
15	---	---	---	---	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	---	---	134.4	-9.5	134.4	-9.5	---	---				
18	---	---	---	---	---	---	---	---				
19	---	---	---	---	---	---	---	---				
20	---	---	---	---	139.1	-8.0	---	---				
21	67.2	-8.2	132.8	-9.9	132.8	-9.9	---	---				
22	---	---	---	---	---	---	---	---				
23	---	---	---	---	139.1	-9.5	---	---				
24	---	---	---	---	---	---	---	---				
25	65.6	-8.4	---	---	---	---	---	---				
26	71.9	-8.1	---	---	---	---	---	---				
27	71.9	-8.3	---	---	145.3	-10.2	---	---				
28	---	---	135.9	-7.1	135.9	-7.1	---	---				
29	---	---	---	---	---	---	---	---				
30	---	---	---	---	---	---	---	---				
31	---	---	---	---	---	---	---	---				
32	---	---	---	---	139.1	-4.9	---	---				
33	---	---	---	---	---	---	---	---				
34	---	---	---	---	---	---	---	---				
35	---	---	---	---	---	---	---	---				
36	---	---	---	---	---	---	---	---				
37	---	---	---	---	---	---	---	---				
38	---	---	---	---	---	---	---	---				
39	---	---	---	---	---	---	---	---				
40	---	---	---	---	---	---	---	---				
41	67.2	-4.1	---	---	---	---	---	---				
42	---	---	---	---	---	---	---	---				
43	---	---	117.2	-2.7	134.4	-8.5	---	---				
44	---	---	117.2	-5.8	135.9	-5.9	---	---				
45	---	---	117.2	-3.0	134.4	-3.4	---	---				
46	---	---	---	---	140.6	-0.7	---	---				

BIN 11: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
47	65.6	-4.0	132.8	-10.3	132.8	-10.3	---	---				
48	---	---	---	---	---	---	---	---				
49	---	---	---	---	139.1	-8.4	---	---				
50	67.2	-6.5	134.4	-4.2	134.4	-4.2	---	---				
51	65.6	-3.0	132.8	-8.3	132.8	-8.3	---	---				
52	---	---	135.9	-9.9	135.9	-9.9	---	---				
53	---	---	---	---	---	---	---	---				
f_t[Hz] | dL_k[dB]	65.8	-9.5	131.3	-10.7	135.0	-9.8	175.0	-16.0				
L_a[dB]		-2.0		-2.0		-2.0		-2.0				
$dL_{a,k}$[dB]		-7.5		-8.7		-7.8		-14.0				
K_{TN}[dB]		0		0		0		0				

BIN 11.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,15,11.5}$:	71.9	1.56	23.7	31.3	40.0	-8.7	-2.0	-6.7
$dL_{t1,30,11.5}$:	67.2	1.56	21.5	28.4	37.7	-9.3	-2.0	-7.3
$dL_{t2,1,11.5}$:	143.8	1.56	28.4	34.8	44.7	-9.9	-2.0	-7.9
$dL_{t2,2,11.5}$:	140.6	1.56	27.8	36.7	44.1	-7.3	-2.0	-5.3
$dL_{t2,6,11.5}$:	139.1	1.56	27.5	40.2	43.8	-3.6	-2.0	-1.6
$dL_{t2,9,11.5}$:	135.9	1.56	25.9	34.4	42.2	-7.8	-2.0	-5.8
$dL_{t2,10,11.5}$:	134.4	1.56	26.4	34.3	42.7	-8.4	-2.0	-6.4
$dL_{t2,11,11.5}$:	139.1	1.56	29.3	37.2	45.6	-8.5	-2.0	-6.5
$dL_{t2,14,11.5}$:	139.1	1.56	25.7	37.3	42.0	-4.7	-2.0	-2.7
$dL_{t2,15,11.5}$:	142.2	1.56	25.8	34.1	42.1	-8.0	-2.0	-5.9
$dL_{t2,19,11.5}$:	145.3	1.56	28.5	37.5	44.8	-7.2	-2.0	-5.2
$dL_{t2,20,11.5}$:	140.6	1.56	26.8	36.6	43.1	-6.4	-2.0	-4.4
$dL_{t2,22,11.5}$:	135.9	1.56	24.1	32.6	40.4	-7.7	-2.0	-5.7
$dL_{t2,24,11.5}$:	140.6	1.56	24.9	37.0	41.2	-4.1	-2.0	-2.1
$dL_{t2,27,11.5}$:	140.6	1.56	24.3	35.3	40.6	-5.3	-2.0	-3.3
$dL_{t2,28,11.5}$:	135.9	1.56	24.5	30.8	40.8	-10.0	-2.0	-8.0
$dL_{t2,29,11.5}$:	139.1	1.56	23.9	37.0	40.2	-3.2	-2.0	-1.2
$dL_{t2,30,11.5}$:	134.4	1.56	24.3	31.9	40.6	-8.6	-2.0	-6.6
$dL_{t2,31,11.5}$:	139.1	1.56	24.1	40.1	40.4	-0.2	-2.0	1.8
$dL_{t3,7,11.5}$:	239.1	1.56	27.2	37.2	43.6	-6.5	-2.1	-4.4
$dL_{t4,29,11.5}$:	439.1	1.56	21.6	30.0	38.4	-8.4	-2.2	-6.1

BIN 11.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
1	---	---	143.8	-9.9	---	---	---	---				
2	---	---	140.6	-7.3	---	---	---	---				
3	---	---	---	---	---	---	---	---				
4	---	---	---	---	---	---	---	---				
5	---	---	---	---	---	---	---	---				
6	---	---	139.1	-3.6	---	---	---	---				
7	---	---	---	---	239.1	-6.5	---	---				
8	---	---	---	---	---	---	---	---				
9	---	---	135.9	-7.8	---	---	---	---				
10	---	---	134.4	-8.4	---	---	---	---				
11	---	---	139.1	-8.5	---	---	---	---				
12	---	---	---	---	---	---	---	---				
13	---	---	---	---	---	---	---	---				
14	---	---	139.1	-4.7	---	---	---	---				
15	71.9	-8.7	142.2	-8.0	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	---	---	---	---	---	---	---	---				
18	---	---	---	---	---	---	---	---				
19	---	---	145.3	-7.2	---	---	---	---				
20	---	---	140.6	-6.4	---	---	---	---				
21	---	---	---	---	---	---	---	---				
22	---	---	135.9	-7.7	---	---	---	---				
23	---	---	---	---	---	---	---	---				
24	---	---	140.6	-4.1	---	---	---	---				
25	---	---	---	---	---	---	---	---				
26	---	---	---	---	---	---	---	---				
27	---	---	140.6	-5.3	---	---	---	---				
28	---	---	135.9	-10.0	---	---	---	---				
29	---	---	139.1	-3.2	---	---	439.1	-8.4				
30	67.2	-9.3	134.4	-8.6	---	---	---	---				
31	---	---	139.1	-0.2	---	---	---	---				
f_t[Hz] | dL_k[dB]	71.7	-15.2	141.2	-8.0	239.1	-15.4	439.1	-16.1				
L_a[dB]		-2.0		-2.0		-2.1		-2.2				
$dL_{a,k}$[dB]		-13.2		-6.0		-13.3		-13.8				
K_{TN}[dB]		0		0		0		0				

BIN 12: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,12,12}$:	65.6	1.56	21.8	29.3	38.0	-8.7	-2.0	-6.7
$dL_{t1,24,12}$:	65.6	1.56	22.7	29.1	38.9	-9.9	-2.0	-7.9
$dL_{t1,26,12}$:	51.6	1.56	23.1	34.8	39.3	-4.5	-2.0	-2.5
$dL_{t1,33,12}$:	67.2	1.56	18.7	30.2	35.0	-4.8	-2.0	-2.8
$dL_{t2,4,12}$:	73.4	1.56	24.4	33.8	40.7	-6.9	-2.0	-4.9
$dL_{t2,12,12}$:	65.6	1.56	21.8	29.3	38.0	-8.7	-2.0	-6.7
$dL_{t2,24,12}$:	65.6	1.56	22.7	29.1	38.9	-9.9	-2.0	-7.9
$dL_{t2,33,12}$:	67.2	1.56	18.7	30.2	35.0	-4.8	-2.0	-2.8
$dL_{t2,38,12}$:	71.9	1.56	19.1	33.2	35.4	-2.2	-2.0	-0.2
$dL_{t3,3,12}$:	140.6	1.56	26.4	38.2	42.7	-4.5	-2.0	-2.4
$dL_{t3,4,12}$:	143.8	1.56	26.4	32.6	42.7	-10.1	-2.0	-8.1
$dL_{t3,12,12}$:	134.4	1.56	25.0	31.1	41.3	-10.3	-2.0	-8.3
$dL_{t3,15,12}$:	143.8	1.56	27.3	35.6	43.6	-8.0	-2.0	-5.9
$dL_{t3,18,12}$:	140.6	1.56	26.6	39.5	42.9	-3.4	-2.0	-1.4
$dL_{t3,19,12}$:	137.5	1.56	24.5	36.5	40.8	-4.3	-2.0	-2.3
$dL_{t3,25,12}$:	140.6	1.56	27.8	34.8	44.1	-9.3	-2.0	-7.3
$dL_{t3,26,12}$:	145.3	1.56	25.3	32.2	41.6	-9.4	-2.0	-7.4
$dL_{t3,27,12}$:	139.1	1.56	24.8	35.0	41.1	-6.1	-2.0	-4.1
$dL_{t3,28,12}$:	139.1	1.56	26.7	38.8	43.0	-4.3	-2.0	-2.2
$dL_{t3,29,12}$:	139.1	1.56	24.8	34.8	41.1	-6.3	-2.0	-4.2
$dL_{t3,30,12}$:	139.1	1.56	24.4	33.5	40.7	-7.3	-2.0	-5.3
$dL_{t3,31,12}$:	139.1	1.56	24.0	35.0	40.3	-5.3	-2.0	-3.3
$dL_{t3,32,12}$:	139.1	1.56	22.3	32.8	38.6	-5.8	-2.0	-3.8
$dL_{t3,33,12}$:	135.9	1.56	22.5	36.3	38.8	-2.5	-2.0	-0.5
$dL_{t3,34,12}$:	140.6	1.56	25.4	38.4	41.7	-3.4	-2.0	-1.3
$dL_{t3,35,12}$:	134.4	1.56	24.3	34.6	40.6	-6.0	-2.0	-4.0
$dL_{t3,36,12}$:	140.6	1.56	24.9	35.7	41.2	-5.5	-2.0	-3.5
$dL_{t3,37,12}$:	135.9	1.56	25.2	37.3	41.5	-4.2	-2.0	-2.2
$dL_{t3,38,12}$:	142.2	1.56	22.8	33.3	39.1	-5.7	-2.0	-3.7
$dL_{t4,1,12}$:	175.0	1.56	25.7	34.3	42.0	-7.7	-2.0	-5.7
$dL_{t5,35,12}$:	414.1	1.56	21.3	27.5	38.0	-10.6	-2.2	-8.3
$dL_{t6,35,12}$:	826.6	1.56	21.7	31.8	39.5	-7.7	-2.7	-5.0

BIN 12: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]
1	---	---	---	---	---	---	175.0	-7.7	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	140.6	-4.5	---	---	---	---	---	---
4	---	---	73.4	-6.9	143.8	-10.1	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	---	---	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	---	---	---	---
12	65.6	-8.7	65.6	-8.7	134.4	-10.3	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	143.8	-8.0	---	---	---	---	---	---

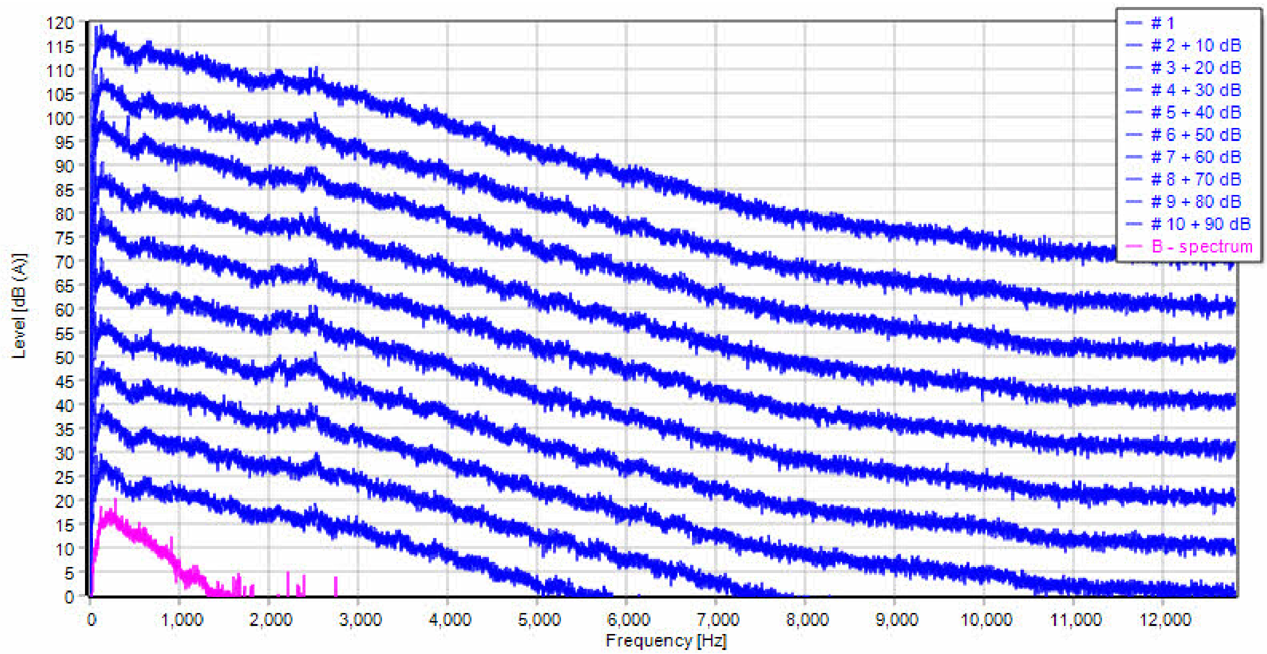
BIN 12: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	140.6	-3.4	---	---	---	---	---	---
19	---	---	---	---	137.5	-4.3	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	65.6	-9.9	65.6	-9.9	---	---	---	---	---	---	---	---
25	---	---	---	---	140.6	-9.3	---	---	---	---	---	---
26	51.6	-4.5	---	---	145.3	-9.4	---	---	---	---	---	---
27	---	---	---	---	139.1	-6.1	---	---	---	---	---	---
28	---	---	---	---	139.1	-4.3	---	---	---	---	---	---
29	---	---	---	---	139.1	-6.3	---	---	---	---	---	---
30	---	---	---	---	139.1	-7.3	---	---	---	---	---	---
31	---	---	---	---	139.1	-5.3	---	---	---	---	---	---
32	---	---	---	---	139.1	-5.8	---	---	---	---	---	---
33	67.2	-4.8	67.2	-4.8	135.9	-2.5	---	---	---	---	---	---
34	---	---	---	---	140.6	-3.4	---	---	---	---	---	---
35	---	---	---	---	134.4	-6.0	---	---	414.1	-10.6	826.6	-7.7
36	---	---	---	---	140.6	-5.5	---	---	---	---	---	---
37	---	---	---	---	135.9	-4.2	---	---	---	---	---	---
38	---	---	71.9	-2.2	142.2	-5.7	---	---	---	---	---	---
f_t[Hz] | dL_k[dB]	52.7	-13.4	72.8	-12.5	140.1	-8.0	175.0	-15.7	414.1	-16.4	826.6	-16.9
L_a[dB]		-2.0		-2.0		-2.0		-2.0		-2.2		-2.7
$dL_{a,k}$[dB]		-11.4		-10.5		-6.0		-13.7		-14.2		-14.3
K_{TN}[dB]		0		0		0		0		0		0

BIN 12.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,1,12.5}$:	57.8	1.56	22.2	29.6	38.4	-8.9	-2.0	-6.9
$dL_{t1,2,12.5}$:	57.8	1.56	22.5	30.2	38.7	-8.5	-2.0	-6.5
$dL_{t1,4,12.5}$:	57.8	1.56	23.3	29.9	39.5	-9.7	-2.0	-7.6
$dL_{t1,7,12.5}$:	65.6	1.56	22.2	28.7	38.4	-9.8	-2.0	-7.8
$dL_{t1,14,12.5}$:	56.3	1.56	21.6	31.7	37.8	-6.1	-2.0	-4.1
$dL_{t1,16,12.5}$:	51.6	1.56	22.6	31.2	38.8	-7.5	-2.0	-5.5
$dL_{t1,20,12.5}$:	70.3	1.56	19.8	28.9	36.1	-7.1	-2.0	-5.1
$dL_{t1,21,12.5}$:	67.2	1.56	20.3	32.4	36.5	-4.1	-2.0	-2.1
$dL_{t2,1,12.5}$:	57.8	1.56	22.2	29.6	38.4	-8.9	-2.0	-6.9
$dL_{t2,2,12.5}$:	57.8	1.56	22.5	30.2	38.7	-8.5	-2.0	-6.5
$dL_{t2,4,12.5}$:	57.8	1.56	23.3	29.9	39.5	-9.7	-2.0	-7.6
$dL_{t2,7,12.5}$:	65.6	1.56	22.2	28.7	38.4	-9.8	-2.0	-7.8
$dL_{t2,19,12.5}$:	76.6	1.56	20.8	32.2	37.1	-4.9	-2.0	-2.9
$dL_{t2,20,12.5}$:	70.3	1.56	19.8	28.9	36.1	-7.1	-2.0	-5.1
$dL_{t2,21,12.5}$:	67.2	1.56	20.3	32.4	36.5	-4.1	-2.0	-2.1
$dL_{t3,1,12.5}$:	135.9	1.56	25.3	33.5	41.6	-8.2	-2.0	-6.2
$dL_{t3,2,12.5}$:	139.1	1.56	25.4	41.0	41.7	-0.7	-2.0	1.3
$dL_{t3,3,12.5}$:	135.9	1.56	25.2	38.1	41.5	-3.4	-2.0	-1.4
$dL_{t3,5,12.5}$:	139.1	1.56	28.6	37.9	44.9	-7.0	-2.0	-5.0
$dL_{t3,6,12.5}$:	145.3	1.56	27.2	34.3	43.5	-9.1	-2.0	-7.1

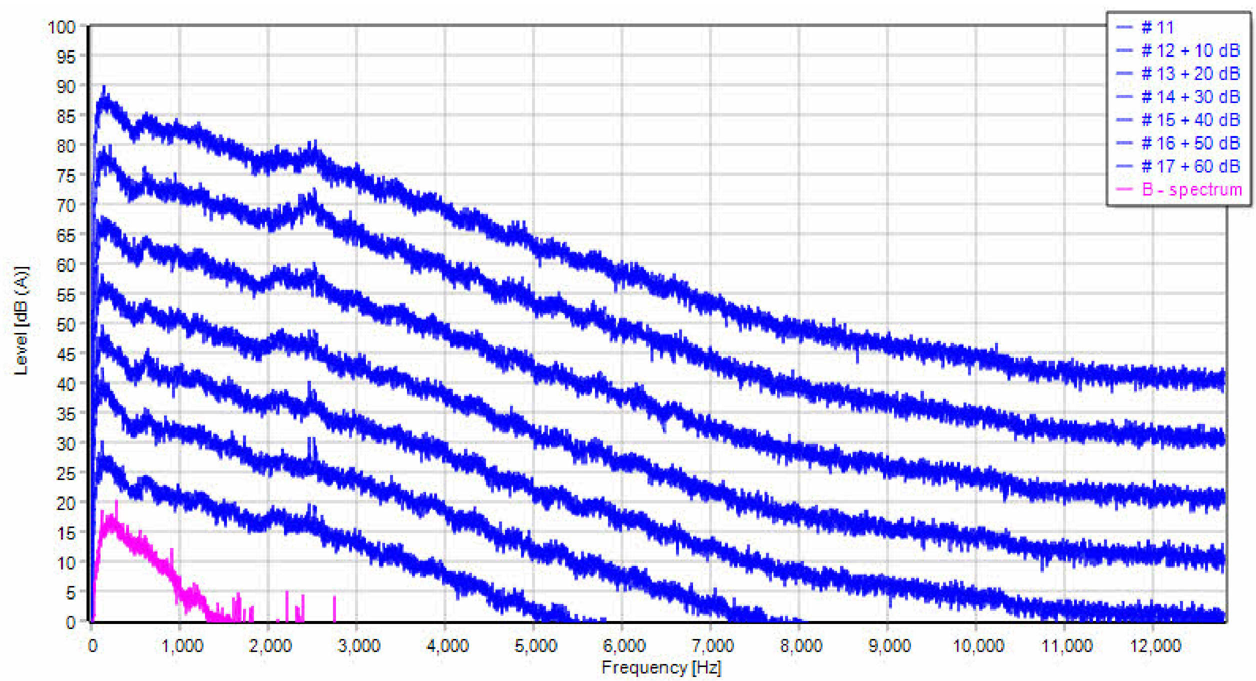
BIN 12.5: Tonal components determined								
	Frequency	**delta f**	$\mathbf{L_{pn,avg,j,k}}$	$\mathbf{L_{pt,j,k}}$	$\mathbf{L_{pn,j,k}}$	$\mathbf{dL_{tn,j,k}}$	$\mathbf{L_a}$	$\mathbf{dL_{a,j,k}}$
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t3,8,12.5}$:	139.1	1.56	26.0	34.1	42.3	-8.2	-2.0	-6.2
$dL_{t3,10,12.5}$:	139.1	1.56	27.2	38.2	43.5	-5.3	-2.0	-3.3
$dL_{t3,11,12.5}$:	135.9	1.56	26.6	35.9	42.9	-7.0	-2.0	-5.0
$dL_{t3,13,12.5}$:	139.1	1.56	28.4	36.5	44.7	-8.3	-2.0	-6.3
$dL_{t3,14,12.5}$:	139.1	1.56	24.4	35.3	40.7	-5.4	-2.0	-3.4
$dL_{t3,15,12.5}$:	135.9	1.56	24.7	34.0	41.0	-7.1	-2.0	-5.0
$dL_{t3,16,12.5}$:	143.8	1.56	25.3	31.8	41.6	-9.8	-2.0	-7.8
$dL_{t3,18,12.5}$:	135.9	1.56	22.9	31.2	39.2	-8.1	-2.0	-6.0
$dL_{t3,19,12.5}$:	153.1	1.56	24.4	35.7	40.7	-5.0	-2.0	-3.0
$dL_{t3,20,12.5}$:	139.1	1.56	22.8	38.6	39.1	-0.5	-2.0	1.5
$dL_{t3,21,12.5}$:	134.4	1.56	23.7	34.5	40.0	-5.4	-2.0	-3.4

BIN 12.5: Tonal components determined - Compact												
Spectrum	$\mathbf{f_T}$	$\mathbf{dL_{tn,j,k}}$	$\mathbf{f_T}$	$\mathbf{dL_{tn,j,k}}$	$\mathbf{f_T}$	$\mathbf{dL_{tn,j,k}}$						
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**						
1	57.8	-8.9	57.8	-8.9	135.9	-8.2						
2	57.8	-8.5	57.8	-8.5	139.1	-0.7						
3	---	---	---	---	135.9	-3.4						
4	57.8	-9.7	57.8	-9.7	---	---						
5	---	---	---	---	139.1	-7.0						
6	---	---	---	---	145.3	-9.1						
7	65.6	-9.8	65.6	-9.8	---	---						
8	---	---	---	---	139.1	-8.2						
9	---	---	---	---	---	---						
10	---	---	---	---	139.1	-5.3						
11	---	---	---	---	135.9	-7.0						
12	---	---	---	---	---	---						
13	---	---	---	---	139.1	-8.3						
14	56.3	-6.1	---	---	139.1	-5.4						
15	---	---	---	---	135.9	-7.1						
16	51.6	-7.5	---	---	143.8	-9.8						
17	---	---	---	---	---	---						
18	---	---	---	---	135.9	-8.1						
19	---	---	76.6	-4.9	153.1	-5.0						
20	70.3	-7.1	70.3	-7.1	139.1	-0.5						
21	67.2	-4.1	67.2	-4.1	134.4	-5.4						
$\mathbf{f_t}$**[Hz] | $\mathbf{dL_k}$[dB]**	58.8	-10.7	61.9	-10.9	138.6	-6.3						
$\mathbf{L_a}$**[dB]**		-2.0		-2.0		-2.0						
$\mathbf{dL_{a,k}}$**[dB]**		-8.7		-8.9		-4.3						
$\mathbf{K_{TN}}$**[dB]**		0		0		0						

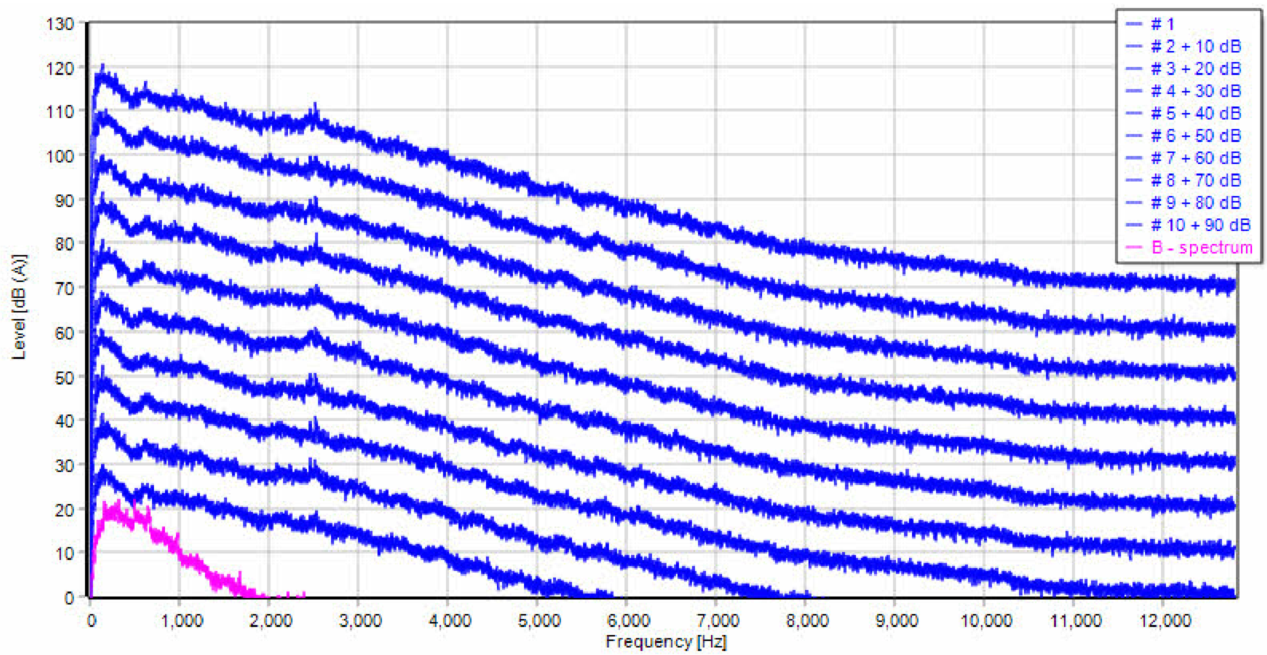
BIN 7.5: Narrowband spectrum



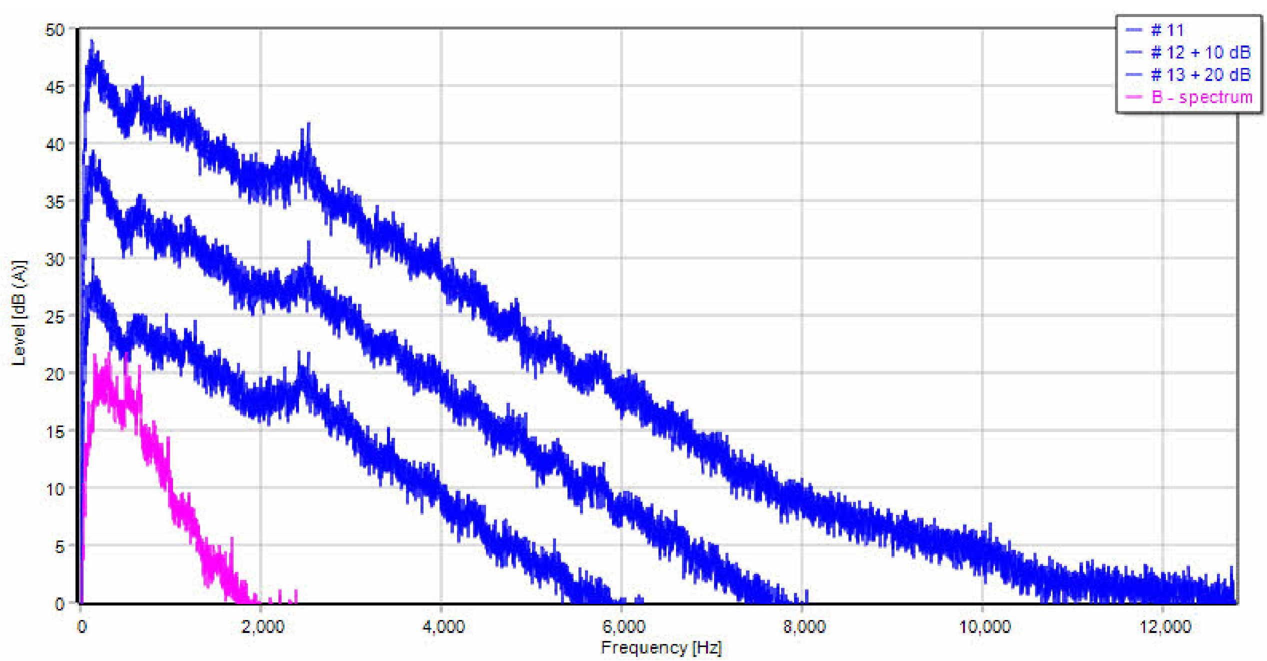
BIN 7.5: Narrowband spectrum



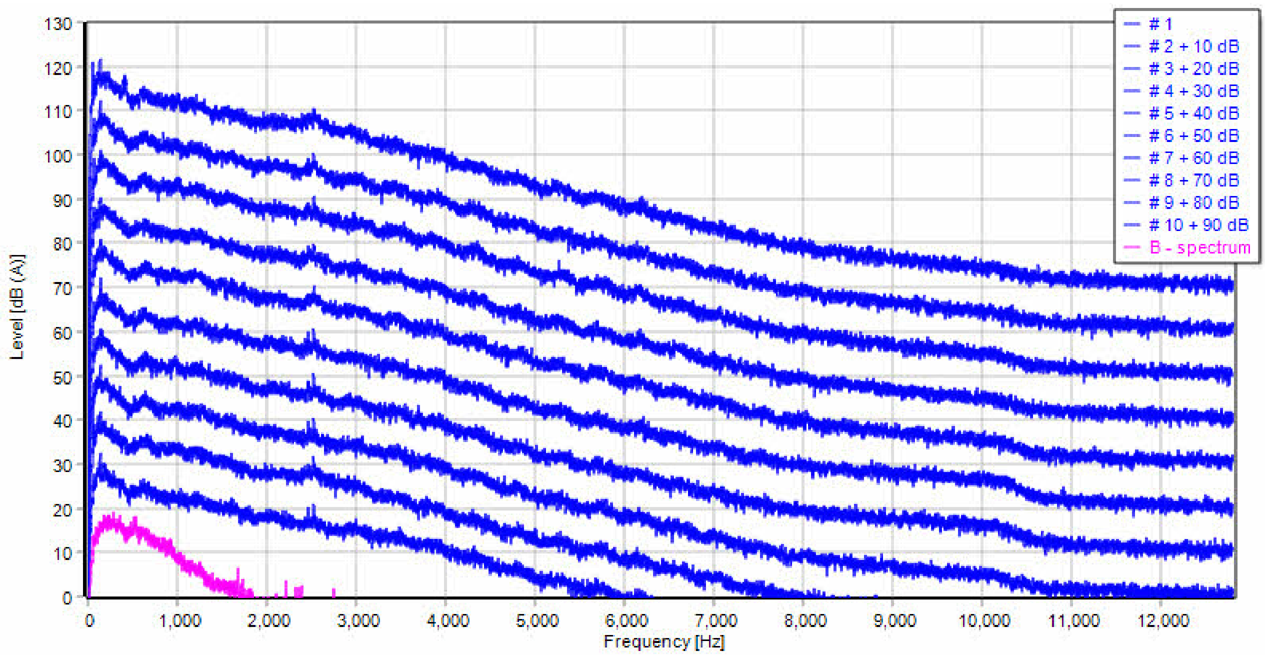
BIN 8: Narrowband spectrum



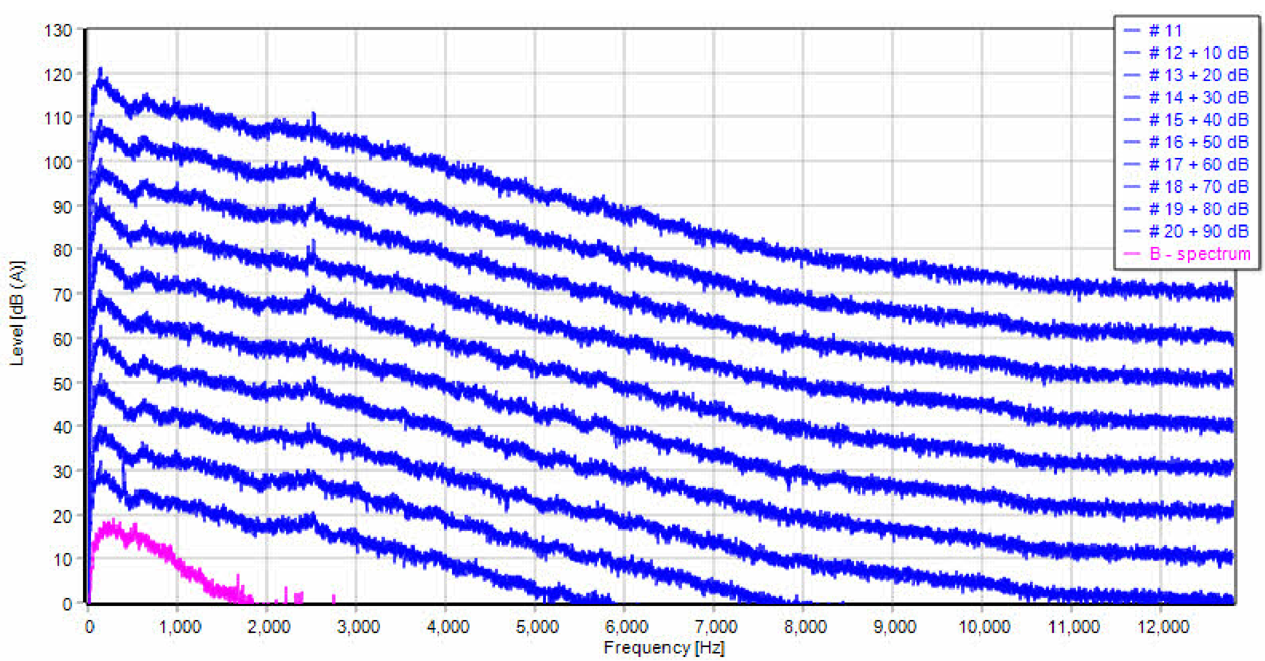
BIN 8: Narrowband spectrum



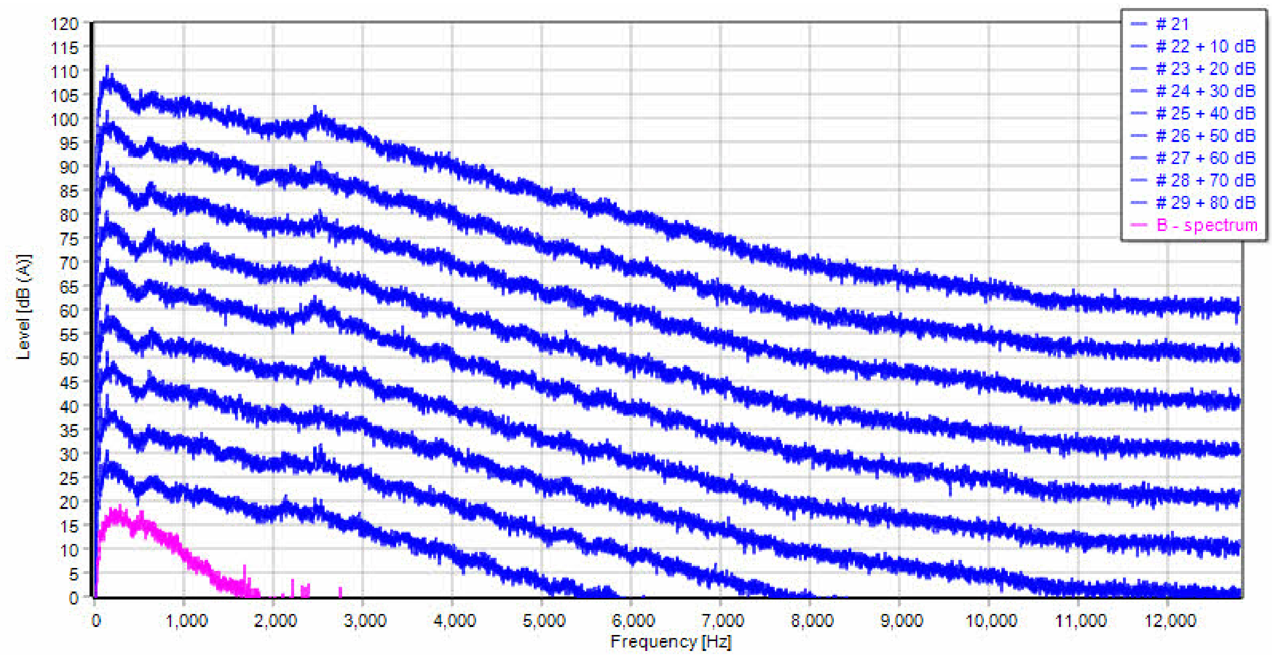
BIN 8.5: Narrowband spectrum



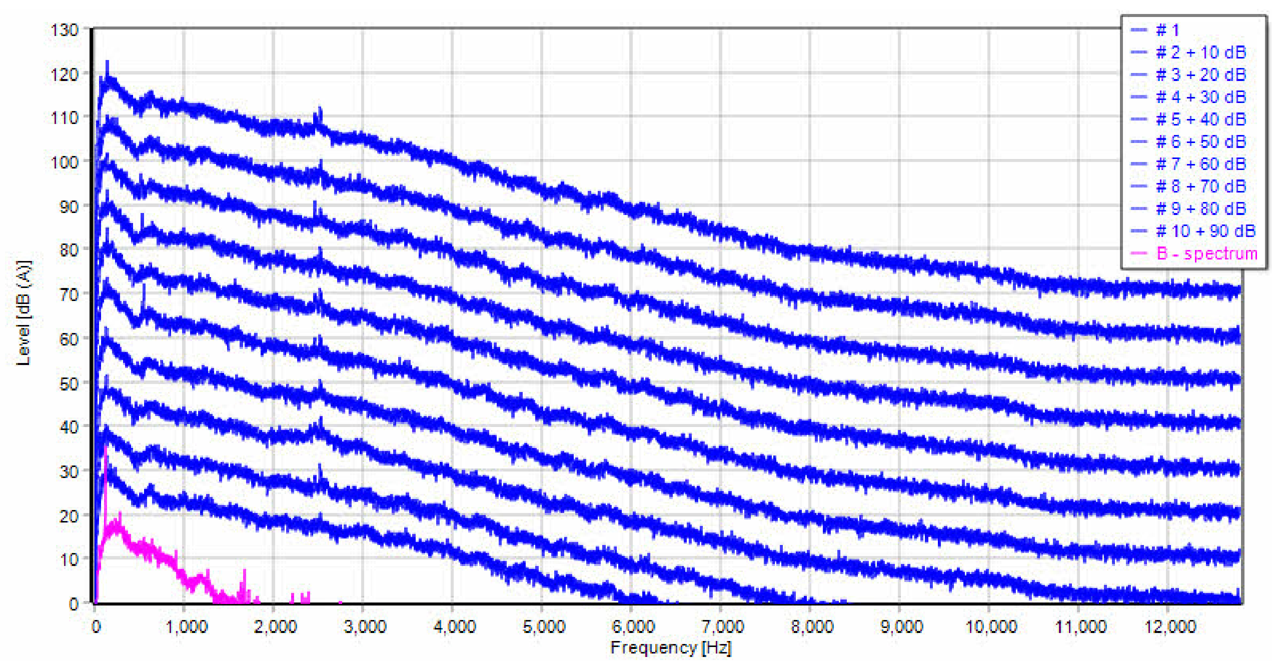
BIN 8.5: Narrowband spectrum



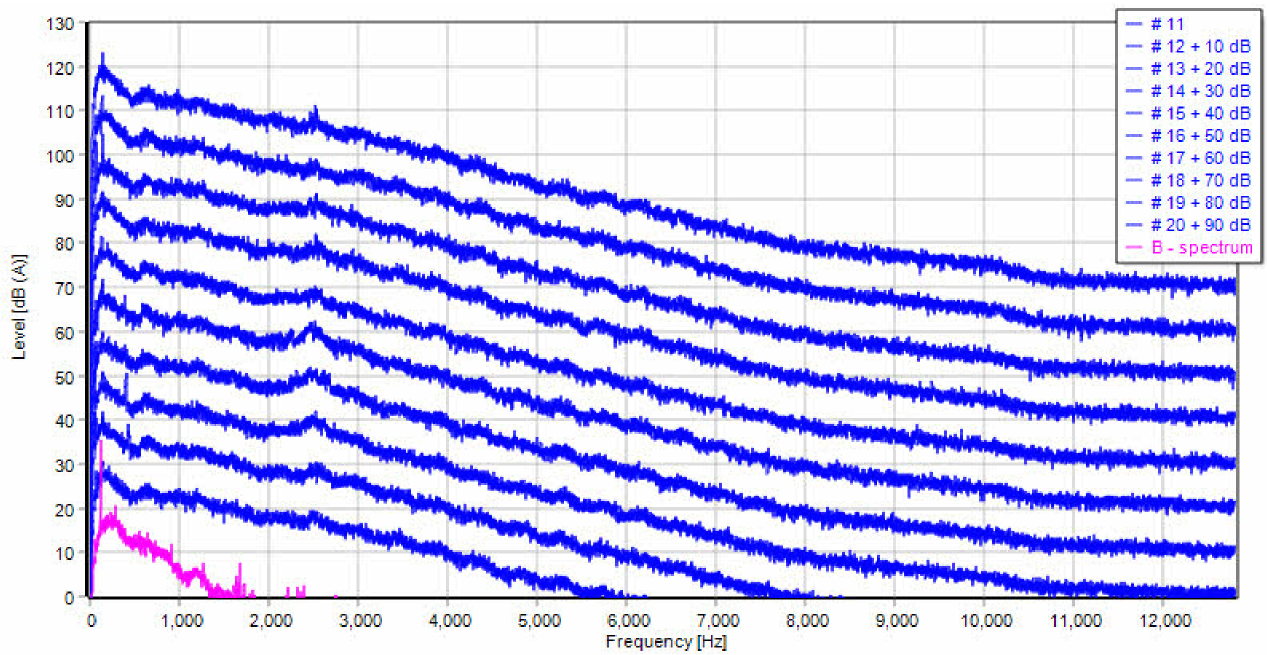
BIN 8.5: Narrowband spectrum



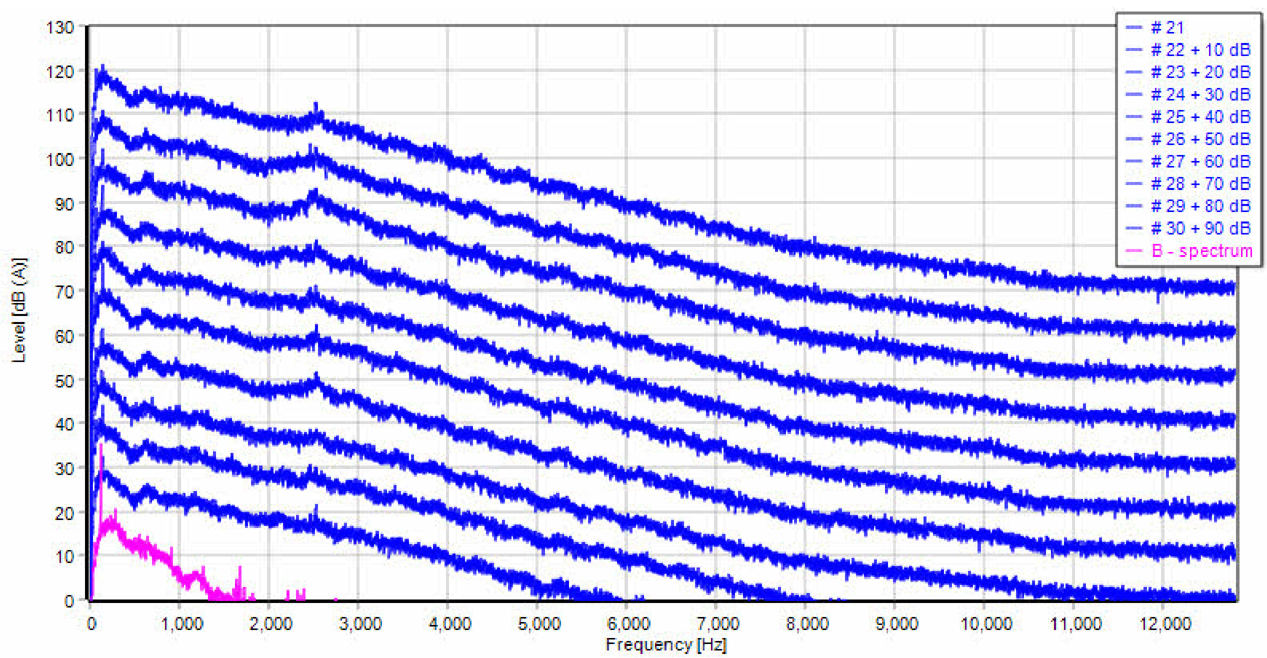
BIN 9: Narrowband spectrum



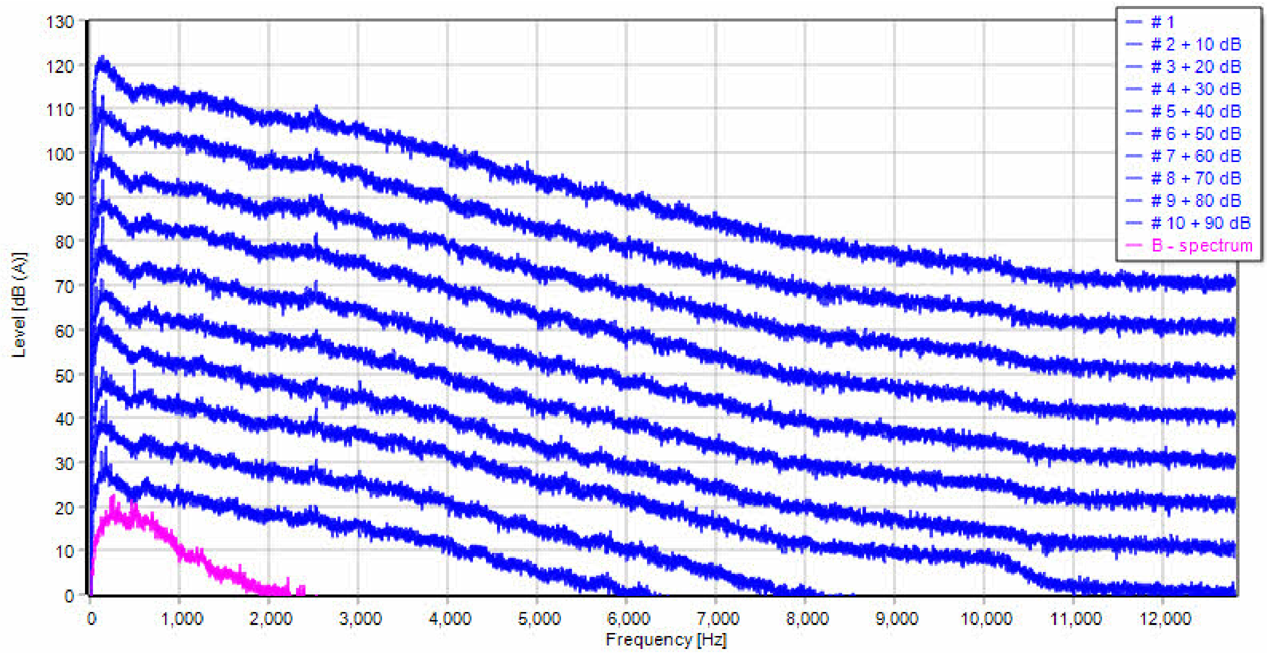
BIN 9: Narrowband spectrum



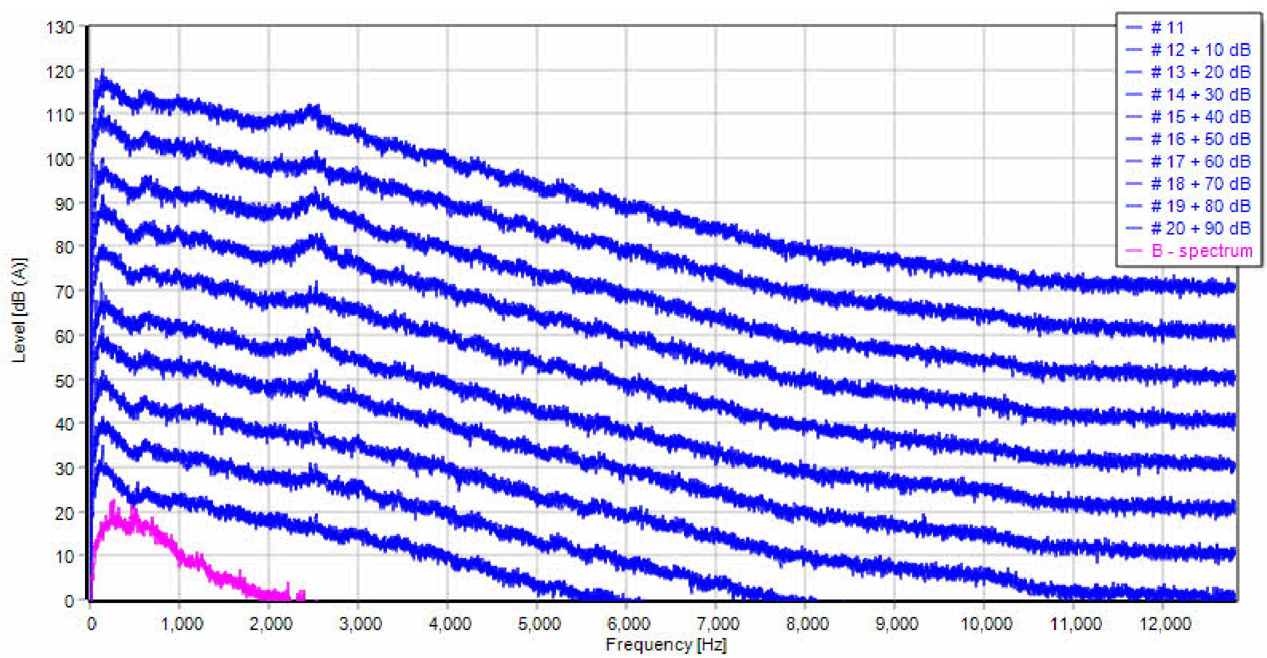
BIN 9: Narrowband spectrum



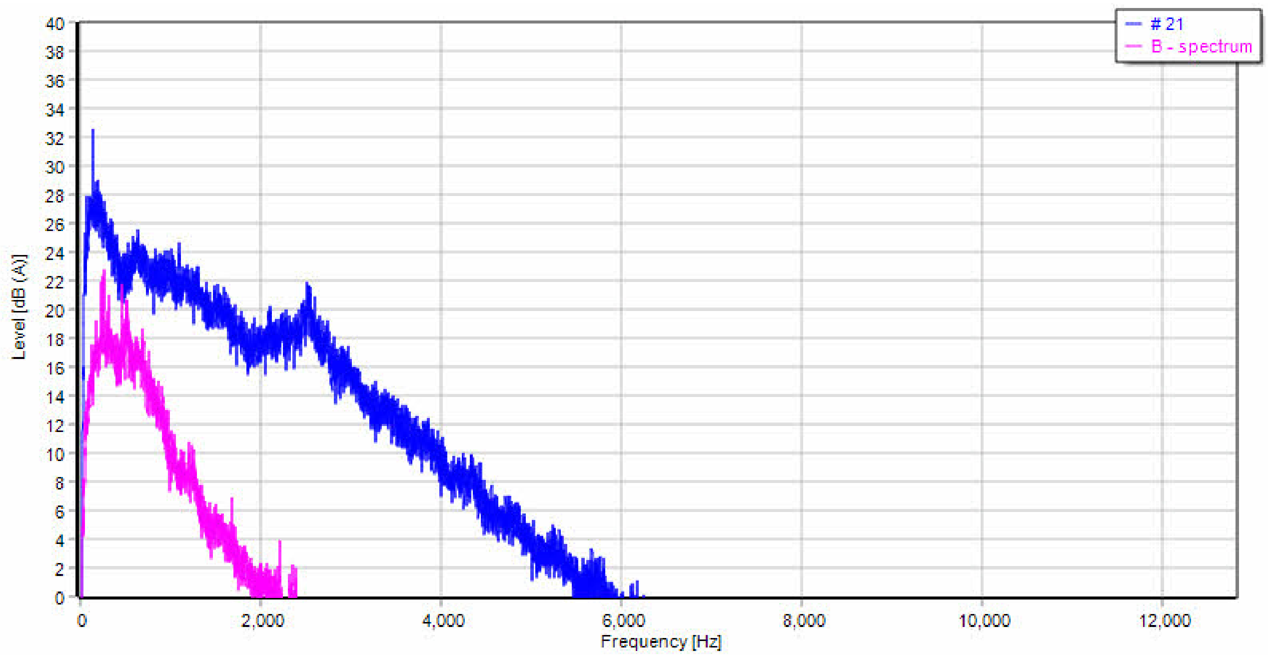
BIN 9.5: Narrowband spectrum



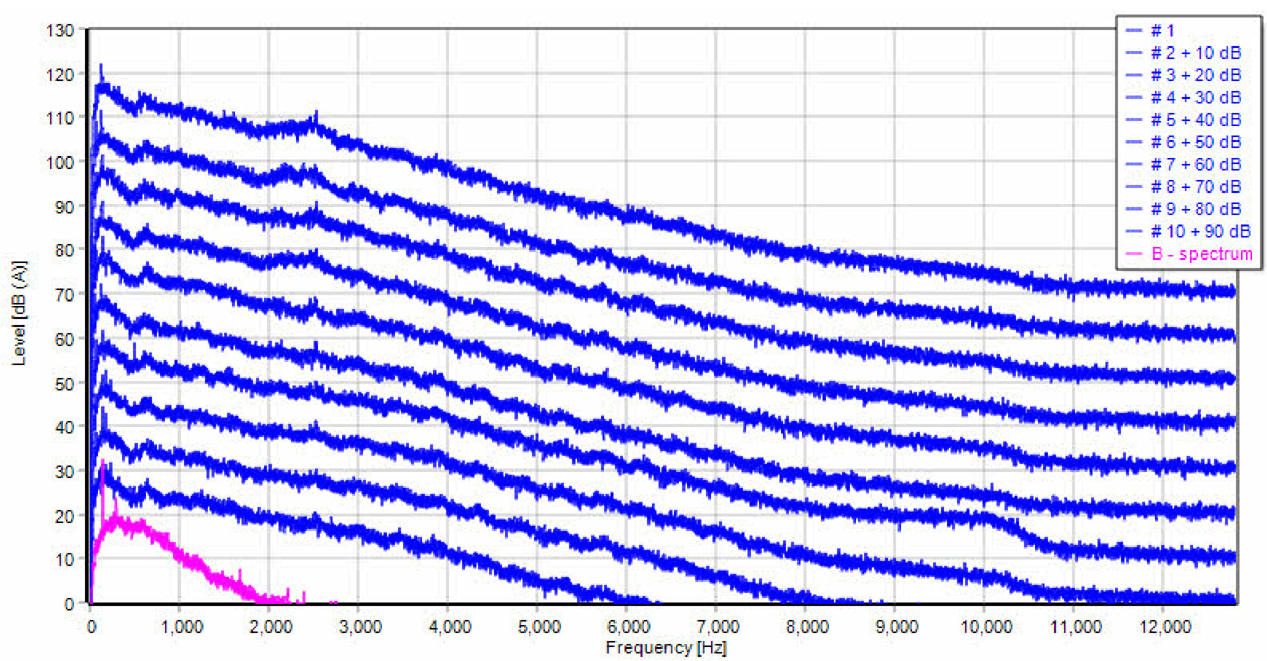
BIN 9.5: Narrowband spectrum



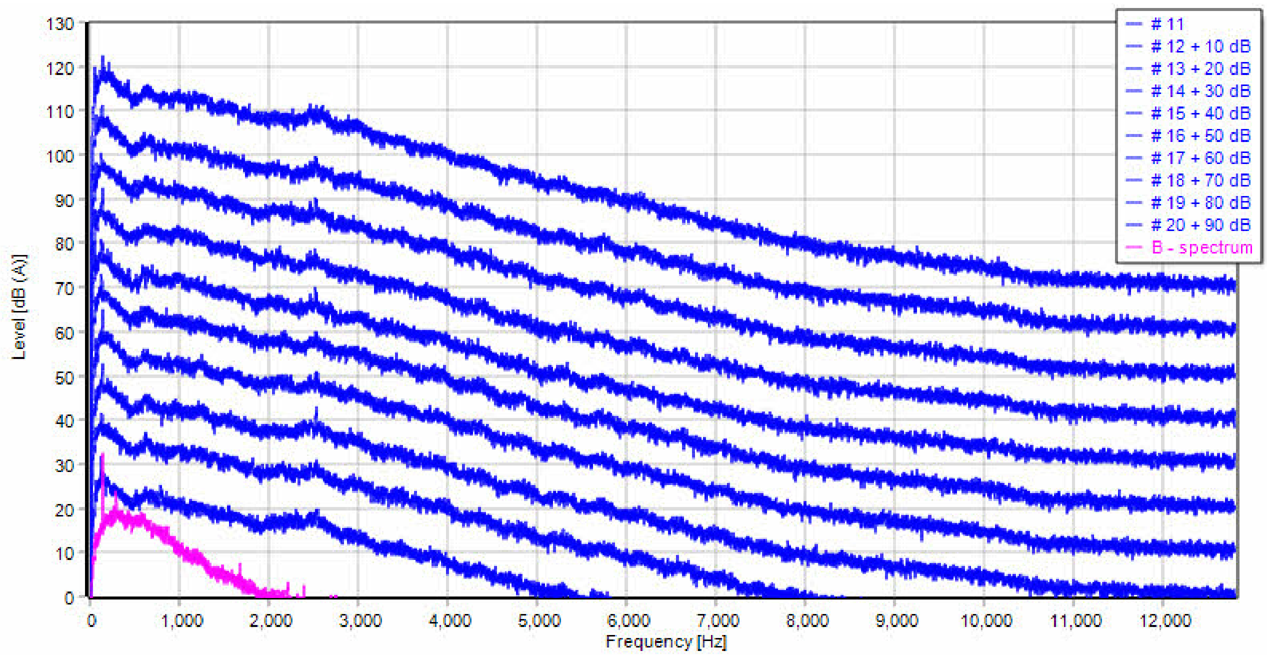
BIN 9.5: Narrowband spectrum



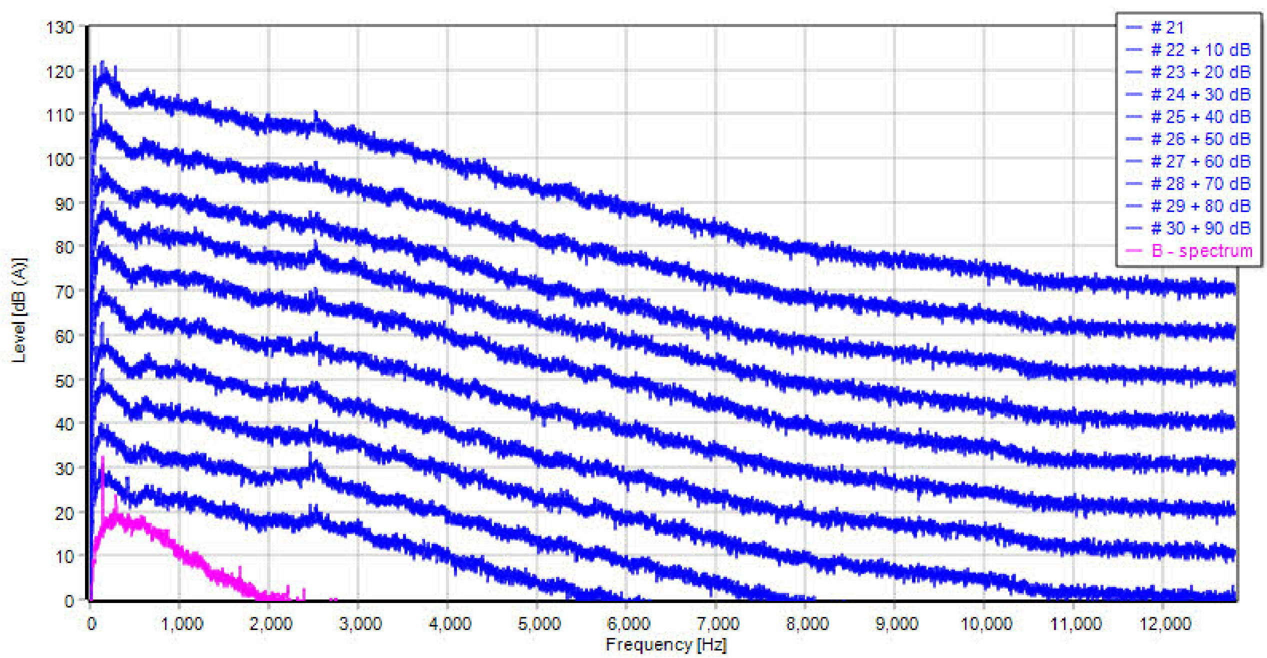
BIN 10: Narrowband spectrum



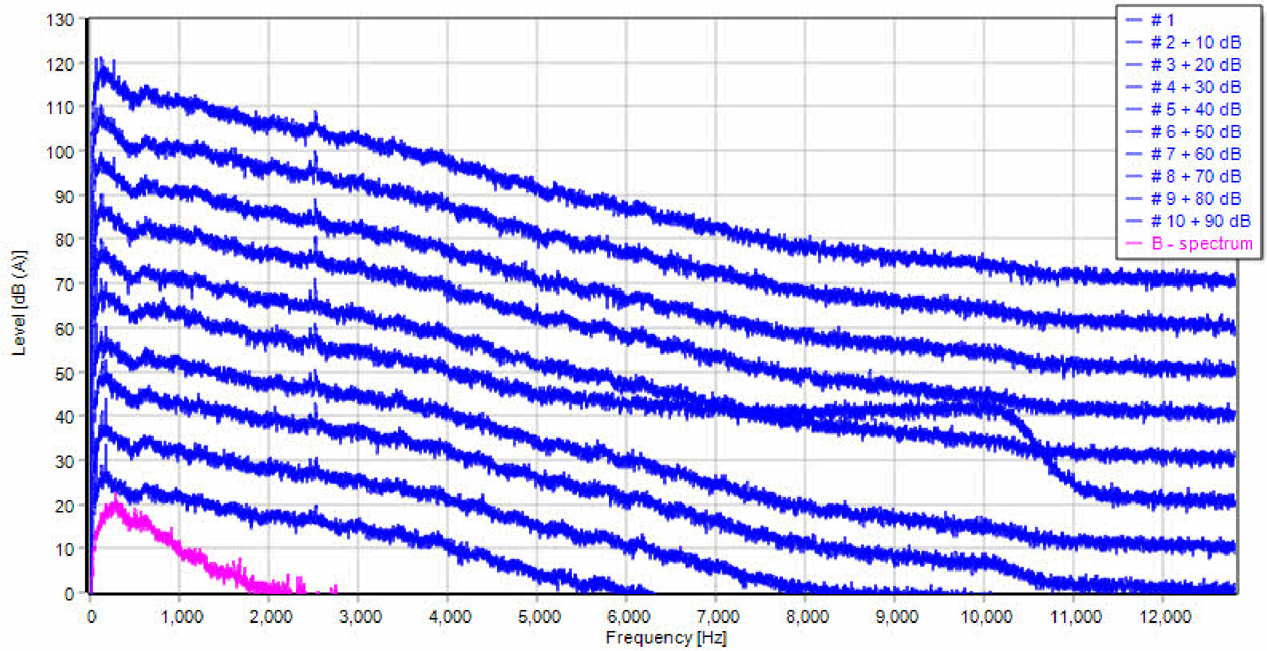
BIN 10: Narrowband spectrum



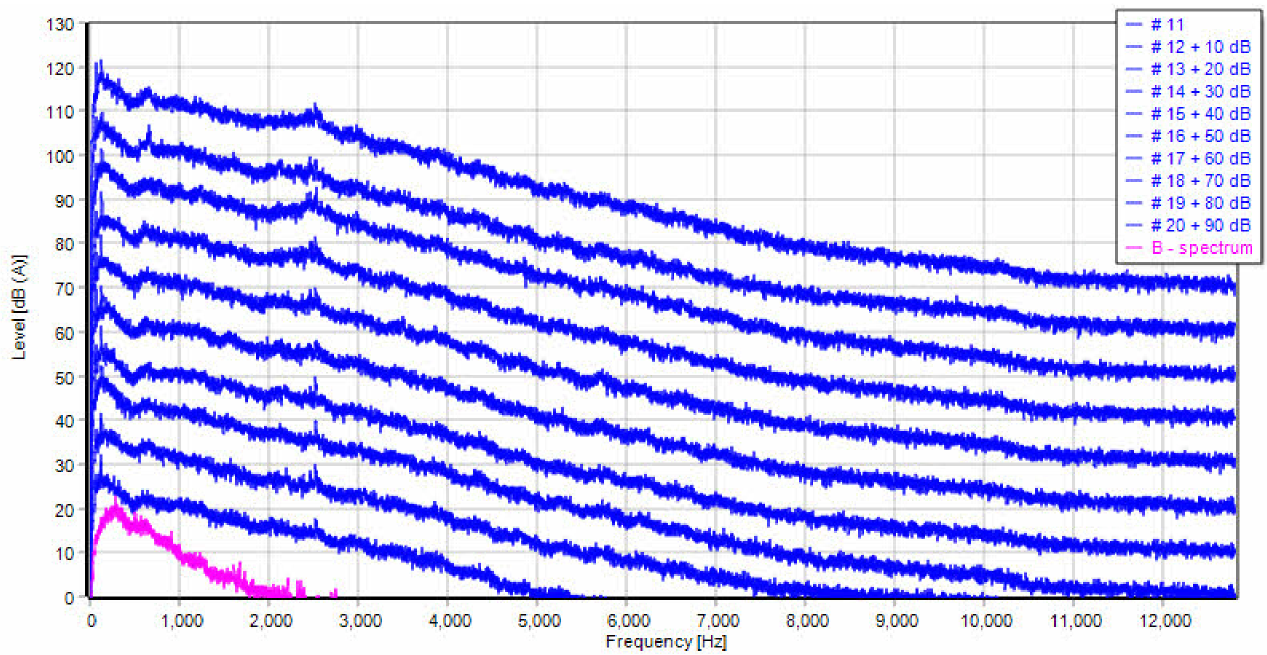
BIN 10: Narrowband spectrum



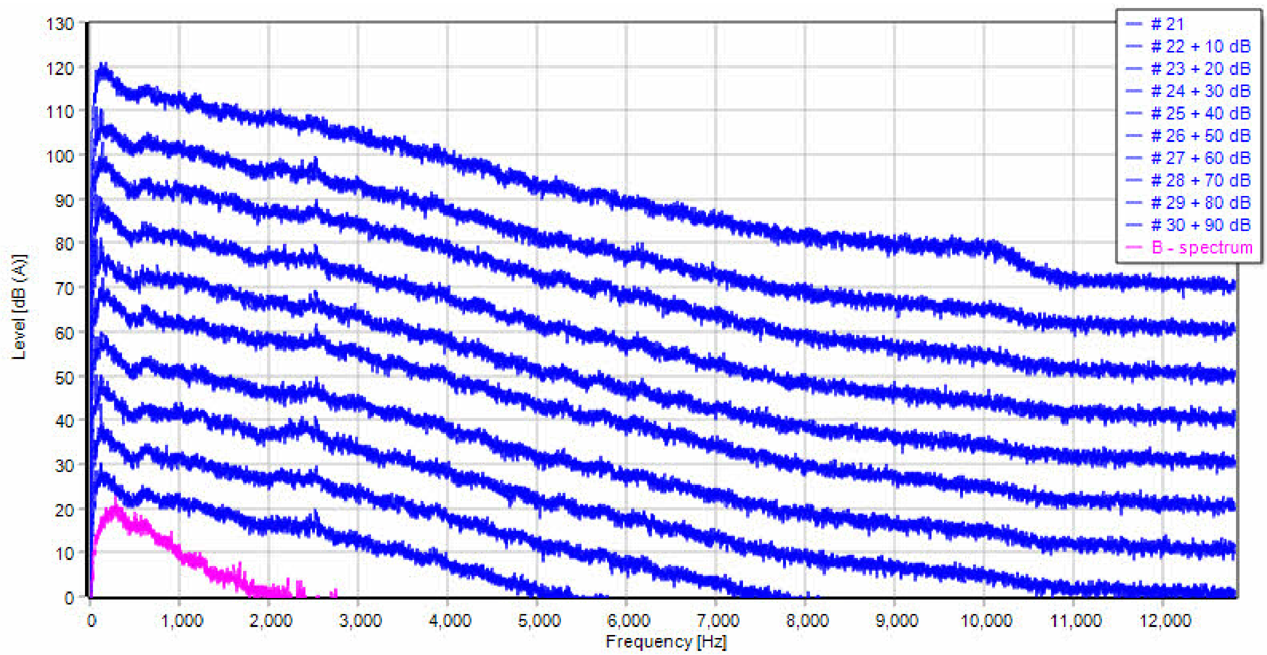
BIN 10.5: Narrowband spectrum



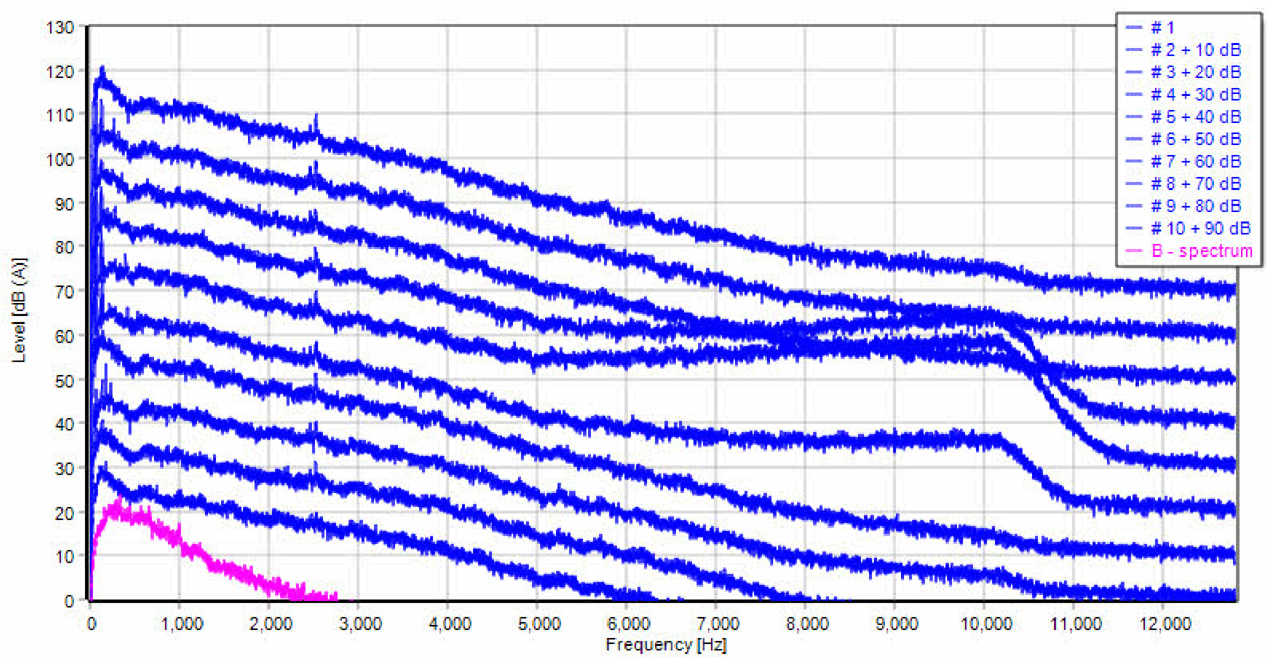
BIN 10.5: Narrowband spectrum



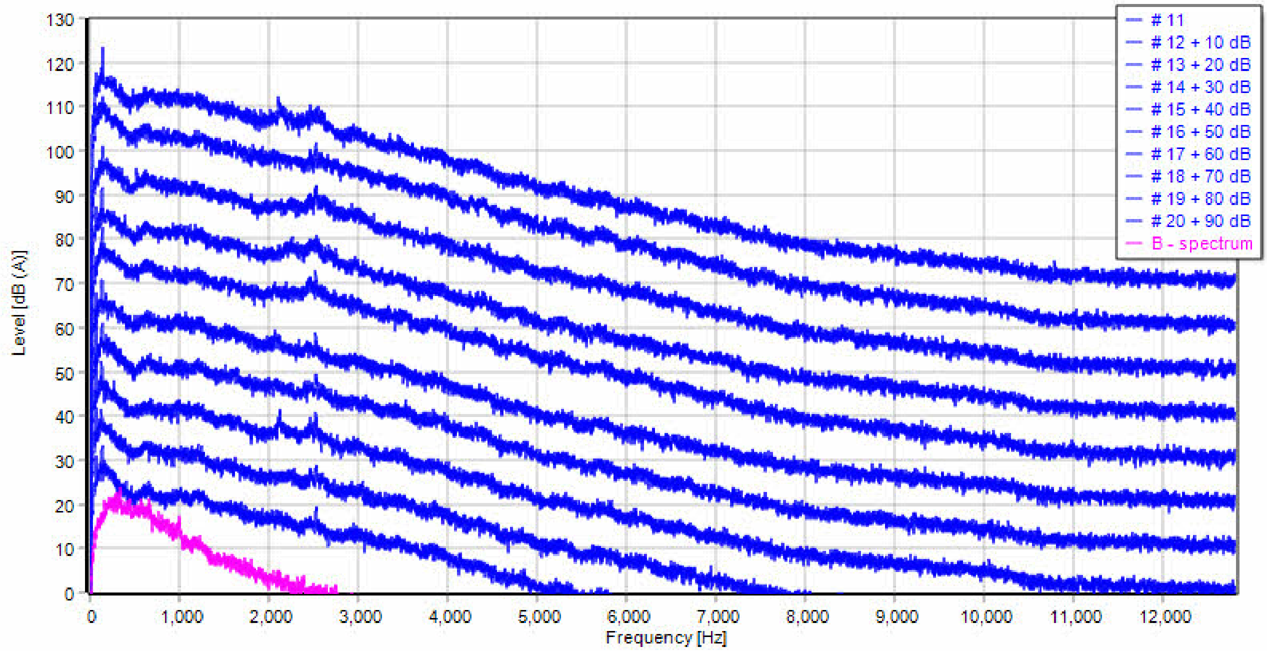
BIN 10.5: Narrowband spectrum



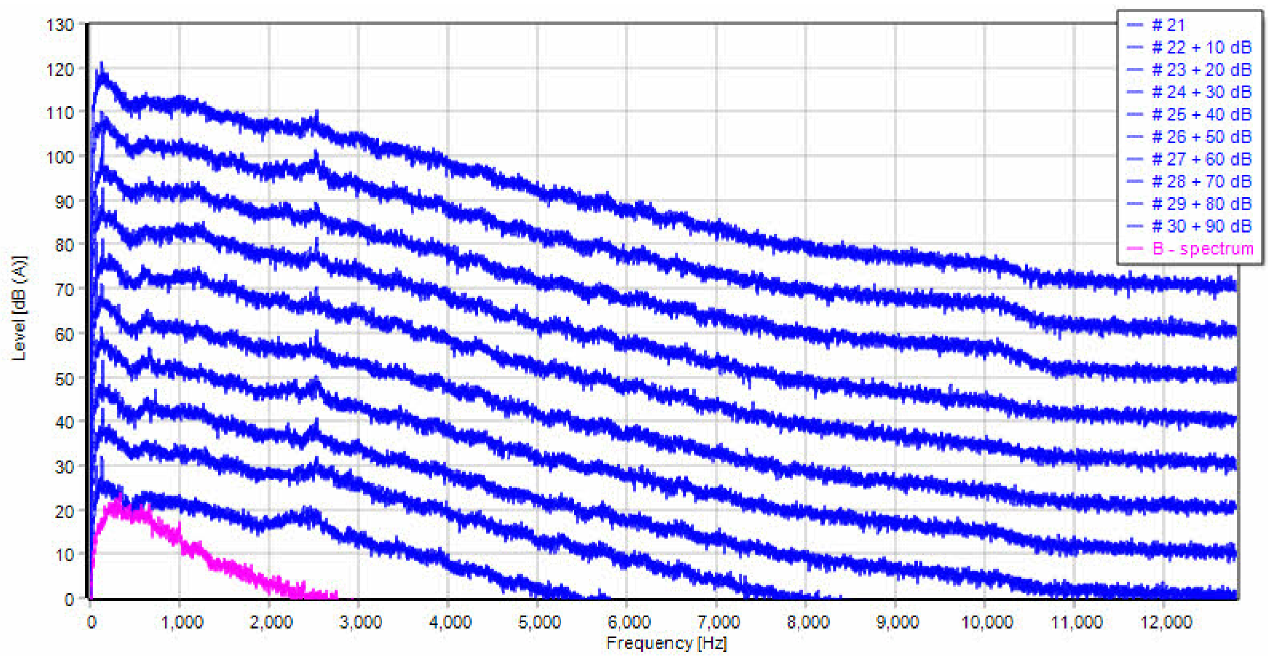
BIN 11: Narrowband spectrum



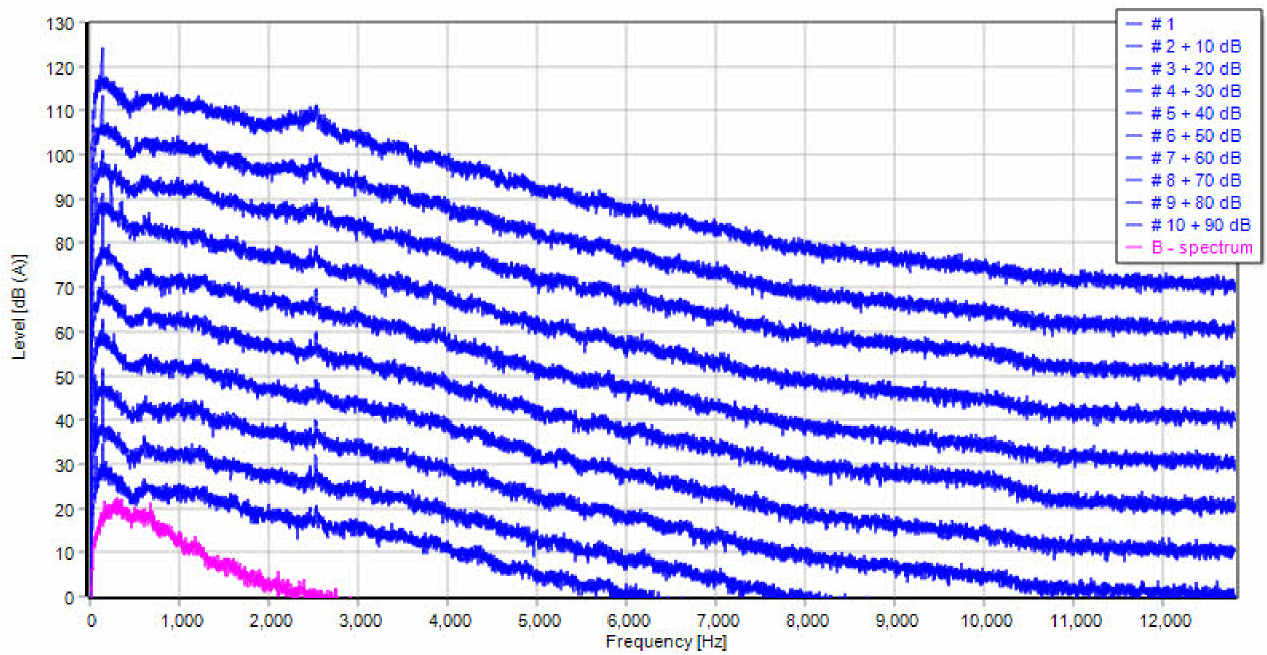
BIN 11: Narrowband spectrum



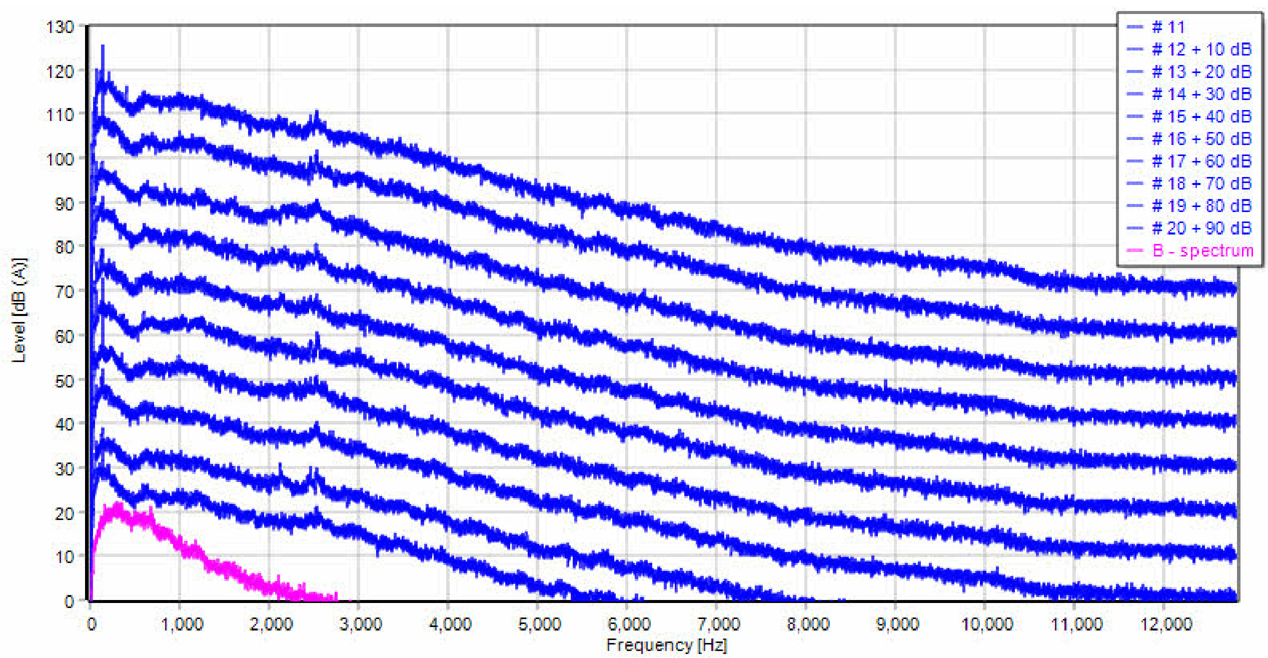
BIN 11: Narrowband spectrum



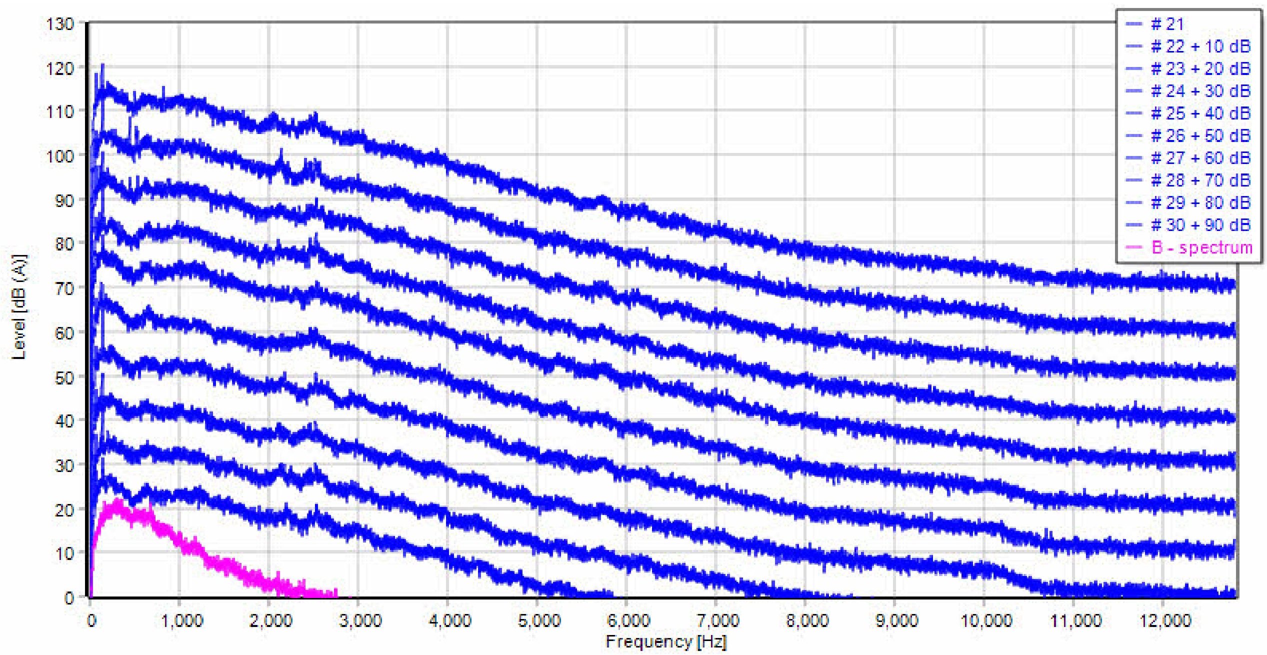
BIN 11.5: Narrowband spectrum



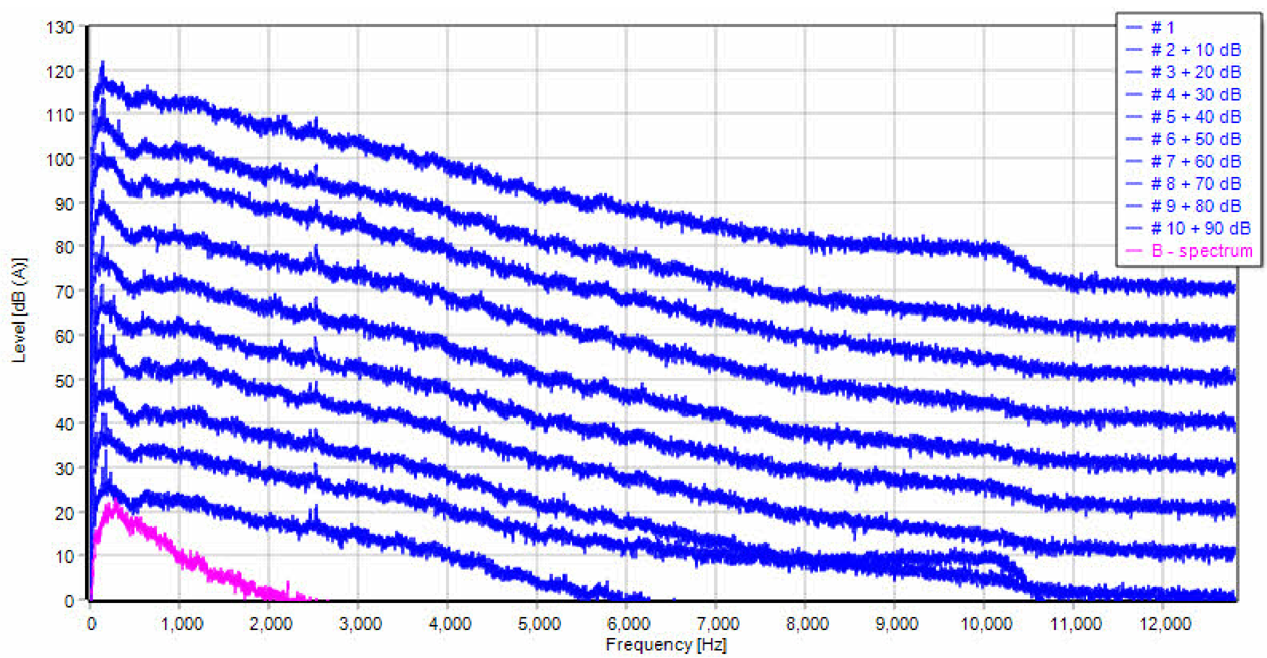
BIN 11.5: Narrowband spectrum



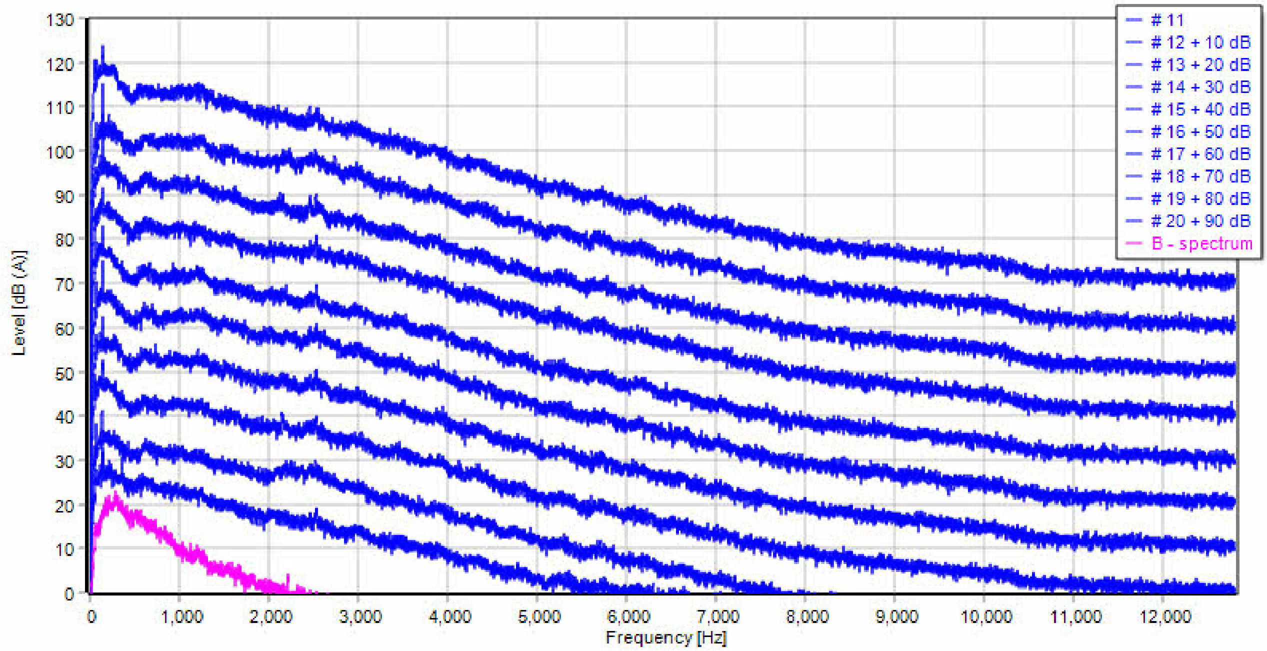
BIN 11.5: Narrowband spectrum



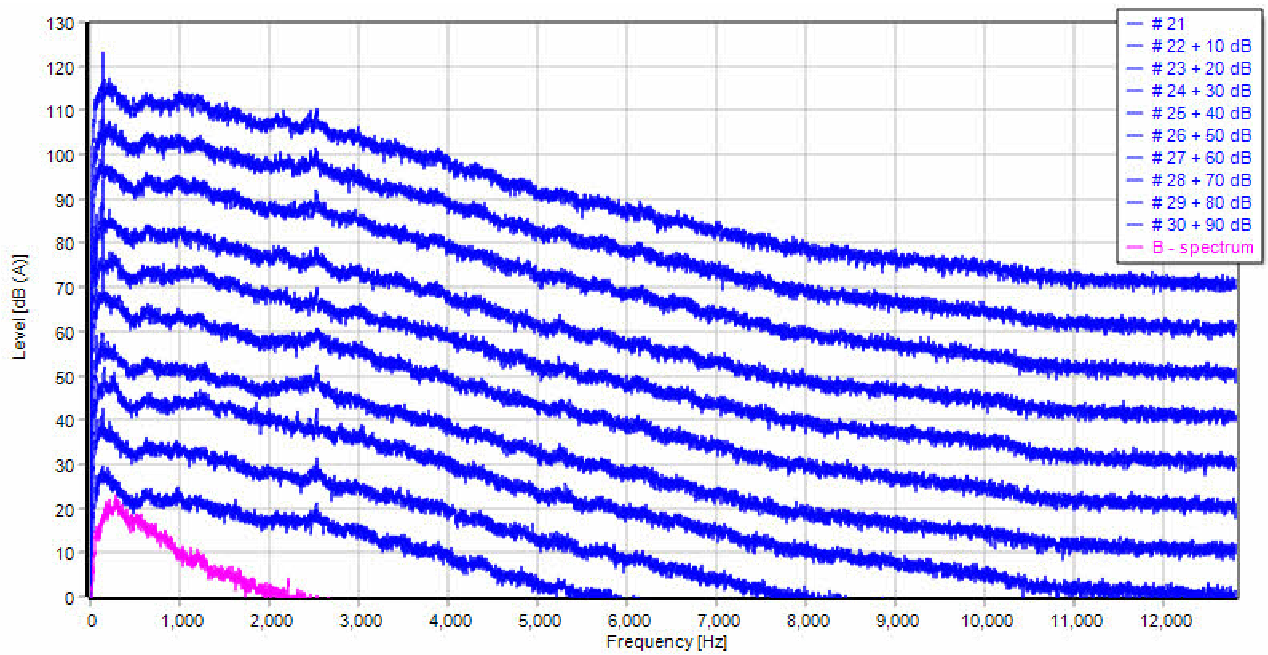
BIN 12: Narrowband spectrum



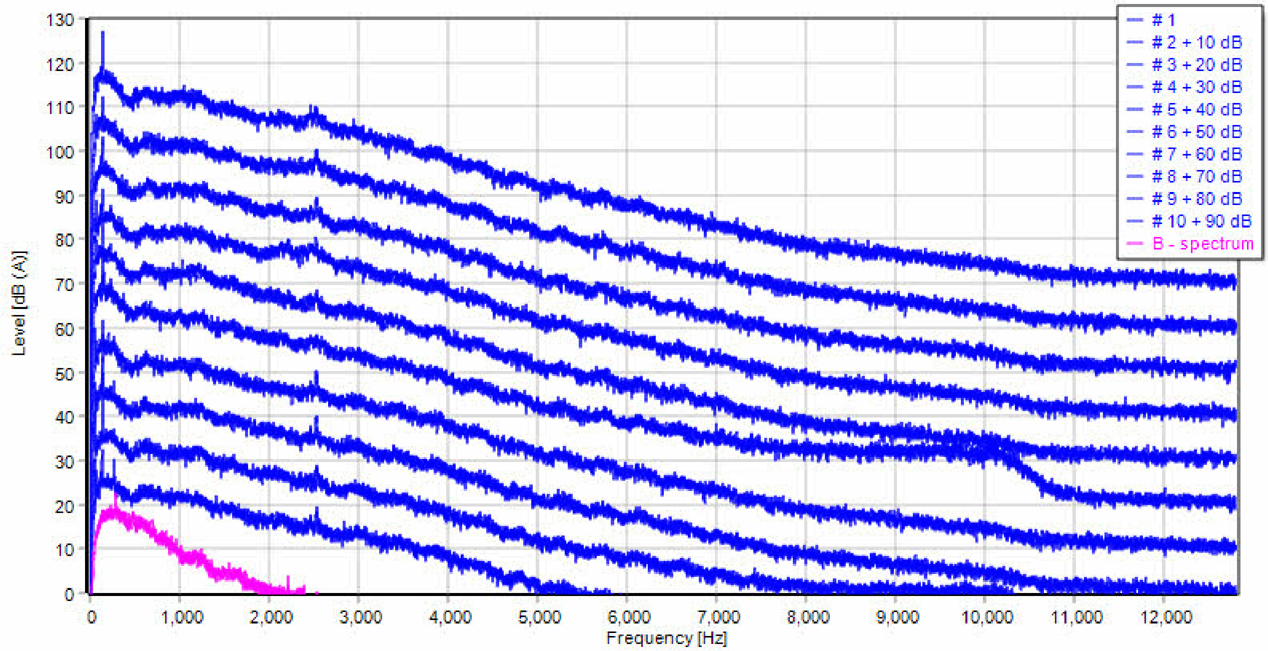
BIN 12: Narrowband spectrum



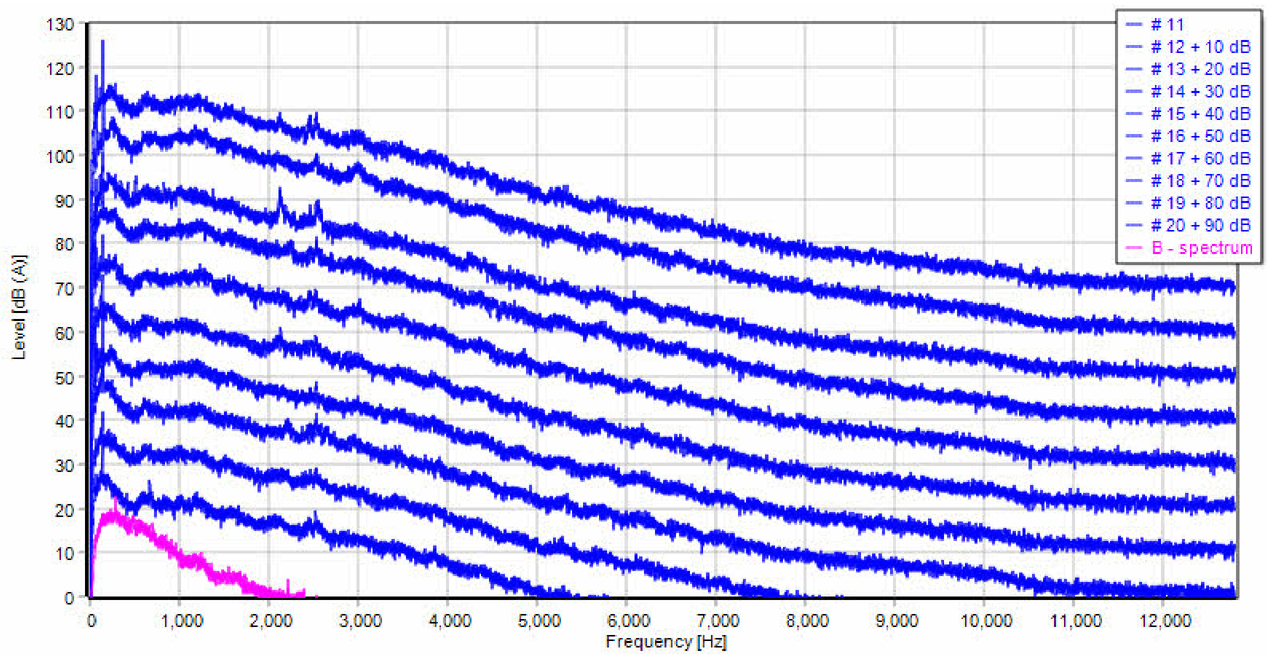
BIN 12: Narrowband spectrum



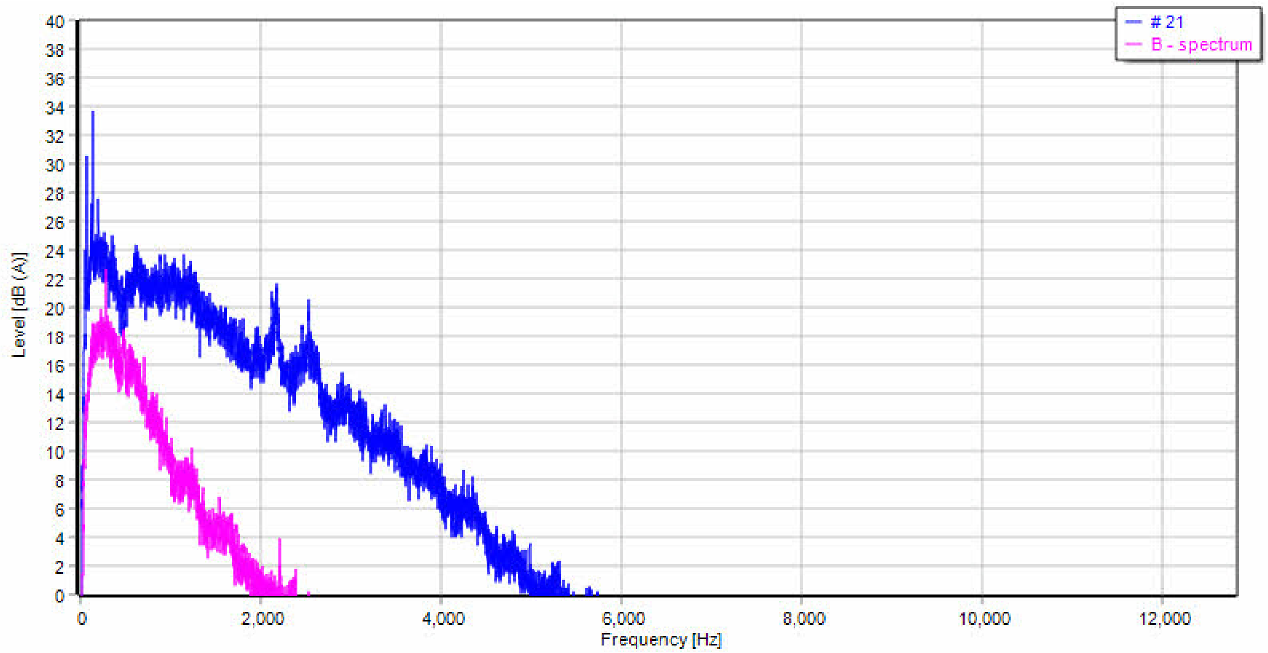
BIN 12.5: Narrowband spectrum



BIN 12.5: Narrowband spectrum



BIN 12.5: Narrowband spectrum



APPENDIX F:
WIND BIN LIST

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*2	7.5	7.5	1:30:29 PM	50.2	332.7	8.4	-1.5	953.4	1218.5
*3	7.5	7.7	1:30:39 PM	50.6	334.1	8.2	-1.5	953.4	1281.9
*4	7.5	7.6	1:30:59 PM	49.9	330.7	6.8	-1.5	953.5	1256.1
*5	7.5	7.4	1:31:09 PM	49.8	325.6	6.6	-1.5	953.5	1171.9
*6	7.5	7.6	1:31:19 PM	50.5	331	5.7	-1.5	953.5	1245.7
*7	7.5	7.6	1:31:29 PM	50.3	334	7.1	-1.5	953.5	1263.1
*8	7.5	7.6	1:32:09 PM	50.4	330.9	4.7	-1.5	953.5	1277.2
*9	7.5	7.7	1:32:19 PM	51.2	329.3	4.8	-1.5	953.5	1291.1
*10	7.5	7.6	1:37:59 PM	50.2	317.2	7.9	-1.5	953.5	1234.2
*11	7.5	7.6	1:38:09 PM	50.4	319.5	7.3	-1.5	953.5	1249.1
*12	7.5	7.5	1:38:19 PM	50.1	327.9	8.5	-1.5	953.5	1188.8
*13	7.5	7.6	1:43:09 PM	50.8	311.6	8.1	-1.7	953.4	1243.8
*14	7.5	7.4	2:02:29 PM	49.8	324.9	4.9	-1.8	953.6	1154.8
*15	7.5	7.3	2:02:49 PM	49.3	329	6.9	-1.8	953.6	1091.1
*16	7.5	7.5	2:02:59 PM	49.9	325.3	6.6	-1.8	953.5	1195.6
*17	7.5	7.7	2:03:09 PM	50.8	326	6.8	-1.8	953.6	1299.3
*18	7.5	7.7	2:06:09 PM	50.8	315.8	5.3	-1.7	953.7	1302.4
*19	8	7.9	1:30:09 PM	50.6	330.8	7.2	-1.5	953.5	1416.2
*20	8	8.1	1:37:49 PM	50.8	316.4	8.2	-1.5	953.5	1525.8
*21	8	8.2	1:42:39 PM	51.1	315.9	9.8	-1.6	953.4	1572.9
*22	8	7.8	1:43:19 PM	50.8	318.4	8.2	-1.7	953.4	1341.3
*23	8	8.2	1:58:39 PM	50.6	323.5	6.7	-1.8	953.5	1529.5
*24	8	8.1	1:58:49 PM	50.8	321.4	6.2	-1.8	953.5	1492.2
*25	8	8	1:58:59 PM	51.3	318.6	6.7	-1.8	953.6	1441.8
*26	8	8	2:00:09 PM	50.9	326.3	6.8	-1.8	953.5	1451.6
*27	8	7.9	2:00:49 PM	51.5	322.7	7.5	-1.8	953.6	1405.2
*28	8	7.8	2:02:19 PM	50.8	330.9	5.5	-1.8	953.6	1347.2
*29	8	8.1	2:03:19 PM	51	327	6.8	-1.8	953.7	1482.8
*30	8	8.2	2:03:29 PM	50.8	328.7	6.8	-1.8	953.7	1533.4
*31	8	7.9	2:05:59 PM	50.6	328.9	6.5	-1.7	953.6	1418.6
*32	8.5	8.6	11:08:59 AM	51.6	333.1	8.5	-1.3	952.4	1748.7
*33	8.5	8.7	1:22:39 PM	51.5	327.6	7	-1.6	953.5	1843.1
*34	8.5	8.7	1:28:29 PM	51.2	323.7	6.8	-1.6	953.4	1828.8
*35	8.5	8.6	1:28:39 PM	50.8	321.8	7.6	-1.6	953.4	1766.3
*36	8.5	8.5	1:28:49 PM	50.6	320.8	8	-1.5	953.4	1702.7
*37	8.5	8.7	1:28:59 PM	51.2	324.1	7.5	-1.5	953.4	1825.2
*38	8.5	8.6	1:29:19 PM	50.7	324.2	7.3	-1.5	953.4	1754.8
*39	8.5	8.6	1:29:29 PM	51.3	333.2	6.8	-1.5	953.4	1797.1
*40	8.5	8.6	1:29:59 PM	50.7	326.5	5.9	-1.5	953.5	1772.2
*41	8.5	8.7	1:32:59 PM	50.9	331.9	7.3	-1.4	953.6	1838.5
*42	8.5	8.3	1:33:09 PM	51.6	333.2	6.2	-1.4	953.5	1633.4
*43	8.5	8.5	1:36:19 PM	51.1	320.9	11.1	-1.4	953.4	1712.2
*44	8.5	8.5	1:36:29 PM	51.3	318.1	10.1	-1.5	953.4	1737.4
*45	8.5	8.7	1:36:39 PM	51.4	314.7	10	-1.5	953.3	1853.2
*46	8.5	8.7	1:37:19 PM	51.2	319.5	8.6	-1.5	953.5	1807.5
*47	8.5	8.7	1:37:39 PM	51.3	321.9	8.9	-1.5	953.4	1817.6
*48	8.5	8.5	1:42:49 PM	51.5	307.9	8.4	-1.6	953.4	1702.4
*49	8.5	8.6	1:58:19 PM	51	339.2	8	-1.8	953.5	1783.8
*50	8.5	8.5	1:58:29 PM	50.8	333.3	7.3	-1.8	953.5	1706
*51	8.5	8.7	1:59:29 PM	50.7	328.8	7.6	-1.8	953.6	1814.1
*52	8.5	8.4	1:59:59 PM	50.8	322.9	7.6	-1.8	953.5	1676.2

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*53	8.5	8.3	2:00:19 PM	51	322.8	6.6	-1.8	953.6	1612.8
*54	8.5	8.6	2:00:29 PM	51.3	323.1	7.7	-1.8	953.5	1773.1
*55	8.5	8.4	2:00:39 PM	50.9	327.2	7.7	-1.8	953.6	1655.1
*56	8.5	8.5	2:00:59 PM	51.5	325.9	7.1	-1.8	953.6	1725.2
*57	8.5	8.7	2:01:49 PM	50.8	333.8	6.1	-1.8	953.6	1839.7
*58	8.5	8.5	2:01:59 PM	50.8	326.3	7	-1.8	953.5	1727.9
*59	8.5	8.3	2:02:09 PM	51.1	318.7	5.9	-1.8	953.6	1587
*60	8.5	8.5	2:06:19 PM	51.4	324.3	6.1	-1.7	953.5	1706.9
*61	9	9	11:04:19 PM	51.9	320.7	7.8	-1.6	952.3	2007
*62	9	9.2	12:52:19 PM	50.8	335.3	8	-1.4	953.3	2084.5
*63	9	9.2	1:18:49 PM	51	327	6.6	-1.5	953.6	2072.5
*64	9	9	1:26:39 PM	51.5	324.1	7.7	-1.6	953.4	1979
*65	9	9.2	1:27:39 PM	52.5	329.7	5.9	-1.6	953.5	2105.1
*66	9	9.2	1:27:49 PM	52.4	328.2	7.3	-1.6	953.5	2094.4
*67	9	9.2	1:28:09 PM	51.5	313	7.4	-1.6	953.5	2087.6
*68	9	9.1	1:28:19 PM	51.6	315	8.1	-1.6	953.4	2029.4
*69	9	8.9	1:29:09 PM	51	319.5	7.9	-1.5	953.4	1945.6
*70	9	9	1:29:39 PM	51	333.7	5.7	-1.5	953.5	1998
*71	9	9.2	1:29:49 PM	51	331.9	5.6	-1.5	953.5	2104.1
*72	9	8.9	1:32:29 PM	51.8	330.9	5.2	-1.4	953.6	1920.2
*73	9	8.9	1:33:29 PM	51.3	329.1	6.1	-1.4	953.5	1926
*74	9	9.2	1:33:39 PM	51.1	318.1	6.3	-1.4	953.5	2077.5
*75	9	8.9	1:33:49 PM	51.3	324.9	5.9	-1.4	953.5	1911.7
*76	9	8.9	1:37:09 PM	51.3	318.4	8.9	-1.5	953.4	1932.9
*77	9	9.1	1:37:29 PM	51.6	319.8	9.1	-1.5	953.5	2025.5
*78	9	8.9	1:38:29 PM	51.3	334.6	8.4	-1.5	953.6	1931.5
*79	9	9.2	1:41:59 PM	51.6	314.9	9.4	-1.6	953.5	2091.1
*80	9	9	1:42:19 PM	51.4	322.1	9.7	-1.6	953.5	1977.4
*81	9	8.8	1:42:29 PM	51.3	319.3	9.4	-1.6	953.4	1864.5
*82	9	8.9	1:43:29 PM	52.1	325.7	7	-1.7	953.5	1944.9
*83	9	9	1:45:49 PM	51	334.9	7	-1.6	953.5	2005.6
*84	9	8.9	1:58:09 PM	50.8	338.3	9	-1.8	953.5	1949.8
*85	9	9.2	1:59:09 PM	52.1	320.1	8	-1.8	953.5	2089.2
*86	9	9	1:59:39 PM	51.4	324.9	7.3	-1.8	953.6	1995.2
*87	9	8.8	1:59:49 PM	51	324.4	7.7	-1.8	953.5	1883
*88	9	9.2	2:01:09 PM	51.6	320.5	8.9	-1.8	953.5	2103.9
*89	9	9.2	2:01:19 PM	51.6	322.7	7.7	-1.8	953.6	2072.6
*90	9	9	2:03:39 PM	51.6	327.2	6.6	-1.8	953.7	1999.2
*91	9	9	2:05:49 PM	51.2	333.6	7.9	-1.7	953.6	1975.7
*92	9	9.2	2:06:39 PM	51.5	325.5	7.6	-1.7	953.6	2092.3
*93	9	9	2:06:59 PM	51	334.2	7.3	-1.7	953.6	1996.3
*94	9	9	2:07:09 PM	51.2	332	6.1	-1.7	953.7	2008.1
*95	9.5	9.6	11:04:09 AM	51	321.6	8.6	-1.6	952.4	2274.8
*96	9.5	9.3	11:08:29 AM	51.5	334.8	7.3	-1.3	952.5	2109.8
*97	9.5	9.7	11:09:59 AM	51.7	330.1	6.9	-1.3	952.5	2303.6
*98	9.5	9.3	12:53:09 PM	52	327.3	7.5	-1.4	953.3	2115.1
*99	9.5	9.5	1:18:19 PM	50.8	342	9	-1.5	953.5	2219
*100	9.5	9.5	1:18:29 PM	50.9	333.3	8	-1.5	953.5	2235.7
*101	9.5	9.4	1:18:59 PM	51.5	329.9	6.4	-1.5	953.6	2175.8
*102	9.5	9.7	1:19:39 PM	51.4	330.5	6	-1.5	953.5	2294
*103	9.5	9.4	1:22:49 PM	51.8	318.6	7.5	-1.6	953.5	2179.6

Wind bin list - total noise:

No.	Wind Bin	Vs [m/s]	Time	LAeq [dB(A)]	Windd. [°]	Winds. [m/s]	T [°C]	Pressure [hPa]	Power [kW]
*104	9.5	9.6	1:26:49 PM	52.3	331	6.2	-1.6	953.4	2248.7
*105	9.5	9.3	1:27:59 PM	52	327.1	6.5	-1.6	953.5	2124.3
*106	9.5	9.3	1:34:09 PM	51.9	329.2	6.1	-1.4	953.5	2126.7
*107	9.5	9.6	1:42:09 PM	51.5	317.7	10.3	-1.6	953.4	2283.4
*108	9.5	9.4	1:46:29 PM	51.6	328.2	8.3	-1.6	953.5	2194.3
*109	9.5	9.6	1:57:59 PM	50.4	340.6	8.1	-1.8	953.6	2247.7
*110	9.5	9.7	1:59:19 PM	51.6	319.2	8.5	-1.8	953.5	2295.4
*111	9.5	9.4	2:01:29 PM	51.5	333.1	6.4	-1.8	953.6	2166.5
*112	9.5	9.3	2:01:39 PM	50.9	324.5	6.2	-1.8	953.6	2114.4
*113	9.5	9.3	2:04:09 PM	51.6	335.8	6	-1.8	953.7	2136.2
*114	9.5	9.6	2:05:19 PM	51	330.3	7.3	-1.7	953.6	2256.3
*115	9.5	9.5	2:06:49 PM	51.2	330	6.7	-1.7	953.7	2208.9
*116	10	9.8	11:07:39 AM	52.2	331.2	9.3	-1.3	952.4	2377.5
*117	10	10	11:09:09 AM	51.9	330.9	8.4	-1.3	952.4	2437
*118	10	9.8	11:09:19 AM	51.8	333.2	8.8	-1.3	952.4	2371.8
*119	10	9.8	11:09:49 AM	51.7	330.3	7.3	-1.3	952.4	2371.9
*120	10	9.8	12:51:39 PM	50.9	333	10.2	-1.4	953.2	2377.7
*121	10	9.8	12:52:29 PM	51.2	340.8	8.7	-1.4	953.1	2367.1
*122	10	10	1:07:49 PM	50.1	337.4	8.3	-1.5	953.5	2432.3
*123	10	10.1	1:07:59 PM	50.4	340.3	8	-1.5	953.4	2473.5
*124	10	10.2	1:09:09 PM	49.4	346.5	7.8	-1.5	953.5	2482.8
*125	10	9.9	1:09:19 PM	50.4	346.5	8.5	-1.5	953.4	2410.6
*126	10	9.9	1:11:29 PM	49.7	336	8.5	-1.5	953.5	2399
*127	10	9.8	1:14:09 PM	51.6	337	7	-1.5	953.5	2379.2
*128	10	9.9	1:18:39 PM	51	340	8.3	-1.5	953.5	2425.1
*129	10	10.1	1:19:09 PM	51.5	330.8	6.3	-1.5	953.6	2467
*130	10	9.8	1:19:29 PM	51.4	332.3	6.2	-1.5	953.5	2360.4
*131	10	10.1	1:21:59 PM	49.8	336.8	7.1	-1.6	953.6	2473.6
*132	10	10.2	1:23:29 PM	49.9	326.4	5.9	-1.6	953.6	2483
*133	10	9.9	1:23:39 PM	50.3	326.7	5.6	-1.6	953.6	2390.8
*134	10	10	1:26:19 PM	50.1	319.1	8.2	-1.6	953.5	2439.7
*135	10	10.1	1:32:39 PM	51.5	333.3	6.4	-1.4	953.5	2473.3
*136	10	9.9	1:32:49 PM	51.4	329.5	7	-1.4	953.5	2423.5
*137	10	10.1	1:36:59 PM	51.1	317.1	9.5	-1.5	953.4	2468.9
*138	10	10.2	1:40:29 PM	51.2	332.5	9	-1.6	953.5	2485.4
*139	10	9.9	1:41:29 PM	50.1	331.4	8.9	-1.6	953.5	2417.7
*140	10	10	1:45:59 PM	51.3	331.8	9.5	-1.6	953.4	2427.9
*141	10	10.1	1:46:09 PM	51.8	330.9	8.8	-1.6	953.4	2463.8
*142	10	10	1:46:19 PM	51	326.3	7.7	-1.6	953.5	2452.9
*143	10	10.2	1:47:59 PM	49	325.5	8.7	-1.6	953.5	2487.8
*144	10	9.8	1:49:59 PM	49.9	327.2	9.9	-1.7	953.5	2351.1
*145	10	10.2	1:50:39 PM	51.2	330.1	9.4	-1.7	953.6	2476.2
*146	10	10	1:50:49 PM	51.9	325.1	8	-1.7	953.6	2444.4
*147	10	9.9	2:03:59 PM	51.1	340.8	6.2	-1.8	953.6	2394.6
*148	10	9.8	2:05:39 PM	51.4	328.8	8.3	-1.7	953.6	2347.3
*149	10	10	2:07:59 PM	51.4	330.4	6.7	-1.7	953.8	2437.5
*150	10	9.9	2:12:49 PM	49.4	318.9	8.8	-1.7	953.7	2402.4
*151	10	10.1	2:12:59 PM	50.3	320.8	8.7	-1.7	953.8	2471.1
*152	10.5	10.5	11:03:49 AM	50.2	327.3	8.5	-1.6	952.3	2527.3
*153	10.5	10.4	11:03:59 AM	50.8	324.7	8.8	-1.6	952.4	2517.8
*154	10.5	10.3	11:04:49 AM	52	333	7	-1.5	952.5	2492.3

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*155	10.5	10.7	11:07:29 AM	50.5	333.7	9.5	-1.3	952.4	2561.8
*156	10.5	10.6	11:17:09 AM	51	326.5	9.7	-1.6	952.5	2555.8
*157	10.5	10.4	12:51:29 PM	49.7	327.2	10.1	-1.4	953.2	2518.2
*158	10.5	10.4	12:52:09 PM	49.9	344.6	8.2	-1.4	953.2	2513.1
*159	10.5	10.5	12:57:49 PM	49.8	334.6	9.5	-1.5	953.3	2526.8
*160	10.5	10.7	12:59:09 PM	49.6	336.6	9.9	-1.5	953.3	2571.7
*161	10.5	10.6	12:59:19 PM	50	342.8	8	-1.5	953.4	2549.4
*162	10.5	10.5	1:00:39 PM	49.5	327.3	10.3	-1.5	953.3	2528.7
*163	10.5	10.5	1:00:49 PM	50.3	326.5	8.6	-1.5	953.4	2541
*164	10.5	10.7	1:01:09 PM	50.8	331.5	9.7	-1.5	953.3	2568.7
*165	10.5	10.4	1:06:29 PM	49	331.3	9.1	-1.5	953.5	2516.2
*166	10.5	10.6	1:06:59 PM	49.1	343.6	10	-1.5	953.4	2550.8
*167	10.5	10.6	1:07:09 PM	49.4	342.5	10.3	-1.5	953.3	2542.6
*168	10.5	10.5	1:07:39 PM	49.6	333.8	8.8	-1.5	953.4	2532.4
*169	10.5	10.3	1:11:39 PM	50.8	338.6	7.7	-1.5	953.5	2497
*170	10.5	10.6	1:13:19 PM	49.6	338.5	7.2	-1.5	953.5	2548.4
*171	10.5	10.7	1:13:59 PM	50.4	339.2	6.3	-1.5	953.5	2559
*172	10.5	10.6	1:15:49 PM	50	338.6	8.1	-1.5	953.5	2549.8
*173	10.5	10.4	1:15:59 PM	49.7	334.8	7.7	-1.5	953.6	2519.5
*174	10.5	10.7	1:17:19 PM	49.9	334.7	7.7	-1.5	953.6	2566.9
*175	10.5	10.7	1:18:09 PM	49.9	335.8	9.3	-1.5	953.5	2574.1
*176	10.5	10.5	1:19:59 PM	51.2	329.4	8	-1.5	953.5	2539.6
*177	10.5	10.6	1:21:49 PM	49.7	340.4	7	-1.6	953.5	2553.2
*178	10.5	10.7	1:26:09 PM	50.2	322.7	7.4	-1.6	953.4	2567.9
*179	10.5	10.7	1:26:29 PM	50.8	311.9	6.9	-1.6	953.4	2558.1
*180	10.5	10.6	1:34:59 PM	49.8	328.9	10.2	-1.4	953.5	2557.8
*181	10.5	10.3	1:35:09 PM	51.6	315.2	9.9	-1.4	953.4	2499.1
*182	10.5	10.3	1:36:09 PM	50.4	315	10.5	-1.4	953.3	2499.5
*183	10.5	10.6	1:36:49 PM	51.5	320.2	10.5	-1.5	953.4	2551.9
*184	10.5	10.4	1:38:39 PM	51.4	320.1	7.1	-1.5	953.5	2509
*185	10.5	10.5	1:40:19 PM	50.5	334.4	9	-1.6	953.5	2528.5
*186	10.5	10.4	1:40:59 PM	51.3	333.9	8.6	-1.6	953.6	2508.5
*187	10.5	10.7	1:48:09 PM	49.9	321.4	9.6	-1.7	953.4	2562.6
*188	10.5	10.3	1:48:49 PM	51.3	326.3	7.3	-1.7	953.5	2505.5
*189	10.5	10.4	1:50:09 PM	50.7	328.2	10	-1.7	953.5	2515.9
*190	10.5	10.7	1:50:19 PM	51.1	328.9	8.2	-1.7	953.6	2572.6
*191	10.5	10.4	1:50:29 PM	50.7	325.2	9.4	-1.7	953.5	2512.8
*192	10.5	10.7	1:51:59 PM	49.3	333.4	8.3	-1.7	953.6	2561.1
*193	10.5	10.5	1:53:19 PM	49.5	326.1	8.4	-1.7	953.5	2534.4
*194	10.5	10.4	1:53:29 PM	49.9	327.3	8.4	-1.7	953.5	2516.3
*195	10.5	10.6	1:57:49 PM	49.8	336.5	9.1	-1.8	953.5	2552.8
*196	10.5	10.6	2:05:09 PM	50.6	342.4	8.2	-1.7	953.5	2556.1
*197	10.5	10.4	2:07:39 PM	51.6	326.8	6.9	-1.7	953.6	2523
*198	10.5	10.5	2:08:09 PM	51.4	337.6	7	-1.7	953.7	2531.1
*199	10.5	10.7	2:11:29 PM	49.2	322.9	8.7	-1.7	953.7	2568.7
*200	10.5	10.7	2:12:29 PM	49.3	322.6	8.7	-1.7	953.8	2573.4
*201	10.5	10.7	2:12:39 PM	49.1	316.7	8.6	-1.7	953.8	2566.8
*202	10.5	10.6	2:13:29 PM	50.9	324.1	7.9	-1.8	953.7	2546.6
*203	11	10.8	11:05:39 AM	51.6	333	7.7	-1.5	952.5	2580.7
*204	11	11.1	11:06:39 AM	50.9	331.9	7.7	-1.4	952.5	2632
*205	11	10.8	11:07:19 AM	50.3	328.9	9.2	-1.3	952.3	2590.5

Wind bin list - total noise:									
No.	Wind Bin	Vs [m/s]	Time	LAeq [dB(A)]	Windd. [°]	Winds. [m/s]	T [°C]	Pressure [hPa]	Power [kW]
*206	11	11.2	12:51:49 PM	51.5	330.5	9.9	-1.4	953.1	2657.1
*207	11	11	12:55:09 PM	49.6	328.9	12.3	-1.4	953.1	2614.8
*208	11	10.8	12:55:19 PM	50.6	325.9	11.3	-1.4	953	2575.2
*209	11	10.8	12:55:29 PM	50.5	332	11.1	-1.4	953.1	2589.8
*210	11	10.8	12:56:39 PM	50	329.8	8.7	-1.4	953.3	2575.1
*211	11	10.9	12:57:09 PM	49.4	331.9	9.4	-1.4	953.3	2596.1
*212	11	10.8	1:00:29 PM	50.2	334.1	11.7	-1.5	953.3	2584.1
*213	11	11	1:02:29 PM	50.4	333.1	9.9	-1.5	953.4	2619.9
*214	11	10.8	1:04:19 PM	50.1	329.3	11.3	-1.5	953.3	2577.5
*215	11	10.8	1:05:19 PM	49.8	343.5	9.8	-1.5	953.3	2589.8
*216	11	10.8	1:05:59 PM	49.5	335.6	8.4	-1.5	953.5	2580.7
*217	11	10.8	1:06:19 PM	49.3	333.3	9.4	-1.5	953.4	2583.3
*218	11	11	1:08:19 PM	50.8	331.4	6.3	-1.5	953.5	2613.3
*219	11	11	1:08:59 PM	49.7	346	7	-1.5	953.6	2610.4
*220	11	11.2	1:09:49 PM	50.5	339.9	8	-1.5	953.5	2679.4
*221	11	11	1:10:09 PM	52	338.1	7.5	-1.5	953.5	2615.4
*222	11	11.1	1:10:59 PM	50.1	330.5	8.5	-1.5	953.5	2653.2
*223	11	10.9	1:11:09 PM	49.8	343.3	9.3	-1.5	953.5	2599.3
*224	11	11	1:12:09 PM	51.6	336.2	7.2	-1.5	953.5	2729.4
*225	11	11.1	1:12:29 PM	50.5	345.4	8.6	-1.5	953.5	2702.4
*226	11	10.8	1:13:29 PM	50.5	342.6	8.3	-1.5	953.4	2575.5
*227	11	10.8	1:13:49 PM	49.9	341.8	6.3	-1.5	953.5	2582.9
*228	11	11.1	1:15:29 PM	50.3	332	8.9	-1.5	953.5	2731.5
*229	11	11.1	1:16:49 PM	50.8	329.7	10.9	-1.5	953.4	2735.8
*230	11	11.1	1:17:39 PM	50.3	340	7.9	-1.5	953.5	2656.6
*231	11	10.8	1:17:49 PM	50.2	339.7	9.6	-1.5	953.5	2587.8
*232	11	10.8	1:17:59 PM	50.2	339	8.5	-1.5	953.5	2586.2
*233	11	11	1:23:49 PM	50.8	326.3	8.4	-1.6	953.5	2653.4
*234	11	11.2	1:24:19 PM	50.6	318.7	8.7	-1.6	953.4	2705.8
*235	11	11.2	1:27:19 PM	50.7	331.1	7.2	-1.6	953.4	2617.3
*236	11	11	1:35:39 PM	50.2	314	9.5	-1.4	953.3	2611.7
*237	11	10.8	1:38:59 PM	51.1	332.1	8.5	-1.5	953.5	2586.8
*238	11	10.8	1:39:59 PM	50.4	331.8	9.4	-1.5	953.5	2579.4
*239	11	10.9	1:41:19 PM	50.7	330.4	7.1	-1.6	953.7	2606.6
*240	11	10.8	1:41:39 PM	50.3	328.6	9.5	-1.6	953.6	2579.5
*241	11	10.8	1:41:49 PM	51.1	317.6	11.2	-1.6	953.5	2581.3
*242	11	11.1	1:48:29 PM	49.8	322.2	8.2	-1.7	953.5	2666.8
*243	11	10.9	1:49:49 PM	49.2	323.8	10.6	-1.7	953.4	2598.9
*244	11	11.2	1:50:59 PM	52	326.3	7.4	-1.7	953.5	2733.2
*245	11	10.9	1:52:09 PM	49.5	332.7	8.4	-1.7	953.5	2601.5
*246	11	11.2	1:52:59 PM	49.3	333	9.8	-1.7	953.4	2630.5
*247	11	11	1:53:09 PM	49.8	337.7	9.4	-1.7	953.4	2615.7
*248	11	11	1:54:09 PM	50.7	328.3	8.8	-1.7	953.5	2734.2
*249	11	10.8	1:56:59 PM	49.7	317.5	6.6	-1.8	953.6	2582.5
*250	11	10.8	2:05:29 PM	51.1	335.4	8.6	-1.7	953.5	2576.1
*251	11	11.2	2:08:39 PM	49.7	323.4	6.2	-1.7	953.8	2688.7
*252	11	11	2:11:19 PM	49.2	325.7	8.6	-1.7	953.7	2609.4
*253	11	10.9	2:12:19 PM	49.8	324.5	8.8	-1.7	953.7	2595.4
*254	11	11	2:13:09 PM	50.6	315.5	7.3	-1.7	953.7	2612.3
*255	11	11.2	2:13:39 PM	51.4	317.7	8.2	-1.8	953.7	2722.9
*256	11.5	11.7	11:06:19 AM	51.9	333.5	6.5	-1.4	952.4	2731.3

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*257	11.5	11.3	12:51:09 PM	51	335	9.7	-1.4	953.2	2748.9
*258	11.5	11.5	12:51:19 PM	50.5	339.4	8.2	-1.4	953.2	2701.6
*259	11.5	11.5	12:59:29 PM	51.1	342.5	6.9	-1.5	953.4	2712
*260	11.5	11.7	1:00:59 PM	51	328.4	7.8	-1.5	953.4	2683.3
*261	11.5	11.5	1:02:49 PM	50.5	328	8.3	-1.5	953.4	2714.1
*262	11.5	11.7	1:04:09 PM	51.2	327.8	10.8	-1.5	953.3	2621.9
*263	11.5	11.4	1:04:29 PM	50.7	347.5	9.2	-1.5	953.4	2675
*264	11.5	11.3	1:07:29 PM	50	334.5	9.6	-1.5	953.4	2656.9
*265	11.5	11.6	1:11:19 PM	50	342.2	10.3	-1.5	953.4	2638.6
*266	11.5	11.4	1:14:19 PM	51.9	333.7	7.5	-1.5	953.6	2714.8
*267	11.5	11.3	1:16:29 PM	49.7	335.8	9.5	-1.5	953.4	2645.4
*268	11.5	11.3	1:16:39 PM	50.6	327.9	10.9	-1.5	953.4	2617.3
*269	11.5	11.7	1:23:19 PM	50.4	328.4	7	-1.6	953.5	2718.7
*270	11.5	11.7	1:34:39 PM	50.5	323.9	9.8	-1.4	953.4	2741
*271	11.5	11.7	1:34:49 PM	49.7	334.9	10.9	-1.4	953.3	2654.6
*272	11.5	11.6	1:35:29 PM	50.7	314.4	10	-1.4	953.3	2713.3
*273	11.5	11.5	1:35:59 PM	50.3	314.3	11.2	-1.4	953.3	2634
*274	11.5	11.7	1:43:59 PM	51.9	333.2	5.9	-1.7	953.5	2733.6
*275	11.5	11.7	1:45:19 PM	50.7	333.9	9.1	-1.6	953.5	2747.7
*276	11.5	11.3	1:49:29 PM	51.1	326.3	8.2	-1.7	953.5	2748.5
*277	11.5	11.6	1:52:19 PM	50	342.8	11.3	-1.7	953.4	2658.6
*278	11.5	11.4	1:52:29 PM	49.8	344.1	9.7	-1.7	953.4	2645.1
*279	11.5	11.6	1:52:39 PM	50.4	343.2	10.8	-1.7	953.4	2733.7
*280	11.5	11.4	1:53:39 PM	50.6	333.8	8.3	-1.7	953.5	2637.8
*281	11.5	11.7	2:08:19 PM	51.7	337.7	7.2	-1.7	953.8	2731.3
*282	11.5	11.4	2:08:59 PM	50.2	326.3	6.1	-1.7	953.8	2719.1
*283	11.5	11.6	2:09:49 PM	49.8	330.7	8.8	-1.7	953.8	2647.2
*284	11.5	11.6	2:10:09 PM	49.8	322.9	7.5	-1.7	953.8	2676.8
*285	11.5	11.7	2:10:49 PM	49.5	322.6	9.4	-1.7	953.7	2626.9
*286	11.5	11.3	2:11:39 PM	49.9	319.9	9.1	-1.7	953.8	2703.2
*287	12	11.9	11:07:09 AM	50.3	334.6	9.9	-1.3	952.3	2663.8
*288	12	12	11:16:39 AM	51.3	326.5	11.2	-1.5	952.5	2664.1
*289	12	12.1	12:57:39 PM	50.4	334.9	9.6	-1.4	953.2	2735.6
*290	12	12.1	12:58:09 PM	50.5	336	6.8	-1.5	953.3	2751.7
*291	12	12.2	12:58:39 PM	49.8	336.6	9.6	-1.5	953.3	2621.9
*292	12	12.1	12:58:59 PM	50.1	339.3	9.9	-1.5	953.3	2636.9
*293	12	11.8	1:01:19 PM	51.2	327.3	8.1	-1.5	953.4	2667.8
*294	12	12.2	1:01:59 PM	52.4	325.9	11.1	-1.5	953.3	2756.9
*295	12	12	1:02:39 PM	50.5	341.3	10.6	-1.5	953.3	2617.2
*296	12	12.1	1:03:29 PM	50.9	337.7	9.3	-1.5	953.4	2676
*297	12	12.1	1:03:39 PM	51.4	331.4	10	-1.5	953.3	2645.2
*298	12	12.1	1:07:19 PM	49.5	337.8	9.6	-1.5	953.4	2617.1
*299	12	11.8	1:10:29 PM	51	332.3	10.8	-1.5	953.4	2722.3
*300	12	11.8	1:12:19 PM	50.9	343.4	8.5	-1.5	953.5	2733.2
*301	12	12.2	1:12:49 PM	51.1	331.6	9	-1.5	953.5	2726.1
*302	12	12	1:12:59 PM	50.6	333.9	9.8	-1.5	953.4	2723.2
*303	12	11.8	1:16:09 PM	50.7	334.2	9.2	-1.5	953.5	2688.7
*304	12	11.9	1:16:19 PM	50.8	335.6	8.3	-1.5	953.5	2733.4
*305	12	11.9	1:17:29 PM	50.1	339.2	7.5	-1.5	953.5	2681.9
*306	12	12.1	1:23:09 PM	51.9	311.4	7.6	-1.6	953.5	2741.2
*307	12	12	1:35:49 PM	50.5	314.5	9.1	-1.4	953.4	2632.4

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*308	12	12	1:45:09 PM	51.3	332.4	7.9	-1.6	953.5	2735.1
*309	12	12.2	1:46:59 PM	52.3	332.6	7.2	-1.6	953.5	2747.7
*310	12	12	1:48:19 PM	49.9	332.3	7.5	-1.7	953.5	2636.4
*311	12	11.8	1:48:59 PM	51.5	327.6	6.8	-1.7	953.5	2726.8
*312	12	12	1:51:19 PM	50.9	338.8	7.6	-1.7	953.6	2756.1
*313	12	11.8	1:52:49 PM	49.5	338.2	10.7	-1.7	953.5	2660.1
*314	12	12.1	1:53:49 PM	51.2	334.8	8.9	-1.7	953.4	2730.9
*315	12	11.8	1:57:19 PM	50.3	319.5	7.8	-1.8	953.5	2708.9
*316	12	12.2	2:09:09 PM	49.6	336.4	5.8	-1.7	953.7	2702.4
*317	12	11.8	2:09:19 PM	49.9	331.1	7.5	-1.7	953.8	2699.5
*318	12	12	2:09:29 PM	49.6	318.2	6.5	-1.7	953.8	2696
*319	12	11.8	2:09:39 PM	49.5	326.4	7.3	-1.7	953.7	2646.9
*320	12	11.8	2:09:59 PM	50.4	325.2	8.4	-1.7	953.8	2697.9
*321	12	12.2	2:10:39 PM	49.7	327.8	8.8	-1.7	953.8	2635.3
*322	12	12.2	2:10:59 PM	49.9	321.3	8.4	-1.7	953.7	2713.1
*323	12	12.2	2:12:09 PM	49.8	324.7	8.2	-1.7	953.8	2653.1
*324	12	12	2:13:59 PM	50	327.9	9.6	-1.8	953.8	2747.2
*325	12.5	12.3	12:57:19 PM	49.7	329.5	8.7	-1.4	953.3	2631.7
*326	12.5	12.3	12:57:29 PM	50.3	329.5	10	-1.4	953.3	2719
*327	12.5	12.5	12:58:19 PM	49.9	329.9	8	-1.5	953.3	2686.4
*328	12.5	12.7	12:58:29 PM	49.9	333.2	9.1	-1.5	953.3	2680.9
*329	12.5	12.7	1:03:49 PM	51.6	335.2	11.6	-1.5	953.3	2712.2
*330	12.5	12.4	1:04:39 PM	50.9	344.4	8.1	-1.5	953.5	2745.9
*331	12.5	12.5	1:06:39 PM	49.8	334.7	9.5	-1.5	953.4	2655.4
*332	12.5	12.6	1:06:49 PM	49.7	339	10.5	-1.5	953.4	2698
*333	12.5	12.3	1:10:39 PM	50.1	340.1	8.4	-1.5	953.5	2680.8
*334	12.5	12.3	1:10:49 PM	50.5	342.6	8.1	-1.5	953.5	2703.7
*335	12.5	12.5	1:13:09 PM	49.7	339.6	7	-1.5	953.5	2642.4
*336	12.5	12.6	1:15:39 PM	50	340	7.8	-1.5	953.5	2675.7
*337	12.5	12.3	1:17:09 PM	50.8	331.3	7.7	-1.5	953.5	2663.3
*338	12.5	12.3	1:21:29 PM	49.7	331.4	6.5	-1.6	953.6	2676.8
*339	12.5	12.6	1:47:49 PM	49.5	334.7	8.6	-1.6	953.5	2641.1
*340	12.5	12.5	1:51:29 PM	50.4	334.6	7	-1.7	953.7	2741.7
*341	12.5	12.6	2:08:29 PM	51.5	330.4	6.9	-1.7	953.8	2748.1
*342	12.5	12.3	2:10:29 PM	49.1	329.4	8.4	-1.7	953.8	2656.4
*343	12.5	12.4	2:13:49 PM	51.6	318.1	9.2	-1.7	953.7	2737.5
*344	12.5	12.4	2:14:09 PM	49.8	317.1	8.8	-1.8	953.7	2733.1
*345	12.5	12.5	2:14:29 PM	49.7	328.5	10.1	-1.8	953.7	2617.1
* Wind bin for tonality analysed									

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
*16	7.5	7.5	11:43:19 AM	37.7	317.3	6.1	-1.2	953.2
17	7.5	7.6	11:43:49 AM	39.4	330	6.2	-1.1	953.2
18	7.5	7.7	11:49:39 AM	37.9	333.3	6.2	-0.8	953.3
19	7.5	7.5	11:58:39 AM	35.5	319.9	6.1	-0.7	953.3
20	7.5	7.4	12:07:19 PM	39.2	327.2	6	-1.1	953.4
21	7.5	7.5	12:15:29 PM	39.7	316	6.1	-1.7	953.3
22	7.5	7.6	12:16:59 PM	38	328.4	6.2	-1.7	953.4
23	7.5	7.7	12:19:19 PM	37	323	6.3	-1.8	953.3
24	7.5	7.7	12:23:39 PM	39.1	312.8	6.3	-1.9	953.1
25	7.5	7.6	12:23:49 PM	40.5	316.8	6.1	-1.8	953.1
26	7.5	7.6	12:32:29 PM	40.7	317.3	6.2	-1.3	953.3
27	7.5	7.5	12:35:29 PM	41.1	322.5	6.1	-1.3	953.3
*28	8	8.2	11:31:59 AM	41.3	328.7	6.7	-2.3	952.8
29	8	7.9	11:39:49 AM	38.4	329.1	6.4	-1.6	953
30	8	8.2	11:40:49 AM	41.2	331.9	6.7	-1.5	953.1
31	8	8	11:40:59 AM	40.5	330.8	6.5	-1.5	953
32	8	7.9	11:43:09 AM	38.8	329.6	6.4	-1.2	953.1
33	8	8.2	11:43:29 AM	36.9	322.7	6.7	-1.2	953.1
34	8	8.2	11:44:09 AM	38.9	330.8	6.7	-1.1	953.2
35	8	8.1	11:44:19 AM	37.2	326.9	6.6	-1.1	953.2
36	8	7.8	11:44:29 AM	37.6	326	6.3	-1.1	953.2
37	8	8.2	11:46:39 AM	38	325.1	6.6	-0.9	953.2
38	8	7.8	11:46:49 AM	40	328.4	6.3	-0.9	953.2
39	8	8.2	11:48:19 AM	37.8	334	6.7	-0.8	953.2
40	8	8.1	11:48:29 AM	36.9	329.3	6.6	-0.8	953.2
41	8	8.1	11:48:49 AM	37.9	320.6	6.6	-0.8	953.2
42	8	8.1	11:48:59 AM	36.2	325.3	6.6	-0.8	953.2
43	8	7.9	11:49:49 AM	36.8	330.8	6.4	-0.8	953.2
44	8	8.2	11:52:29 AM	37.8	331	6.6	-0.7	953.2
45	8	8	11:55:09 AM	37.9	334.5	6.5	-0.7	953.3
46	8	7.9	11:55:49 AM	38.9	329.6	6.4	-0.7	953.3
47	8	7.8	11:56:29 AM	39.2	325.3	6.3	-0.7	953.3
48	8	7.8	12:01:19 PM	39.7	326	6.4	-0.8	953.3
49	8	8.2	12:01:39 PM	37	320.3	6.7	-0.8	953.3
50	8	8.2	12:08:29 PM	39.5	332.7	6.6	-1.2	953.3
51	8	7.8	12:15:09 PM	40.1	324.6	6.3	-1.7	953.3
52	8	8.1	12:26:09 PM	39.4	329.9	6.6	-1.7	953.1
53	8	8.1	12:31:19 PM	39.1	320.3	6.6	-1.4	953.2
54	8	8.2	12:35:49 PM	40.4	332	6.7	-1.3	953.3
55	8	8.1	12:43:39 PM	38.2	333.3	6.6	-1.4	953.3
56	8	8.1	12:43:49 PM	40	329.5	6.6	-1.4	953.3
*57	8.5	8.4	11:39:39 AM	39.2	324.4	6.8	-1.6	953
58	8.5	8.7	11:39:59 AM	38.7	323.5	7.1	-1.6	953
59	8.5	8.5	11:40:39 AM	39	325.4	6.9	-1.5	953
60	8.5	8.6	11:43:39 AM	38.2	327	7	-1.2	953.1
61	8.5	8.7	11:46:59 AM	39.4	328.7	7	-0.9	953.1
62	8.5	8.6	11:49:09 AM	36.2	323.8	7	-0.8	953.2
63	8.5	8.5	11:49:29 AM	36.7	326.8	6.9	-0.8	953.2
64	8.5	8.5	11:51:59 AM	40.3	325.9	6.9	-0.7	953.2
65	8.5	8.6	11:52:19 AM	37.2	329	7	-0.7	953.1
66	8.5	8.5	11:53:39 AM	39.7	328.5	6.9	-0.7	953.3

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
67	8.5	8.7	11:53:49 AM	39.1	320.4	7	-0.7	953.3
68	8.5	8.4	11:55:19 AM	37.4	326.2	6.8	-0.7	953.3
69	8.5	8.5	11:58:29 AM	35.5	315	6.9	-0.7	953.3
70	8.5	8.3	12:01:29 PM	38.9	325.8	6.8	-0.8	953.4
71	8.5	8.7	12:05:49 PM	39.8	333.1	7	-1	953.3
72	8.5	8.3	12:15:59 PM	40.9	329.7	6.7	-1.7	953.3
73	8.5	8.5	12:16:19 PM	38.3	324.2	6.9	-1.7	953.3
74	8.5	8.4	12:18:59 PM	36.3	326.7	6.8	-1.8	953.3
75	8.5	8.5	12:19:29 PM	37.2	329	6.9	-1.8	953.3
76	8.5	8.3	12:20:39 PM	38.9	326.4	6.8	-1.9	953.1
77	8.5	8.6	12:20:49 PM	40.1	325.6	6.9	-1.9	953.2
78	8.5	8.5	12:22:49 PM	37.2	330.7	6.9	-1.9	953.1
79	8.5	8.7	12:27:19 PM	38.1	327.7	7.1	-1.6	953.1
80	8.5	8.5	12:44:09 PM	38.8	328.4	6.9	-1.4	953.2
81	8.5	8.6	12:44:39 PM	38.6	334.6	7	-1.4	953.3
*82	9	9	11:42:59 AM	40	330.2	7.3	-1.3	953
83	9	9.2	11:45:49 AM	37.9	333.1	7.4	-0.9	953.1
84	9	9.2	11:50:09 AM	37.6	329.6	7.5	-0.7	953.2
85	9	9.2	11:51:49 AM	37.8	331.4	7.5	-0.7	953.2
86	9	9.1	11:52:49 AM	39.7	329.4	7.4	-0.7	953.2
87	9	8.9	11:57:39 AM	39.2	330.3	7.3	-0.7	953.3
88	9	9.2	11:58:19 AM	35.9	324.5	7.5	-0.7	953.3
89	9	9	12:01:49 PM	40.1	330.6	7.3	-0.8	953.3
90	9	9	12:03:49 PM	39.7	313.9	7.3	-0.9	953.2
91	9	8.9	12:08:19 PM	39.3	325.5	7.3	-1.2	953.3
92	9	8.9	12:12:59 PM	40	332.8	7.2	-1.5	953.3
93	9	9.1	12:15:49 PM	39.2	322.2	7.4	-1.7	953.3
94	9	9	12:16:29 PM	39.9	322.6	7.3	-1.7	953.3
95	9	9.1	12:20:09 PM	38.8	328.1	7.4	-1.9	953.2
96	9	8.8	12:20:29 PM	40	328.2	7.1	-1.9	953.1
97	9	9.2	12:20:59 PM	41.4	324.9	7.4	-1.9	953.1
98	9	9.2	12:21:29 PM	40.4	328.6	7.5	-1.9	953.1
99	9	9.2	12:22:39 PM	37.5	330.8	7.5	-1.9	953
100	9	8.8	12:25:49 PM	38	334.3	7.1	-1.8	953.1
101	9	8.9	12:27:09 PM	38.9	320.2	7.2	-1.7	953
102	9	9.2	12:27:29 PM	38.6	331.3	7.4	-1.6	953.1
103	9	9	12:28:09 PM	38.9	333.8	7.3	-1.6	953.1
104	9	8.9	12:28:29 PM	39.9	321.3	7.3	-1.5	953.1
105	9	9.2	12:29:29 PM	39.2	324.6	7.5	-1.5	953.1
106	9	8.8	12:32:09 PM	39.8	334	7.2	-1.3	953.2
107	9	9	12:34:59 PM	40.2	322.4	7.3	-1.3	953.2
108	9	8.8	12:35:19 PM	40.4	330.7	7.2	-1.3	953.3
109	9	9	12:36:09 PM	40.3	326.6	7.3	-1.3	953.2
110	9	9.2	12:43:59 PM	38.4	323.9	7.5	-1.4	953.3
111	9	9.1	12:45:19 PM	38.8	329.2	7.4	-1.4	953.3
112	9	8.8	12:46:29 PM	39	326.7	7.1	-1.4	953.2
*113	9.5	9.5	11:37:39 AM	41.1	333.7	7.8	-1.7	953
114	9.5	9.7	11:37:49 AM	41.7	332.1	7.9	-1.7	953
115	9.5	9.3	11:40:29 AM	38.6	330.5	7.5	-1.5	953
116	9.5	9.4	11:46:29 AM	38.4	334.3	7.7	-0.9	953
117	9.5	9.6	11:48:39 AM	37.6	331.6	7.8	-0.8	953.1

Wind bin list - background noise:								
No.	**Wind**	**Vs**	**Time**	**LAeq**	**Windd.**	**Winds.**	**T**	**Pressure**
	Bin	**[m/s]**		**[dB(A)]**	**[°]**	**[m/s]**	**[°C]**	**[hPa]**
118	9.5	9.4	11:49:19 AM	35.7	319.4	7.7	-0.8	953.1
119	9.5	9.4	11:51:39 AM	40.7	323.1	7.6	-0.7	953.1
120	9.5	9.3	11:52:59 AM	39.2	330.1	7.6	-0.7	953.2
121	9.5	9.6	11:54:59 AM	38	330.2	7.8	-0.7	953.3
122	9.5	9.4	11:56:59 AM	40.8	332.3	7.7	-0.7	953.3
123	9.5	9.6	11:58:09 AM	36.4	333.9	7.8	-0.7	953.3
124	9.5	9.3	11:58:59 AM	36.1	320.4	7.5	-0.7	953.3
125	9.5	9.3	11:59:29 AM	37	316.7	7.5	-0.7	953.3
126	9.5	9.7	12:00:29 PM	38.9	318.5	7.9	-0.7	953.3
127	9.5	9.6	12:06:49 PM	38.5	331.3	7.8	-1.1	953.3
128	9.5	9.4	12:07:39 PM	39	321.8	7.6	-1.1	953.2
129	9.5	9.7	12:07:59 PM	38.2	329.8	7.9	-1.2	953.3
130	9.5	9.3	12:14:29 PM	40.6	325.4	7.5	-1.6	953.3
131	9.5	9.6	12:14:49 PM	41.5	324.9	7.8	-1.6	953.2
132	9.5	9.7	12:16:49 PM	37.5	327.6	7.9	-1.7	953.3
133	9.5	9.5	12:20:19 PM	38.5	323.5	7.7	-1.9	953.2
134	9.5	9.6	12:21:59 PM	35.5	331.2	7.8	-1.9	953
135	9.5	9.6	12:23:19 PM	38.9	331.4	7.8	-1.9	953.1
136	9.5	9.6	12:28:19 PM	39.6	323.1	7.8	-1.6	953.1
137	9.5	9.3	12:28:39 PM	38.9	326.7	7.5	-1.5	953.1
138	9.5	9.7	12:28:59 PM	37.4	328.3	7.8	-1.5	953.2
139	9.5	9.6	12:29:09 PM	37.9	334.9	7.8	-1.5	953.2
140	9.5	9.3	12:29:19 PM	38.8	324.9	7.6	-1.5	953.1
141	9.5	9.5	12:32:19 PM	40.1	329.3	7.8	-1.3	953.2
142	9.5	9.4	12:34:09 PM	42	318	7.7	-1.3	953.2
143	9.5	9.5	12:40:29 PM	42	324.7	7.7	-1.4	953.2
144	9.5	9.6	12:44:59 PM	38.3	331.6	7.8	-1.4	953.2
145	9.5	9.4	12:45:59 PM	39.5	306.7	7.6	-1.4	953.1
*146	10	10.2	11:41:09 AM	42.5	326.4	8.3	-1.4	952.9
147	10	9.9	11:42:29 AM	39.8	329.4	8	-1.3	953
148	10	9.9	11:47:09 AM	38.6	326.3	8	-0.9	953.1
149	10	10.2	11:50:19 AM	37.8	329.2	8.3	-0.7	953.1
150	10	9.9	11:52:09 AM	38.6	331	8	-0.7	953.1
151	10	10.1	11:53:59 AM	37	311.7	8.2	-0.7	953.2
152	10	10.2	11:54:39 AM	36	319.5	8.3	-0.7	953.2
153	10	10	11:59:19 AM	36.8	325.2	8.1	-0.7	953.3
154	10	9.8	12:05:29 PM	39.1	333.2	8	-1	953.3
155	10	10.1	12:06:19 PM	39.8	333.9	8.2	-1.1	953.2
156	10	10.1	12:06:29 PM	39.2	328.8	8.2	-1.1	953.3
157	10	9.8	12:07:49 PM	38.2	324.7	7.9	-1.1	953.2
158	10	9.9	12:08:09 PM	38.7	317.1	8.1	-1.2	953.2
159	10	10.2	12:09:29 PM	41.8	331.5	8.3	-1.3	953.3
160	10	10	12:11:59 PM	40.1	328.7	8.1	-1.4	953.2
161	10	10	12:12:39 PM	41.1	333.5	8.1	-1.5	953.2
162	10	10.1	12:14:09 PM	42	328.8	8.2	-1.6	953.2
163	10	9.9	12:18:39 PM	38.7	317.8	8.1	-1.8	953.2
164	10	10.1	12:22:29 PM	38.2	324.6	8.2	-1.9	953.1
165	10	9.9	12:24:09 PM	40.7	317.5	8.1	-1.8	953
166	10	10	12:25:59 PM	37.8	330.6	8.1	-1.7	953.1
167	10	10	12:26:59 PM	41.1	325.8	8.1	-1.7	953.1
168	10	10	12:29:59 PM	39.1	321.1	8.1	-1.5	953.1

Wind bin list - background noise:								
No.	**Wind**	**Vs**	**Time**	**LAeq**	**Windd.**	**Winds.**	**T**	**Pressure**
	Bin	**[m/s]**		**[dB(A)]**	**[°]**	**[m/s]**	**[°C]**	**[hPa]**
169	10	10	12:33:59 PM	42	314.7	8.1	-1.3	953.2
170	10	9.8	12:38:39 PM	40.4	324.9	8	-1.3	953.2
171	10	9.8	12:45:09 PM	39	331.3	8	-1.4	953.3
172	10	9.9	12:46:39 PM	40.1	331.2	8	-1.4	953.2
*173	10.5	10.6	11:30:19 AM	41	332.7	8.6	-2.3	952.8
174	10.5	10.3	11:33:19 AM	41.8	333.7	8.3	-2.1	952.9
175	10.5	10.5	11:34:39 AM	39.5	325.9	8.5	-2	952.9
176	10.5	10.5	11:37:09 AM	42.3	314.5	8.6	-1.8	952.9
177	10.5	10.5	11:39:29 AM	40.2	331.9	8.5	-1.6	952.9
178	10.5	10.3	11:42:19 AM	39.5	328.3	8.4	-1.3	953
179	10.5	10.7	11:47:19 AM	37.3	308.5	8.7	-0.9	953
180	10.5	10.6	11:59:59 AM	39.3	320.7	8.6	-0.7	953.3
181	10.5	10.5	12:00:39 PM	39.2	327.3	8.5	-0.7	953.3
182	10.5	10.5	12:03:19 PM	40.4	329.6	8.5	-0.9	953.2
183	10.5	10.4	12:05:09 PM	41	325.1	8.4	-1	953.3
184	10.5	10.3	12:05:19 PM	39.4	328.4	8.4	-1	953.2
185	10.5	10.4	12:06:39 PM	38.7	332	8.5	-1.1	953.3
186	10.5	10.6	12:09:09 PM	38.8	332	8.6	-1.2	953.2
187	10.5	10.3	12:09:19 PM	38.8	331.5	8.4	-1.2	953.2
188	10.5	10.6	12:16:39 PM	39	323.7	8.6	-1.7	953.2
189	10.5	10.7	12:17:29 PM	37	315.9	8.7	-1.8	953.3
190	10.5	10.5	12:18:49 PM	37	327.6	8.5	-1.8	953.3
191	10.5	10.4	12:19:39 PM	38.3	323.5	8.4	-1.8	953.2
192	10.5	10.4	12:19:59 PM	38.7	327	8.5	-1.8	953.1
193	10.5	10.3	12:23:29 PM	37.9	316.5	8.4	-1.9	953.1
194	10.5	10.6	12:25:19 PM	38.5	331	8.6	-1.8	953
195	10.5	10.6	12:33:19 PM	42.2	331.6	8.6	-1.3	953.2
196	10.5	10.3	12:34:49 PM	40.8	325	8.4	-1.3	953.2
197	10.5	10.5	12:35:59 PM	40.4	314	8.6	-1.3	953.1
198	10.5	10.6	12:40:09 PM	42.8	322.4	8.6	-1.4	953.1
199	10.5	10.6	12:40:39 PM	40.9	319.8	8.6	-1.4	953.1
200	10.5	10.3	12:44:19 PM	40	332.5	8.4	-1.4	953.3
201	10.5	10.7	12:45:29 PM	40.2	330.5	8.7	-1.4	953.1
*202	11	10.9	11:31:39 AM	42.9	332.5	8.8	-2.3	952.8
203	11	11.2	11:34:49 AM	39.1	323.8	9.1	-2	952.8
204	11	11	11:35:19 AM	42.8	334.3	9	-1.9	952.8
205	11	10.9	11:37:29 AM	40.7	325.3	8.8	-1.7	952.9
206	11	10.8	11:40:09 AM	39.8	319.1	8.8	-1.6	953
207	11	11.1	11:42:09 AM	39.9	327.3	9	-1.3	953
208	11	11	11:42:49 AM	40	334	9	-1.3	953
209	11	11.1	11:46:09 AM	38.5	334.2	9	-0.9	953
210	11	10.9	11:47:59 AM	39.6	315.6	8.9	-0.8	953
211	11	10.8	11:50:49 AM	41.5	333.8	8.8	-0.7	953.1
212	11	10.8	11:57:59 AM	36.5	331.6	8.8	-0.7	953.2
213	11	11	12:07:29 PM	39.1	331.8	8.9	-1.1	953.3
214	11	10.8	12:14:19 PM	39.3	333	8.8	-1.6	953.2
215	11	10.8	12:14:39 PM	42.2	325.9	8.8	-1.6	953.3
216	11	10.9	12:21:39 PM	37.5	333.5	8.8	-1.9	953.1
217	11	11.2	12:22:19 PM	38.4	334.9	9.1	-1.9	953
218	11	10.9	12:25:39 PM	37.8	321.3	8.9	-1.8	953.1
219	11	10.8	12:30:29 PM	39.3	325.4	8.8	-1.4	953.1

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
220	11	10.9	12:30:39 PM	40.3	320.4	8.8	-1.4	953.1
221	11	10.8	12:30:49 PM	39.5	321.4	8.8	-1.4	953.1
222	11	11.1	12:34:39 PM	41.3	328.5	9.1	-1.3	953.2
223	11	11	12:39:49 PM	42	326.9	8.9	-1.4	953.2
224	11	11.1	12:40:49 PM	42	318.3	9.1	-1.4	953
225	11	11.2	12:40:59 PM	42.3	334.8	9.1	-1.4	953
226	11	11	12:44:49 PM	40	331.2	8.9	-1.4	953.2
227	11	11.1	12:45:49 PM	40.7	327.4	9.1	-1.4	953.2
228	11	10.8	12:46:09 PM	41.8	327.5	8.8	-1.4	953.1
*229	11.5	11.3	11:31:29 AM	42.7	333.6	9.2	-2.3	952.8
230	11.5	11.3	11:32:29 AM	42.4	331.2	9.2	-2.2	952.8
231	11.5	11.7	11:38:59 AM	41.2	330.9	9.5	-1.7	952.8
232	11.5	11.5	11:40:19 AM	38.5	326.3	9.4	-1.5	952.9
233	11.5	11.6	11:47:39 AM	37.2	312.6	9.4	-0.9	953
234	11.5	11.3	11:54:09 AM	35.8	319.7	9.2	-0.7	953.1
235	11.5	11.4	11:54:49 AM	37	329.6	9.3	-0.7	953.3
236	11.5	11.4	11:57:49 AM	37.6	333.1	9.3	-0.7	953.2
237	11.5	11.4	12:10:19 PM	40.8	333.5	9.3	-1.3	953.2
238	11.5	11.5	12:11:49 PM	39.4	334.2	9.3	-1.4	953.2
239	11.5	11.3	12:17:09 PM	38.3	325.7	9.2	-1.7	953.2
240	11.5	11.5	12:17:19 PM	39.4	324.3	9.3	-1.8	953.3
241	11.5	11.4	12:22:09 PM	36.6	331.5	9.3	-1.9	953
242	11.5	11.3	12:26:19 PM	39	329.1	9.2	-1.7	953.1
243	11.5	11.4	12:26:49 PM	38.9	327.3	9.3	-1.7	953
244	11.5	11.5	12:32:39 PM	43.1	325.8	9.4	-1.3	953.2
245	11.5	11.7	12:39:39 PM	40.8	328.7	9.5	-1.4	953.2
246	11.5	11.7	12:39:59 PM	42.6	328.6	9.5	-1.4	953.2
*247	12	12.1	11:29:59 AM	41.8	330.3	9.8	-2.3	952.7
248	12	11.9	11:30:09 AM	41.2	328.5	9.7	-2.3	952.8
249	12	12.1	11:30:29 AM	41.1	321.4	9.9	-2.3	952.6
250	12	12.2	11:30:49 AM	39.7	332.5	9.9	-2.3	952.7
251	12	12.2	11:35:29 AM	39.8	331.3	9.9	-1.9	952.9
252	12	11.8	11:47:49 AM	40.4	317.4	9.6	-0.9	953
253	12	12.1	11:54:29 AM	35.4	312.7	9.8	-0.7	953.1
254	12	12	12:18:29 PM	40.5	324.1	9.8	-1.8	953.2
255	12	12.2	12:19:49 PM	37.9	327.4	9.9	-1.8	953.1
256	12	11.9	12:21:09 PM	40.1	322.4	9.7	-1.9	953.1
257	12	12.2	12:25:29 PM	38.6	327.4	9.9	-1.8	953
258	12	11.8	12:30:59 PM	38.2	326.3	9.6	-1.4	953.1
259	12	12.1	12:32:49 PM	41.2	314.3	9.8	-1.3	953
260	12	12.2	12:34:29 PM	43.2	326.1	9.9	-1.3	953.1
261	12	12	12:38:49 PM	40	333	9.8	-1.3	953.1
262	12	12	12:39:29 PM	40.5	324.9	9.7	-1.4	953.2
*263	12.5	12.7	11:30:39 AM	40.4	326.3	10.3	-2.3	952.7
264	12.5	12.4	11:36:59 AM	42	323.1	10.1	-1.8	952.8
265	12.5	12.6	11:42:39 AM	39.5	329	10.2	-1.3	952.9
266	12.5	12.5	11:47:29 AM	36.7	321.7	10.2	-0.9	953
267	12.5	12.6	11:54:19 AM	35.2	321.8	10.2	-0.7	953.1
268	12.5	12.5	12:12:19 PM	39.2	326.6	10.1	-1.5	953.1
269	12.5	12.6	12:13:49 PM	42.3	329.1	10.2	-1.5	953.3
270	12.5	12.3	12:30:09 PM	38.8	323.8	10	-1.4	953

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
271	12.5	12.3	12:30:19 PM	39.1	320.4	10	-1.4	953
272	12.5	12.5	12:33:09 PM	42.6	325	10.2	-1.3	953.1
273	12.5	12.6	12:38:59 PM	40.5	330.9	10.2	-1.3	953.2
274	12.5	12.4	12:39:19 PM	41.4	315.7	10	-1.4	953.1
275	12.5	12.5	12:45:39 PM	40.9	325.2	10.1	-1.4	953.1
* Wind bin for tonality analysed								

APPENDIX F:
REPORT CHECKLIST

Report Checklist		
Items 1 to 26; IEC61400-11:2013, Section 10.2, Characterization of the wind turbine		
1. manufacturer	Section 2	✓
2. model number	Section 2	✓
3. serial number/turbine ID	Section 2	✓
Operating details:		
4. vertical or horizontal axis wind turbine	Section 2	✓
5. upwind or downwind rotor	Section 2	✓
6. hub height	Section 2	✓
7. horizontal distance from rotor centre to tower axis	Section 2	✓
8. diameter of rotor	Section 2	✓
9. tower type (lattice or tube)	Section 2	✓
10. passive stall, active stall, or pitch controlled turbine	Section 2	✓
11. constant or variable speed	Section 2	✓
12. power curve (if required for wind speed determination)	Section 2	✓
13. rotational speed at each integer wind bin	Section 2	✓
14. rated power output	Section 2	✓
15. control software version	Section 2	✓
Rotor details:		
16. rotor control devices	Section 2	✓
17. presence of vortex generators, stall strips, serrated trailing edges	Section 2	✓
18. blade type	Section 2	✓
19. serial number	Section 2	✓
20. number of blades	Section 2	✓
Gearbox details:		
21. manufacturer	Section 2	✓
22. model number	Section 2	✓
23. serial number	Section 2	✓
Generator details:		
24. manufacturer	Section 2	✓
25. model number	Section 2	✓
26. serial number	Section 2	✓

Report Checklist		
Items 27 to 33; IEC61400-11:2013, Section 10.3, Physical Environment		
27. details of the site including location, site map and other relevant information;	Section 3 and Figure 1	✓
28. type of topography/terrain (hilly, flat, cliffs, mountains, etc.) in surrounding area (nearest 1 km);	Section 3	✓
29. surface characteristics (such as grass, sand, trees, bushes, water surfaces);	Section 3	✓
30. nearby reflecting structures such as buildings or other structures, cliffs, trees, water surfaces;	Section 3	✓
31. other nearby sound sources possibly affecting background noise level, such as other wind turbines, highways, industrial complexes, airports;	Section 3	✓
32. two photos, one taken in the direction of the turbine from the reference microphone position, and one taken from the wind mast toward the turbine;	Appendix A	✓
33. a photo of the microphone on the measurement board positioned on the ground and immediate surroundings;	Appendix A	✓
Items 34 to 39; IEC61400-11:2013, Section 10.4, Instrumentation		
34. the manufacturer(s);	Section 4	✓
35. the instrument name and type;	Section 4	✓
36. serial number(s);	Section 4	✓
37. other relevant information (such as last calibration date, calibration certificate(s));	Section 4	✓
38. met mast anemometer position and height for each measurement series;	Section 4	✓
39. influence of secondary wind screen, if used.	Section 4	✓
Items 40 to 52; IEC61400-11:2013, Section 10.5, Acoustic Data		
40. the measured position of each microphone for each measurement series;	Section 3	✓
41. LWA,k, where LWA,k is the apparent sound power level, at bin centre wind speeds at hub height;	Section 5	✓
42. LWA,k, where LWA,k is the apparent sound power level, at wind speeds at 10 m height;	Section 5	✓
43. a plot showing all measured data pairs at position 1 of the wind turbine sound and background noise (with different symbols);	Figure 3	✓
44. a plot showing all measured total noise versus electrical power data;	Figure 4	✓
45. table and plot of sound power spectrum in third octaves for each relevant wind speed;	Appendix C	✓
46. table showing total noise and background noise;	Section 5	✓
For each relevant wind speed (k):		
47. ΔLtn,j,k (for j = 1, 2, 3,…12) for each identified tone;	Appendix D	✓
48. ΔLk for each identified tone, where Lk is the sound pressure level;	Appendix D	✓
49. ΔLa,k for each identified tone, where La,k is the tonal audibility;	Appendix D	✓
50. frequency of the tone(s);	Appendix D	✓
51. narrowband spectra of total and background noise as an overlay plot per bin;	Appendix D	✓
52. time and date of each measurement series.	Appendix E	✓

END OF DOCUMENT

Appendix B.3 Grand Valley Wind Farms Phase 3 Acoustic Report Summary and Acoustic Report, WTG T101 (2648 KW) (December 22, 2023)

HGC ENGINEERING

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

ACOUSTIC REPORT, WTG T101 (2648 KW)

Version 1

Grand Valley Wind Farms, Phase 3

Grand Valley, ON

Report Number: 0220226.002

Project Number: 0220226

Prepared for:

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

Prepared by

Nathan Gara, C.E.T., EIT

LICENSED PROFESSIONAL ENGINEER
R. B. HOWE
Dec 22, 2023
PROVINCE OF ONTARIO

Checked by

Brian Howe, MEng, MBA, LLM, PEng

December 22, 2023

VERSION CONTROL

Version	Date	Version Description
1	December 22, 2023	Original Report

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EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership to complete an Acoustic Noise test in accordance with IEC 61400-11 of wind turbine generator WTG 101, part of the Grand Valley Wind Farms Phase 3 project near Grand Valley, Ontario. The measurements were completed on November 4, 2022.

HGC Engineering has assessed the acoustic emissions of WTG T101, a Siemens SWT-3.2-113 wind turbine, rated at 2648 kW, in accordance with IEC 61400-11:2018-06. A summary of the acoustic results is provided in the following tables:

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)	101.2	101.5	101.7	101.7	101.9	101.5	101.0	100.9	101.3	101.3	100.8
Tonal Audibility, ΔL_{ak} in 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 $u_{LWA,k}$ in dB:	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9

* Above *allowed range* of the power curve.

10 m Height Wind Speed [m/s]	**6**	**7***	**8***
Sound Power Level $L_{WA,k}$ in dB(A):	101.7	101.5	101.2
Total Uncertainty $u_{LWA,k}$ in dB:	0.7	0.8	0.9

* Above *allowed range* of the power curve.

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1 INTRODUCTION

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Grand Valley 2 Limited Partnership, to complete sound level measurements (Emission Audit) of Wind Turbine Generator ("WTG") T101 to determine the sound power level of the turbine. The turbine is part of the 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. Measurements were completed on November 4, 2022. Figure 1 shows the location of WTG T101.

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" [1].

1.1 DEVIATIONS FROM IEC 61400-11

There are no deviations from IEC 61400-11 to report.

2 WIND TURBINE GENERATOR

The wind turbine generator is manufactured by Siemens and is the SWT-3.2-113 model, rated at 2648 kW, with a rotor diameter of 113 m and a hub height of 99.5 m. This turbine is an upwind, pitch controlled, horizontal axis wind turbine with three blades. Specific details of the wind turbine generator are included in Table 1.

Table 1: Wind Turbine Generator Characteristics

Wind Turbine					
Manufacturer	Siemens				
Model Number	SWT 3.2-113				
Serial Number	3000929				
Hub Height	99.5 m				
Tower Type (lattice or tube)	Tubular				
Horizontal Distance from Rotor Centre to Tower Axis	5.5 m				
Rotor Diameter	113 m				
Speed (constant or variable)	Variable				
	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s
Pitch Angle	Confidential				
Rotational Speed	Confidential				
Rated Power Output	2648 kW				
Control Software Version	151.3.0.11				
Rotor Details					
Rotor Control Devices	Pitch Control				
Presence of Vortex Generators, Stall Strips Trailing Edges	Vortex Generators and Dino Tails				
Blade Type	B55				
Serial Number	Blade A: 550244101 Blade B: 550243701 Blade C: 550332601				
Gearbox					
Manufacturer	N/A – Direct Drive				
Model Number	N/A – Direct Drive				
Serial Number	N/A – Direct Drive				
Generator					
Manufacturer	Siemens				
Model Number	DD22_02				
Serial Number	5100123892				
UTM Coordinates (Zone 17)					
Easting	546165				
Northing	4873540				

The electrical power curve utilized for the sound level measurements is shown in Figure 2. From the supplied power curve, 85% of maximum electrical power is reached at 2251 kW, which corresponds to a hub height wind speed of 9.6 m/s. The required minimum wind speed range for reporting is between 0.8 to 1.3 times the hub height wind speed at 85% electrical power, which is 7.5 to 12.5 m/s for this wind turbine generator.

3 TEST ENVIRONMENT

WTG T101 is part of the Grand Valley Wind Farms Phase 3 Project located near Grand Valley, Ontario. Figure 1 shows the specific location of WTG T101. The surrounding land is used mainly for agricultural crops and includes gently rolling terrain. The sound level measurement location was in an area with recently harvested crops.

There are several additional wind turbine generators located in the vicinity of the test turbine. The nearest wind turbine, WTG T102, part of the Grand Valley Wind Farms Phase 3 Project, is located approximately 540 m to the south of WTG T101. WTG T102 was parked during the testing of WTG T101. Sources of background sound included air traffic and occasional road traffic.

Photos of the sound level measurement location, the test turbine, and wind mast location are included under Appendix A.

4 INSTRUMENTATION AND SETUP

A Wolfel RoBin measurement system was utilized to complete the IEC measurements. Sound pressure level measurements and recordings were completed utilizing a 01 dB DUO Smart Noise Monitor. The microphone was mounted on a one metre diameter board with a primary and secondary windscreen. A standard Bruel & Kjaer 3” wind screen (half) was used on the microphone as well as a secondary Bruel & Kjaer UA-2133 wind screen. The influence of the secondary windscreen is shown in Table 2. The acoustic influence of the secondary windscreen contributes approximately 0.2 dBA to the overall sound level and the sound levels have been corrected herein.

Table 2: Frequency Dependent Influence for UA-2133 Windscreen

Frequency [Hz]	SPL Influence [dB]	Frequency [Hz]	SPL Influence [dB]
100	-0.07	1600	-0.3
125	0.06	2000	-0.03
160	0.01	2500	-0.12
200	0.18	3150	-0.25
250	-0.03	4000	-0.73
315	-0.25	5000	-0.5
400	-0.26	6300	-0.03
500	-0.18	8000	-0.99
630	0.04	10000	-0.77
800	-0.14	12500	-0.75
1000	-0.44	16000	-1.23
1250	-0.14	20000	-0.59

The RoBin and DUO systems were time synchronized prior to the start of the measurements (within 1 second).

After the measurements were completed, the electrical power, rotor RPM, azimuth and hub height wind speeds were provided by the customer in tabular format.

Wind speed and direction at 10 m height were measured using a Vaisala ultrasonic anemometer while a Reinhardt DFT485 sensor was utilized to measure air pressure, temperature, and air humidity. Table 3 shows the weather conditions during the measurement periods.

Table 3: Weather Conditions

	November 22, 2019	
	Start of Test	End of Test
Air Temperature [°C]	14	19
Air Pressure [hPa]	960	957
Relative Humidity [%]	78	60
Sky Condition	Overcast	
Range of Wind Direction [°]	285 to 330	

The measurement equipment and the relevant calibration information are shown in Table 4.

Table 4: Instrumentation

Instrumentation	Manufacturer / Model / Serial Number	Calibration	
		Completed	Due
Measurement System	Wolfel / RoBin / ROBIN.00.0003	N/A	N/A
Sound Level Meter	01 dB-Metravib / DUO / 10815	31-Jan-21	31-Jan-23
Microphone	GRAS / 40CD / 154426	31-Jan-21	31-Jan-23
Anemometer	Vaisala / WMT701 / J3920012	19-Jan-21	19-Jan-23
Air Pressure / Temperature and Humidity	Reinhardt / DFT485 / 1027951	21-Jan-21	21-Jan-23
Acoustic Calibrator	Bruel & Kjaer / 4231 / 3010241	29-Dec-21	29-Dec-22
Primary Wind Screen	Bruel & Kjaer	N/A	N/A
Secondary Wind Screen and Ground Board	Bruel & Kjaer / UA 2133	N/A	N/A
Noisy Software	Wolfel / Noisy Version 2021-2 Beta	N/A	N/A

Correct calibration of the acoustic instrumentation was verified using an acoustic calibrator manufactured by Brüel & Kjær. Verification of calibration status was carried out at the start and end of the measurement period and when the microphone was disconnected from the sound level meter. Calibration certificates for the test equipment are provided in Appendix B. Unless indicated otherwise, the same equipment was utilized during the entire test period.

The anemometer was located 115 metres north of the turbine for all measurement periods (cross wind). For all measurement sets the anemometer was located at 10 metres above grade.

The sound level measurement location was established at 156 metres from the base of the turbine. This distance was determined utilizing the reference distance calculation provided in IEC 61400; $R_0 = H + D/2 \pm 20\%$ where H is the hub height and D is the rotor diameter. An R_1 distance of 191.5 metres was determined for this test using the equation:

$$R_1 = \sqrt{(D_1 + D_2 + D_3)^2 + {H_{hub}}^2}$$

Where D_1 is the distance from turbine base to the microphone (156 m), D_2 is the tower radius (2.15 m), D_3 is the distance from rotor to tower axis (5.5 m) and H_{hub} is the hub height (99.5 m). Based on measurements taken during the testing, the difference in elevation between the turbine base and the microphone location was negligible.

The standard roughness length applicable for this site is 0.05 given the surrounding farmland with some vegetation.

Sound level measurements were completed with the turbine operational and with the turbine parked. Significant interfering sound from road traffic, aircraft, bird calls, local agricultural activity, etc. was not included in the analyzed data for either the turbine on or off condition. The microphone position was maintained to be within +/- 15° of the downwind direction through visual inspection and the recording of the azimuth position. The azimuth angle of the turbine ranged between 204° and 217°.

4.1 TYPE B UNCERTAINTIES

The uncertainty components of Type B are provided in Table 5. Additional one-third octave Type B uncertainty components for the instrument and wind screen insertion loss can be provided upon request. These uncertainty components are provided by the instrument manufacturers.

Table 5: Type B Uncertainty Components

Component	Value
Calibration, u_{B1}	0.2 dB
Instrument, u_{B2}	0.2 - 0.5 dB
Board, u_{B3}	0.3 dB
Wind screen insertion loss, u_{B4}	0.1 - 0.5 dB
Distance and Direction, u_{B5}	0.1 dB
Air Absorption, u_{B6}	0.2 dB
Weather Conditions, u_{B7}	0.5 dB
Wind Speed, Measured, u_{B8}	0.7 m/s
Wind Speed Derived, u_{B8}	0.3 m/s
Wind Speed, Power Curve, u_{B9}	0.2 m/s

The uncertainty associated with the electrical power transducer (derived wind speed, u_{B8}) has been increased to 0.3 m/s as the turbine operation data was provided by the manufacturer. The manufacturer has indicated a measurement chain uncertainty of 1% on the measured electrical power, which corresponds to approximately 0.05 m/s. An increase of 0.1 m/s, over the typical standard uncertainty, has been included for the derived wind speed uncertainty.

5 MEASUREMENTS AND RESULTS

Sound level measurements were conducted of WTG T101 on November 4, 2022, between 11:30 and 16:40. Temperature and other weather characteristics are reported in Table 3 above.

The data points where the turbine was operating within the allowed power curve range are identified as the *allowed range* (intervals on the electrical power curve where no duplicated values exist and the slope of the power curve including the uncertainty is positive). In accordance with Equation (3) of Section 8.2.1.1 of IEC 61400-11, and using a typical tolerance on the power curve (P_{tol}) of 3%, the allowed range of the power curve was determined. The slope of the power curve was calculated to be positive at integer wind speeds between 4 and 10 m/s. The allowed range of the power curve was therefore determined to be between 166 kW and 2450 kW.

For data within the allowed range of the electrical power curve the wind speed ($V_{P,n}$) is determined. The average value of the ratio between the derived wind speed from the electrical power curve and the measured nacelle wind speed ($V_{nac,m}$), k_{nac} is determined. $k_{\mathrm{nac}} = \frac{V_{\mathrm{nac,n}}}{V_{\mathrm{nac,m}}}$. For this data set the k_{nac} value of 0.93 was applied to the measured nacelle wind speed to derive the normalized wind speed outside the allowed range.

For background noise measurements, the measured 10 m wind speed ($V_{Z,m}$) and the wind speed derived from the power curve $V_{P,n}$ are used to determine k_Z. $k_{\mathrm{Z}} = \frac{V_{\mathrm{P,n}}}{V_{Z,\mathrm{m}}}$. For this data set, the k_Z value of 1.19, was applied to the measured 10 m wind speed ($V_{Z,m}$) to derive the normalised wind speed at hub height ($V_{B,n}$) during background noise measurements.

Figure 3 shows the sound pressure level at the measurement location versus the hub height wind speed. Blue circles represent sound level data points collected with the turbine operating in the allowed range, above this point the sound levels are shown as black squares. Magenta triangles indicate data points of the background sound level (turbine off).

Figure 4 shows the measured total noise versus electrical power. Figure 5 plots the wind speed determined from the electrical power curve (V_p) relative to the measured nacelle wind speed ($V_{nac,m}$) and 10 m met mast wind speed ($V_{z,m}$).

Table 6 summarizes the analysis of the measured results.

Table 6: Sound Level Data

Hub Height Wind Speed [m/s]	7.5	8	8.5	9	9.5	10	10.5	11*	11.5*	12*	12.5*
Collected Data Points, Total	33	46	81	94	100	53	85	97	24	18	25
Collected Data Points, Background	10	20	25	29	49	40	57	40	37	44	45
Average Wind Speed, V_K [m/s]	7.6	8.0	8.5	9.0	9.5	10.0	10.5	10.9	11.5	12.0	12.5
Total Noise, $L_{V,T,}$ [dB(A)]	50.8	51.2	51.3	51.4	51.6	51.3	50.9	50.9	51.3	51.3	51.0
Background Noise, $L_{V,B}$ [dB(A)]	38.8	39.2	39.9	40.4	40.6	41.2	41.0	42.3	43.0	42.5	42.9
Difference T-B [dB(A)]	12.0	12.0	11.4	11.0	11.0	10.1	9.8	8.6	8.3	8.8	8.0
Corrected L_{Aeq} [dB(A)]	50.6	50.9	51.0	51.1	51.2	50.8	50.4	50.3	50.6	50.7	50.2

* Above *allowed range* of the power curve

Table 6 shows that at least 180 measurements were collected for both total noise and background noise and at least 10 measurements or data points are included in the analysis for each wind speed bin for total noise, as required by IEC 61400-11.

Table 7 shows the calculated sound level data, the resulting sound power levels, tonality, and measurement uncertainty at hub height, while Table 8 shows the apparent sound power levels at a reference height of 10 metres. Figure 6 presents the apparent sound power level at the integer wind speeds.

Table 7: Apparent Sound Power Level at Hub Height

Hub Height Wind Speed [m/s]	7.5	8	8.5	9	9.5	10	10.5	11*	11.5*	12*	12.5*
Corrected L_{Aeq} [dB(A)]	50.6	50.9	51.0	51.1	51.2	50.8	50.4	50.3	50.6	50.7	50.2
Sound Power Level $L_{WA,K}$ [dB(A)]	101.2	101.5	101.7	101.7	101.9	101.5	101.0	100.9	101.3	101.3	100.8
Theoretical Active Power [kW]	1208	1446	1719	1991	2221	2450	2533	2616	2631	2645	2647
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]	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9

* Above *allowed range* of the power curve

Table 8: Apparent Sound Power Level at 10m Height

10 m Height Wind Speed [m/s]	6	7*	8*
Sound Power Level $L_{WA,k}$ in dB(A):	101.7	101.5	101.2
Total Uncertainty $u_{LWA,k}$ in dB:	0.7	0.8	0.9

* Above *allowed range* of the power curve

A table and plot of the sound pressure spectrum in third octaves for each integer wind speed are included under Appendix B.

The tonality assessment indicates no tonal audibility greater than or equal to 0 dB. A summary of the tonality assessment is shown in Table 9. The detailed results of the tonality assessment are included under Appendix D.

Table 9: Summary of Tonality Assessment

Hub Height Wind Speed [m/s]	7.5	8	8.5	9	9.5	10	10.5	11*	11.5*	12*	12.5*
Dominant Frequency [Hz]	58	74	74	140	137	58	66	65	81	73	61
Tonal Audibility, ΔL_{ak} in dB:	< -3	< -3	< -3	< -3	< -3	< -3	< -3	< -3	< -3	< -3	< -3
Total Assessed Data Points	33	46	81	94	100	53	85	97	63	18	25
Occurrence of the Dominant Tone	6%	11%	6%	15%	23%	13%	44%	62%	17%	33%	52%

* Above *allowed range* of power curve.

6 CONCLUSIONS

The measurements and analysis, performed in accordance with the methods prescribed in IEC Standard 61400-11:2018-06 indicate that WTG T101, rated at 2648 kW and part of the Grand Valley Wind Farms, Phase 3, has the following sound power levels:

Table 10: Sound Power Level Summary

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)	101.2	101.5	101.7	101.7	101.9	101.5	101.0	100.9	101.3	101.3	100.8
Tonal Audibility, ΔL_{ak} in 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 $u_{LWA,k}$ in dB:	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9

* Above *allowed range* of power curve.

The sound levels presented above are relevant for Siemens SWT-3.2-113 turbine WTG T101 operating at 2648 kW given the environmental conditions and the operating parameters of the turbine during the testing periods.

REFERENCES

1. International Electrotechnical Commission, 61400-11: 2018-06 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.
2. Google Maps Aerial Imagery, Internet Application: *maps.google.com*

Figure 1 – Location of Test Turbine T101

Figure 2: Reference Electrical Power Curve
T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

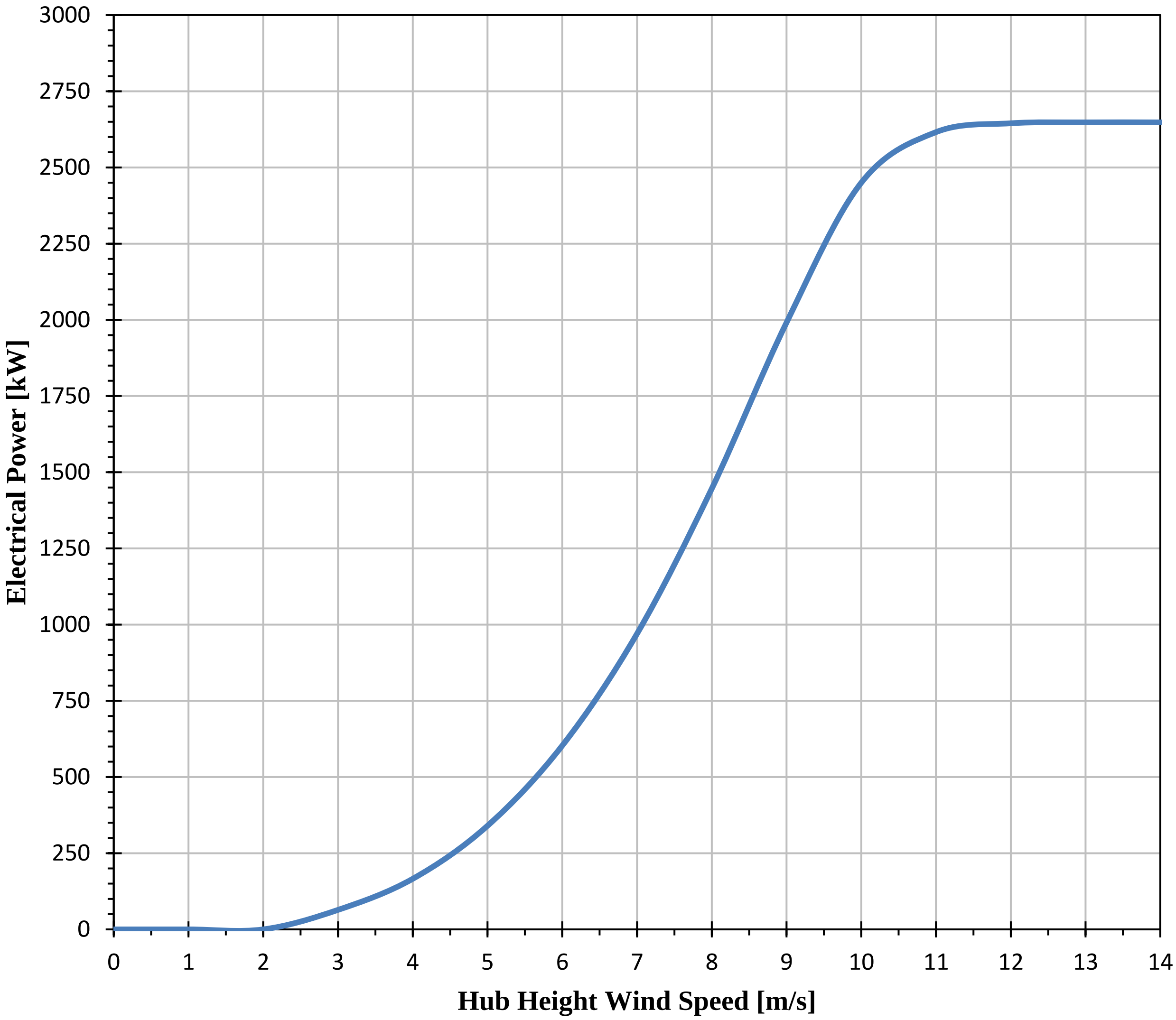


Figure 3: Acoustic Noise Measurements of the Wind Turbine Generator T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

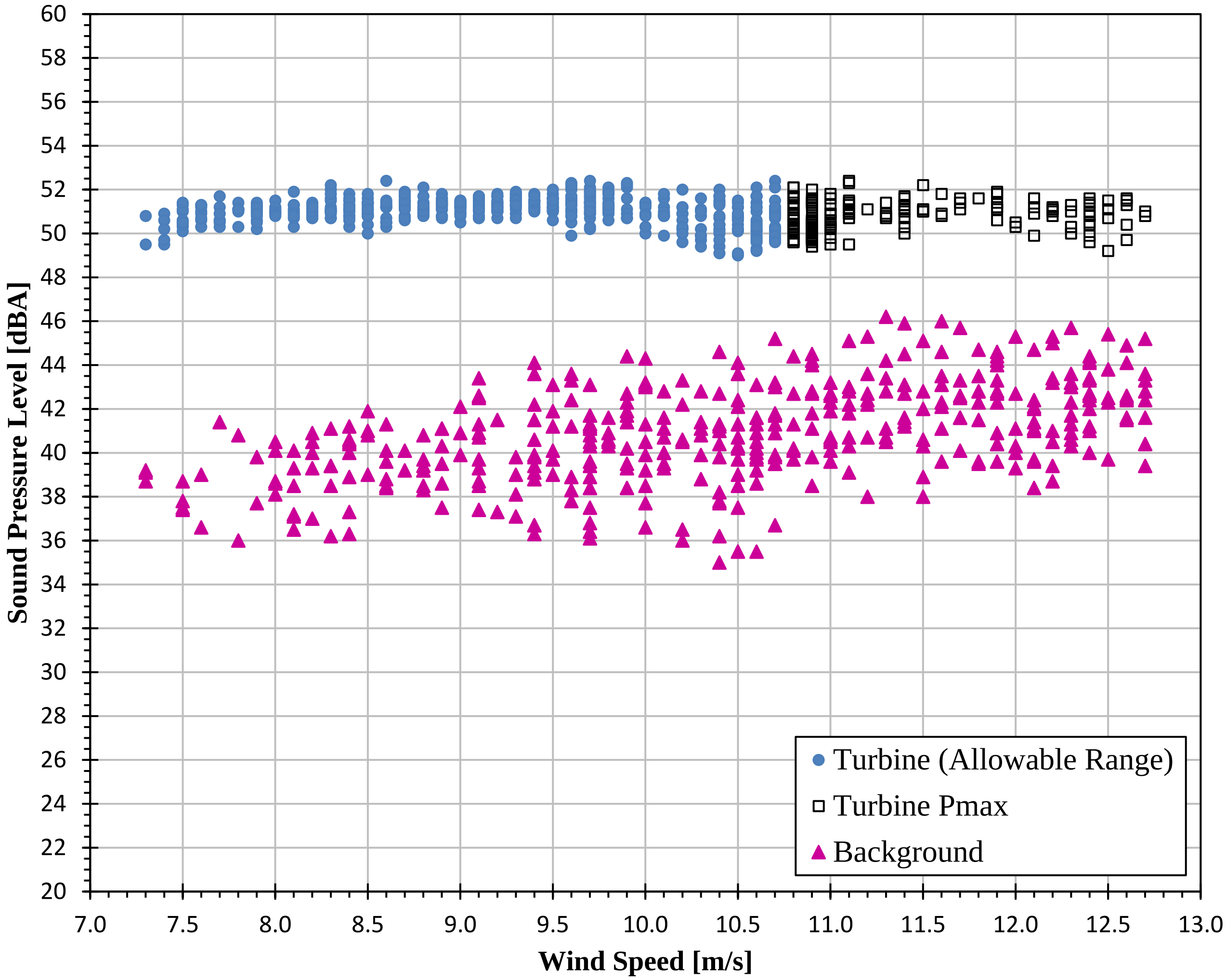


Figure 4: Total Sound Level [dBA] vs Electrical Power [kW]
T101, 2648kW, Grand Valley Wind Farm - Phase 3, Ontario

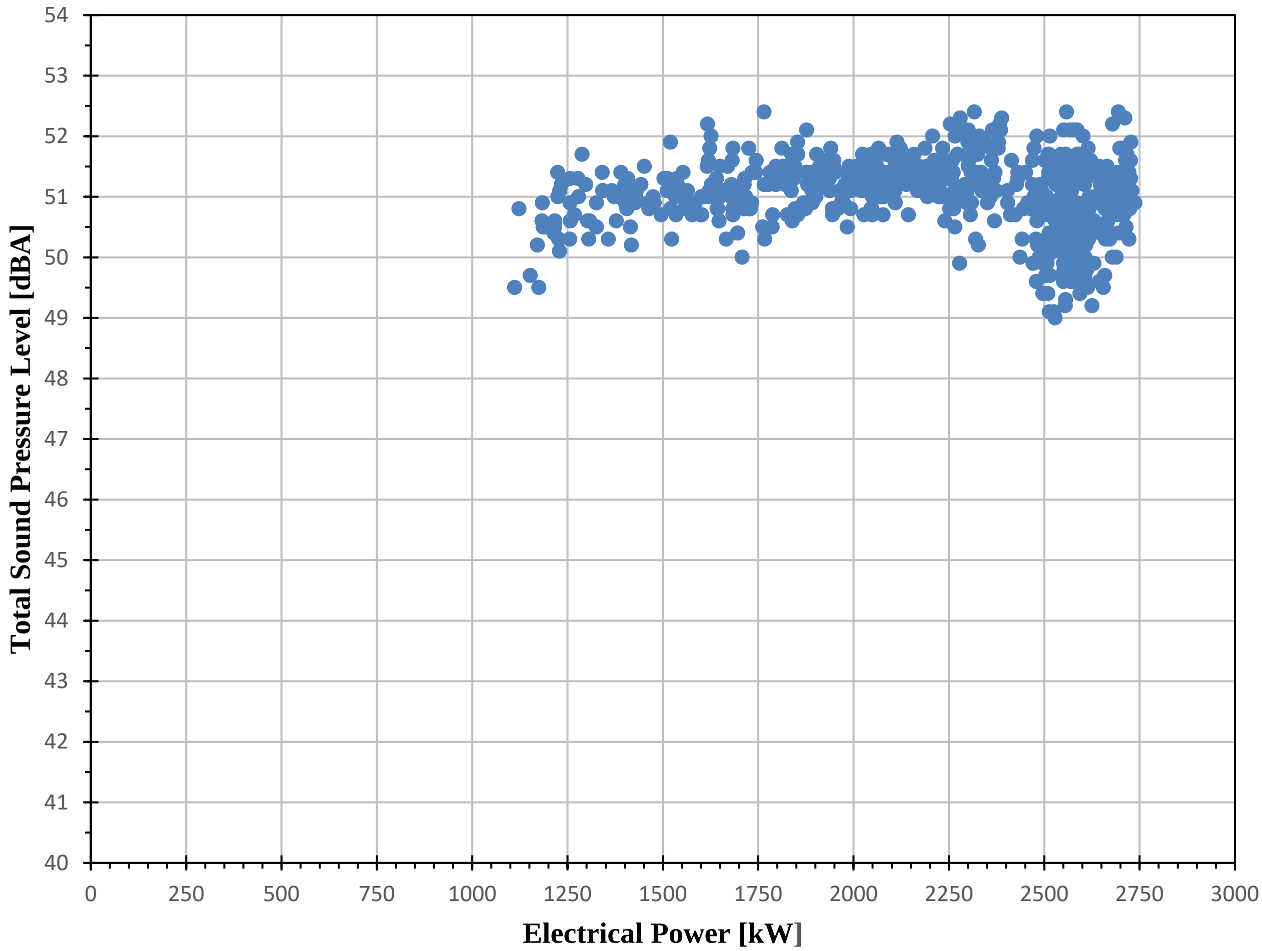


Figure 5: Measured Wind Speed (Nacelle and 10m) vs Derived Wind Speed, T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario

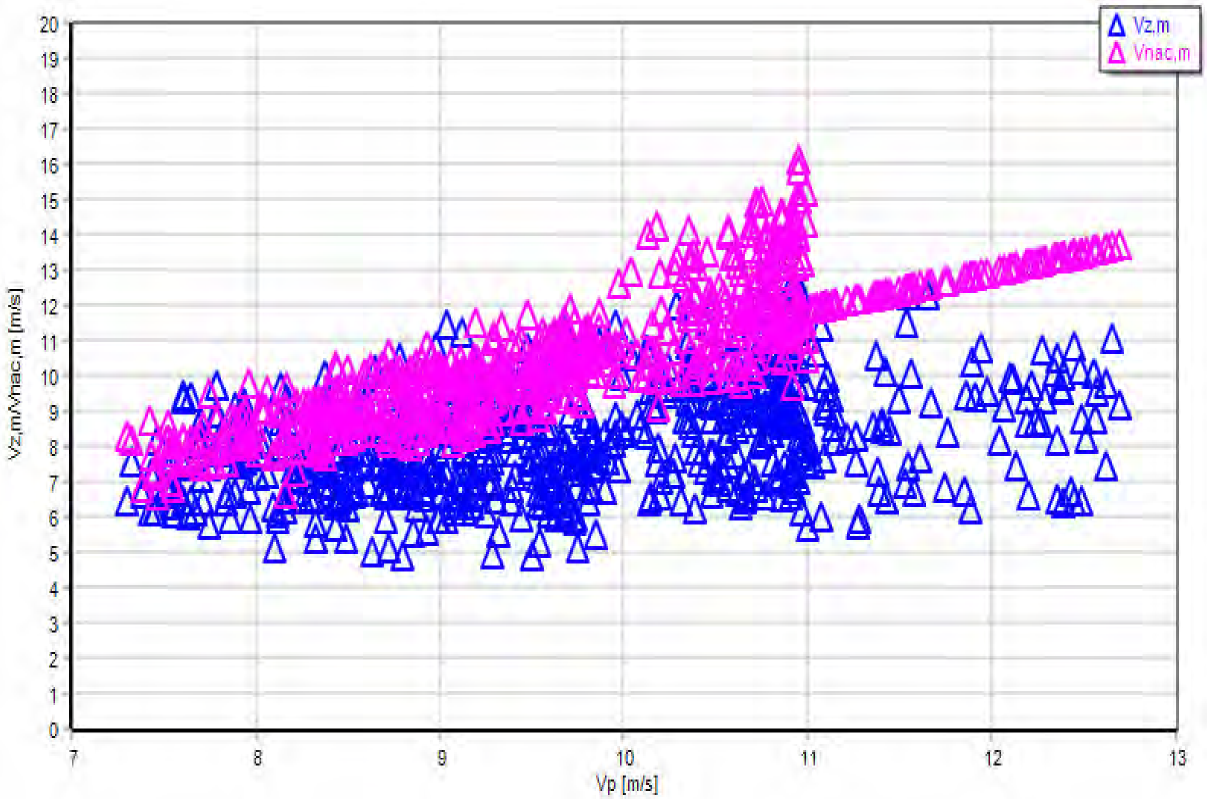
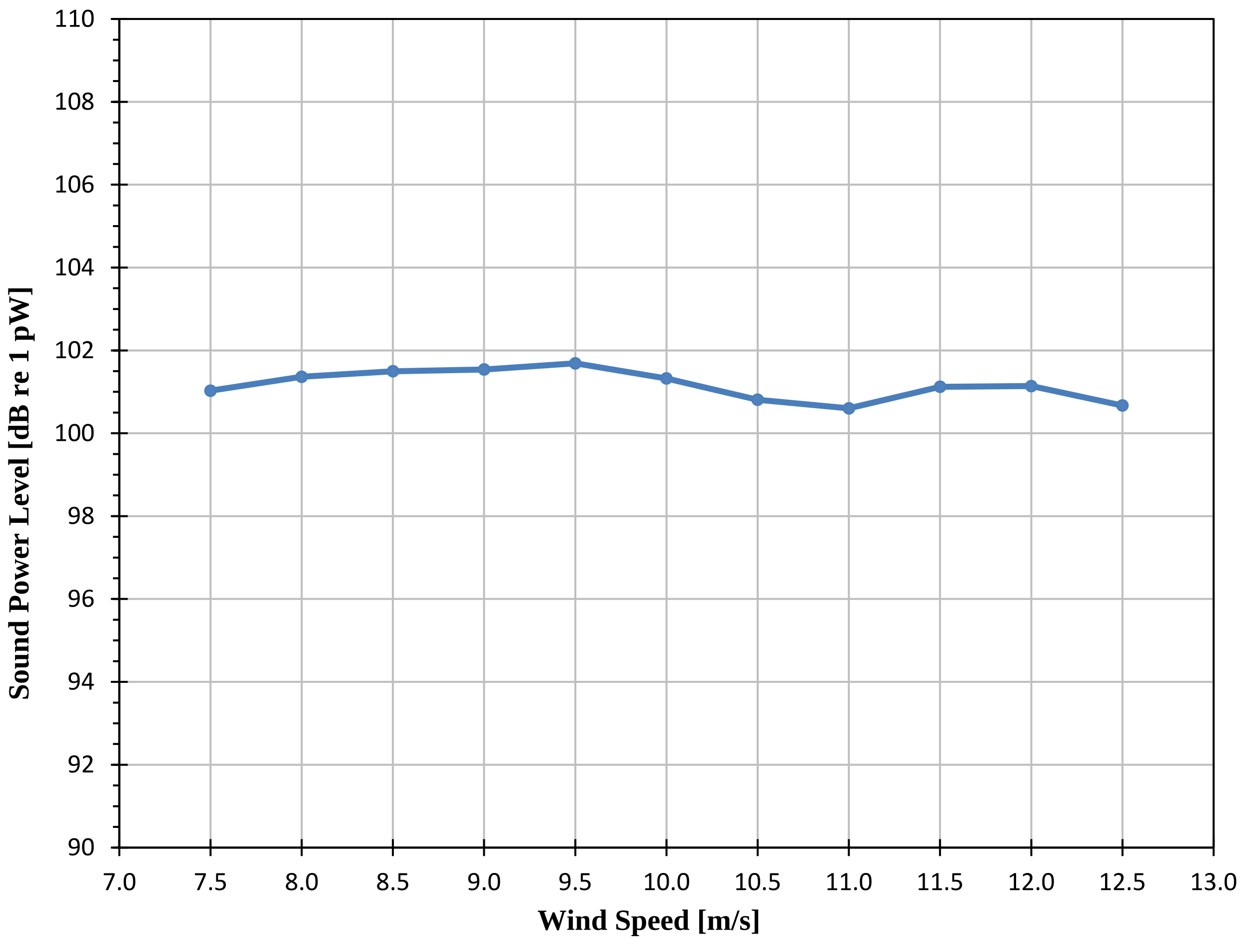


Figure 6: Apparent Sound Power Level vs. Wind Speed
T101, 2648 kW, Grand Valley Wind Farm - Phase 3, Ontario



APPENDIX A:
LOCATION PHOTOS

Wind Mast Location

Sound Level Measurement Location

Sound Level Microphone on Board

APPENDIX B:

CALIBRATION CERTIFICATES

CERTIFICATE of CALIBRATION

Make : 01dB Inc.

Reference # : 169366

Model : DUO

Customer : HGC Engineering
Mississauga, ON

Descr. : Sound Level Meter Type 1

Serial # : 10815

P. Order :

Asset # : #1

Cal. status : Received in spec's, no adjustment made.

MG
7 Feb 2022

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.

Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.

Our calibration system complies with the requirements of ISO-9001-2015 and is registered under certificate CA96/269, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Jan 31, 2022

By : T. Beilin

Cal. Due : Jan 31, 2023

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-303

Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST

6375 Dixie Rd. Mississauga, ON, L5T 2E7
Phone : 800-668-7440 Fax: 905 565 8325
http: // www.navair.com
e-Mail: service @ navair.com

CERTIFICATE of CALIBRATION

Make : Bruel & Kjaer
Reference # : 169049

Model : 4231
Customer : HGC Engineering
Mississauga, ON

Descr. : Sound cal 94/114dB 1KHz Type 1

Serial # : 3010241
P. Order : Sean Richardson

Asset # : B&K CAL #7

Cal. status : Received in spec's, no adjustment made.

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.
Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.
Our calibration system complies with the requirements of ISO-9001-2015 and is registered under certificate CA96/269, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Dec 29, 2021
By : [signature]
Cal. Due : Dec 29, 2022
Petro Onasko

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-163 J-261 J-282 J-420 J-512

Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST

6375 Dixie Rd. Mississauga, ON, L5T 2E7
Phone : 800-668-7440
Fax: 905 565 8325
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e-Mail: service @ navair.com

REINHARDT
System- und Messelectronic GmbH

Kalibrierzertifikat Calibration Certificate

Typ/Gegenstand
Type/Object
DFT-485 (RS-422)

Hersteller
Manufacturer
REINHARDT System- und Messelectronic GmbH

Seriennummer
Serial Number
1027951

Inventarnummer
Inventory Number
- - -

Auftraggeber
Customer
HGC Engineering
2000 Argentia Road, Plaza 1, Suite 203
Mississauga, ON L5N 1P7 - CANADA

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Sie wurde in Übereinstimmung mit den Normen DIN EN ISO 9000ff und DIN ISO 10012 durchgeführt.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certficate documents the traceability to national standards which realize the units of measurement according to the International System of Units (SI).
The calibration is performed according to the standards DIN EN ISO 9000ff and DIN ISO 10012.
The user is obliged to have the object recalibrated at appropriate intervals.

Kalibrierdatum
Date of Calibration
21/01/2021

Nächste Kalibrierung in 24 Monaten
Recalibration in months

Prüfer
person in charge
Harald Stiegelmayer

OK
MG.

Unterschrift
....

Messeinrichtungen
measuring equipment

Referenz Reference	Bezeichnung Name	Rückführung Traceability	Zertifikat-Nr. Certificate No.	Rekalibrierung Recalibration	Seriennummer Serial Number
Klimakammer/ Climatic Chamber	Weiss SB111 Typ 1005				95032
Multimeter/ Multimeter Temperaturreferenz/ Temperature Reference	Keysight HP 3458A PT100 Typ W60/1, 1/10 DIN	Keysight	1-104849309331	20/10/2020	MY45051675
Feuchtereferenz/ Humidity Reference	DFT 485	REINHARDT	F55728/F55907	16/09/2022	1028316
Druck/ Pressure Transmitter	Digiquarz 1030A	TESTO	D43406	14/09/2022	30840
Windgeschwindigkeit/ Wind Speed Sensor	WDS 55	REINHARDT	S19592	30/08/2022	1034340
Pyranometer/ Pyranometer	Kipp & Zonen CM11	Kipp & Zonen	2850071	28/08/2022	112383

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TG
28Jan2021

SOH Wind Engineering LLC
141 Leroy Road · Williston, VT 05495 · USA
Tel 802.316.4368 · Fax 802.735.9106 · www.sohwind.com

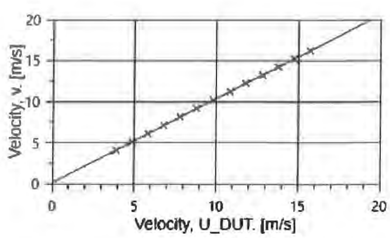
CERTIFICATE FOR CALIBRATION OF SONIC ANEMOMETER

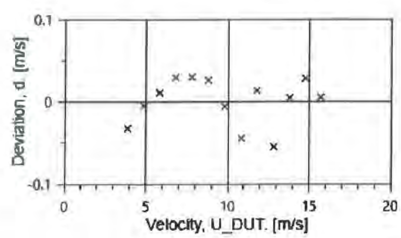
Certificate number: 21.US2.00518
Date of issue: January 19, 2021
Type: Vaisala WMT700 with ROBIN Transmitter
Serial number: J3920012
Manufacturer: Vaisala, Oyj, Pl 26, FIN-00421 Helsinki, Finland
Client: HGC Engineering, 2000 Argentia Road, Plaza One, Suite 203, Mississauga, ON L5N 1P7, Canada
Anemometer received: January 14, 2021
Anemometer calibrated: January 19, 2021
Calibrated by: MEJ
Procedure: MEASNET, IEC 61400-12-1:2017 Annex F
Certificate prepared by: EJF
Approved by: Calibration engineer, EJF

Calibration equation obtained: v [m/s] = 1.02453 · f [m/s] + 0.11348

Standard uncertainty, slope: 0.00217
Standard uncertainty, offset: 0.20531
Covariance: -0.0000484 (m/s)²/m/s
Coefficient of correlation: ρ = 0.999974
Absolute maximum deviation: -0.055 m/s at 13.204 m/s
Barometric pressure: 1000.9 hPa **Relative humidity:** 18.7% **Avg. Direction Output:** 1.0

Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	Temperature in d.p. box [°C]	Wind velocity, v. [m/s]	Anemometer Output, f. [m/s]	Deviation, d. [m/s]	Uncertainty u_c (k=2) [m/s]
1-first	9.69	22.4	26.7	4.056	3.8807	-0.033	0.023
13-last	15.22	22.5	26.7	5.085	4.8573	-0.005	0.027
2	21.87	22.4	26.7	6.094	5.8270	0.011	0.031
12	29.69	22.6	26.7	7.102	6.7930	0.029	0.035
3	38.96	22.4	26.7	8.133	7.7990	0.029	0.039
11	49.24	22.6	26.7	9.148	8.7927	0.026	0.044
4	60.77	22.4	26.7	10.159	9.8110	-0.006	0.048
10	73.51	22.7	26.7	11.178	10.8433	-0.045	0.052
5	87.80	22.4	26.7	12.212	11.7960	0.013	0.057
9	102.54	22.7	26.7	13.204	12.8310	-0.055	0.061
6	119.40	22.5	26.7	14.243	13.7873	0.004	0.066
8	136.86	22.6	26.7	15.254	14.7510	0.028	0.070
7	154.78	22.6	26.7	16.221	15.7170	0.005	0.074





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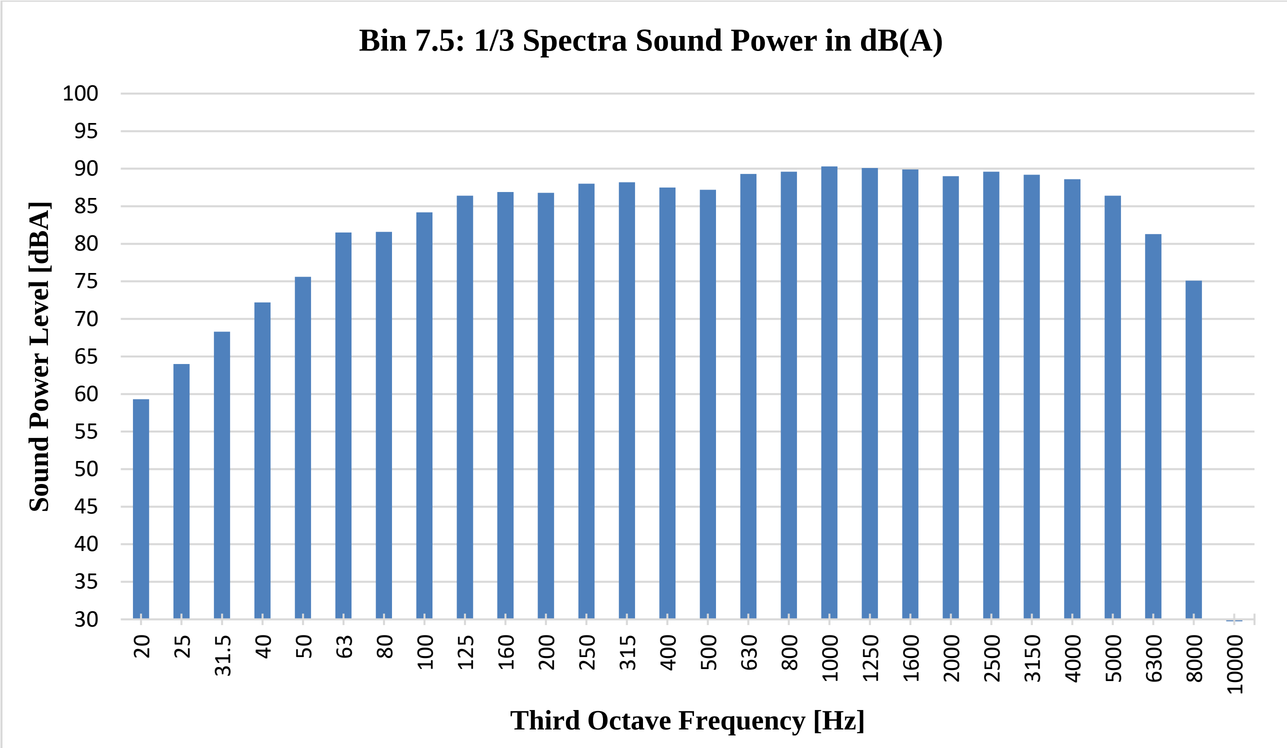
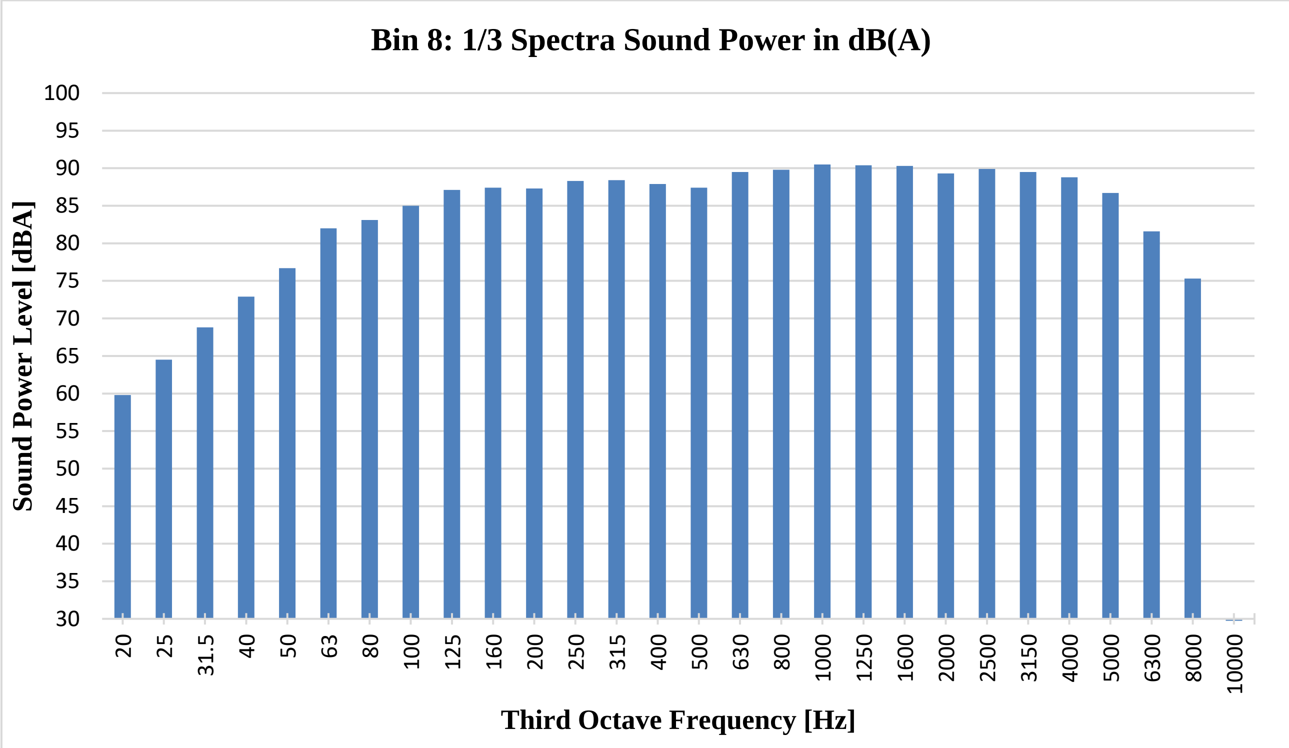
APPENDIX C:

OCTAVE BAND SOUND LEVEL RESULTS



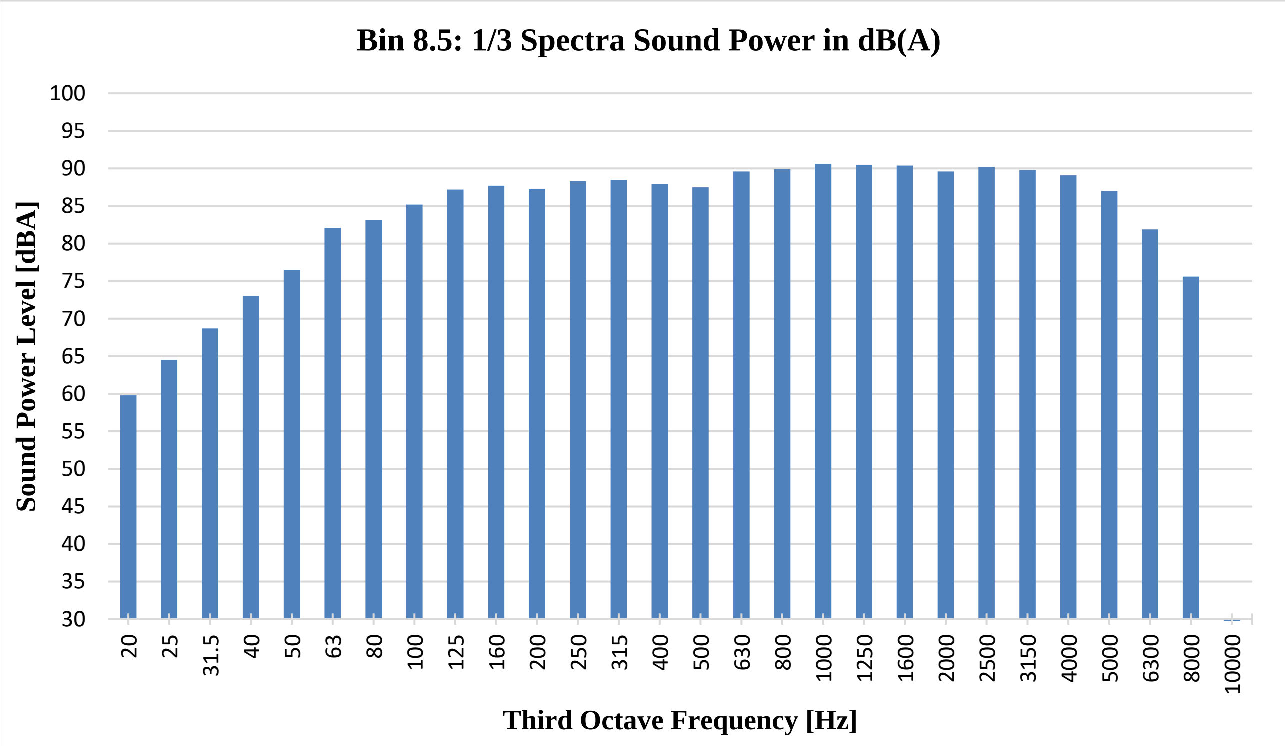
Bin 7.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.3	64.0	68.3	72.2	75.6	81.5	81.6	84.2	86.4	86.9	86.8	88.0	88.2	87.5
U_C	1.1	1.1	1.1	1.1	1.2	1.1	1.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.2	89.3	89.6	90.3	90.1	89.9	89.0	89.6	89.2	88.6	86.4	81.3	75.1	[65.6]
U_C	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	1.1	1.1	1.0	1.9

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



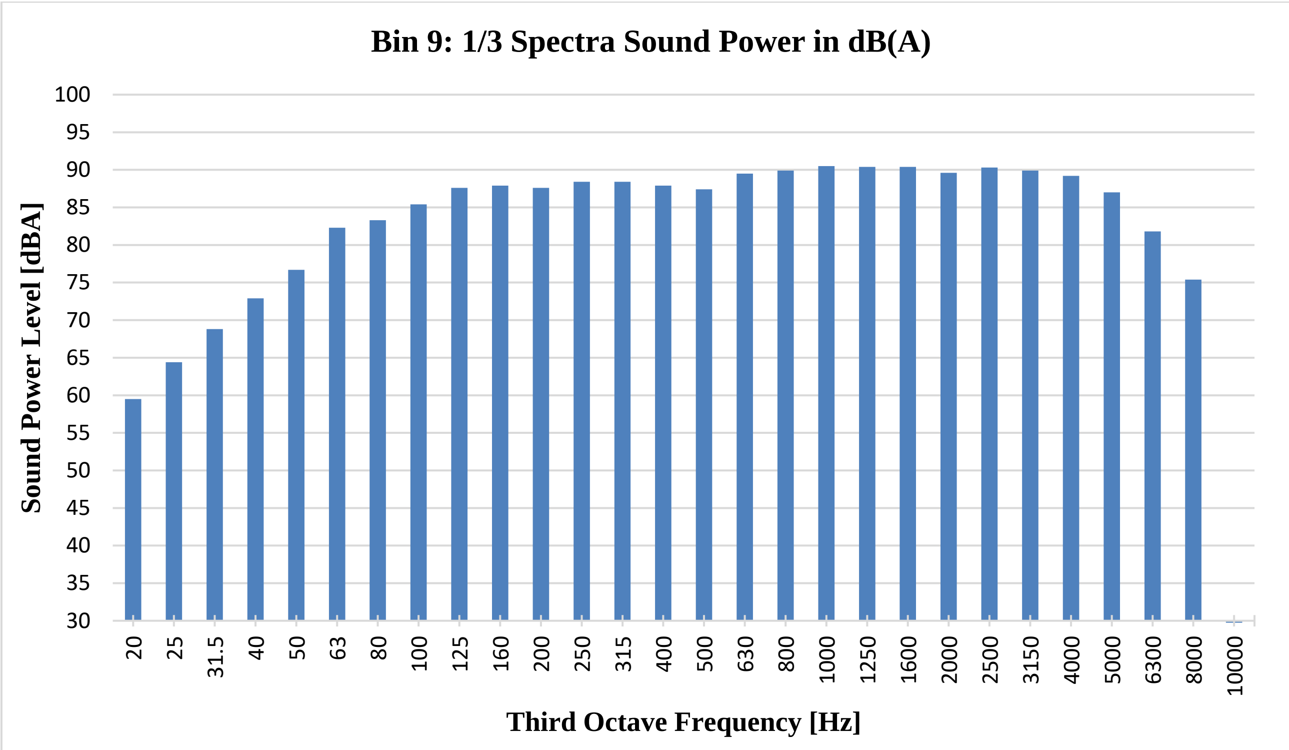
Bin 8: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.8	64.5	68.8	72.9	76.7	82.0	83.1	85.0	87.1	87.4	87.3	88.3	88.4	87.9
U_C	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.8	0.7	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.4	89.5	89.8	90.5	90.4	90.3	89.3	89.9	89.5	88.8	86.7	81.6	75.3	[65.9]
U_C	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



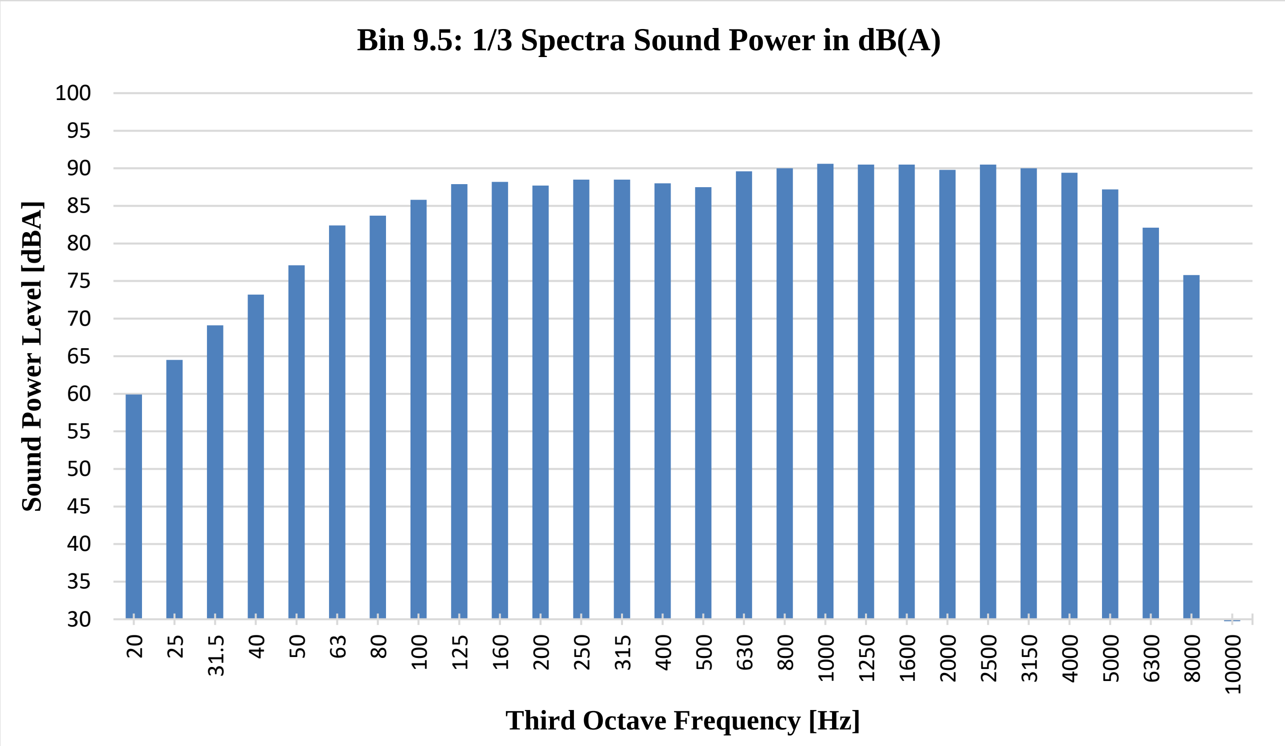
Bin 8.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.8	64.5	68.7	73.0	76.5	82.1	83.1	85.2	87.2	87.7	87.3	88.3	88.5	87.9
U_C	0.9	0.9	0.9	0.9	1.0	0.9	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.5	89.6	89.9	90.6	90.5	90.4	89.6	90.2	89.8	89.1	87.0	81.9	75.6	[66.2]
U_C	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



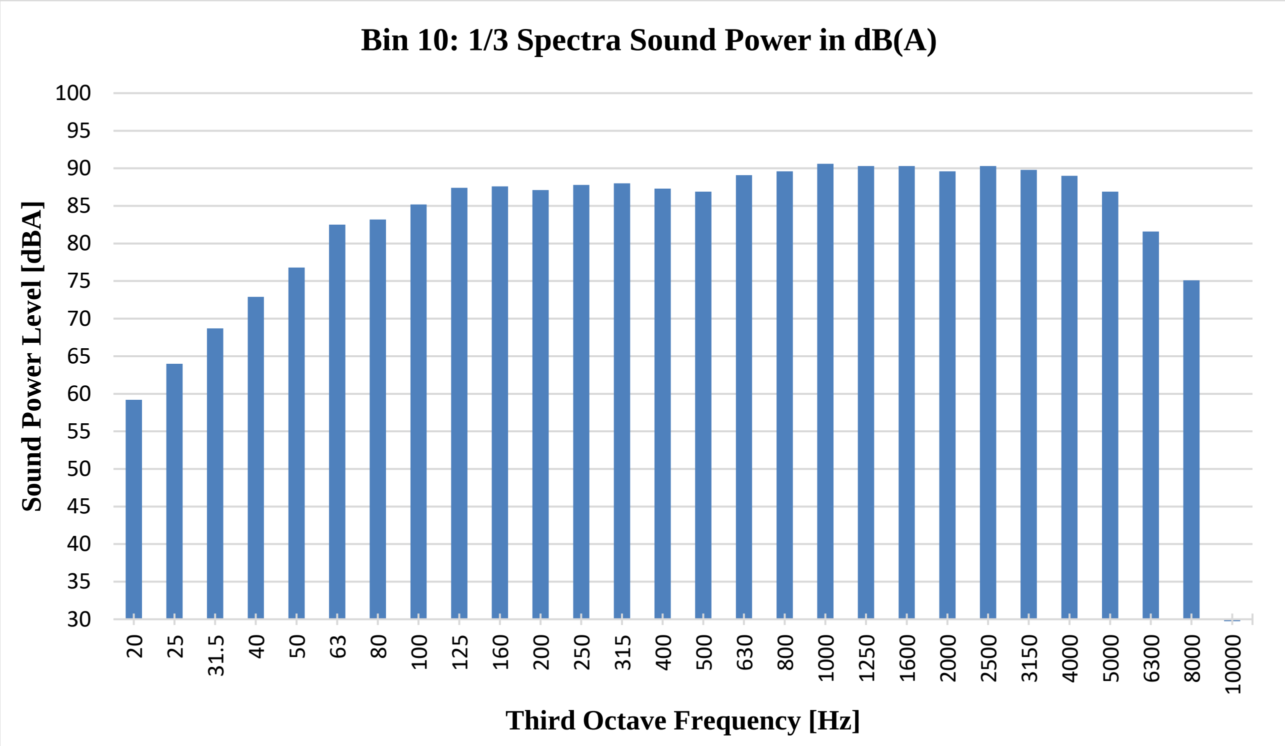
Bin 9: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.5	64.4	68.8	72.9	76.7	82.3	83.3	85.4	87.6	87.9	87.6	88.4	88.4	87.9
U_C	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.8	0.8	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.4	89.5	89.9	90.5	90.4	90.4	89.6	90.3	89.9	89.2	87.0	81.8	75.4	[66.4]
U_C	0.9	0.8	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



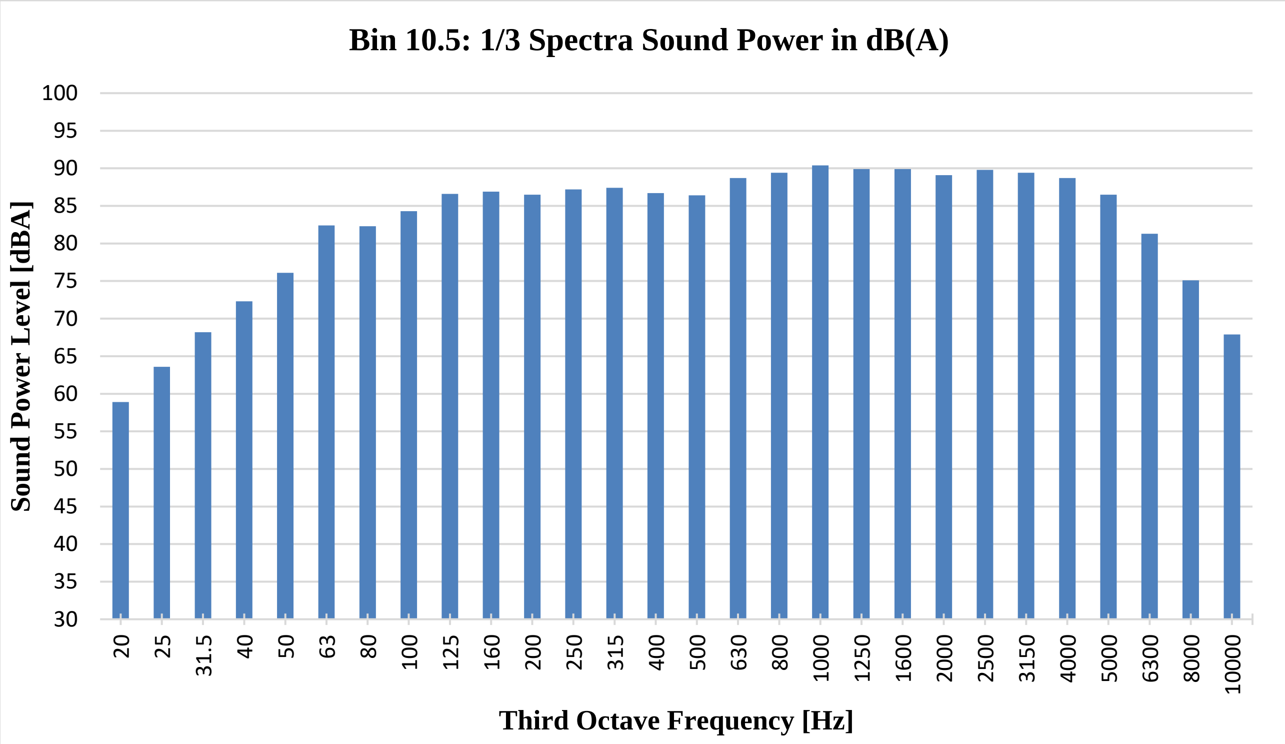
Bin 9.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.9	64.5	69.1	73.2	77.1	82.4	83.7	85.8	87.9	88.2	87.7	88.5	88.5	88.0
UC	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	0.7	0.8	0.8	0.8	0.8
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	87.5	89.6	90.0	90.6	90.5	90.5	89.8	90.5	90.0	89.4	87.2	82.1	75.8	[67.5]
UC	0.9	0.8	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



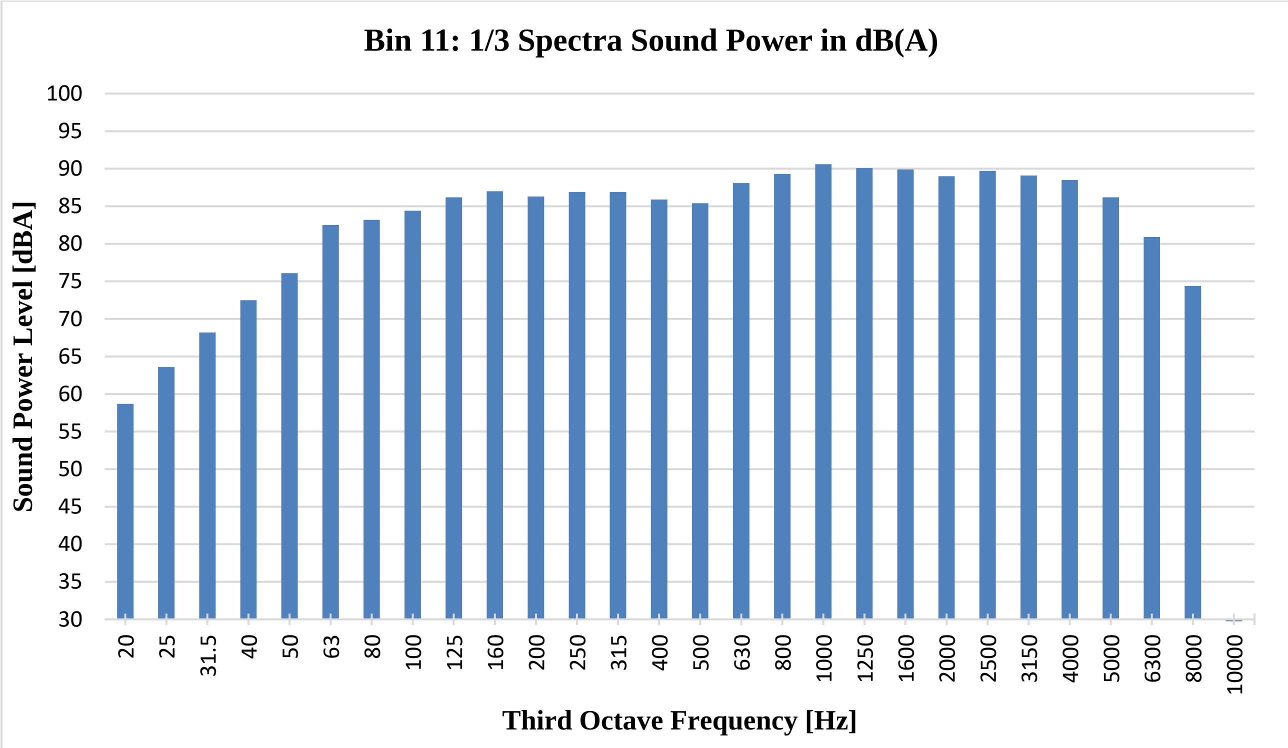
Bin 10: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.2	64.0	68.7	72.9	76.8	82.5	83.2	85.2	87.4	87.6	87.1	87.8	88.0	87.3
U_C	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.9	89.1	89.6	90.6	90.3	90.3	89.6	90.3	89.8	89.0	86.9	81.6	75.1	[66.9]
U_C	0.9	0.9	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



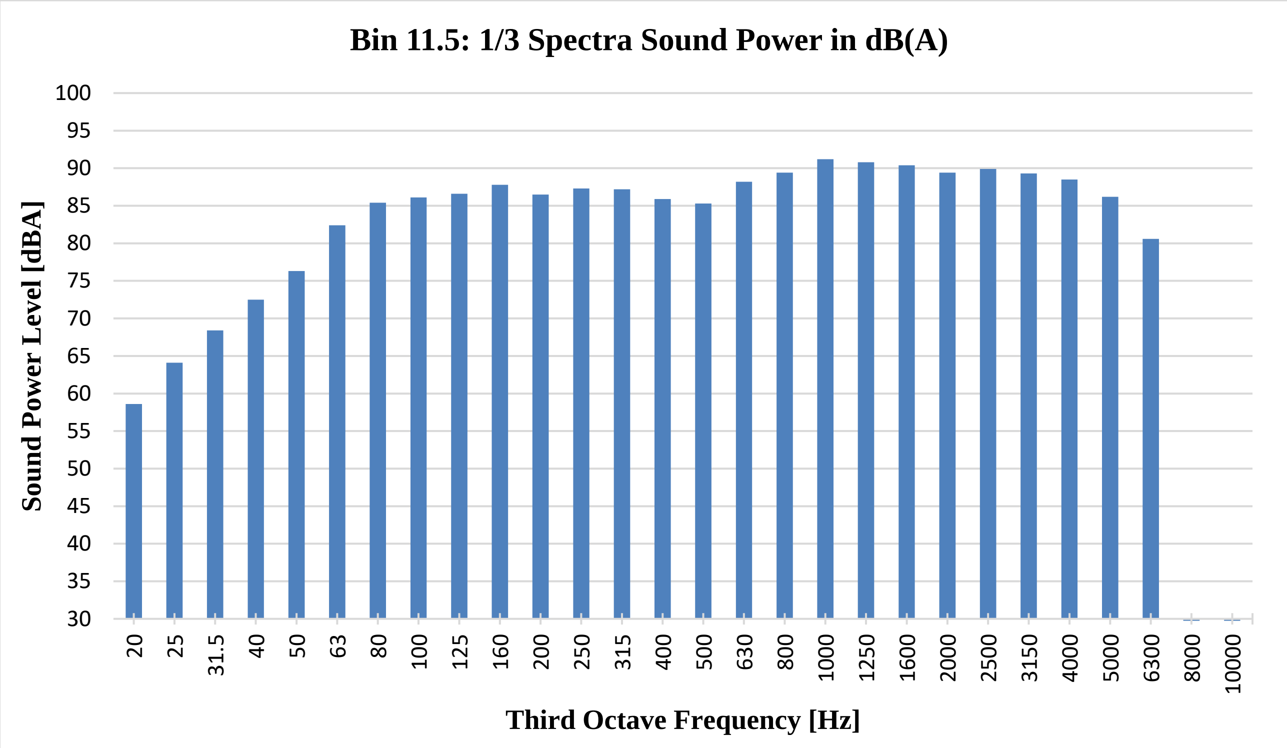
Bin 10.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	58.9	63.6	68.2	72.3	76.1	82.4	82.3	84.3	86.6	86.9	86.5	87.2	87.4	86.7
U_C	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.8	0.8	0.8	0.8	0.8	0.9	0.9
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	86.4	88.7	89.4	90.4	89.9	89.9	89.1	89.8	89.4	88.7	86.5	81.3	75.1	67.9
U_C	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



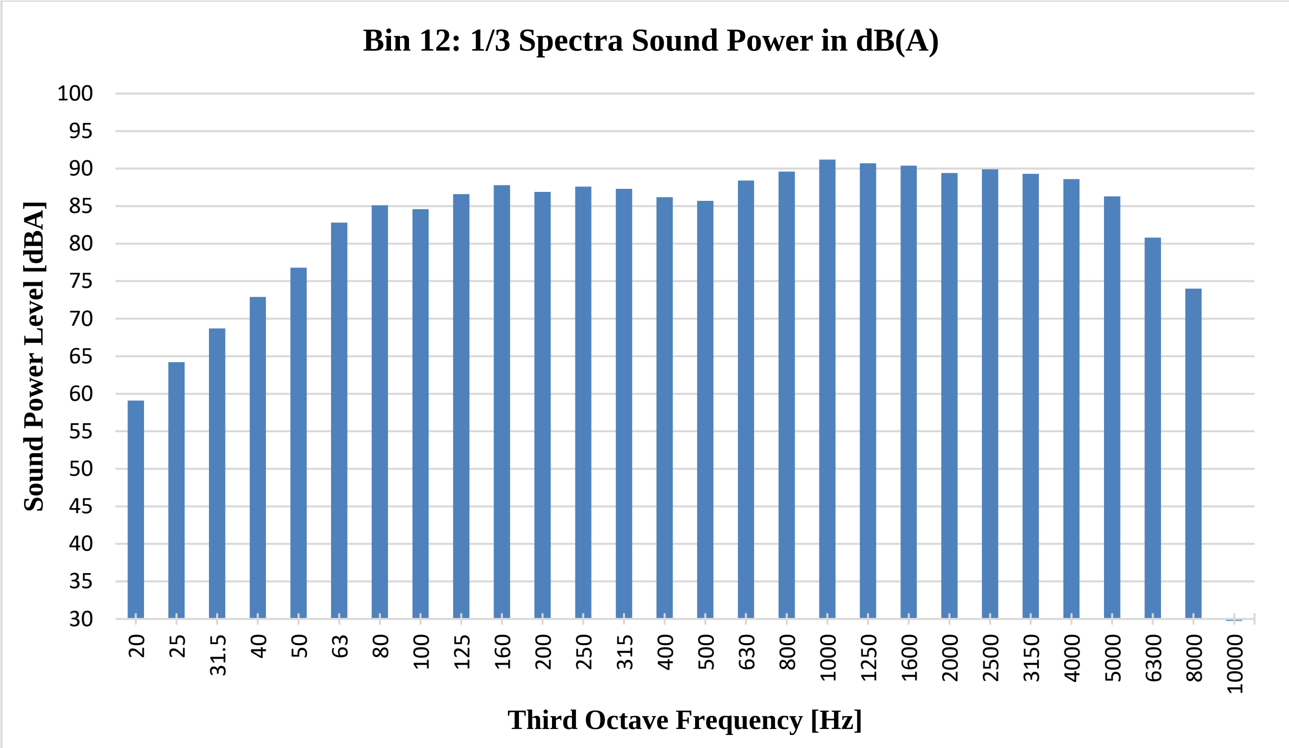
Bin 11: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	58.7	63.6	68.2	72.5	76.1	82.5	83.2	84.4	86.2	87.0	86.3	86.9	86.9	85.9
U_C	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.7	0.7	0.7	0.8	0.8	0.9	1.0
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	85.4	88.1	89.3	90.6	90.1	89.9	89.0	89.7	89.1	88.5	86.2	80.9	74.4	[67.1]
U_C	1.1	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.8	0.8	0.8	1.6

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



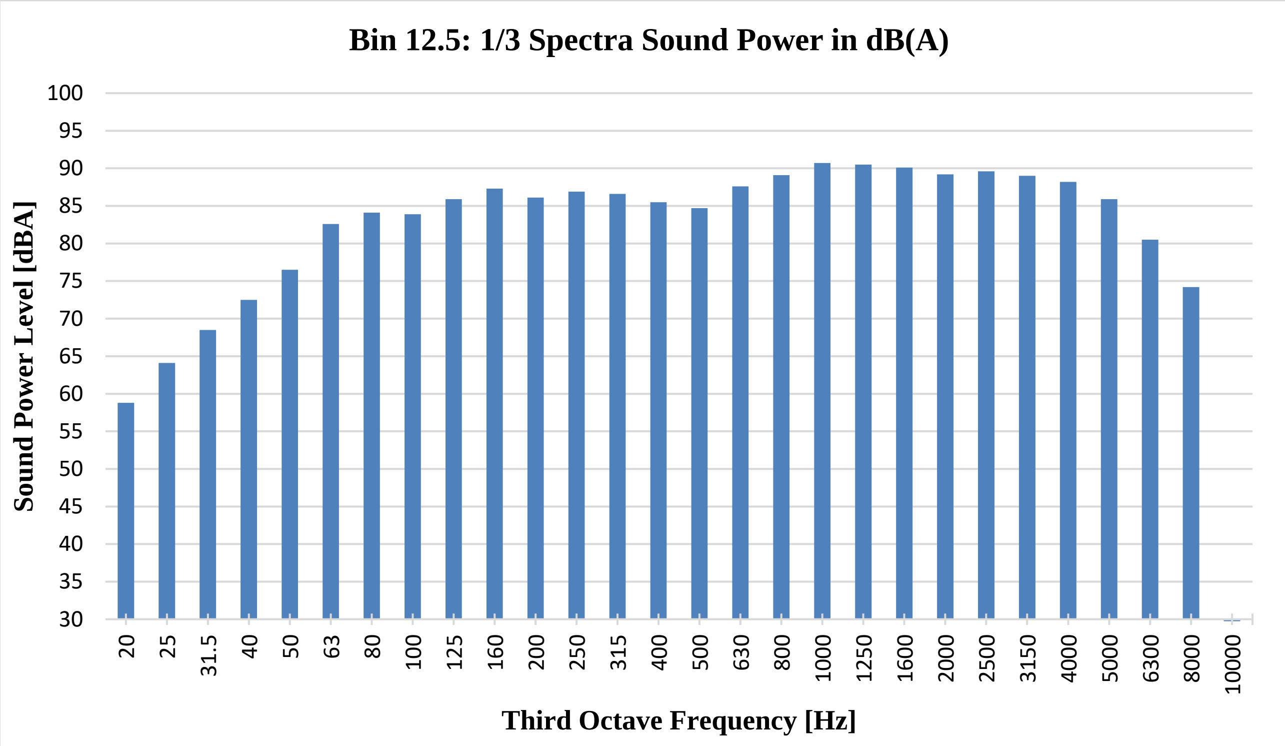
Bin 11.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	58.6	64.1	68.4	72.5	76.3	82.4	85.4	86.1	86.6	87.8	86.5	87.3	87.2	85.9
U_C	1.2	1.0	1.0	1.0	1.0	0.9	1.0	1.0	0.8	0.8	0.9	0.9	1.0	1.1
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	85.3	88.2	89.4	91.2	90.8	90.4	89.4	89.9	89.3	88.5	86.2	80.6	[71.7]	[66.9]
U_C	1.2	1.0	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.9	1.0	2.5	1.8

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



Bin 12: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	59.1	64.2	68.7	72.9	76.8	82.8	85.1	84.6	86.6	87.8	86.9	87.6	87.3	86.2
U_C	1.1	1.0	1.0	1.0	1.0	0.9	1.0	0.8	0.8	0.8	0.9	0.9	1.0	1.1
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	85.7	88.4	89.6	91.2	90.7	90.4	89.4	89.9	89.3	88.6	86.3	80.8	74.0	[67]
U_C	1.2	1.0	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.8	0.9	0.9	1.0	1.7

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).



Bin 12.5: 1/3 Spectra Sound Power in dB(A)														
Frequency[Hz]	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
Laeq	58.8	64.1	68.5	72.5	76.5	82.6	84.1	83.9	85.9	87.3	86.1	86.9	86.6	85.5
U_C	1.2	1.1	1.0	1.0	1.0	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.2	1.3
Frequency[Hz]	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Laeq	84.7	87.6	89.1	90.7	90.5	90.1	89.2	89.6	89.0	88.2	85.9	80.5	74.2	[68.2]
U_C	1.4	1.1	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.1	2.0

[ ] Total Noise less than 3 dB greater than background (3 dB correction applied).

APPENDIX D:

TONALITY ASSESSMENT

BIN 7.5: Tonal components determined

	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,4,7.5}$:	57.8	1.56	23.0	29.4	39.2	-9.8	-2.0	-7.8
$dL_{t1,20,7.5}$:	57.8	1.56	22.3	28.4	38.5	-10.2	-2.0	-8.2

BIN 7.5: Tonal components determined - Compact

Spectrum	f_T	$dL_{tn,j,k}$									
##	[Hz]	[dB]									
1	---	---									
2	---	---									
3	---	---									
4	57.8	-9.8									
5	---	---									
6	---	---									
7	---	---									
8	---	---									
9	---	---									
10	---	---									
11	---	---									
12	---	---									
13	---	---									
14	---	---									
15	---	---									
16	---	---									
17	---	---									
18	---	---									
19	---	---									
20	57.8	-10.2									
21	---	---									
22	---	---									
23	---	---									
24	---	---									
25	---	---									
26	---	---									
27	---	---									
28	---	---									
29	---	---									
30	---	---									
31	---	---									
32	---	---									
33	---	---									
f_t[Hz] | dL_k[dB]	57.8	-15.5									
L_a[dB]		-2.0									
$dL_{a,k}$[dB]		-13.5									
K_{TN}[dB]		0									

BIN 8: Tonal components determined

	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,7,8}$:	75.0	1.56	25.6	34.6	41.9	-7.4	-2.0	-5.4
$dL_{t1,8,8}$:	75.0	1.56	25.4	33.2	41.7	-8.5	-2.0	-6.5
$dL_{t1,13,8}$:	57.8	1.56	23.7	30.0	39.9	-9.9	-2.0	-7.9
$dL_{t1,15,8}$:	57.8	1.56	23.5	29.5	39.7	-10.2	-2.0	-8.2

$dL_{t1,45,8}$:	57.8	1.56	24.4	30.8	40.6	-9.9	-2.0	-7.9
$dL_{t2,30,8}$:	1657.9	1.56	18.2	24.2	38.4	-14.2	-3.3	-10.9

BIN 8: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**								
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**								
1	---	---	---	---								
2	---	---	---	---								
3	---	---	---	---								
4	---	---	---	---								
5	---	---	---	---								
6	---	---	---	---								
7	75.0	-7.4	---	---								
8	75.0	-8.5	---	---								
9	---	---	---	---								
10	---	---	---	---								
11	---	---	---	---								
12	---	---	---	---								
13	57.8	-9.9	---	---								
14	---	---	---	---								
15	57.8	-10.2	---	---								
16	---	---	---	---								
17	---	---	---	---								
18	---	---	---	---								
19	---	---	---	---								
20	---	---	---	---								
21	---	---	---	---								
22	---	---	---	---								
23	---	---	---	---								
24	---	---	---	---								
25	---	---	---	---								
26	---	---	---	---								
27	---	---	---	---								
28	---	---	---	---								
29	---	---	---	---								
30	---	---	1657.9	-14.2								
31	---	---	---	---								
32	---	---	---	---								
33	---	---	---	---								
34	---	---	---	---								
35	---	---	---	---								
36	---	---	---	---								
37	---	---	---	---								
38	---	---	---	---								
39	---	---	---	---								
40	---	---	---	---								
41	---	---	---	---								
42	---	---	---	---								
43	---	---	---	---								
44	---	---	---	---								
45	57.8	-9.9	---	---								
46	---	---	---	---								
f_t[Hz] | dL_k[dB]	73.9	-14.6	1657.9	-20.0								
L_a[dB]		-2.0		-3.3								

BIN 8: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**								
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**								
$dL_{a,k}$[dB]		-12.6		-16.6								
K_{TN}[dB]		0		0								

BIN 8.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,17,8.5}$:	75.0	1.56	24.9	31.8	41.2	-9.4	-2.0	-7.4
$dL_{t1,23,8.5}$:	57.8	1.56	23.5	29.7	39.7	-10.0	-2.0	-8.0
$dL_{t1,25,8.5}$:	57.8	1.56	22.7	29.1	38.9	-9.9	-2.0	-7.9
$dL_{t1,68,8.5}$:	57.8	1.56	24.2	30.5	40.4	-9.9	-2.0	-7.9
$dL_{t1,78,8.5}$:	57.8	1.56	23.3	29.8	39.6	-9.8	-2.0	-7.8
$dL_{t2,31,8.5}$:	95.3	1.56	26.2	32.3	42.5	-10.2	-2.0	-8.2
$dL_{t3,79,8.5}$:	137.5	1.56	28.1	35.9	44.4	-8.5	-2.0	-6.5
$dL_{t4,78,8.5}$:	175.0	1.56	26.8	33.3	43.1	-9.7	-2.0	-7.7

BIN 8.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
1	---	---	---	---	---	---	---	---				
2	---	---	---	---	---	---	---	---				
3	---	---	---	---	---	---	---	---				
4	---	---	---	---	---	---	---	---				
5	---	---	---	---	---	---	---	---				
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9	---	---	---	---	---	---	---	---				
10	---	---	---	---	---	---	---	---				
11	---	---	---	---	---	---	---	---				
12	---	---	---	---	---	---	---	---				
13	---	---	---	---	---	---	---	---				
14	---	---	---	---	---	---	---	---				
15	---	---	---	---	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	75.0	-9.4	---	---	---	---	---	---				
18	---	---	---	---	---	---	---	---				
19	---	---	---	---	---	---	---	---				
20	---	---	---	---	---	---	---	---				
21	---	---	---	---	---	---	---	---				
22	---	---	---	---	---	---	---	---				
23	57.8	-10.0	---	---	---	---	---	---				
24	---	---	---	---	---	---	---	---				
25	57.8	-9.9	---	---	---	---	---	---				
26	---	---	---	---	---	---	---	---				
27	---	---	---	---	---	---	---	---				
28	---	---	---	---	---	---	---	---				
29	---	---	---	---	---	---	---	---				
30	---	---	---	---	---	---	---	---				
31	---	---	95.3	-10.2	---	---	---	---				
32	---	---	---	---	---	---	---	---				

BIN 8.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
33	---	---	---	---	---	---	---	---				
34	---	---	---	---	---	---	---	---				
35	---	---	---	---	---	---	---	---				
36	---	---	---	---	---	---	---	---				
37	---	---	---	---	---	---	---	---				
38	---	---	---	---	---	---	---	---				
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40	---	---	---	---	---	---	---	---				
41	---	---	---	---	---	---	---	---				
42	---	---	---	---	---	---	---	---				
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46	---	---	---	---	---	---	---	---				
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56	---	---	---	---	---	---	---	---				
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59	---	---	---	---	---	---	---	---				
60	---	---	---	---	---	---	---	---				
61	---	---	---	---	---	---	---	---				
62	---	---	---	---	---	---	---	---				
63	---	---	---	---	---	---	---	---				
64	---	---	---	---	---	---	---	---				
65	---	---	---	---	---	---	---	---				
66	---	---	---	---	---	---	---	---				
67	---	---	---	---	---	---	---	---				
68	57.8	-9.9	---	---	---	---	---	---				
69	---	---	---	---	---	---	---	---				
70	---	---	---	---	---	---	---	---				
71	---	---	---	---	---	---	---	---				
72	---	---	---	---	---	---	---	---				
73	---	---	---	---	---	---	---	---				
74	---	---	---	---	---	---	---	---				
75	---	---	---	---	---	---	---	---				
76	---	---	---	---	---	---	---	---				
77	---	---	---	---	---	---	---	---				
78	57.8	-9.8	---	---	---	---	175.0	-9.7				
79	---	---	---	---	137.5	-8.5	---	---				
80	---	---	---	---	---	---	---	---				
81	---	---	---	---	---	---	---	---				
f_t[Hz] | dL_k[dB]	74.2	-15.5	95.3	-16.2	137.5	-16.1	175.0	-16.2				
L_a[dB]		-2.0		-2.0		-2.0		-2.0				

BIN 8.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
$dL_{a,k}$[dB]		-13.5		-14.2		-14.1		-14.2				
K_{TN}[dB]		0		0		0		0				

BIN 9: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,2,9}$:	70.3	1.56	23.3	34.5	39.6	-5.1	-2.0	-3.1
$dL_{t1,31,9}$:	57.8	1.56	23.6	30.5	39.8	-9.3	-2.0	-7.3
$dL_{t1,69,9}$:	57.8	1.56	23.7	30.6	40.0	-9.4	-2.0	-7.4
$dL_{t1,89,9}$:	57.8	1.56	25.3	31.5	41.6	-10.0	-2.0	-8.0
$dL_{t1,90,9}$:	57.8	1.56	23.6	31.0	39.9	-8.9	-2.0	-6.9
$dL_{t2,2,9}$:	70.3	1.56	23.3	34.5	39.6	-5.1	-2.0	-3.1
$dL_{t2,22,9}$:	78.1	1.56	25.7	34.4	42.0	-7.6	-2.0	-5.6
$dL_{t2,78,9}$:	85.9	1.56	26.9	39.4	43.2	-3.8	-2.0	-1.8
$dL_{t3,2,9}$:	140.6	1.56	26.0	35.6	42.3	-6.7	-2.0	-4.7
$dL_{t3,13,9}$:	137.5	1.56	27.8	34.1	44.1	-10.0	-2.0	-8.0
$dL_{t3,26,9}$:	137.5	1.56	26.8	32.9	43.1	-10.3	-2.0	-8.2
$dL_{t3,61,9}$:	135.9	1.56	28.0	35.7	44.3	-8.7	-2.0	-6.6
$dL_{t3,64,9}$:	135.9	1.56	28.8	38.1	45.1	-7.1	-2.0	-5.0
$dL_{t3,65,9}$:	135.9	1.56	26.6	32.9	42.9	-10.0	-2.0	-8.0
$dL_{t3,66,9}$:	135.9	1.56	27.2	33.4	43.5	-10.1	-2.0	-8.1
$dL_{t3,72,9}$:	135.9	1.56	28.8	36.9	45.1	-8.1	-2.0	-6.1
$dL_{t3,77,9}$:	135.9	1.56	27.1	33.3	43.4	-10.1	-2.0	-8.1
$dL_{t3,81,9}$:	137.5	1.56	28.1	35.6	44.4	-8.8	-2.0	-6.8
$dL_{t3,84,9}$:	137.5	1.56	27.0	33.4	43.3	-9.9	-2.0	-7.9
$dL_{t3,88,9}$:	137.5	1.56	27.4	37.7	43.7	-6.1	-2.0	-4.1
$dL_{t3,90,9}$:	135.9	1.56	26.8	36.3	43.1	-6.8	-2.0	-4.8
$dL_{t3,91,9}$:	135.9	1.56	27.5	36.3	43.8	-7.5	-2.0	-5.5
$dL_{t4,92,9}$:	206.3	1.56	27.7	36.0	44.0	-8.0	-2.0	-5.9
$dL_{t5,78,9}$:	259.4	1.56	26.4	32.6	42.8	-10.2	-2.1	-8.1

BIN 9: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$		
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]		
1	---	---	---	---	---	---	---	---	---	---		
2	70.3	-5.1	70.3	-5.1	140.6	-6.7	---	---	---	---		
3	---	---	---	---	---	---	---	---	---	---		
4	---	---	---	---	---	---	---	---	---	---		
5	---	---	---	---	---	---	---	---	---	---		
6	---	---	---	---	---	---	---	---	---	---		
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9	---	---	---	---	---	---	---	---	---	---		
10	---	---	---	---	---	---	---	---	---	---		
11	---	---	---	---	---	---	---	---	---	---		
12	---	---	---	---	---	---	---	---	---	---		
13	---	---	---	---	137.5	-10.0	---	---	---	---		
14	---	---	---	---	---	---	---	---	---	---		
15	---	---	---	---	---	---	---	---	---	---		
16	---	---	---	---	---	---	---	---	---	---		

BIN 9: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$		
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]		
17	---	---	---	---	---	---	---	---	---	---		
18	---	---	---	---	---	---	---	---	---	---		
19	---	---	---	---	---	---	---	---	---	---		
20	---	---	---	---	---	---	---	---	---	---		
21	---	---	---	---	---	---	---	---	---	---		
22	---	---	78.1	-7.6	---	---	---	---	---	---		
23	---	---	---	---	---	---	---	---	---	---		
24	---	---	---	---	---	---	---	---	---	---		
25	---	---	---	---	---	---	---	---	---	---		
26	---	---	---	---	137.5	-10.3	---	---	---	---		
27	---	---	---	---	---	---	---	---	---	---		
28	---	---	---	---	---	---	---	---	---	---		
29	---	---	---	---	---	---	---	---	---	---		
30	---	---	---	---	---	---	---	---	---	---		
31	57.8	-9.3	---	---	---	---	---	---	---	---		
32	---	---	---	---	---	---	---	---	---	---		
33	---	---	---	---	---	---	---	---	---	---		
34	---	---	---	---	---	---	---	---	---	---		
35	---	---	---	---	---	---	---	---	---	---		
36	---	---	---	---	---	---	---	---	---	---		
37	---	---	---	---	---	---	---	---	---	---		
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48	---	---	---	---	---	---	---	---	---	---		
49	---	---	---	---	---	---	---	---	---	---		
50	---	---	---	---	---	---	---	---	---	---		
51	---	---	---	---	---	---	---	---	---	---		
52	---	---	---	---	---	---	---	---	---	---		
53	---	---	---	---	---	---	---	---	---	---		
54	---	---	---	---	---	---	---	---	---	---		
55	---	---	---	---	---	---	---	---	---	---		
56	---	---	---	---	---	---	---	---	---	---		
57	---	---	---	---	---	---	---	---	---	---		
58	---	---	---	---	---	---	---	---	---	---		
59	---	---	---	---	---	---	---	---	---	---		
60	---	---	---	---	---	---	---	---	---	---		
61	---	---	---	---	135.9	-8.7	---	---	---	---		
62	---	---	---	---	---	---	---	---	---	---		
63	---	---	---	---	---	---	---	---	---	---		
64	---	---	---	---	135.9	-7.1	---	---	---	---		
65	---	---	---	---	135.9	-10.0	---	---	---	---		
66	---	---	---	---	135.9	-10.1	---	---	---	---		
67	---	---	---	---	---	---	---	---	---	---		

BIN 9: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**		
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**		
68	---	---	---	---	---	---	---	---	---	---		
69	57.8	-9.4	---	---	---	---	---	---	---	---		
70	---	---	---	---	---	---	---	---	---	---		
71	---	---	---	---	---	---	---	---	---	---		
72	---	---	---	---	135.9	-8.1	---	---	---	---		
73	---	---	---	---	---	---	---	---	---	---		
74	---	---	---	---	---	---	---	---	---	---		
75	---	---	---	---	---	---	---	---	---	---		
76	---	---	---	---	---	---	---	---	---	---		
77	---	---	---	---	135.9	-10.1	---	---	---	---		
78	---	---	85.9	-3.8	---	---	---	---	259.4	-10.2		
79	---	---	---	---	---	---	---	---	---	---		
80	---	---	---	---	---	---	---	---	---	---		
81	---	---	---	---	137.5	-8.8	---	---	---	---		
82	---	---	---	---	---	---	---	---	---	---		
83	---	---	---	---	---	---	---	---	---	---		
84	---	---	---	---	137.5	-9.9	---	---	---	---		
85	---	---	---	---	---	---	---	---	---	---		
86	---	---	---	---	---	---	---	---	---	---		
87	---	---	---	---	---	---	---	---	---	---		
88	---	---	---	---	137.5	-6.1	---	---	---	---		
89	57.8	-10.0	---	---	---	---	---	---	---	---		
90	57.8	-8.9	---	---	135.9	-6.8	---	---	---	---		
91	---	---	---	---	135.9	-7.5	---	---	---	---		
92	---	---	---	---	---	---	206.3	-8.0	---	---		
93	---	---	---	---	---	---	---	---	---	---		
94	---	---	---	---	---	---	---	---	---	---		
f_t[Hz] | dL_k[dB]	69.5	-15.2	70.9	-14.9	140.1	-13.8	206.3	-16.2	259.4	-16.4		
L_a[dB]		-2.0		-2.0		-2.0		-2.0		-2.1		
$dL_{a,k}$[dB]		-13.2		-12.9		-11.8		-14.1		-14.3		
K_{TN}[dB]		0		0		0		0		0		

BIN 9.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,87,9.5}$:	57.8	1.56	24.5	31.2	40.8	-9.6	-2.0	-7.6
$dL_{t1,88,9.5}$:	57.8	1.56	24.0	30.3	40.2	-9.9	-2.0	-7.9
$dL_{t2,11,9.5}$:	79.7	1.56	25.7	31.9	42.0	-10.2	-2.0	-8.2
$dL_{t3,5,9.5}$:	137.5	1.56	26.8	34.2	43.1	-8.9	-2.0	-6.9
$dL_{t3,7,9.5}$:	135.9	1.56	27.2	33.8	43.5	-9.7	-2.0	-7.7
$dL_{t3,45,9.5}$:	135.9	1.56	26.7	32.7	43.0	-10.3	-2.0	-8.3
$dL_{t3,50,9.5}$:	137.5	1.56	27.4	33.8	43.7	-9.9	-2.0	-7.9
$dL_{t3,51,9.5}$:	137.5	1.56	27.0	35.6	43.3	-7.7	-2.0	-5.7
$dL_{t3,55,9.5}$:	135.9	1.56	28.6	37.6	44.9	-7.3	-2.0	-5.2
$dL_{t3,56,9.5}$:	135.9	1.56	28.0	38.0	44.3	-6.3	-2.0	-4.2
$dL_{t3,57,9.5}$:	135.9	1.56	27.5	34.2	43.8	-9.5	-2.0	-7.5
$dL_{t3,58,9.5}$:	135.9	1.56	28.3	36.6	44.6	-8.0	-2.0	-5.9
$dL_{t3,63,9.5}$:	135.9	1.56	28.0	34.0	44.3	-10.3	-2.0	-8.3
$dL_{t3,67,9.5}$:	135.9	1.56	27.1	33.6	43.4	-9.8	-2.0	-7.8
$dL_{t3,72,9.5}$:	135.9	1.56	26.9	34.3	43.2	-8.9	-2.0	-6.9
$dL_{t3,73,9.5}$:	135.9	1.56	28.2	39.5	44.5	-5.0	-2.0	-3.0

BIN 9.5: Tonal components determined								
	Frequency	**delta f**	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t3,74,9.5}$:	135.9	1.56	27.4	34.5	43.7	-9.3	-2.0	-7.2
$dL_{t3,75,9.5}$:	135.9	1.56	27.1	36.0	43.4	-7.4	-2.0	-5.4
$dL_{t3,78,9.5}$:	135.9	1.56	27.8	34.3	44.1	-9.8	-2.0	-7.8
$dL_{t3,81,9.5}$:	135.9	1.56	28.7	35.8	45.0	-9.2	-2.0	-7.2
$dL_{t3,82,9.5}$:	135.9	1.56	27.8	37.2	44.1	-6.9	-2.0	-4.8
$dL_{t3,84,9.5}$:	137.5	1.56	27.2	33.3	43.5	-10.2	-2.0	-8.2
$dL_{t3,87,9.5}$:	137.5	1.56	27.2	36.8	43.5	-6.8	-2.0	-4.7
$dL_{t3,94,9.5}$:	137.5	1.56	28.6	36.8	44.9	-8.1	-2.0	-6.1
$dL_{t3,98,9.5}$:	135.9	1.56	27.8	34.2	44.1	-9.9	-2.0	-7.9
$dL_{t3,99,9.5}$:	137.5	1.56	27.4	36.6	43.7	-7.2	-2.0	-5.1
$dL_{t4,11,9.5}$:	159.4	1.56	28.0	34.1	44.3	-10.2	-2.0	-8.2

BIN 9.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
1	---	---	---	---	---	---	---	---				
2	---	---	---	---	---	---	---	---				
3	---	---	---	---	---	---	---	---				
4	---	---	---	---	---	---	---	---				
5	---	---	---	---	137.5	-8.9	---	---				
6	---	---	---	---	---	---	---	---				
7	---	---	---	---	135.9	-9.7	---	---				
8	---	---	---	---	---	---	---	---				
9	---	---	---	---	---	---	---	---				
10	---	---	---	---	---	---	---	---				
11	---	---	79.7	-10.2	---	---	159.4	-10.2				
12	---	---	---	---	---	---	---	---				
13	---	---	---	---	---	---	---	---				
14	---	---	---	---	---	---	---	---				
15	---	---	---	---	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	---	---	---	---	---	---	---	---				
18	---	---	---	---	---	---	---	---				
19	---	---	---	---	---	---	---	---				
20	---	---	---	---	---	---	---	---				
21	---	---	---	---	---	---	---	---				
22	---	---	---	---	---	---	---	---				
23	---	---	---	---	---	---	---	---				
24	---	---	---	---	---	---	---	---				
25	---	---	---	---	---	---	---	---				
26	---	---	---	---	---	---	---	---				
27	---	---	---	---	---	---	---	---				
28	---	---	---	---	---	---	---	---				
29	---	---	---	---	---	---	---	---				
30	---	---	---	---	---	---	---	---				
31	---	---	---	---	---	---	---	---				
32	---	---	---	---	---	---	---	---				
33	---	---	---	---	---	---	---	---				
34	---	---	---	---	---	---	---	---				
35	---	---	---	---	---	---	---	---				
36	---	---	---	---	---	---	---	---				

BIN 9.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
37	---	---	---	---	---	---	---	---				
38	---	---	---	---	---	---	---	---				
39	---	---	---	---	---	---	---	---				
40	---	---	---	---	---	---	---	---				
41	---	---	---	---	---	---	---	---				
42	---	---	---	---	---	---	---	---				
43	---	---	---	---	---	---	---	---				
44	---	---	---	---	---	---	---	---				
45	---	---	---	---	135.9	-10.3	---	---				
46	---	---	---	---	---	---	---	---				
47	---	---	---	---	---	---	---	---				
48	---	---	---	---	---	---	---	---				
49	---	---	---	---	---	---	---	---				
50	---	---	---	---	137.5	-9.9	---	---				
51	---	---	---	---	137.5	-7.7	---	---				
52	---	---	---	---	---	---	---	---				
53	---	---	---	---	---	---	---	---				
54	---	---	---	---	---	---	---	---				
55	---	---	---	---	135.9	-7.3	---	---				
56	---	---	---	---	135.9	-6.3	---	---				
57	---	---	---	---	135.9	-9.5	---	---				
58	---	---	---	---	135.9	-8.0	---	---				
59	---	---	---	---	---	---	---	---				
60	---	---	---	---	---	---	---	---				
61	---	---	---	---	---	---	---	---				
62	---	---	---	---	---	---	---	---				
63	---	---	---	---	135.9	-10.3	---	---				
64	---	---	---	---	---	---	---	---				
65	---	---	---	---	---	---	---	---				
66	---	---	---	---	---	---	---	---				
67	---	---	---	---	135.9	-9.8	---	---				
68	---	---	---	---	---	---	---	---				
69	---	---	---	---	---	---	---	---				
70	---	---	---	---	---	---	---	---				
71	---	---	---	---	---	---	---	---				
72	---	---	---	---	135.9	-8.9	---	---				
73	---	---	---	---	135.9	-5.0	---	---				
74	---	---	---	---	135.9	-9.3	---	---				
75	---	---	---	---	135.9	-7.4	---	---				
76	---	---	---	---	---	---	---	---				
77	---	---	---	---	---	---	---	---				
78	---	---	---	---	135.9	-9.8	---	---				
79	---	---	---	---	---	---	---	---				
80	---	---	---	---	---	---	---	---				
81	---	---	---	---	135.9	-9.2	---	---				
82	---	---	---	---	135.9	-6.9	---	---				
83	---	---	---	---	---	---	---	---				
84	---	---	---	---	137.5	-10.2	---	---				
85	---	---	---	---	---	---	---	---				
86	---	---	---	---	---	---	---	---				
87	57.8	-9.6	---	---	137.5	-6.8	---	---				

BIN 9.5: Tonal components determined - Compact

Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
88	57.8	-9.9	---	---	---	---	---	---				
89	---	---	---	---	---	---	---	---				
90	---	---	---	---	---	---	---	---				
91	---	---	---	---	---	---	---	---				
92	---	---	---	---	---	---	---	---				
93	---	---	---	---	---	---	---	---				
94	---	---	---	---	137.5	-8.1	---	---				
95	---	---	---	---	---	---	---	---				
96	---	---	---	---	---	---	---	---				
97	---	---	---	---	---	---	---	---				
98	---	---	---	---	135.9	-9.9	---	---				
99	---	---	---	---	137.5	-7.2	---	---				
100	---	---	---	---	---	---	---	---				
f_t[Hz] | dL_k[dB]	57.8	-16.0	79.7	-16.2	137.3	-12.8	159.4	-16.2				
L_a[dB]		-2.0		-2.0		-2.0		-2.0				
$dL_{a,k}$[dB]		-14.0		-14.2		-10.8		-14.2				
K_{TN}[dB]		0		0		0		0				

BIN 10: Tonal components determined

	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,18,10}$:	57.8	1.56	24.3	31.6	40.6	-9.0	-2.0	-7.0
$dL_{t1,24,10}$:	65.6	1.56	23.0	30.0	39.2	-9.2	-2.0	-7.2
$dL_{t1,32,10}$:	57.8	1.56	23.5	30.0	39.7	-9.7	-2.0	-7.7
$dL_{t1,34,10}$:	57.8	1.56	21.7	30.1	37.9	-7.8	-2.0	-5.8
$dL_{t1,40,10}$:	65.6	1.56	20.1	35.6	36.4	-0.8	-2.0	1.2
$dL_{t1,47,10}$:	57.8	1.56	24.6	31.1	40.9	-9.8	-2.0	-7.8
$dL_{t1,49,10}$:	57.8	1.56	22.2	29.8	38.4	-8.6	-2.0	-6.6
$dL_{t2,19,10}$:	135.9	1.56	27.8	34.6	44.1	-9.6	-2.0	-7.5
$dL_{t2,21,10}$:	135.9	1.56	26.0	33.5	42.3	-8.9	-2.0	-6.8
$dL_{t2,30,10}$:	135.9	1.56	27.2	33.5	43.5	-10.0	-2.0	-8.0
$dL_{t2,38,10}$:	135.9	1.56	27.2	33.3	43.5	-10.3	-2.0	-8.2
$dL_{t2,40,10}$:	117.2	1.56	23.3	30.8	39.6	-8.8	-2.0	-6.8
$dL_{t2,44,10}$:	135.9	1.56	26.8	33.1	43.1	-10.0	-2.0	-8.0
$dL_{t2,50,10}$:	135.9	1.56	27.4	37.3	43.7	-6.3	-2.0	-4.3
$dL_{t3,19,10}$:	135.9	1.56	27.8	34.6	44.1	-9.6	-2.0	-7.5
$dL_{t3,20,10}$:	137.5	1.56	27.7	34.3	44.0	-9.7	-2.0	-7.7
$dL_{t3,21,10}$:	135.9	1.56	26.0	33.5	42.3	-8.9	-2.0	-6.8
$dL_{t3,30,10}$:	135.9	1.56	27.2	33.5	43.5	-10.0	-2.0	-8.0
$dL_{t3,38,10}$:	135.9	1.56	27.2	33.3	43.5	-10.3	-2.0	-8.2
$dL_{t3,44,10}$:	135.9	1.56	26.8	33.1	43.1	-10.0	-2.0	-8.0
$dL_{t3,50,10}$:	135.9	1.56	27.4	37.3	43.7	-6.3	-2.0	-4.3
$dL_{t4,40,10}$:	175.0	1.56	24.0	34.5	40.3	-5.9	-2.0	-3.8

BIN 10: Tonal components determined - Compact

Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
1	---	---	---	---	---	---	---	---				
2	---	---	---	---	---	---	---	---				
3	---	---	---	---	---	---	---	---				

BIN 10: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
4	---	---	---	---	---	---	---	---				
5	---	---	---	---	---	---	---	---				
6	---	---	---	---	---	---	---	---				
7	---	---	---	---	---	---	---	---				
8	---	---	---	---	---	---	---	---				
9	---	---	---	---	---	---	---	---				
10	---	---	---	---	---	---	---	---				
11	---	---	---	---	---	---	---	---				
12	---	---	---	---	---	---	---	---				
13	---	---	---	---	---	---	---	---				
14	---	---	---	---	---	---	---	---				
15	---	---	---	---	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	---	---	---	---	---	---	---	---				
18	57.8	-9.0	---	---	---	---	---	---				
19	---	---	135.9	-9.6	135.9	-9.6	---	---				
20	---	---	---	---	137.5	-9.7	---	---				
21	---	---	135.9	-8.9	135.9	-8.9	---	---				
22	---	---	---	---	---	---	---	---				
23	---	---	---	---	---	---	---	---				
24	65.6	-9.2	---	---	---	---	---	---				
25	---	---	---	---	---	---	---	---				
26	---	---	---	---	---	---	---	---				
27	---	---	---	---	---	---	---	---				
28	---	---	---	---	---	---	---	---				
29	---	---	---	---	---	---	---	---				
30	---	---	135.9	-10.0	135.9	-10.0	---	---				
31	---	---	---	---	---	---	---	---				
32	57.8	-9.7	---	---	---	---	---	---				
33	---	---	---	---	---	---	---	---				
34	57.8	-7.8	---	---	---	---	---	---				
35	---	---	---	---	---	---	---	---				
36	---	---	---	---	---	---	---	---				
37	---	---	---	---	---	---	---	---				
38	---	---	135.9	-10.3	135.9	-10.3	---	---				
39	---	---	---	---	---	---	---	---				
40	65.6	-0.8	117.2	-8.8	---	---	175.0	-5.9				
41	---	---	---	---	---	---	---	---				
42	---	---	---	---	---	---	---	---				
43	---	---	---	---	---	---	---	---				
44	---	---	135.9	-10.0	135.9	-10.0	---	---				
45	---	---	---	---	---	---	---	---				
46	---	---	---	---	---	---	---	---				
47	57.8	-9.8	---	---	---	---	---	---				
48	---	---	---	---	---	---	---	---				
49	57.8	-8.6	---	---	---	---	---	---				
50	---	---	135.9	-6.3	135.9	-6.3	---	---				
51	---	---	---	---	---	---	---	---				
52	---	---	---	---	---	---	---	---				
53	---	---	---	---	---	---	---	---				
$f_t[Hz] \mid dL_k[dB]$	58.1	-13.0	135.2	-14.3	136.0	-14.4	175.0	-15.6				

BIN 10: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$				
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]				
L_a[dB]		-2.0		-2.0		-2.0		-2.0				
$dL_{a,k}$[dB]		-11.0		-12.3		-12.4		-13.6				
K_{TN}[dB]		0		0		0		0				

BIN 10.5: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,13,10.5}$:	70.3	1.56	24.0	35.1	40.3	-5.1	-2.0	-3.1
$dL_{t1,14,10.5}$:	65.6	1.56	23.2	29.4	39.5	-10.1	-2.0	-8.1
$dL_{t1,31,10.5}$:	57.8	1.56	20.6	30.8	36.8	-6.0	-2.0	-4.0
$dL_{t1,35,10.5}$:	65.6	1.56	24.5	31.3	40.8	-9.5	-2.0	-7.5
$dL_{t1,37,10.5}$:	57.8	1.56	22.1	30.6	38.3	-7.7	-2.0	-5.7
$dL_{t1,38,10.5}$:	57.8	1.56	23.5	29.6	39.7	-10.1	-2.0	-8.1
$dL_{t1,39,10.5}$:	57.8	1.56	22.6	29.6	38.8	-9.2	-2.0	-7.2
$dL_{t1,41,10.5}$:	65.6	1.56	21.4	31.1	37.7	-6.6	-2.0	-4.6
$dL_{t1,44,10.5}$:	57.8	1.56	22.8	30.2	39.0	-8.9	-2.0	-6.9
$dL_{t1,46,10.5}$:	57.8	1.56	22.8	29.0	39.0	-10.0	-2.0	-8.0
$dL_{t1,48,10.5}$:	57.8	1.56	22.2	30.4	38.4	-8.0	-2.0	-6.0
$dL_{t1,49,10.5}$:	65.6	1.56	22.5	30.5	38.7	-8.2	-2.0	-6.2
$dL_{t1,53,10.5}$:	57.8	1.56	21.6	32.3	37.8	-5.5	-2.0	-3.5
$dL_{t1,54,10.5}$:	57.8	1.56	21.3	28.9	37.6	-8.7	-2.0	-6.7
$dL_{t1,55,10.5}$:	57.8	1.56	20.6	32.1	36.9	-4.8	-2.0	-2.8
$dL_{t1,56,10.5}$:	57.8	1.56	21.3	30.8	37.6	-6.8	-2.0	-4.8
$dL_{t1,57,10.5}$:	57.8	1.56	20.9	29.3	37.1	-7.8	-2.0	-5.8
$dL_{t1,58,10.5}$:	57.8	1.56	23.7	31.8	39.9	-8.1	-2.0	-6.1
$dL_{t1,59,10.5}$:	57.8	1.56	23.6	32.0	39.9	-7.8	-2.0	-5.8
$dL_{t1,61,10.5}$:	70.3	1.56	23.5	31.1	39.8	-8.8	-2.0	-6.8
$dL_{t1,62,10.5}$:	57.8	1.56	23.5	30.1	39.7	-9.6	-2.0	-7.6
$dL_{t1,63,10.5}$:	57.8	1.56	23.0	29.8	39.2	-9.5	-2.0	-7.5
$dL_{t1,64,10.5}$:	65.6	1.56	21.5	33.2	37.8	-4.6	-2.0	-2.6
$dL_{t1,65,10.5}$:	57.8	1.56	21.5	30.7	37.7	-7.0	-2.0	-5.0
$dL_{t1,66,10.5}$:	57.8	1.56	22.2	32.9	38.4	-5.5	-2.0	-3.5
$dL_{t1,67,10.5}$:	57.8	1.56	23.5	30.1	39.7	-9.5	-2.0	-7.5
$dL_{t1,68,10.5}$:	57.8	1.56	21.9	30.6	38.2	-7.5	-2.0	-5.5
$dL_{t1,69,10.5}$:	57.8	1.56	23.2	30.5	39.5	-8.9	-2.0	-6.9
$dL_{t1,71,10.5}$:	57.8	1.56	21.6	29.7	37.8	-8.1	-2.0	-6.1
$dL_{t1,72,10.5}$:	57.8	1.56	20.8	31.9	37.1	-5.2	-2.0	-3.2
$dL_{t1,73,10.5}$:	57.8	1.56	21.0	30.6	37.2	-6.7	-2.0	-4.7
$dL_{t1,74,10.5}$:	57.8	1.56	22.4	31.0	38.6	-7.6	-2.0	-5.6
$dL_{t1,75,10.5}$:	57.8	1.56	23.1	30.9	39.4	-8.5	-2.0	-6.5
$dL_{t1,79,10.5}$:	57.8	1.56	23.9	32.6	40.1	-7.5	-2.0	-5.5
$dL_{t1,82,10.5}$:	57.8	1.56	22.5	29.8	38.7	-8.9	-2.0	-6.9
$dL_{t1,83,10.5}$:	57.8	1.56	24.1	31.1	40.3	-9.2	-2.0	-7.2
$dL_{t1,84,10.5}$:	57.8	1.56	22.8	29.2	39.0	-9.8	-2.0	-7.8
$dL_{t2,21,10.5}$:	135.9	1.56	27.5	33.5	43.8	-10.3	-2.0	-8.3
$dL_{t2,36,10.5}$:	135.9	1.56	28.6	37.1	44.9	-7.8	-2.0	-5.8
$dL_{t2,47,10.5}$:	137.5	1.56	26.5	34.3	42.8	-8.5	-2.0	-6.5
$dL_{t2,65,10.5}$:	134.4	1.56	24.2	30.3	40.5	-10.3	-2.0	-8.2
$dL_{t3,31,10.5}$:	175.0	1.56	24.1	32.8	40.4	-7.6	-2.0	-5.5
$dL_{t3,39,10.5}$:	175.0	1.56	25.6	35.1	41.9	-6.8	-2.0	-4.8
$dL_{t3,48,10.5}$:	175.0	1.56	25.6	32.8	41.9	-9.1	-2.0	-7.0

BIN 10.5: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t3,55,10.5}$:	175.0	1.56	23.8	30.1	40.1	-10.0	-2.0	-8.0
$dL_{t3,57,10.5}$:	175.0	1.56	25.0	31.7	41.3	-9.6	-2.0	-7.5
$dL_{t3,59,10.5}$:	175.0	1.56	26.5	32.6	42.8	-10.2	-2.0	-8.1
$dL_{t3,66,10.5}$:	175.0	1.56	25.7	37.1	42.0	-4.8	-2.0	-2.8
$dL_{t3,67,10.5}$:	175.0	1.56	26.2	32.4	42.5	-10.1	-2.0	-8.0
$dL_{t3,71,10.5}$:	175.0	1.56	24.9	31.0	41.2	-10.2	-2.0	-8.2
$dL_{t3,73,10.5}$:	175.0	1.56	24.6	31.2	40.9	-9.7	-2.0	-7.7
$dL_{t3,84,10.5}$:	175.0	1.56	25.5	33.8	41.8	-8.0	-2.0	-6.0

BIN 10.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$						
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]						
1	---	---	---	---	---	---						
2	---	---	---	---	---	---						
3	---	---	---	---	---	---						
4	---	---	---	---	---	---						
5	---	---	---	---	---	---						
6	---	---	---	---	---	---						
7	---	---	---	---	---	---						
8	---	---	---	---	---	---						
9	---	---	---	---	---	---						
10	---	---	---	---	---	---						
11	---	---	---	---	---	---						
12	---	---	---	---	---	---						
13	70.3	-5.1	---	---	---	---						
14	65.6	-10.1	---	---	---	---						
15	---	---	---	---	---	---						
16	---	---	---	---	---	---						
17	---	---	---	---	---	---						
18	---	---	---	---	---	---						
19	---	---	---	---	---	---						
20	---	---	---	---	---	---						
21	---	---	135.9	-10.3	---	---						
22	---	---	---	---	---	---						
23	---	---	---	---	---	---						
24	---	---	---	---	---	---						
25	---	---	---	---	---	---						
26	---	---	---	---	---	---						
27	---	---	---	---	---	---						
28	---	---	---	---	---	---						
29	---	---	---	---	---	---						
30	---	---	---	---	---	---						
31	57.8	-6.0	---	---	175.0	-7.6						
32	---	---	---	---	---	---						
33	---	---	---	---	---	---						
34	---	---	---	---	---	---						
35	65.6	-9.5	---	---	---	---						
36	---	---	135.9	-7.8	---	---						
37	57.8	-7.7	---	---	---	---						
38	57.8	-10.1	---	---	---	---						
39	57.8	-9.2	---	---	175.0	-6.8						

BIN 10.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**						
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**						
40	---	---	---	---	---	---						
41	65.6	-6.6	---	---	---	---						
42	---	---	---	---	---	---						
43	---	---	---	---	---	---						
44	57.8	-8.9	---	---	---	---						
45	---	---	---	---	---	---						
46	57.8	-10.0	---	---	---	---						
47	---	---	137.5	-8.5	---	---						
48	57.8	-8.0	---	---	175.0	-9.1						
49	65.6	-8.2	---	---	---	---						
50	---	---	---	---	---	---						
51	---	---	---	---	---	---						
52	---	---	---	---	---	---						
53	57.8	-5.5	---	---	---	---						
54	57.8	-8.7	---	---	---	---						
55	57.8	-4.8	---	---	175.0	-10.0						
56	57.8	-6.8	---	---	---	---						
57	57.8	-7.8	---	---	175.0	-9.6						
58	57.8	-8.1	---	---	---	---						
59	57.8	-7.8	---	---	175.0	-10.2						
60	---	---	---	---	---	---						
61	70.3	-8.8	---	---	---	---						
62	57.8	-9.6	---	---	---	---						
63	57.8	-9.5	---	---	---	---						
64	65.6	-4.6	---	---	---	---						
65	57.8	-7.0	134.4	-10.3	---	---						
66	57.8	-5.5	---	---	175.0	-4.8						
67	57.8	-9.5	---	---	175.0	-10.1						
68	57.8	-7.5	---	---	---	---						
69	57.8	-8.9	---	---	---	---						
70	---	---	---	---	---	---						
71	57.8	-8.1	---	---	175.0	-10.2						
72	57.8	-5.2	---	---	---	---						
73	57.8	-6.7	---	---	175.0	-9.7						
74	57.8	-7.6	---	---	---	---						
75	57.8	-8.5	---	---	---	---						
76	---	---	---	---	---	---						
77	---	---	---	---	---	---						
78	---	---	---	---	---	---						
79	57.8	-7.5	---	---	---	---						
80	---	---	---	---	---	---						
81	---	---	---	---	---	---						
82	57.8	-8.9	---	---	---	---						
83	57.8	-9.2	---	---	---	---						
84	57.8	-9.8	---	---	175.0	-8.0						
85	---	---	---	---	---	---						
**f_t[Hz]	dL_k[dB]**	65.6	-10.5	135.9	-15.5	175.0	-14.1						
L_a[dB]		-2.0		-2.0		-2.0						
$dL_{a,k}$[dB]		-8.5		-13.5		-12.1						
K_{TN}[dB]		0		0		0						

BIN 11: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,3,11}$:	70.3	1.56	25.3	33.0	41.6	-8.6	-2.0	-6.6
$dL_{t1,4,11}$:	70.3	1.56	25.7	34.9	42.0	-7.1	-2.0	-5.1
$dL_{t1,6,11}$:	71.9	1.56	25.0	33.2	41.3	-8.1	-2.0	-6.1
$dL_{t1,12,11}$:	67.2	1.56	20.9	31.0	37.2	-6.2	-2.0	-4.2
$dL_{t1,13,11}$:	57.8	1.56	22.4	33.7	38.6	-4.9	-2.0	-2.9
$dL_{t1,14,11}$:	57.8	1.56	23.2	30.4	39.5	-9.0	-2.0	-7.0
$dL_{t1,17,11}$:	70.3	1.56	24.5	31.9	40.8	-8.9	-2.0	-6.9
$dL_{t1,19,11}$:	65.6	1.56	23.5	31.2	39.8	-8.6	-2.0	-6.6
$dL_{t1,20,11}$:	70.3	1.56	26.0	32.4	42.3	-9.8	-2.0	-7.8
$dL_{t1,21,11}$:	57.8	1.56	21.1	29.4	37.3	-7.9	-2.0	-5.9
$dL_{t1,24,11}$:	70.3	1.56	23.9	35.0	40.2	-5.2	-2.0	-3.2
$dL_{t1,25,11}$:	65.6	1.56	21.7	29.8	38.0	-8.2	-2.0	-6.2
$dL_{t1,28,11}$:	57.8	1.56	22.2	30.8	38.5	-7.6	-2.0	-5.6
$dL_{t1,31,11}$:	65.6	1.56	21.3	31.8	37.5	-5.7	-2.0	-3.7
$dL_{t1,32,11}$:	57.8	1.56	23.9	31.0	40.2	-9.1	-2.0	-7.1
$dL_{t1,33,11}$:	57.8	1.56	25.1	31.6	41.4	-9.8	-2.0	-7.8
$dL_{t1,34,11}$:	65.6	1.56	24.2	31.9	40.4	-8.5	-2.0	-6.5
$dL_{t1,35,11}$:	57.8	1.56	23.0	29.7	39.3	-9.5	-2.0	-7.5
$dL_{t1,40,11}$:	70.3	1.56	23.8	32.0	40.1	-8.1	-2.0	-6.1
$dL_{t1,41,11}$:	57.8	1.56	21.7	31.8	37.9	-6.1	-2.0	-4.1
$dL_{t1,42,11}$:	57.8	1.56	22.3	31.0	38.5	-7.6	-2.0	-5.6
$dL_{t1,43,11}$:	57.8	1.56	24.0	30.1	40.2	-10.1	-2.0	-8.1
$dL_{t1,46,11}$:	57.8	1.56	23.5	30.2	39.7	-9.5	-2.0	-7.5
$dL_{t1,47,11}$:	57.8	1.56	21.9	32.5	38.1	-5.7	-2.0	-3.7
$dL_{t1,48,11}$:	57.8	1.56	22.6	29.1	38.9	-9.7	-2.0	-7.7
$dL_{t1,49,11}$:	65.6	1.56	20.9	29.7	37.1	-7.4	-2.0	-5.4
$dL_{t1,50,11}$:	65.6	1.56	21.2	33.4	37.4	-4.0	-2.0	-2.0
$dL_{t1,51,11}$:	65.6	1.56	23.3	30.2	39.6	-9.4	-2.0	-7.4
$dL_{t1,52,11}$:	65.6	1.56	23.0	34.2	39.2	-5.0	-2.0	-3.0
$dL_{t1,53,11}$:	57.8	1.56	23.3	31.3	39.6	-8.3	-2.0	-6.3
$dL_{t1,55,11}$:	57.8	1.56	23.3	30.5	39.5	-9.0	-2.0	-7.0
$dL_{t1,56,11}$:	57.8	1.56	23.0	29.7	39.2	-9.6	-2.0	-7.6
$dL_{t1,58,11}$:	57.8	1.56	22.6	31.6	38.8	-7.2	-2.0	-5.2
$dL_{t1,59,11}$:	57.8	1.56	23.1	30.8	39.4	-8.6	-2.0	-6.6
$dL_{t1,60,11}$:	57.8	1.56	21.8	33.8	38.1	-4.2	-2.0	-2.2
$dL_{t1,62,11}$:	67.2	1.56	22.5	30.7	38.7	-8.0	-2.0	-6.0
$dL_{t1,63,11}$:	57.8	1.56	23.2	30.6	39.5	-8.9	-2.0	-6.9
$dL_{t1,64,11}$:	65.6	1.56	20.5	35.3	36.7	-1.4	-2.0	0.6
$dL_{t1,65,11}$:	57.8	1.56	22.3	31.1	38.6	-7.5	-2.0	-5.5
$dL_{t1,67,11}$:	65.6	1.56	25.0	31.6	41.2	-9.7	-2.0	-7.7
$dL_{t1,70,11}$:	57.8	1.56	22.2	30.6	38.4	-7.8	-2.0	-5.8
$dL_{t1,71,11}$:	57.8	1.56	23.0	29.9	39.2	-9.3	-2.0	-7.3
$dL_{t1,72,11}$:	57.8	1.56	23.7	29.9	39.9	-10.0	-2.0	-8.0
$dL_{t1,74,11}$:	57.8	1.56	24.9	32.0	41.1	-9.1	-2.0	-7.1
$dL_{t1,75,11}$:	57.8	1.56	22.5	29.3	38.7	-9.4	-2.0	-7.4
$dL_{t1,76,11}$:	57.8	1.56	23.6	29.7	39.9	-10.2	-2.0	-8.2
$dL_{t1,78,11}$:	57.8	1.56	24.3	31.3	40.6	-9.3	-2.0	-7.3
$dL_{t1,79,11}$:	71.9	1.56	26.0	32.3	42.3	-10.0	-2.0	-8.0
$dL_{t1,81,11}$:	57.8	1.56	22.9	33.7	39.2	-5.5	-2.0	-3.5
$dL_{t1,82,11}$:	57.8	1.56	23.7	29.9	39.9	-10.0	-2.0	-8.0
$dL_{t1,83,11}$:	57.8	1.56	22.5	33.8	38.7	-4.9	-2.0	-2.9

BIN 11: Tonal components determined								
	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t1,84,11}$:	57.8	1.56	24.4	31.2	40.6	-9.4	-2.0	-7.4
$dL_{t1,86,11}$:	57.8	1.56	20.7	30.9	36.9	-6.1	-2.0	-4.1
$dL_{t1,87,11}$:	57.8	1.56	20.9	31.4	37.1	-5.7	-2.0	-3.7
$dL_{t1,88,11}$:	57.8	1.56	21.1	32.3	37.4	-5.0	-2.0	-3.0
$dL_{t1,89,11}$:	57.8	1.56	21.4	31.8	37.6	-5.9	-2.0	-3.9
$dL_{t1,90,11}$:	57.8	1.56	22.6	32.7	38.8	-6.1	-2.0	-4.1
$dL_{t1,91,11}$:	57.8	1.56	25.3	31.4	41.5	-10.1	-2.0	-8.1
$dL_{t1,96,11}$:	57.8	1.56	25.0	31.4	41.2	-9.8	-2.0	-7.8
$dL_{t1,97,11}$:	57.8	1.56	23.7	30.9	39.9	-9.0	-2.0	-7.0
$dL_{t2,3,11}$:	70.3	1.56	25.3	33.0	41.6	-8.6	-2.0	-6.6
$dL_{t2,4,11}$:	70.3	1.56	25.7	34.9	42.0	-7.1	-2.0	-5.1
$dL_{t2,6,11}$:	71.9	1.56	25.0	33.2	41.3	-8.1	-2.0	-6.1
$dL_{t2,12,11}$:	67.2	1.56	20.9	31.0	37.2	-6.2	-2.0	-4.2
$dL_{t2,15,11}$:	81.3	1.56	24.9	37.7	41.2	-3.5	-2.0	-1.5
$dL_{t2,17,11}$:	70.3	1.56	24.5	31.9	40.8	-8.9	-2.0	-6.9
$dL_{t2,19,11}$:	65.6	1.56	23.5	31.2	39.8	-8.6	-2.0	-6.6
$dL_{t2,20,11}$:	70.3	1.56	26.0	32.4	42.3	-9.8	-2.0	-7.8
$dL_{t2,24,11}$:	70.3	1.56	23.9	35.0	40.2	-5.2	-2.0	-3.2
$dL_{t2,25,11}$:	65.6	1.56	21.7	29.8	38.0	-8.2	-2.0	-6.2
$dL_{t2,31,11}$:	65.6	1.56	21.3	31.8	37.5	-5.7	-2.0	-3.7
$dL_{t2,34,11}$:	65.6	1.56	24.2	31.9	40.4	-8.5	-2.0	-6.5
$dL_{t2,40,11}$:	70.3	1.56	23.8	32.0	40.1	-8.1	-2.0	-6.1
$dL_{t2,49,11}$:	65.6	1.56	20.9	29.7	37.1	-7.4	-2.0	-5.4
$dL_{t2,50,11}$:	65.6	1.56	21.2	33.4	37.4	-4.0	-2.0	-2.0
$dL_{t2,51,11}$:	65.6	1.56	23.3	30.2	39.6	-9.4	-2.0	-7.4
$dL_{t2,52,11}$:	65.6	1.56	23.0	34.2	39.2	-5.0	-2.0	-3.0
$dL_{t2,62,11}$:	67.2	1.56	22.5	30.7	38.7	-8.0	-2.0	-6.0
$dL_{t2,64,11}$:	65.6	1.56	20.5	35.3	36.7	-1.4	-2.0	0.6
$dL_{t2,67,11}$:	65.6	1.56	25.0	31.6	41.2	-9.7	-2.0	-7.7
$dL_{t2,79,11}$:	71.9	1.56	26.0	32.3	42.3	-10.0	-2.0	-8.0
$dL_{t3,20,11}$:	140.6	1.56	28.2	35.1	44.5	-9.4	-2.0	-7.3
$dL_{t3,21,11}$:	137.5	1.56	24.0	33.0	40.3	-7.3	-2.0	-5.3
$dL_{t3,24,11}$:	142.2	1.56	25.8	36.7	42.1	-5.3	-2.0	-3.3
$dL_{t3,29,11}$:	137.5	1.56	25.0	33.4	41.3	-7.9	-2.0	-5.9
$dL_{t3,40,11}$:	143.8	1.56	26.2	32.4	42.5	-10.1	-2.0	-8.1
$dL_{t3,47,11}$:	140.6	1.56	25.3	34.1	41.6	-7.5	-2.0	-5.5
$dL_{t3,56,11}$:	135.9	1.56	25.6	34.7	41.9	-7.3	-2.0	-5.3
$dL_{t3,58,11}$:	135.9	1.56	25.2	34.1	41.5	-7.4	-2.0	-5.4
$dL_{t3,59,11}$:	137.5	1.56	25.8	32.1	42.1	-10.1	-2.0	-8.0
$dL_{t3,64,11}$:	132.8	1.56	23.6	31.7	39.9	-8.2	-2.0	-6.2
$dL_{t3,74,11}$:	137.5	1.56	27.8	33.9	44.1	-10.2	-2.0	-8.2
$dL_{t3,77,11}$:	137.5	1.56	28.0	36.1	44.3	-8.2	-2.0	-6.2
$dL_{t3,86,11}$:	137.5	1.56	24.2	35.3	40.5	-5.2	-2.0	-3.2
$dL_{t4,27,11}$:	175.0	1.56	25.9	33.5	42.2	-8.6	-2.0	-6.6
$dL_{t4,42,11}$:	175.0	1.56	26.0	32.4	42.3	-9.9	-2.0	-7.8
$dL_{t4,43,11}$:	175.0	1.56	26.8	33.5	43.1	-9.5	-2.0	-7.5
$dL_{t4,49,11}$:	175.0	1.56	24.5	31.5	40.8	-9.2	-2.0	-7.2
$dL_{t4,52,11}$:	175.0	1.56	26.1	32.6	42.4	-9.8	-2.0	-7.8
$dL_{t4,63,11}$:	175.0	1.56	26.2	33.5	42.5	-9.1	-2.0	-7.0
$dL_{t4,64,11}$:	175.0	1.56	24.4	33.2	40.7	-7.6	-2.0	-5.5
$dL_{t4,76,11}$:	175.0	1.56	26.0	32.0	42.3	-10.3	-2.0	-8.3

BIN 11: Tonal components determined

	Frequency	delta f	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
$dL_{t4,80,11}$:	175.0	1.56	26.7	33.4	43.0	-9.6	-2.0	-7.6
$dL_{t4,83,11}$:	175.0	1.56	25.5	32.4	41.8	-9.4	-2.0	-7.4
$dL_{t4,88,11}$:	175.0	1.56	24.6	32.0	40.9	-8.9	-2.0	-6.9
$dL_{t5,12,11}$:	2525.2	1.56	16.3	23.6	38.5	-14.9	-3.8	-11.1

BIN 11: Tonal components determined - Compact

Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$		
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]		
1	---	---	---	---	---	---	---	---	---	---		
2	---	---	---	---	---	---	---	---	---	---		
3	70.3	-8.6	70.3	-8.6	---	---	---	---	---	---		
4	70.3	-7.1	70.3	-7.1	---	---	---	---	---	---		
5	---	---	---	---	---	---	---	---	---	---		
6	71.9	-8.1	71.9	-8.1	---	---	---	---	---	---		
7	---	---	---	---	---	---	---	---	---	---		
8	---	---	---	---	---	---	---	---	---	---		
9	---	---	---	---	---	---	---	---	---	---		
10	---	---	---	---	---	---	---	---	---	---		
11	---	---	---	---	---	---	---	---	---	---		
12	67.2	-6.2	67.2	-6.2	---	---	---	---	2525.2	-14.9		
13	57.8	-4.9	---	---	---	---	---	---	---	---		
14	57.8	-9.0	---	---	---	---	---	---	---	---		
15	---	---	81.3	-3.5	---	---	---	---	---	---		
16	---	---	---	---	---	---	---	---	---	---		
17	70.3	-8.9	70.3	-8.9	---	---	---	---	---	---		
18	---	---	---	---	---	---	---	---	---	---		
19	65.6	-8.6	65.6	-8.6	---	---	---	---	---	---		
20	70.3	-9.8	70.3	-9.8	140.6	-9.4	---	---	---	---		
21	57.8	-7.9	---	---	137.5	-7.3	---	---	---	---		
22	---	---	---	---	---	---	---	---	---	---		
23	---	---	---	---	---	---	---	---	---	---		
24	70.3	-5.2	70.3	-5.2	142.2	-5.3	---	---	---	---		
25	65.6	-8.2	65.6	-8.2	---	---	---	---	---	---		
26	---	---	---	---	---	---	---	---	---	---		
27	---	---	---	---	---	---	175.0	-8.6	---	---		
28	57.8	-7.6	---	---	---	---	---	---	---	---		
29	---	---	---	---	137.5	-7.9	---	---	---	---		
30	---	---	---	---	---	---	---	---	---	---		
31	65.6	-5.7	65.6	-5.7	---	---	---	---	---	---		
32	57.8	-9.1	---	---	---	---	---	---	---	---		
33	57.8	-9.8	---	---	---	---	---	---	---	---		
34	65.6	-8.5	65.6	-8.5	---	---	---	---	---	---		
35	57.8	-9.5	---	---	---	---	---	---	---	---		
36	---	---	---	---	---	---	---	---	---	---		
37	---	---	---	---	---	---	---	---	---	---		
38	---	---	---	---	---	---	---	---	---	---		
39	---	---	---	---	---	---	---	---	---	---		
40	70.3	-8.1	70.3	-8.1	143.8	-10.1	---	---	---	---		
41	57.8	-6.1	---	---	---	---	---	---	---	---		
42	57.8	-7.6	---	---	---	---	175.0	-9.9	---	---		
43	57.8	-10.1	---	---	---	---	175.0	-9.5	---	---		

BIN 11: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$		
##	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]		
44	---	---	---	---	---	---	---	---	---	---		
45	---	---	---	---	---	---	---	---	---	---		
46	57.8	-9.5	---	---	---	---	---	---	---	---		
47	57.8	-5.7	---	---	140.6	-7.5	---	---	---	---		
48	57.8	-9.7	---	---	---	---	---	---	---	---		
49	65.6	-7.4	65.6	-7.4	---	---	175.0	-9.2	---	---		
50	65.6	-4.0	65.6	-4.0	---	---	---	---	---	---		
51	65.6	-9.4	65.6	-9.4	---	---	---	---	---	---		
52	65.6	-5.0	65.6	-5.0	---	---	175.0	-9.8	---	---		
53	57.8	-8.3	---	---	---	---	---	---	---	---		
54	---	---	---	---	---	---	---	---	---	---		
55	57.8	-9.0	---	---	---	---	---	---	---	---		
56	57.8	-9.6	---	---	135.9	-7.3	---	---	---	---		
57	---	---	---	---	---	---	---	---	---	---		
58	57.8	-7.2	---	---	135.9	-7.4	---	---	---	---		
59	57.8	-8.6	---	---	137.5	-10.1	---	---	---	---		
60	57.8	-4.2	---	---	---	---	---	---	---	---		
61	---	---	---	---	---	---	---	---	---	---		
62	67.2	-8.0	67.2	-8.0	---	---	---	---	---	---		
63	57.8	-8.9	---	---	---	---	175.0	-9.1	---	---		
64	65.6	-1.4	65.6	-1.4	132.8	-8.2	175.0	-7.6	---	---		
65	57.8	-7.5	---	---	---	---	---	---	---	---		
66	---	---	---	---	---	---	---	---	---	---		
67	65.6	-9.7	65.6	-9.7	---	---	---	---	---	---		
68	---	---	---	---	---	---	---	---	---	---		
69	---	---	---	---	---	---	---	---	---	---		
70	57.8	-7.8	---	---	---	---	---	---	---	---		
71	57.8	-9.3	---	---	---	---	---	---	---	---		
72	57.8	-10.0	---	---	---	---	---	---	---	---		
73	---	---	---	---	---	---	---	---	---	---		
74	57.8	-9.1	---	---	137.5	-10.2	---	---	---	---		
75	57.8	-9.4	---	---	---	---	---	---	---	---		
76	57.8	-10.2	---	---	---	---	175.0	-10.3	---	---		
77	---	---	---	---	137.5	-8.2	---	---	---	---		
78	57.8	-9.3	---	---	---	---	---	---	---	---		
79	71.9	-10.0	71.9	-10.0	---	---	---	---	---	---		
80	---	---	---	---	---	---	175.0	-9.6	---	---		
81	57.8	-5.5	---	---	---	---	---	---	---	---		
82	57.8	-10.0	---	---	---	---	---	---	---	---		
83	57.8	-4.9	---	---	---	---	175.0	-9.4	---	---		
84	57.8	-9.4	---	---	---	---	---	---	---	---		
85	---	---	---	---	---	---	---	---	---	---		
86	57.8	-6.1	---	---	137.5	-5.2	---	---	---	---		
87	57.8	-5.7	---	---	---	---	---	---	---	---		
88	57.8	-5.0	---	---	---	---	175.0	-8.9	---	---		
89	57.8	-5.9	---	---	---	---	---	---	---	---		
90	57.8	-6.1	---	---	---	---	---	---	---	---		
91	57.8	-10.1	---	---	---	---	---	---	---	---		
92	---	---	---	---	---	---	---	---	---	---		
93	---	---	---	---	---	---	---	---	---	---		
94	---	---	---	---	---	---	---	---	---	---		

BIN 11: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**		
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**		
95	---	---	---	---	---	---	---	---	---	---		
96	57.8	-9.8	---	---	---	---	---	---	---	---		
97	57.8	-9.0	---	---	---	---	---	---	---	---		
f_t[Hz] | dL_k[dB]	64.5	-9.1	74.4	-11.8	140.3	-13.7	175.0	-14.7	2525.2	-22.0		
L_a[dB]		-2.0		-2.0		-2.0		-2.0		-3.8		
$dL_{a,k}$[dB]		-7.1		-9.8		-11.7		-12.7		-18.3		
K_{TN}[dB]		0		0		0		0		0		

BIN 11.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,2,11.5}$:	57.8	1.56	22.4	29.4	38.6	-9.2	-2.0	-7.2
$dL_{t1,3,11.5}$:	70.3	1.56	24.2	32.1	40.5	-8.4	-2.0	-6.4
$dL_{t1,4,11.5}$:	70.3	1.56	24.0	31.7	40.3	-8.6	-2.0	-6.6
$dL_{t1,6,11.5}$:	71.9	1.56	24.2	32.5	40.5	-8.0	-2.0	-6.0
$dL_{t1,10,11.5}$:	70.3	1.56	22.9	35.0	39.2	-4.1	-2.0	-2.1
$dL_{t1,13,11.5}$:	57.8	1.56	22.9	30.8	39.2	-8.3	-2.0	-6.3
$dL_{t1,14,11.5}$:	71.9	1.56	22.0	36.5	38.2	-1.7	-2.0	0.3
$dL_{t1,15,11.5}$:	71.9	1.56	24.5	32.1	40.8	-8.6	-2.0	-6.6
$dL_{t1,16,11.5}$:	71.9	1.56	23.4	35.0	39.7	-4.7	-2.0	-2.7
$dL_{t1,17,11.5}$:	57.8	1.56	24.2	30.9	40.5	-9.6	-2.0	-7.6
$dL_{t1,19,11.5}$:	57.8	1.56	23.0	29.0	39.2	-10.2	-2.0	-8.2
$dL_{t1,21,11.5}$:	71.9	1.56	25.0	36.3	41.3	-5.0	-2.0	-3.0
$dL_{t1,23,11.5}$:	71.9	1.56	24.9	34.2	41.2	-7.0	-2.0	-5.0
$dL_{t1,24,11.5}$:	71.9	1.56	25.5	32.1	41.8	-9.6	-2.0	-7.6
$dL_{t2,3,11.5}$:	70.3	1.56	24.2	32.1	40.5	-8.4	-2.0	-6.4
$dL_{t2,4,11.5}$:	70.3	1.56	24.0	31.7	40.3	-8.6	-2.0	-6.6
$dL_{t2,6,11.5}$:	71.9	1.56	24.2	32.5	40.5	-8.0	-2.0	-6.0
$dL_{t2,7,11.5}$:	87.5	1.56	24.0	46.1	40.3	5.8	-2.0	7.8
$dL_{t2,10,11.5}$:	70.3	1.56	22.9	35.0	39.2	-4.1	-2.0	-2.1
$dL_{t2,14,11.5}$:	71.9	1.56	22.0	36.5	38.2	-1.7	-2.0	0.3
$dL_{t2,15,11.5}$:	71.9	1.56	24.5	32.1	40.8	-8.6	-2.0	-6.6
$dL_{t2,16,11.5}$:	71.9	1.56	23.4	35.0	39.7	-4.7	-2.0	-2.7
$dL_{t2,21,11.5}$:	71.9	1.56	25.0	36.3	41.3	-5.0	-2.0	-3.0
$dL_{t2,23,11.5}$:	71.9	1.56	24.9	34.2	41.2	-7.0	-2.0	-5.0
$dL_{t2,24,11.5}$:	71.9	1.56	25.5	32.1	41.8	-9.6	-2.0	-7.6
$dL_{t3,7,11.5}$:	87.5	1.56	24.0	46.1	40.3	5.8	-2.0	7.8
$dL_{t4,3,11.5}$:	142.2	1.56	26.8	38.1	43.1	-4.9	-2.0	-2.9
$dL_{t4,4,11.5}$:	139.1	1.56	26.3	32.6	42.6	-10.0	-2.0	-8.0
$dL_{t4,6,11.5}$:	125.0	1.56	26.4	41.2	42.7	-1.5	-2.0	0.5
$dL_{t4,9,11.5}$:	135.9	1.56	26.7	35.7	43.0	-7.3	-2.0	-5.2
$dL_{t4,10,11.5}$:	142.2	1.56	25.3	36.9	41.6	-4.7	-2.0	-2.6
$dL_{t4,15,11.5}$:	142.2	1.56	26.5	34.9	42.8	-7.9	-2.0	-5.9
$dL_{t5,8,11.5}$:	175.0	1.56	26.0	34.3	42.3	-8.0	-2.0	-5.9
$dL_{t5,14,11.5}$:	175.0	1.56	25.6	34.3	41.9	-7.7	-2.0	-5.6

BIN 11.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**		
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**		
1	---	---	---	---	---	---	---	---	---	---		

BIN 11.5: Tonal components determined - Compact												
Spectrum	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$	f_T	$dL_{tn,j,k}$		
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**		
2	57.8	-9.2	---	---	---	---	---	---	---	---		
3	70.3	-8.4	70.3	-8.4	---	---	142.2	-4.9	---	---		
4	70.3	-8.6	70.3	-8.6	---	---	139.1	-10.0	---	---		
5	---	---	---	---	---	---	---	---	---	---		
6	71.9	-8.0	71.9	-8.0	---	---	125.0	-1.5	---	---		
7	---	---	87.5	5.8	87.5	5.8	---	---	---	---		
8	---	---	---	---	---	---	---	---	175.0	-8.0		
9	---	---	---	---	---	---	135.9	-7.3	---	---		
10	70.3	-4.1	70.3	-4.1	---	---	142.2	-4.7	---	---		
11	---	---	---	---	---	---	---	---	---	---		
12	---	---	---	---	---	---	---	---	---	---		
13	57.8	-8.3	---	---	---	---	---	---	---	---		
14	71.9	-1.7	71.9	-1.7	---	---	---	---	175.0	-7.7		
15	71.9	-8.6	71.9	-8.6	---	---	142.2	-7.9	---	---		
16	71.9	-4.7	71.9	-4.7	---	---	---	---	---	---		
17	57.8	-9.6	---	---	---	---	---	---	---	---		
18	---	---	---	---	---	---	---	---	---	---		
19	57.8	-10.2	---	---	---	---	---	---	---	---		
20	---	---	---	---	---	---	---	---	---	---		
21	71.9	-5.0	71.9	-5.0	---	---	---	---	---	---		
22	---	---	---	---	---	---	---	---	---	---		
23	71.9	-7.0	71.9	-7.0	---	---	---	---	---	---		
24	71.9	-9.6	71.9	-9.6	---	---	---	---	---	---		
f_t[Hz] | dL_k[dB]	63.5	-8.6	80.8	-5.5	90.1	-7.4	141.1	-10.3	175.0	-14.6		
L_a[dB]		-2.0		-2.0		-2.0		-2.0		-2.0		
$dL_{a,k}$[dB]		-6.6		-3.5		-5.4		-8.3		-12.6		
K_{TN}[dB]		0		0		0		0		0		

BIN 12: Tonal components determined								
	Frequency	**delta f**	$L_{pn,avg,j,k}$	$L_{pt,j,k}$	$L_{pn,j,k}$	$dL_{tn,j,k}$	L_a	$dL_{a,j,k}$
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,2,12}$:	70.3	1.56	24.3	31.8	40.6	-8.9	-2.0	-6.9
$dL_{t1,7,12}$:	70.3	1.56	22.9	31.8	39.2	-7.4	-2.0	-5.4
$dL_{t1,11,12}$:	57.8	1.56	24.4	32.7	40.6	-7.9	-2.0	-5.9
$dL_{t1,12,12}$:	57.8	1.56	23.3	29.7	39.5	-9.8	-2.0	-7.8
$dL_{t1,13,12}$:	57.8	1.56	23.3	33.4	39.5	-6.1	-2.0	-4.1
$dL_{t1,16,12}$:	71.9	1.56	23.5	35.1	39.8	-4.6	-2.0	-2.6
$dL_{t1,17,12}$:	71.9	1.56	25.8	32.2	42.1	-9.9	-2.0	-7.9
$dL_{t1,18,12}$:	71.9	1.56	22.8	36.1	39.1	-3.0	-2.0	-1.0
$dL_{t2,2,12}$:	70.3	1.56	24.3	31.8	40.6	-8.9	-2.0	-6.9
$dL_{t2,6,12}$:	81.3	1.56	25.4	39.6	41.7	-2.1	-2.0	-0.1
$dL_{t2,7,12}$:	70.3	1.56	22.9	31.8	39.2	-7.4	-2.0	-5.4
$dL_{t2,16,12}$:	71.9	1.56	23.5	35.1	39.8	-4.6	-2.0	-2.6
$dL_{t2,17,12}$:	71.9	1.56	25.8	32.2	42.1	-9.9	-2.0	-7.9
$dL_{t2,18,12}$:	71.9	1.56	22.8	36.1	39.1	-3.0	-2.0	-1.0
$dL_{t3,4,12}$:	146.9	1.56	27.3	34.3	43.6	-9.3	-2.0	-7.3
$dL_{t3,6,12}$:	142.2	1.56	26.4	37.0	42.7	-5.7	-2.0	-3.7
$dL_{t3,7,12}$:	135.9	1.56	25.3	34.6	41.6	-7.0	-2.0	-5.0
$dL_{t3,8,12}$:	137.5	1.56	26.7	40.6	43.0	-2.4	-2.0	-0.4
$dL_{t3,9,12}$:	140.6	1.56	25.9	32.2	42.2	-10.0	-2.0	-8.0
$dL_{t3,10,12}$:	135.9	1.56	27.5	34.1	43.8	-9.7	-2.0	-7.7

BIN 12: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t4,12,12}$:	175.0	1.56	25.8	32.8	42.1	-9.3	-2.0	-7.3
$dL_{t4,18,12}$:	175.0	1.56	26.2	38.2	42.5	-4.2	-2.0	-2.2
$dL_{t5,7,12}$:	209.4	1.56	25.1	31.8	41.6	-9.8	-2.0	-7.8

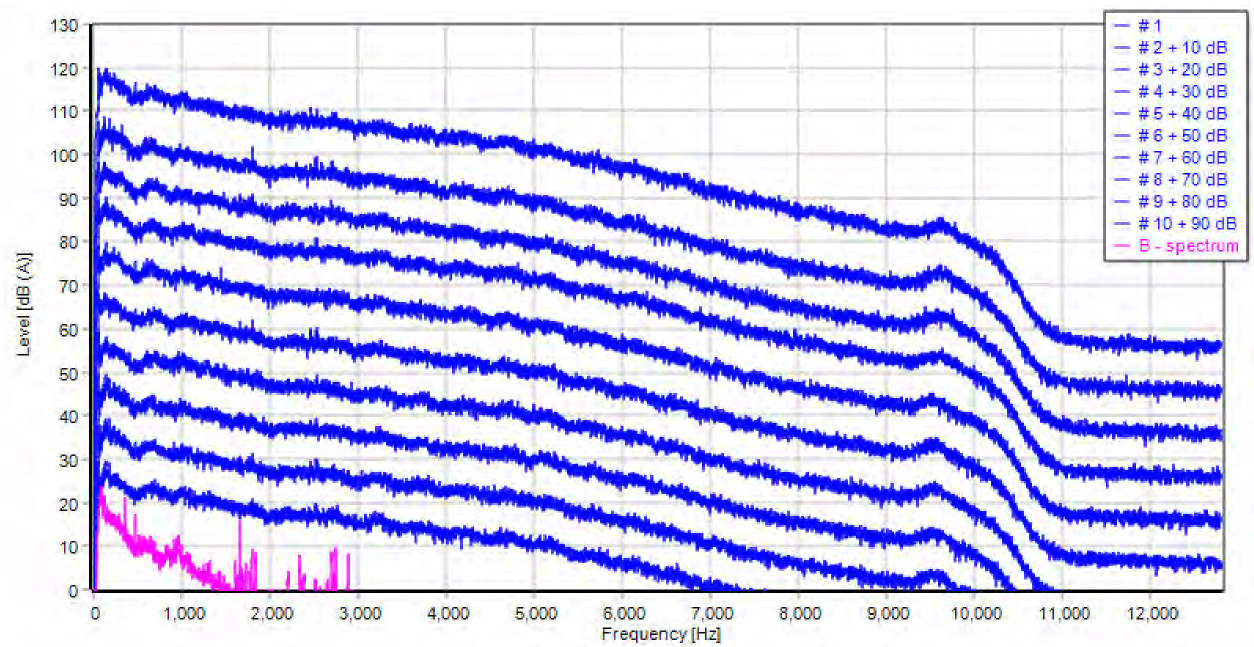
BIN 12: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**		
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**		
1	---	---	---	---	---	---	---	---	---	---		
2	70.3	-8.9	70.3	-8.9	---	---	---	---	---	---		
3	---	---	---	---	---	---	---	---	---	---		
4	---	---	---	---	146.9	-9.3	---	---	---	---		
5	---	---	---	---	---	---	---	---	---	---		
6	---	---	81.3	-2.1	142.2	-5.7	---	---	---	---		
7	70.3	-7.4	70.3	-7.4	135.9	-7.0	---	---	209.4	-9.8		
8	---	---	---	---	137.5	-2.4	---	---	---	---		
9	---	---	---	---	140.6	-10.0	---	---	---	---		
10	---	---	---	---	135.9	-9.7	---	---	---	---		
11	57.8	-7.9	---	---	---	---	---	---	---	---		
12	57.8	-9.8	---	---	---	---	175.0	-9.3	---	---		
13	57.8	-6.1	---	---	---	---	---	---	---	---		
14	---	---	---	---	---	---	---	---	---	---		
15	---	---	---	---	---	---	---	---	---	---		
16	71.9	-4.6	71.9	-4.6	---	---	---	---	---	---		
17	71.9	-9.9	71.9	-9.9	---	---	---	---	---	---		
18	71.9	-3.0	71.9	-3.0	---	---	175.0	-4.2	---	---		
f_t[Hz] | dL_k[dB]	67.8	-9.5	73.0	-9.2	144.5	-10.4	175.0	-13.2	209.4	-15.6		
L_a[dB]		-2.0		-2.0		-2.0		-2.0		-2.0		
$dL_{a,k}$[dB]		-7.5		-7.2		-8.4		-11.2		-13.6		
K_{TN}[dB]		0		0		0		0		0		

BIN 12.5: Tonal components determined								
	Frequency	**delta f**	**$L_{pn,avg,j,k}$**	**$L_{pt,j,k}$**	**$L_{pn,j,k}$**	**$dL_{tn,j,k}$**	**L_a**	**$dL_{a,j,k}$**
	[Hz]	**[Hz]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**	**[dB]**
$dL_{t1,1,12.5}$:	57.8	1.56	21.9	31.4	38.1	-6.7	-2.0	-4.7
$dL_{t1,2,12.5}$:	57.8	1.56	21.6	29.8	37.8	-8.1	-2.0	-6.1
$dL_{t1,4,12.5}$:	57.8	1.56	22.3	29.9	38.6	-8.6	-2.0	-6.6
$dL_{t1,10,12.5}$:	57.8	1.56	22.3	30.5	38.6	-8.0	-2.0	-6.0
$dL_{t1,15,12.5}$:	57.8	1.56	24.8	31.3	41.0	-9.7	-2.0	-7.7
$dL_{t1,17,12.5}$:	70.3	1.56	22.6	33.6	38.9	-5.3	-2.0	-3.3
$dL_{t1,18,12.5}$:	71.9	1.56	24.7	30.9	41.0	-10.1	-2.0	-8.1
$dL_{t1,20,12.5}$:	57.8	1.56	23.7	30.0	39.9	-9.9	-2.0	-7.9
$dL_{t1,21,12.5}$:	71.9	1.56	24.2	36.9	40.5	-3.6	-2.0	-1.6
$dL_{t1,22,12.5}$:	70.3	1.56	23.4	34.7	39.7	-5.0	-2.0	-3.0
$dL_{t1,23,12.5}$:	71.9	1.56	24.5	35.2	40.8	-5.5	-2.0	-3.5
$dL_{t1,24,12.5}$:	57.8	1.56	23.9	29.9	40.1	-10.2	-2.0	-8.2
$dL_{t1,25,12.5}$:	71.9	1.56	24.8	31.1	41.1	-10.0	-2.0	-8.0
$dL_{t2,14,12.5}$:	87.5	1.56	24.2	37.4	40.5	-3.1	-2.0	-1.1
$dL_{t2,17,12.5}$:	70.3	1.56	22.6	33.6	38.9	-5.3	-2.0	-3.3
$dL_{t2,18,12.5}$:	71.9	1.56	24.7	30.9	41.0	-10.1	-2.0	-8.1
$dL_{t2,21,12.5}$:	71.9	1.56	24.2	36.9	40.5	-3.6	-2.0	-1.6

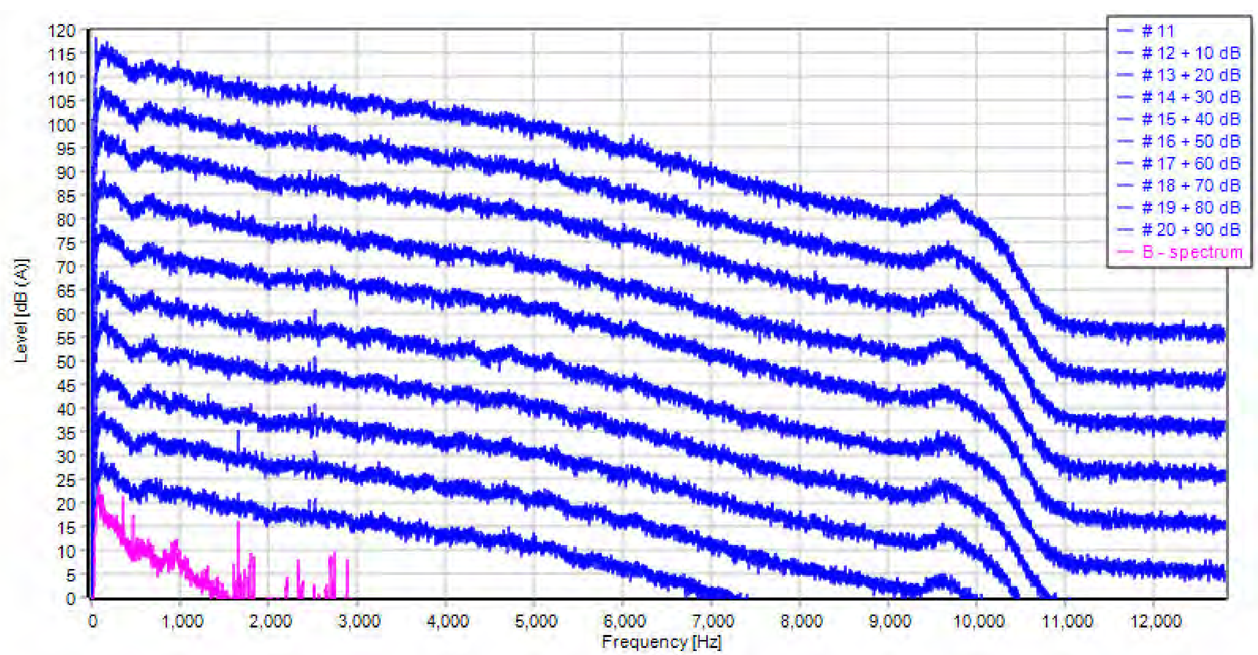
$dL_{t2,22,12.5}$:	70.3	1.56	23.4	34.7	39.7	-5.0	-2.0	-3.0
$dL_{t2,23,12.5}$:	71.9	1.56	24.5	35.2	40.8	-5.5	-2.0	-3.5
$dL_{t2,25,12.5}$:	71.9	1.56	24.8	31.1	41.1	-10.0	-2.0	-8.0
$dL_{t3,12,12.5}$:	140.6	1.56	27.2	33.5	43.5	-10.0	-2.0	-8.0
$dL_{t3,14,12.5}$:	142.2	1.56	26.4	33.6	42.7	-9.1	-2.0	-7.1
$dL_{t3,17,12.5}$:	140.6	1.56	25.1	31.3	41.4	-10.1	-2.0	-8.1
$dL_{t3,21,12.5}$:	142.2	1.56	26.7	35.4	43.0	-7.6	-2.0	-5.6
$dL_{t4,10,12.5}$:	175.0	1.56	25.8	31.9	42.1	-10.3	-2.0	-8.2

BIN 12.5: Tonal components determined - Compact												
Spectrum	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**	**f_T**	**$dL_{tn,j,k}$**				
##	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**	**[Hz]**	**[dB]**				
1	57.8	-6.7	---	---	---	---	---	---				
2	57.8	-8.1	---	---	---	---	---	---				
3	---	---	---	---	---	---	---	---				
4	57.8	-8.6	---	---	---	---	---	---				
5	---	---	---	---	---	---	---	---				
6	---	---	---	---	---	---	---	---				
7	---	---	---	---	---	---	---	---				
8	---	---	---	---	---	---	---	---				
9	---	---	---	---	---	---	---	---				
10	57.8	-8.0	---	---	---	---	175.0	-10.3				
11	---	---	---	---	---	---	---	---				
12	---	---	---	---	140.6	-10.0	---	---				
13	---	---	---	---	---	---	---	---				
14	---	---	87.5	-3.1	142.2	-9.1	---	---				
15	57.8	-9.7	---	---	---	---	---	---				
16	---	---	---	---	---	---	---	---				
17	70.3	-5.3	70.3	-5.3	140.6	-10.1	---	---				
18	71.9	-10.1	71.9	-10.1	---	---	---	---				
19	---	---	---	---	---	---	---	---				
20	57.8	-9.9	---	---	---	---	---	---				
21	71.9	-3.6	71.9	-3.6	142.2	-7.6	---	---				
22	70.3	-5.0	70.3	-5.0	---	---	---	---				
23	71.9	-5.5	71.9	-5.5	---	---	---	---				
24	57.8	-10.2	---	---	---	---	---	---				
25	71.9	-10.0	71.9	-10.0	---	---	---	---				
$f_t[Hz] \mid dL_k[dB]$	61.1	-9.5	83.6	-10.1	140.8	-14.1	175.0	-15.9				
L_a[dB]		-2.0		-2.0		-2.0		-2.0				
$dL_{a,k}$[dB]		-7.5		-8.1		-12.0		-13.9				
K_{TN}[dB]		0		0		0		0				

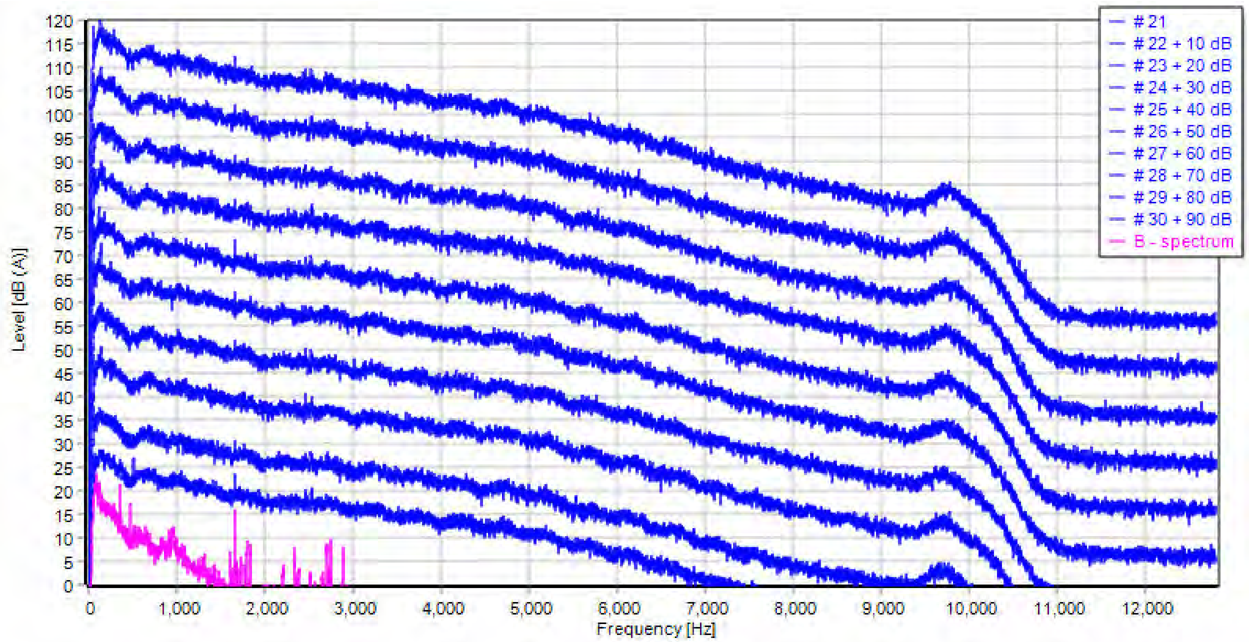
BIN 7.5: Narrowband spectrum



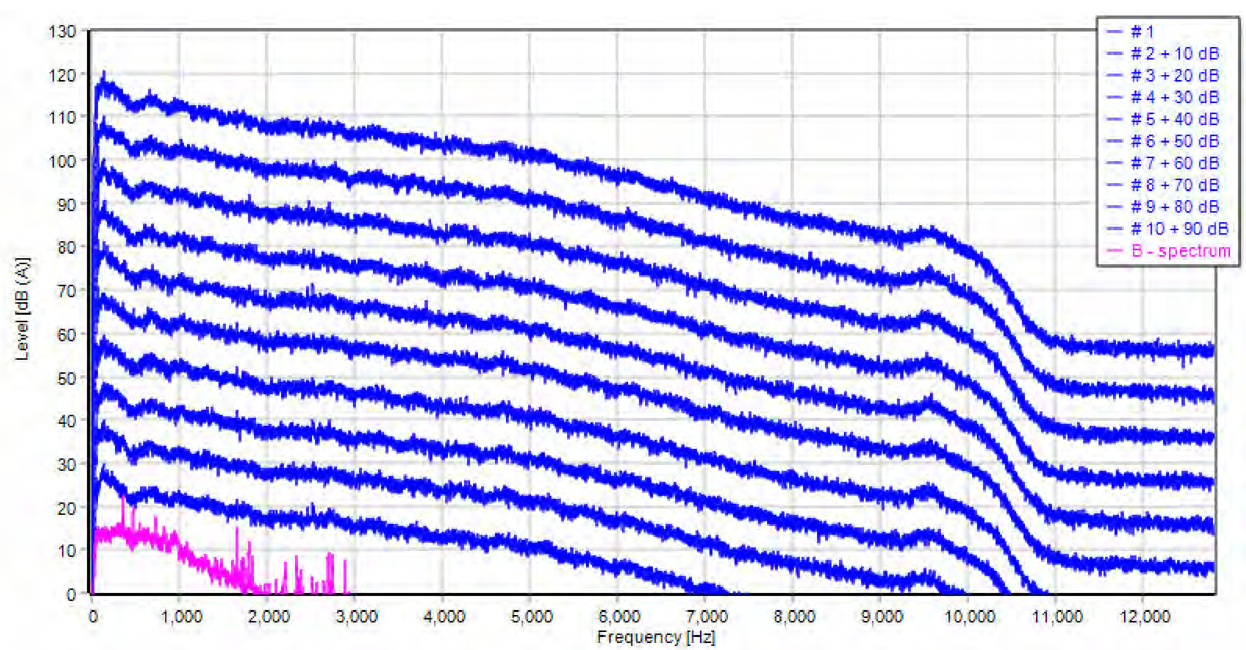
BIN 7.5: Narrowband spectrum



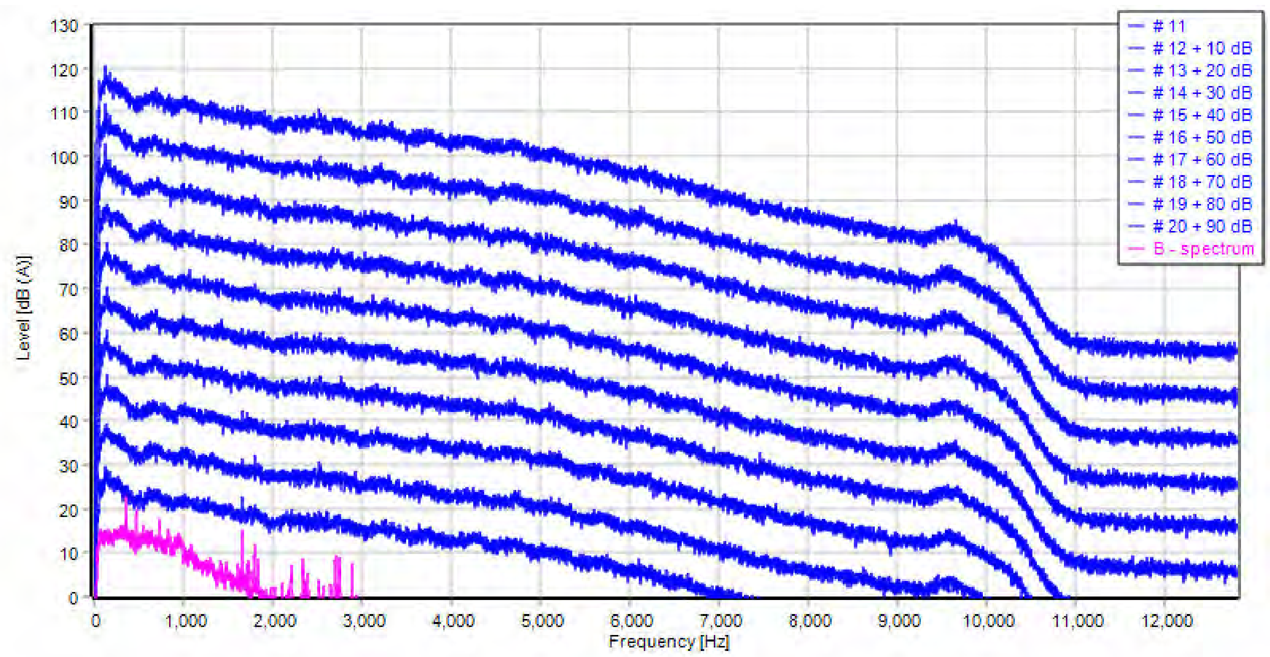
BIN 7.5: Narrowband spectrum



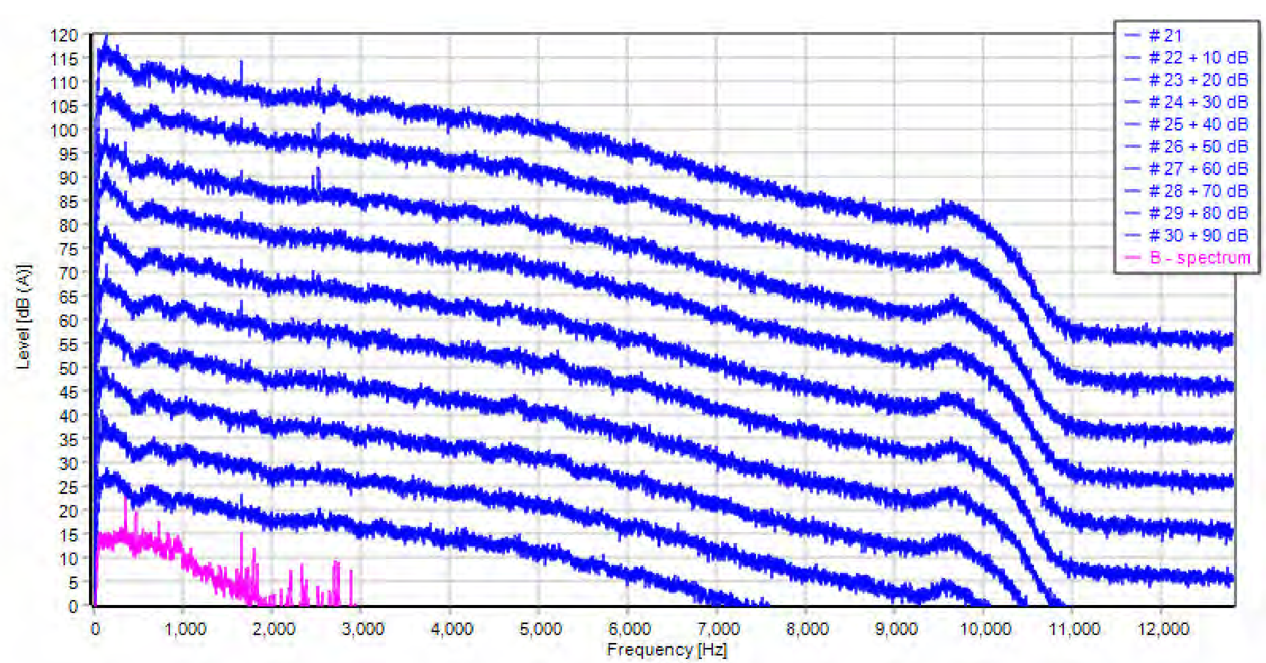
BIN 8: Narrowband spectrum



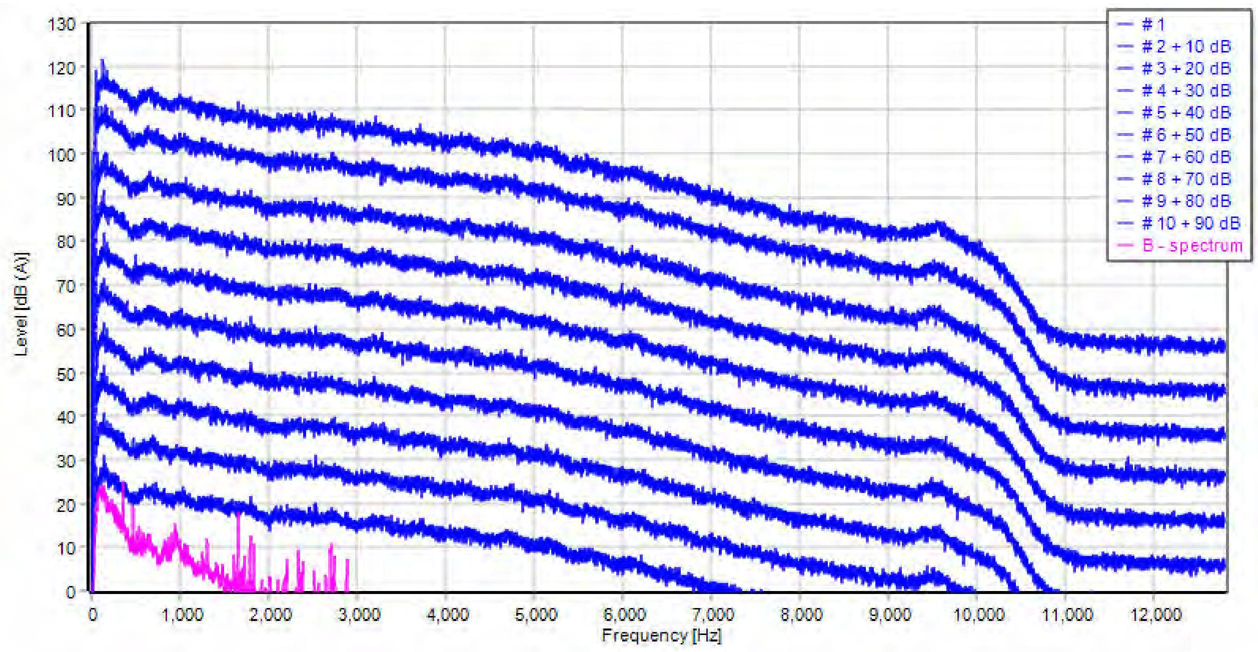
BIN 8: Narrowband spectrum



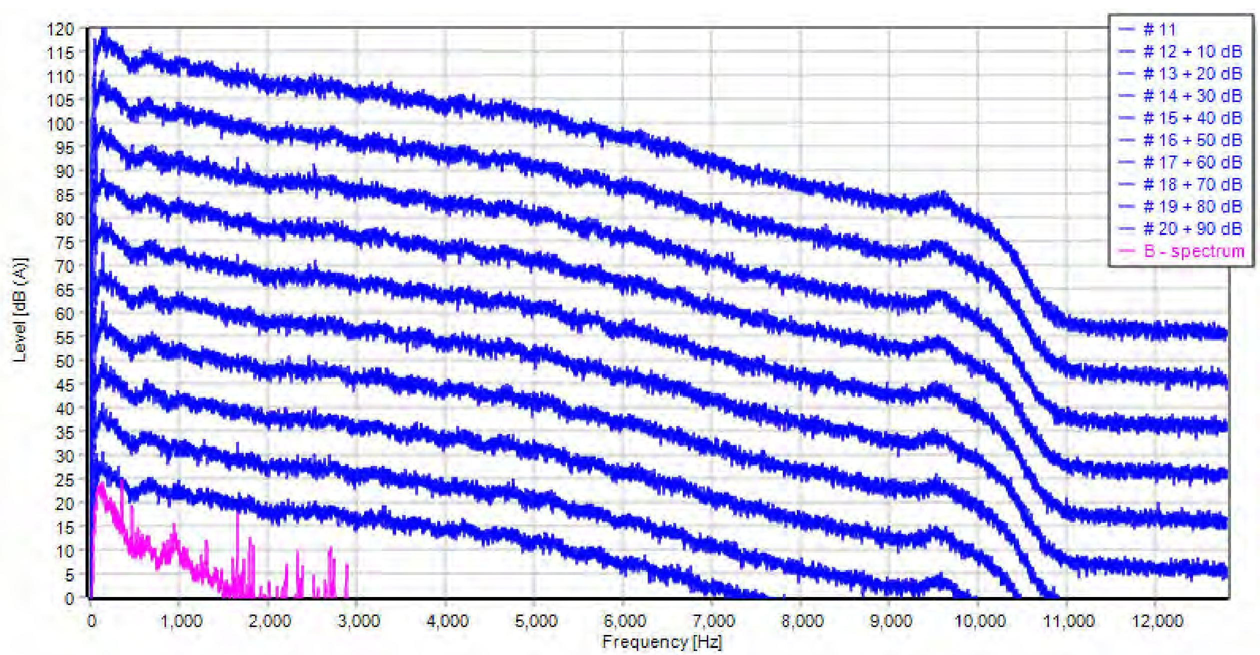
BIN 8: Narrowband spectrum



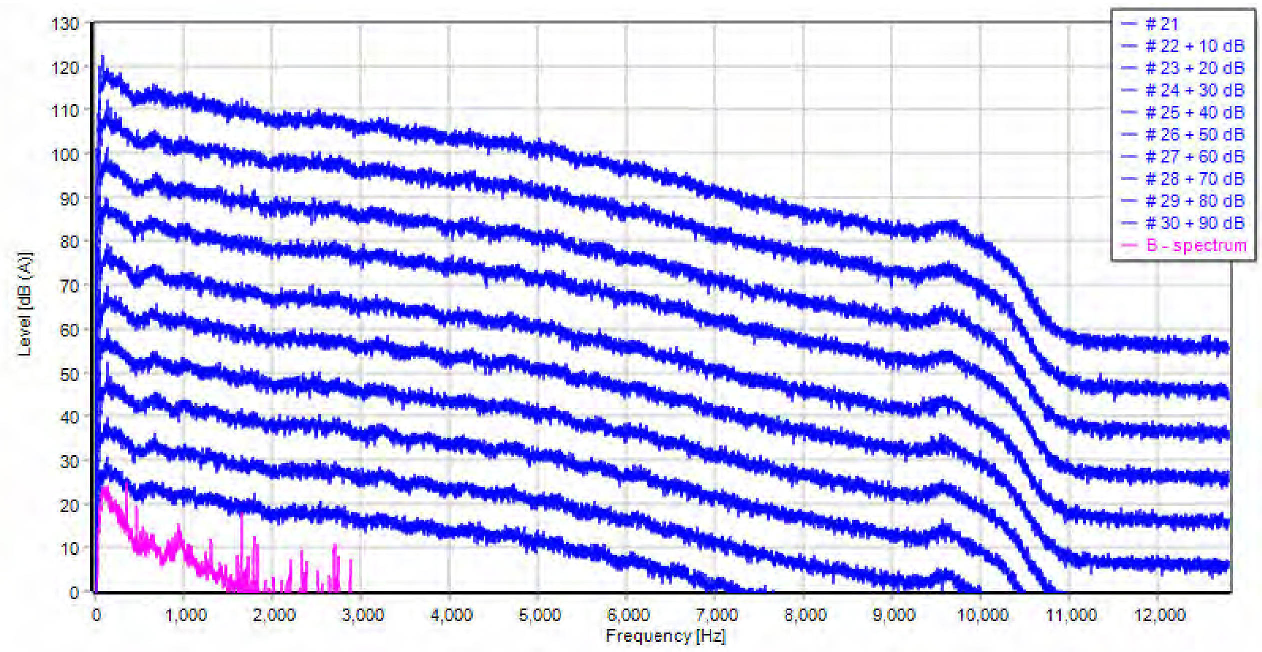
BIN 8.5: Narrowband spectrum



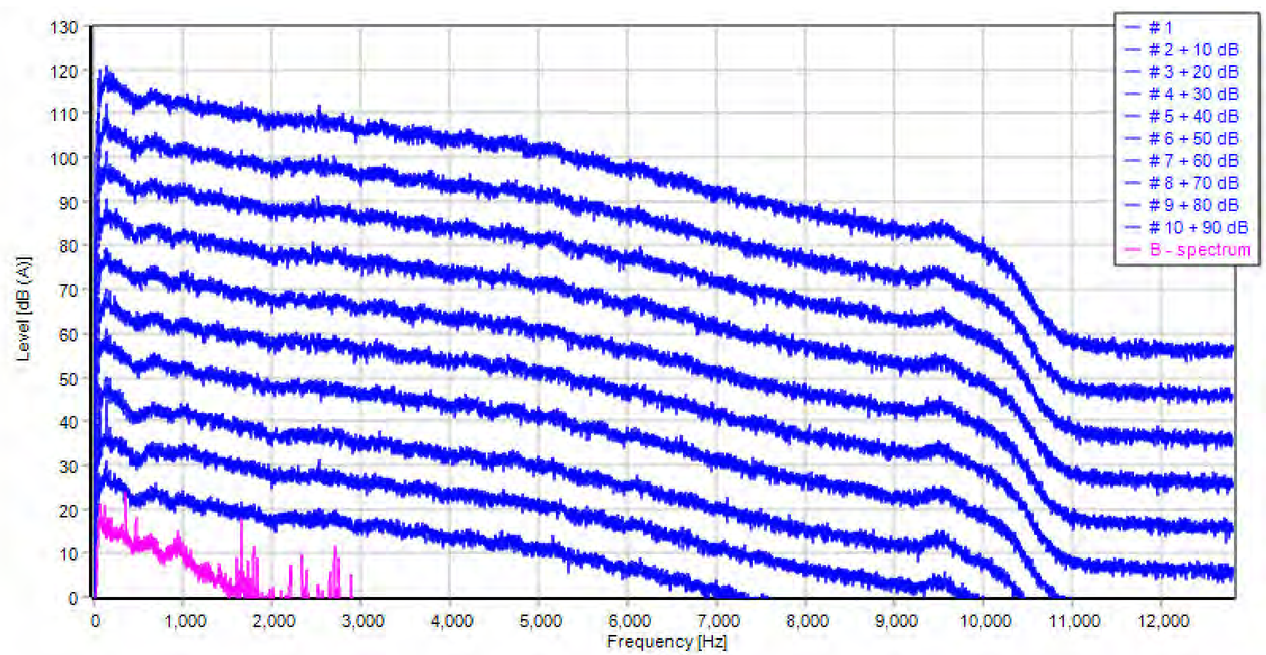
BIN 8.5: Narrowband spectrum



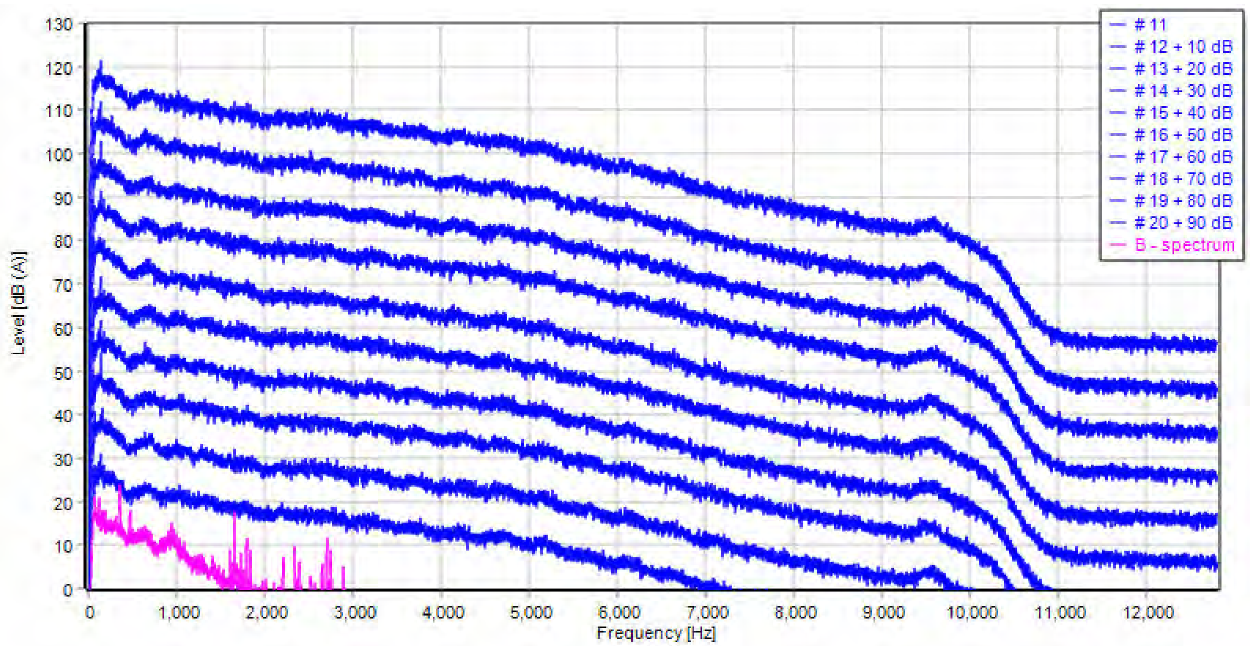
BIN 8.5: Narrowband spectrum



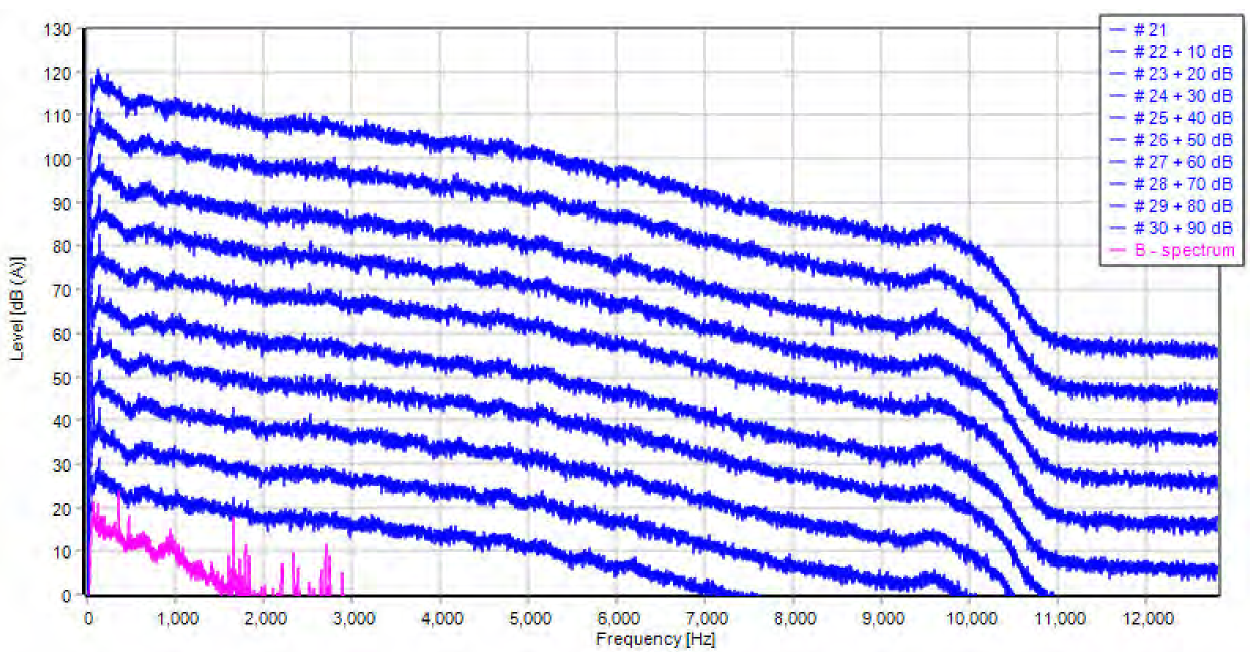
BIN 9: Narrowband spectrum



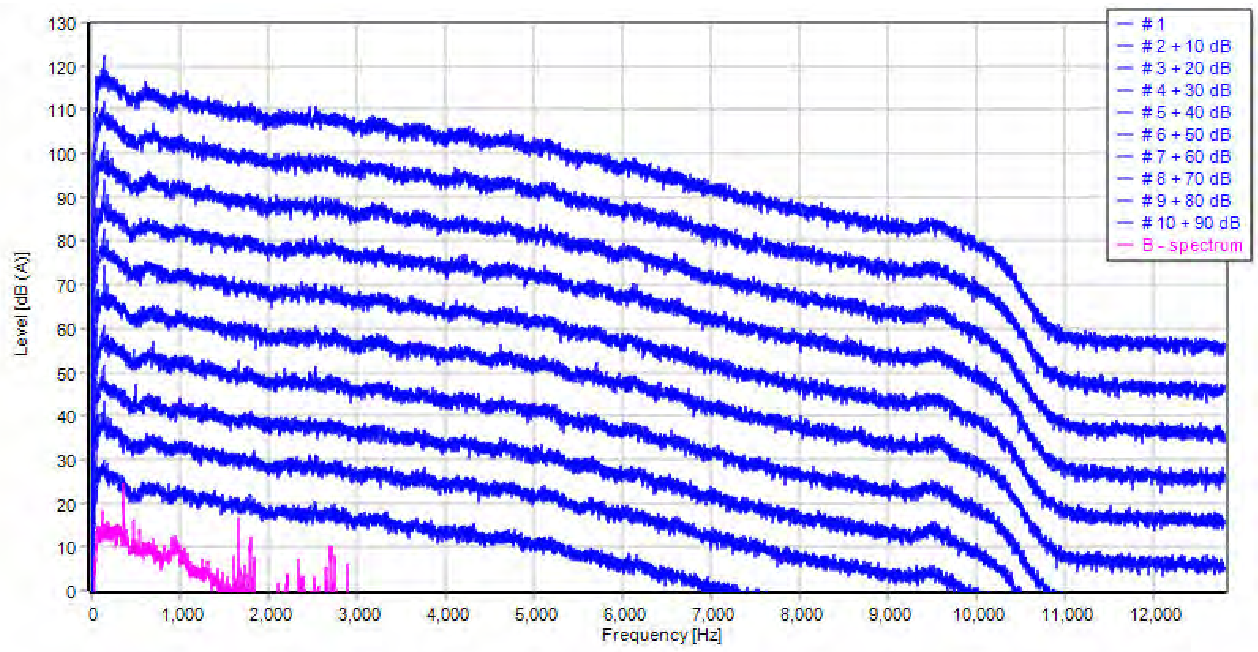
BIN 9: Narrowband spectrum



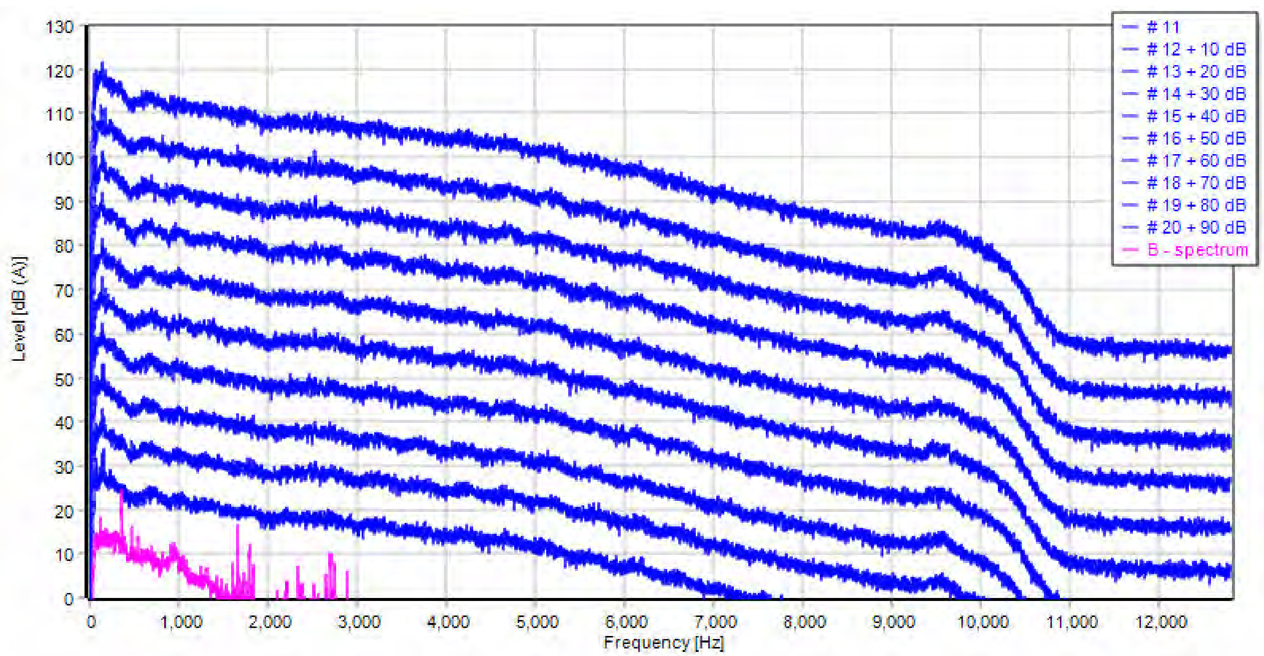
BIN 9: Narrowband spectrum



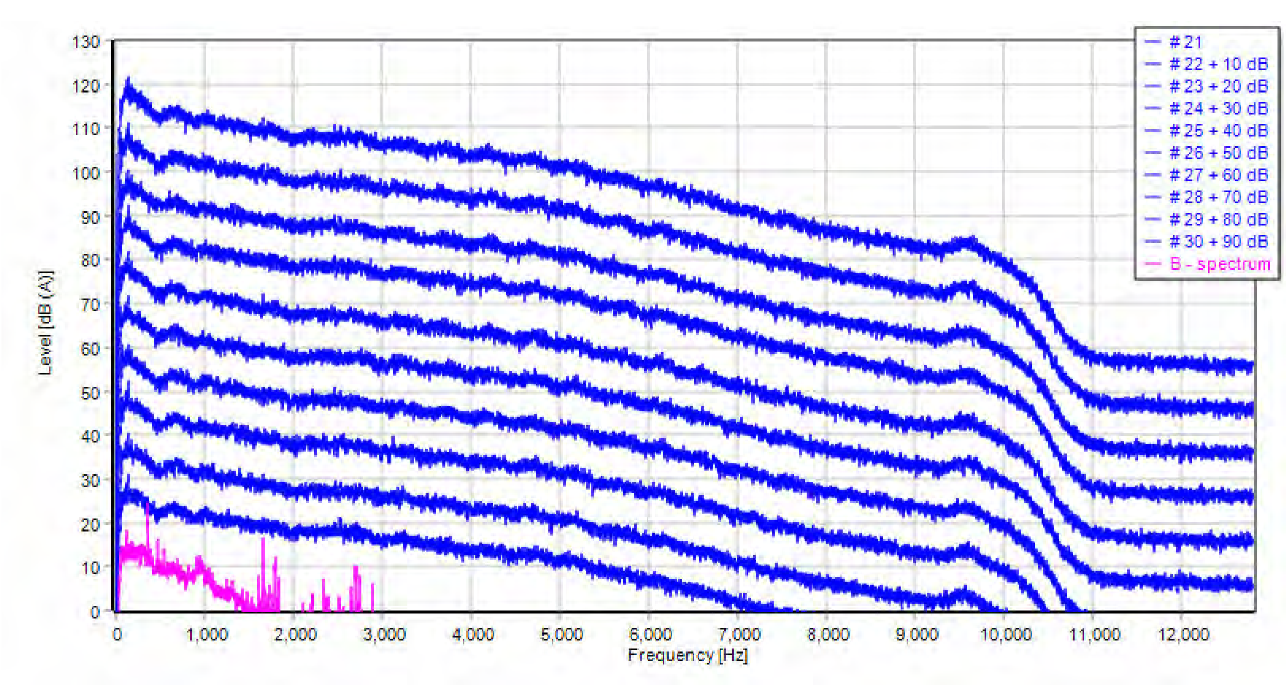
BIN 9.5: Narrowband spectrum



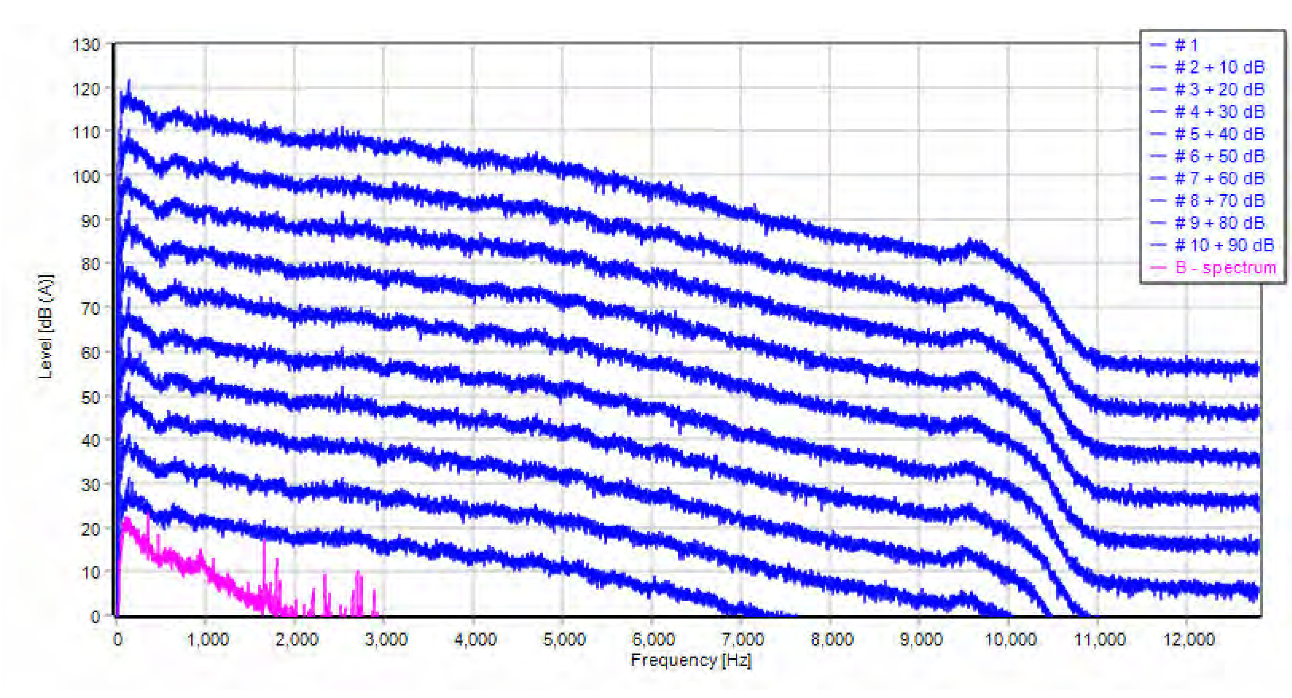
BIN 9.5: Narrowband spectrum



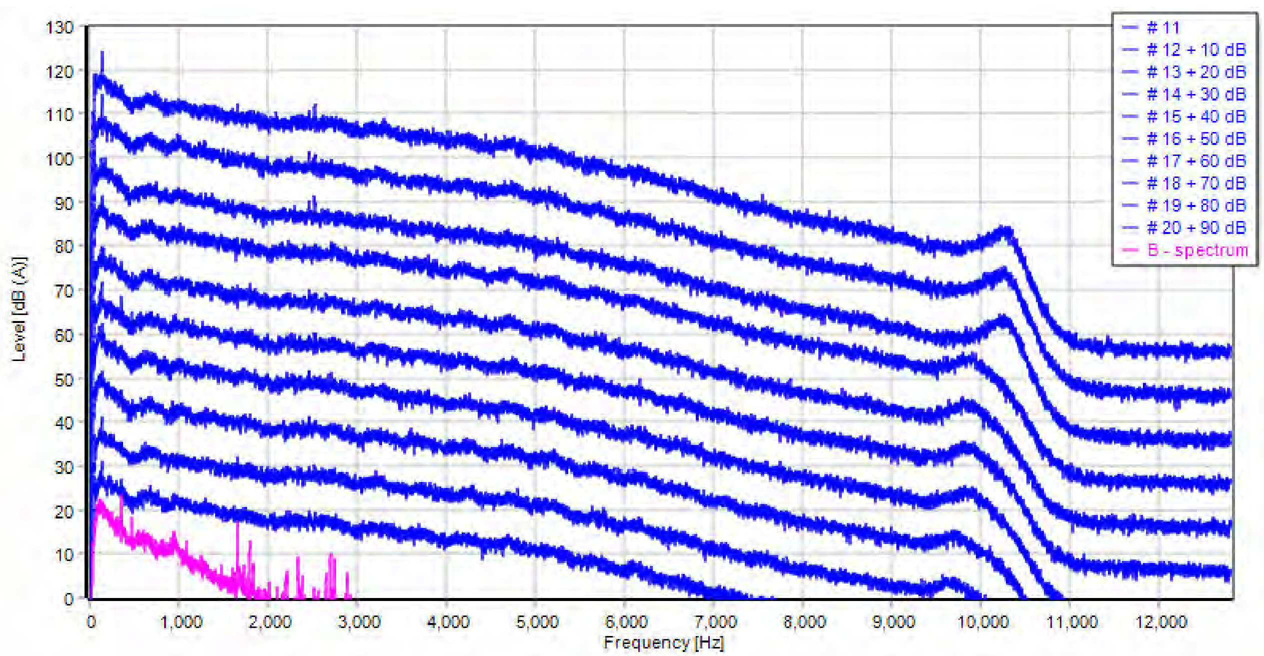
BIN 9.5: Narrowband spectrum



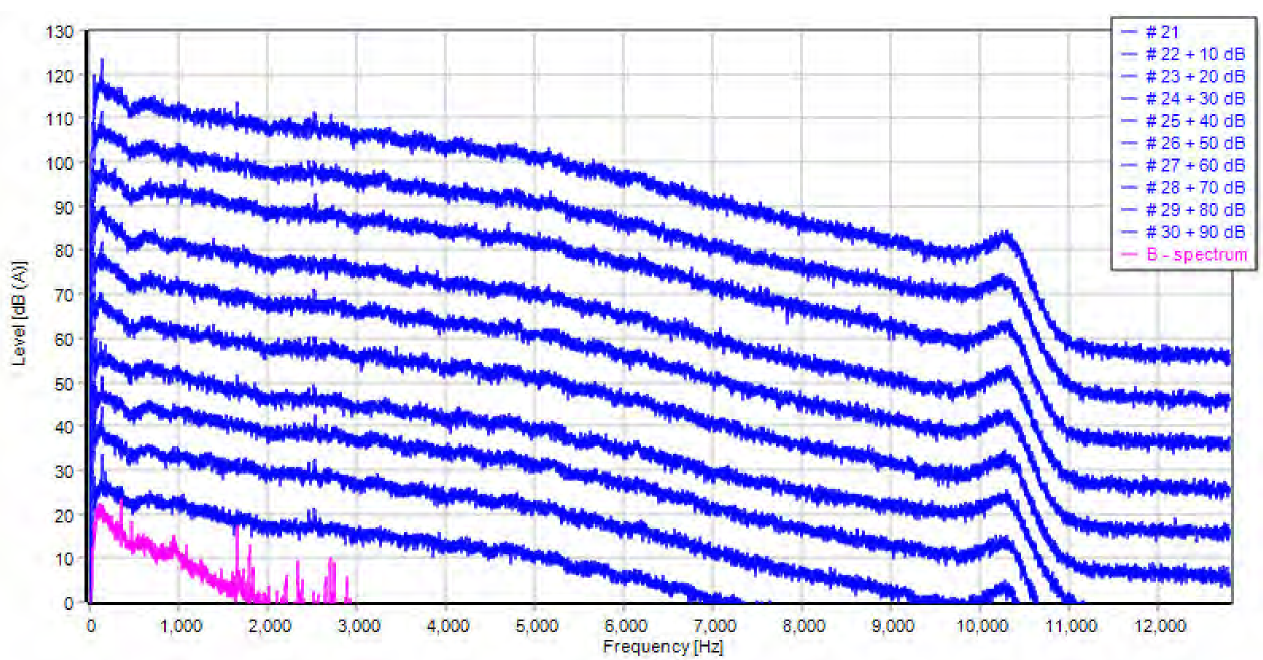
BIN 10: Narrowband spectrum



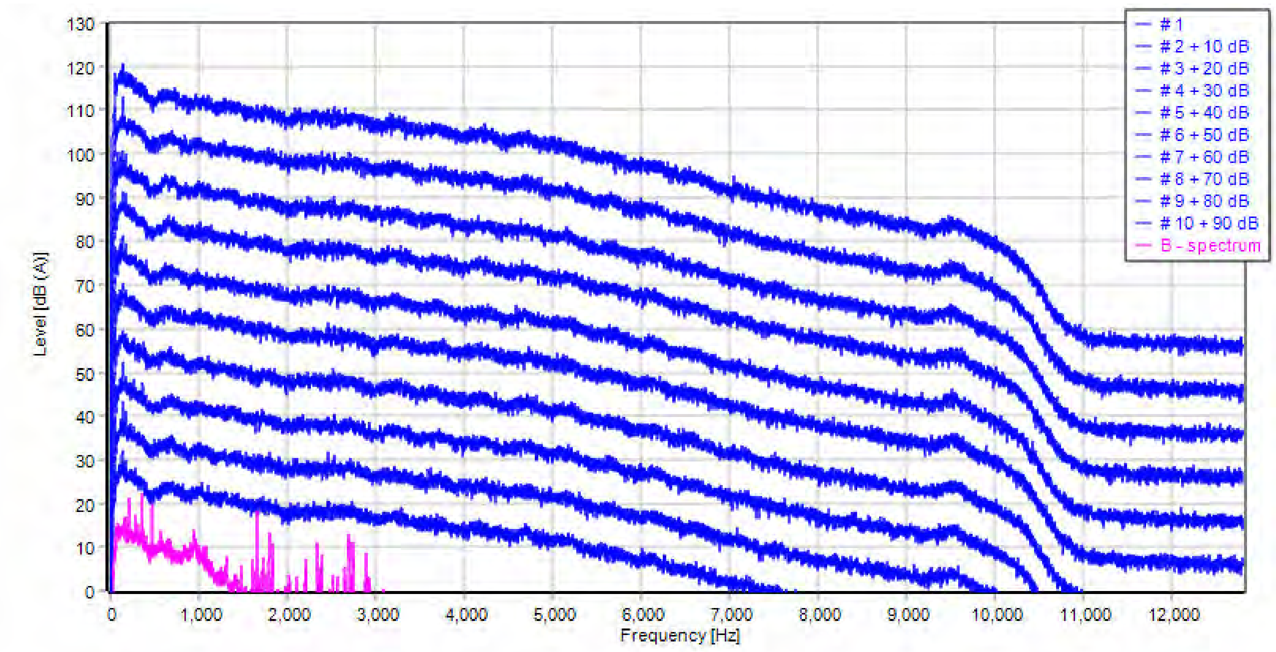
BIN 10: Narrowband spectrum



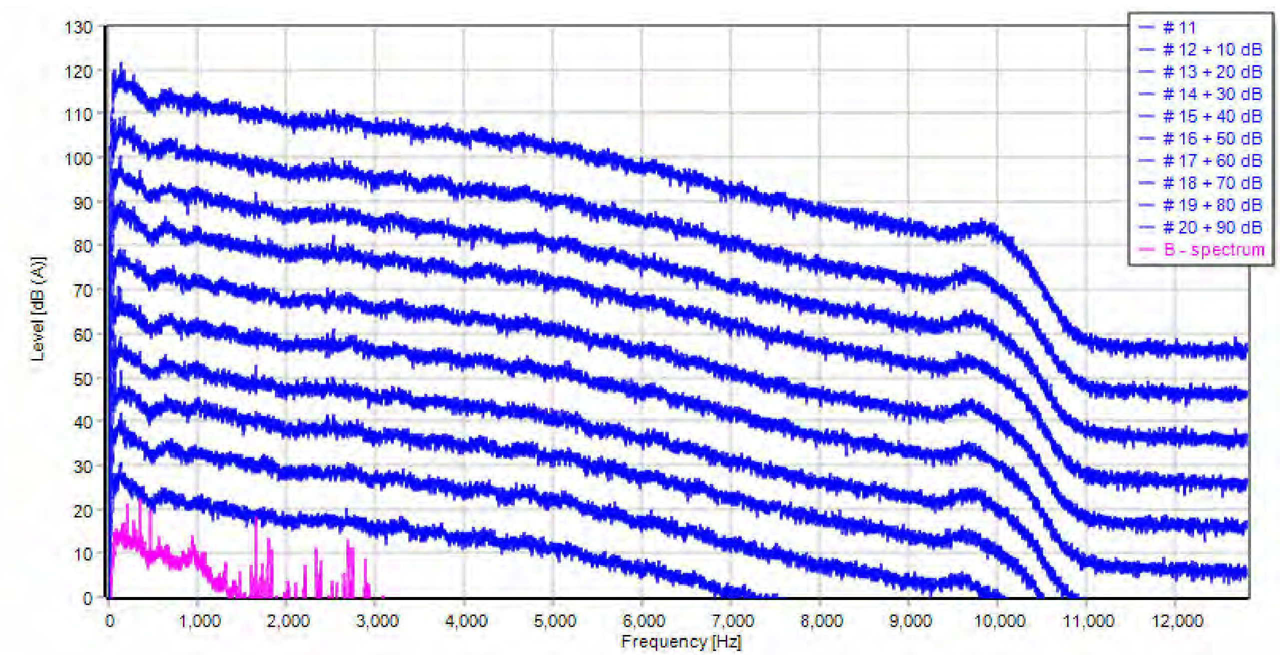
BIN 10: Narrowband spectrum



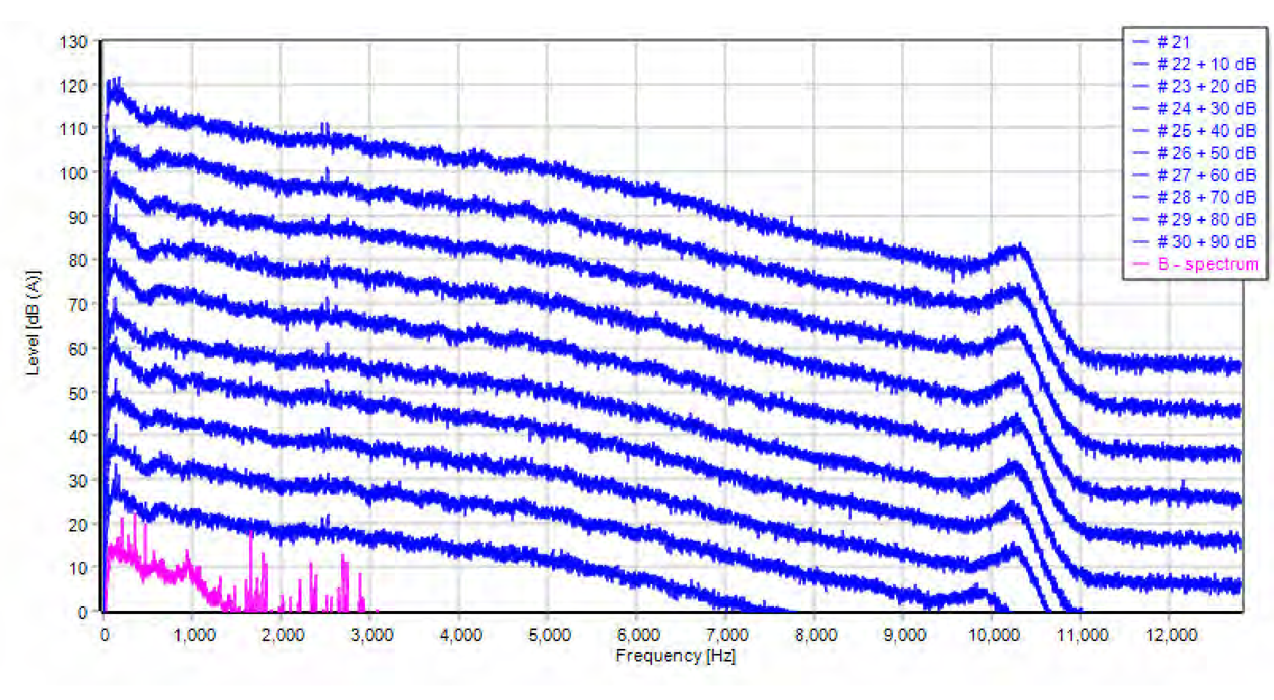
BIN 10.5: Narrowband spectrum



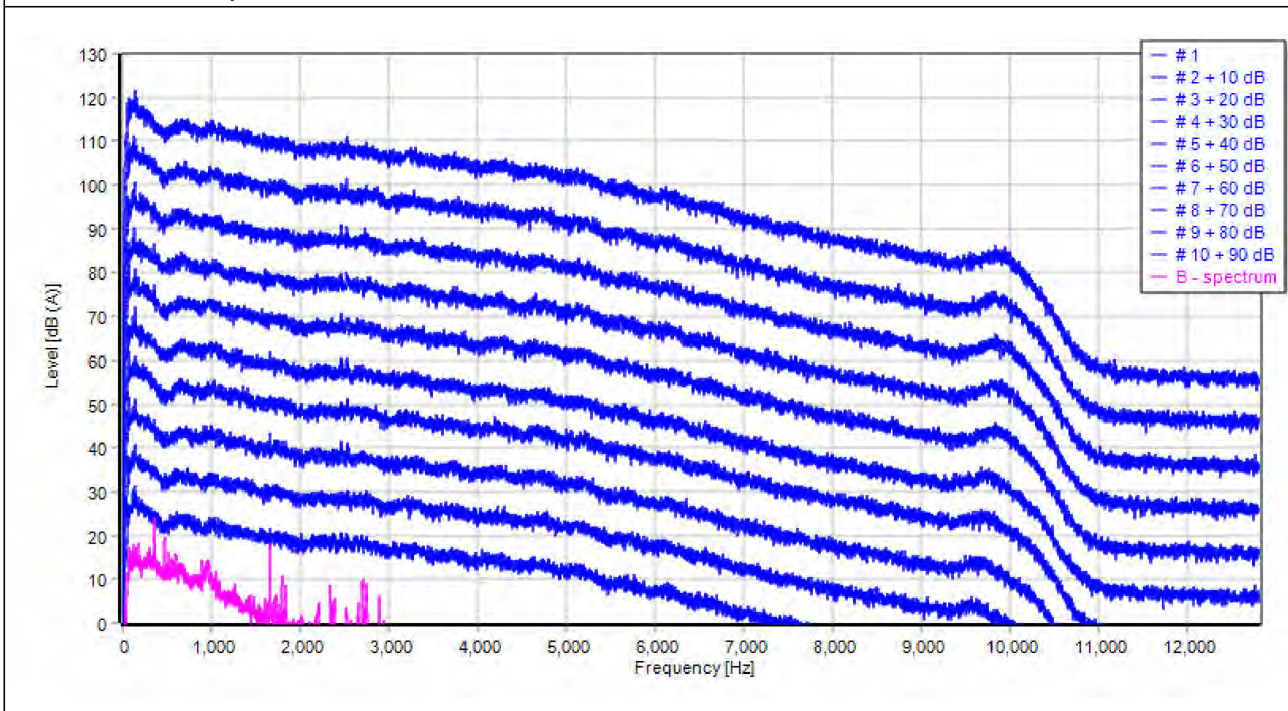
BIN 10.5: Narrowband spectrum



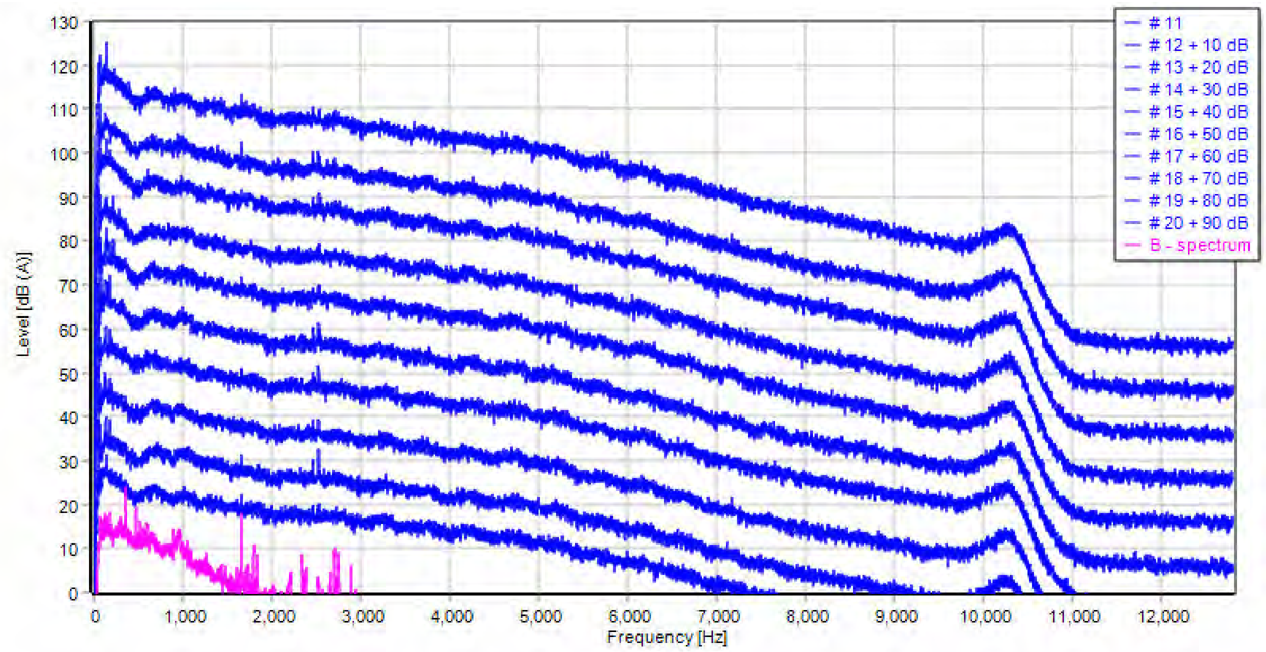
BIN 10.5: Narrowband spectrum



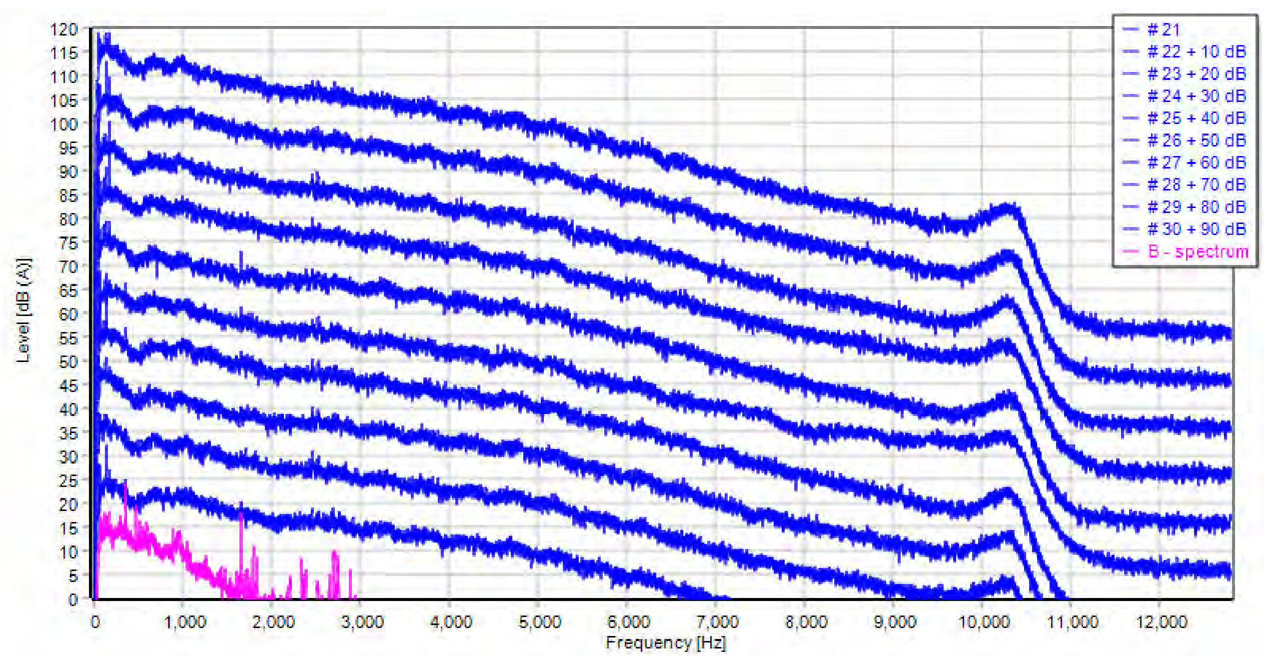
BIN 11: Narrowband spectrum



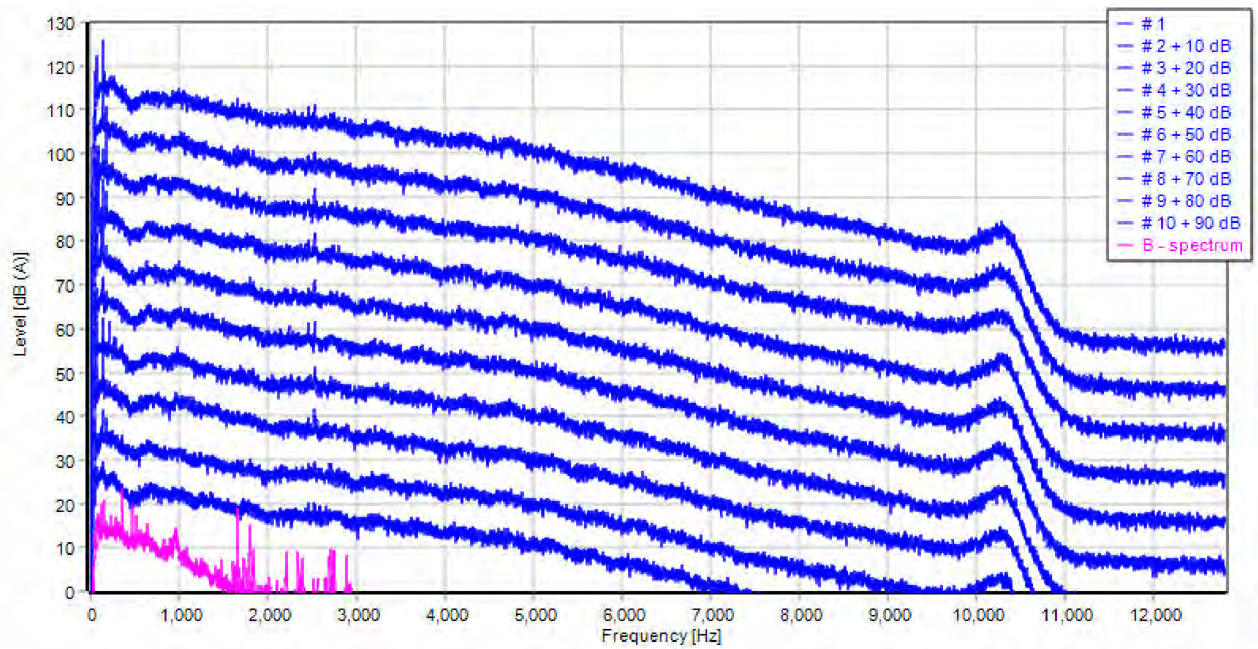
BIN 11: Narrowband spectrum



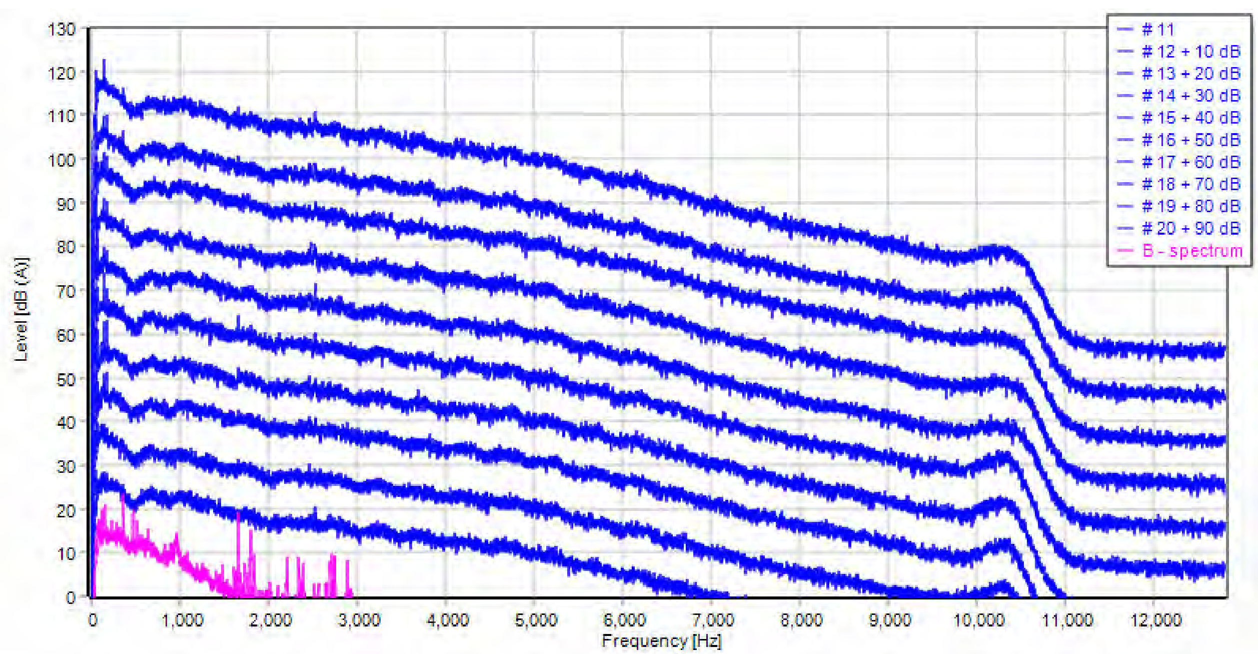
BIN 11: Narrowband spectrum



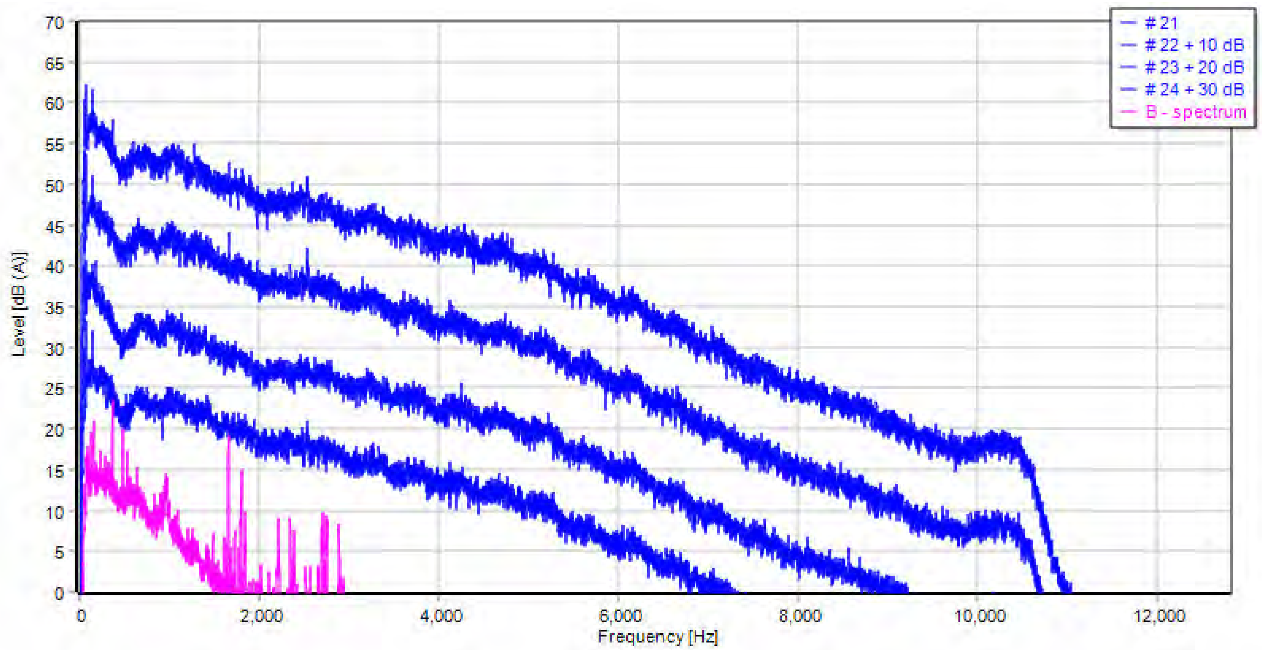
BIN 11.5: Narrowband spectrum



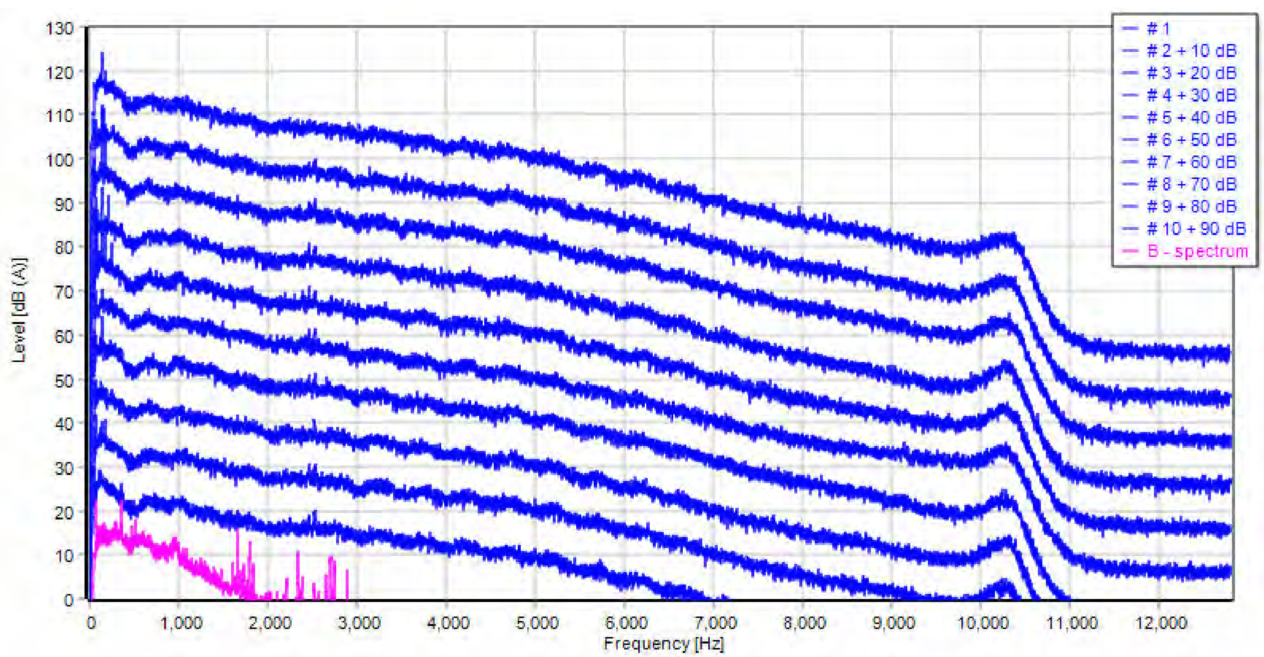
BIN 11.5: Narrowband spectrum



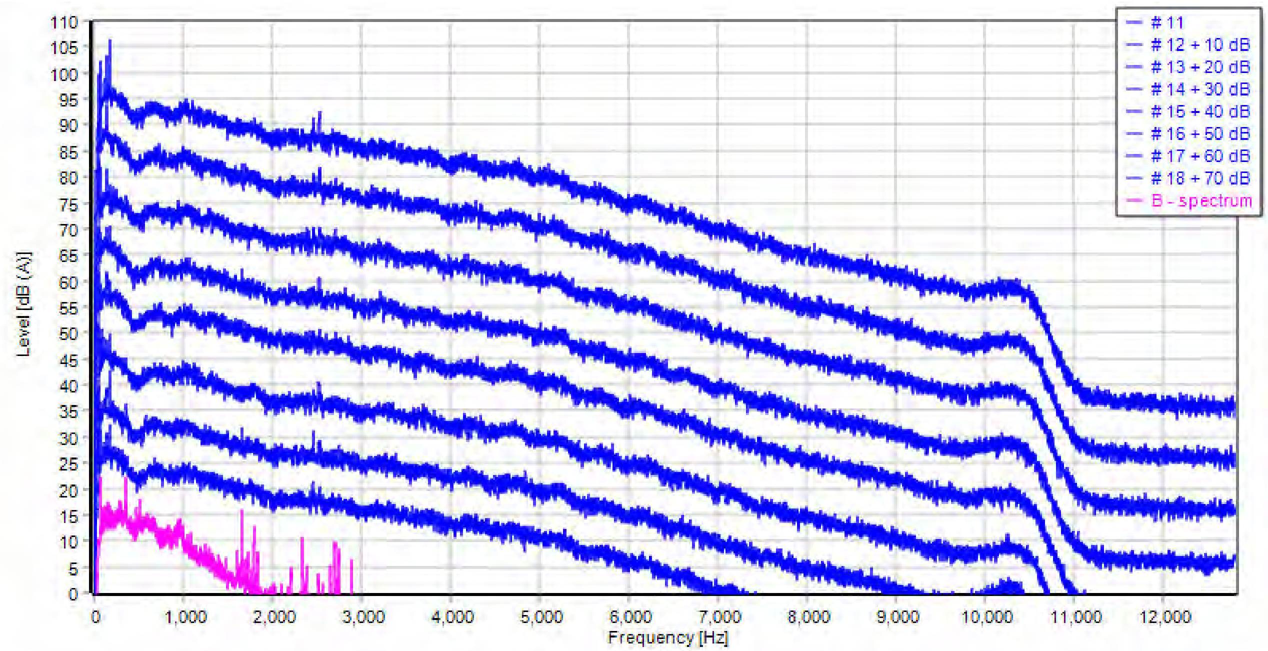
BIN 11.5: Narrowband spectrum



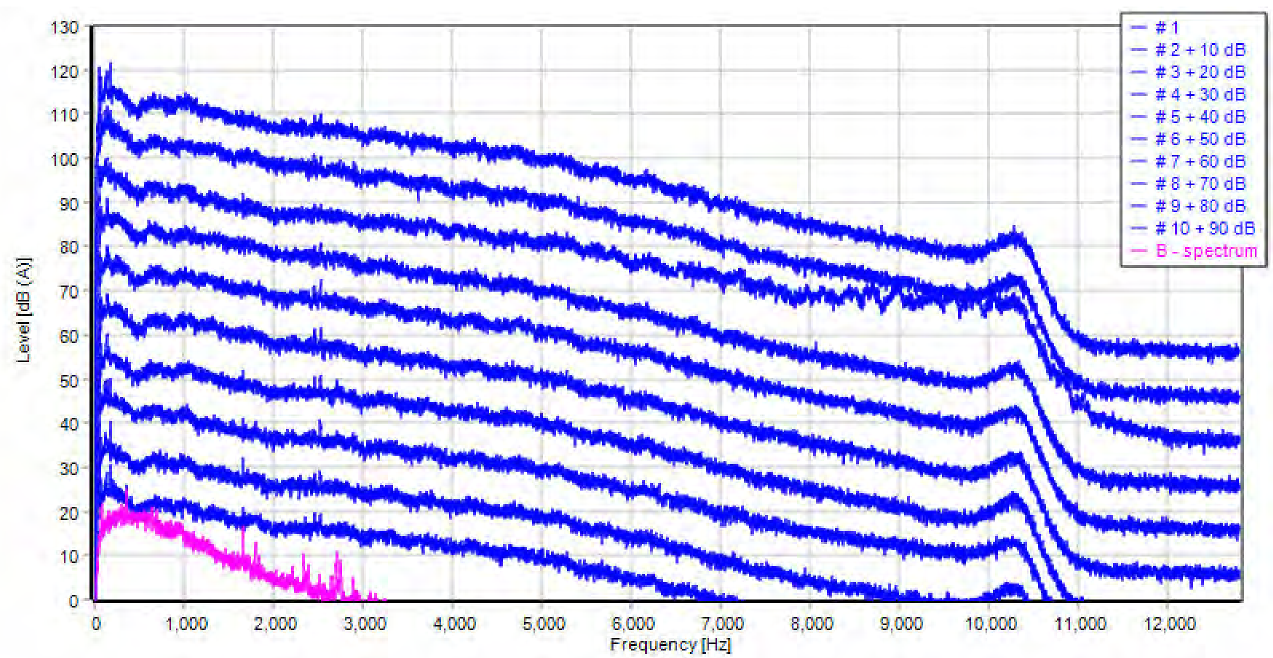
BIN 12: Narrowband spectrum



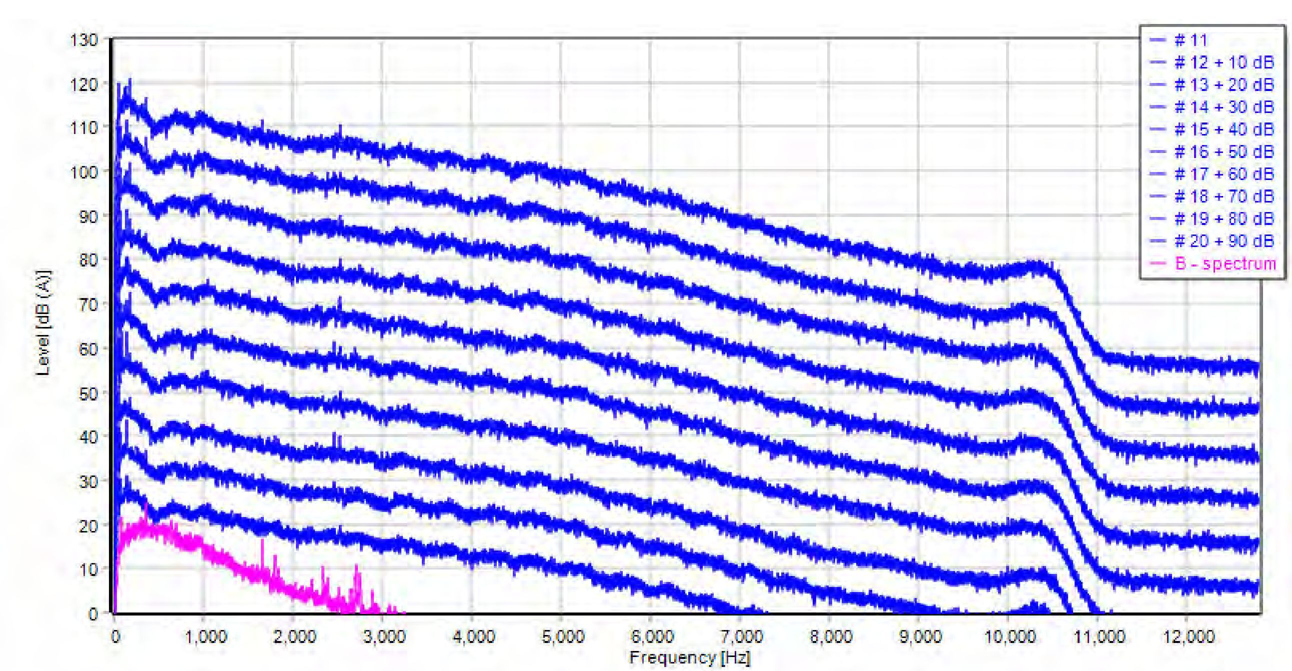
BIN 12: Narrowband spectrum



BIN 12.5: Narrowband spectrum



BIN 12.5: Narrowband spectrum



APPENDIX E:
WIND BIN LIST

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*1	7.5	7.6	11:37:59	50.6	226.3	9.4	14.6	959.4	1257.8
*2	7.5	7.7	11:38:19	50.6	227.3	8	14.6	959.4	1302.8
*3	7.5	7.5	11:38:29	50.5	225.2	8.2	14.6	959.5	1191.6
*4	7.5	7.5	11:38:39	50.3	218.6	6.8	14.6	959.5	1227.1
*5	7.5	7.6	11:38:49	50.3	215.2	6.5	14.6	959.5	1256.1
*6	7.5	7.6	11:38:59	51	216.8	6.5	14.6	959.5	1278.9
*7	7.5	7.5	11:52:09	51.3	233.2	8.2	15.1	959.4	1218.2
*8	7.5	7.5	11:53:39	50.1	218.3	6.3	15.2	959.4	1229.2
*9	7.5	7.3	11:53:49	49.5	215.3	6.5	15.3	959.5	1111.6
*10	7.5	7.7	11:54:09	51.7	217.4	6.2	15.3	959.5	1288.3
*11	7.5	7.5	11:55:39	51	216.5	6.7	15.4	959.4	1224.7
*12	7.5	7.5	11:55:49	51.1	222.4	6.1	15.4	959.5	1230.1
*13	7.5	7.5	12:02:09	50.4	217	6.9	15.7	959.5	1214.7
*14	7.5	7.7	12:02:29	50.5	223.9	5.8	15.8	959.5	1326
*15	7.5	7.5	12:02:39	50.5	229.6	6.2	15.8	959.5	1186.5
*16	7.5	7.4	12:02:49	50.9	217.3	7.2	15.8	959.5	1184.1
*17	7.5	7.5	12:05:59	50.6	230.1	6.6	15.8	959.4	1217.1
*18	7.5	7.6	12:06:09	50.9	233	7.4	15.8	959.4	1256.7
*19	7.5	7.7	12:06:19	50.3	228.2	7.1	15.8	959.4	1306.1
*20	7.5	7.4	12:06:29	49.5	225.7	7.2	15.8	959.4	1175
*21	7.5	7.6	12:07:19	51.2	231.9	7	15.8	959.4	1234.3
*22	7.5	7.4	12:10:09	49.7	220.6	6.7	15.9	959.3	1152.2
*23	7.5	7.6	12:10:29	51.3	228.4	9.4	15.9	959.3	1277.3
*24	7.5	7.7	12:10:59	51.2	228	8.6	16	959.3	1297.9
*25	7.5	7.6	12:14:39	51.3	217.6	9.3	16	959.3	1256.7
*26	7.5	7.7	12:15:39	50.6	231.8	6.5	16	959.4	1307.9
*27	7.5	7.3	12:16:29	50.8	224.3	7.6	16	959.4	1122.8
*28	7.5	7.7	12:21:09	50.9	214.7	7.5	16.3	959.3	1325.9
*29	7.5	7.6	12:21:19	50.7	230.5	6.1	16.3	959.3	1268.7
*30	7.5	7.4	12:21:29	50.6	234	6.2	16.3	959.3	1183.2
*31	7.5	7.5	12:21:39	51.4	224.4	7.5	16.3	959.3	1224.4
*32	7.5	7.5	12:28:29	50.5	224.9	7.4	16.3	959.4	1216.4
*33	7.5	7.4	12:28:39	50.2	230.3	6.2	16.3	959.3	1171.1
*34	8	8.2	11:29:59	50.7	215.8	6.5	14.3	959.5	1534.5
*35	8	8.1	11:30:09	51.1	213	6.1	14.3	959.5	1511.6
*36	8	7.9	11:38:09	50.8	231.7	8.9	14.6	959.4	1405.8
*37	8	7.8	11:39:09	51.1	217	6.5	14.6	959.5	1366.3
*38	8	8	11:42:39	51.5	219.6	7.2	14.8	959.5	1451.4
*39	8	7.8	11:43:09	51.4	225.1	7.8	14.8	959.4	1341.3
*40	8	8.2	11:43:19	51.1	222.9	8	14.8	959.4	1564.3
*41	8	7.9	11:43:29	51	224.3	9.2	14.8	959.3	1413.8
*42	8	7.9	11:43:59	51.1	221.9	6.7	14.9	959.4	1392.9
*43	8	8.1	11:44:09	51.3	221.3	5.9	14.9	959.4	1511.9
*44	8	8.2	11:51:39	50.9	234.3	6.7	15.1	959.5	1562.4
*45	8	7.9	11:51:59	51	233.1	7.8	15.1	959.4	1385
*46	8	8.1	11:52:19	51	233.1	8.2	15.1	863.5	1474.6
*47	8	8.2	11:52:29	50.8	214.4	7.1	15.1	959.5	1563.1
*48	8	8.2	11:52:49	50.7	220	7.6	15.2	959.5	1577.1
*49	8	8.2	11:53:19	50.8	210.9	7.1	15.2	959.5	1555.9

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*50	8	8.2	11:53:29	51	223.1	6.5	15.2	959.5	1533.3
*51	8	8	11:54:19	51.1	213.6	5.9	15.3	959.5	1430.9
*52	8	7.8	11:54:29	51	213.7	6.6	15.3	959.4	1372.9
*53	8	8	11:55:29	51	218.7	7.7	15.4	959.5	1428.8
*54	8	8.2	11:55:59	51.4	226.9	7.4	15.4	959.4	1553.3
*55	8	8	11:57:29	50.9	224.9	8.4	15.5	959.4	1427.6
*56	8	8	11:57:39	51.2	232.8	8	15.5	959.4	1442.9
*57	8	8	11:57:49	51	232.8	6.8	15.5	959.4	1428.1
*58	8	8.1	11:59:19	51.3	217.2	5.1	15.6	959.5	1503
*59	8	8.1	11:59:59	50.9	215.1	7.3	15.7	959.5	1477.5
*60	8	8.2	12:00:09	51.2	228	6.3	15.7	959.4	1533.6
*61	8	8.1	12:01:59	50.3	214	8	15.7	959.5	1523.4
*62	8	7.9	12:02:19	50.6	222.3	5.9	15.8	959.5	1378.2
*63	8	7.9	12:05:49	50.2	228.5	7.6	15.8	959.4	1417.4
*64	8	8.1	12:09:59	50.7	218.7	6.3	15.9	959.4	1495.4
*65	8	7.9	12:10:39	51.2	232.9	8.8	15.9	863.3	1414.4
*66	8	7.9	12:10:49	51.3	225.9	8.1	16	959.3	1407.7
*67	8	7.9	12:14:29	50.5	221.8	7.7	16	959.4	1415.2
*68	8	8.1	12:14:49	51.9	220.6	8.7	16	959.3	1520
*69	8	7.9	12:15:19	51.4	233.5	9.1	16	959.3	1390.3
*70	8	7.8	12:15:29	51.1	234.6	8.9	16	959.3	1342.4
*71	8	7.9	12:17:09	51.2	229.1	7.5	16.1	959.4	1400.2
*72	8	8.2	12:19:19	51.3	230.9	8.7	16.2	959.4	1537
*73	8	7.9	12:28:19	50.9	226.7	8	16.3	959.3	1402.2
*74	8	8.1	14:47:09	50.8	209	9.7	19	957.6	1520.5
*75	8	7.8	14:47:29	50.3	211.5	8.4	19	957.6	1357.3
*76	8	8	14:47:49	50.9	212.6	8	19	957.6	1462.4
*77	8	8	16:10:49	50.8	201.7	9	18.6	957	1463.7
*78	8	7.8	16:10:59	51.1	199.3	9.7	18.6	957	1343.4
*79	8	8.2	16:11:09	51.2	197.6	9.4	18.6	957	1538.4
*80	8.5	8.7	11:29:09	50.7	218.6	7.5	14.3	959.5	1853.8
*81	8.5	8.7	11:29:19	50.8	217.2	7.3	14.3	959.5	1847
*82	8.5	8.5	11:29:29	51.4	216.5	6.7	14.3	959.5	1743.8
*83	8.5	8.4	11:30:29	51.1	217.8	7.4	14.3	959.5	1652.3
*84	8.5	8.5	11:30:39	51.6	221.2	8.1	14.3	959.5	1744.7
*85	8.5	8.7	11:31:29	51.3	227.7	7.3	14.3	959.5	1844.3
*86	8.5	8.7	11:32:29	51.2	214.9	6.8	14.4	959.5	1820.9
*87	8.5	8.4	11:35:39	51.1	212.8	9.4	14.5	959.5	1661.5
*88	8.5	8.3	11:35:49	52	224	8.3	14.5	959.5	1626.6
*89	8.5	8.6	11:37:49	50.5	219.6	8.7	14.6	959.5	1786.7
*90	8.5	8.5	11:39:19	51.2	215.2	6.6	14.6	959.5	1713.5
*91	8.5	8.6	11:41:09	51.2	226.3	7	14.7	959.4	1776.4
*92	8.5	8.4	11:41:19	51.1	221	8	14.7	959.3	1636.8
*93	8.5	8.3	11:41:29	51.2	221.2	7.7	14.7	959.4	1627.2
*94	8.5	8.7	11:41:39	51.5	221	6.7	14.7	959.5	1815.1
*95	8.5	8.4	11:42:09	51	214	7.8	14.8	959.5	1649.6
*96	8.5	8.5	11:42:19	51.1	214.5	7.9	14.8	959.5	1692.5
*97	8.5	8.5	11:42:29	50.9	217.5	7.9	14.8	959.5	1698.2
*98	8.5	8.3	11:43:49	51	223.8	7.2	14.8	959.4	1601.4

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*99	8.5	8.7	11:44:19	51.3	222.4	6.6	14.9	959.4	1835.7
*100	8.5	8.3	11:46:49	51.5	224.1	7.8	15	959.4	1616.6
*101	8.5	8.5	11:50:19	50.8	224.2	7	15	959.4	1725.7
*102	8.5	8.6	11:50:29	51.2	226.7	7.4	15	959.4	1796.7
*103	8.5	8.5	11:52:39	50.8	219.8	7.4	15.2	959.5	1729.2
*104	8.5	8.5	11:52:59	50.8	209.6	6.4	15.2	959.5	1692.3
*105	8.5	8.5	11:53:09	50.4	211.4	7.8	15.2	959.5	1696.4
*106	8.5	8.5	11:54:39	51.4	211.5	6.7	15.3	959.4	1736.4
*107	8.5	8.4	11:55:19	50.8	220.3	7.6	15.4	959.5	1642.5
*108	8.5	8.7	11:56:29	51.5	205.5	6	15.4	959.5	1829.7
*109	8.5	8.5	11:56:59	51.4	222.3	8.8	15.4	959.5	1739.7
*110	8.5	8.4	11:57:09	51.3	223.2	9	15.5	959.5	1640.8
*111	8.5	8.4	11:57:19	51	224.9	9.1	15.5	959.4	1679
*112	8.5	8.4	11:58:19	51.3	226.5	7	15.5	959.4	1640.4
*113	8.5	8.7	11:59:09	50.6	213.7	5.1	15.6	959.4	1839.7
*114	8.5	8.6	11:59:39	50.3	217.4	7.9	15.6	959.5	1767.3
*115	8.5	8.5	11:59:49	50	218.3	7.4	15.6	959.5	1708.1
*116	8.5	8.3	12:00:19	52.2	225.6	6.5	15.7	959.5	1617.2
*117	8.5	8.6	12:00:39	51.2	234	7.5	15.7	959.5	1765.8
*118	8.5	8.7	12:00:49	51.7	228	7.2	15.7	959.5	1838
*119	8.5	8.7	12:02:59	51.4	217.5	7.6	15.8	959.5	1838.4
*120	8.5	8.7	12:05:09	51.4	218.5	7.5	15.8	959.5	1814.7
*121	8.5	8.4	12:05:39	50.3	225.1	7.2	15.8	959.5	1666.3
*122	8.5	8.4	12:07:29	51.8	227.1	6.6	15.9	959.5	1684
*123	8.5	8.4	12:11:09	51.5	222	10	16	959.3	1649.5
*124	8.5	8.6	12:13:09	51.5	222	10.2	16	959.4	1796.4
*125	8.5	8.7	12:14:19	50.7	226	8.5	16	959.3	1826.8
*126	8.5	8.7	12:14:59	51.5	225.6	9.1	16	959.3	1845.9
*127	8.5	8.3	12:15:09	51.6	230.8	8.7	16	959.4	1619.3
*128	8.5	8.3	12:16:39	50.7	230.3	7	16	959.4	1602.1
*129	8.5	8.3	12:16:49	51.1	226.1	7.5	16	959.4	1630
*130	8.5	8.3	12:16:59	50.7	221.3	7.5	16.1	959.5	1600
*131	8.5	8.7	12:17:19	51.7	230.9	8.3	16.1	959.4	1854.2
*132	8.5	8.4	12:17:39	51.5	210.4	6.9	16.1	959.5	1670
*133	8.5	8.5	12:17:49	51.3	216.6	7.7	16.1	959.4	1715.3
*134	8.5	8.4	12:17:59	50.8	225.5	7.3	16.2	959.4	1644.3
*135	8.5	8.3	12:18:09	51	221.9	6.5	16.2	959.5	1620.8
*136	8.5	8.5	12:18:19	51.4	226.5	7.9	16.2	959.4	1733.8
*137	8.5	8.4	12:20:29	51.6	229.1	5.7	16.3	959.3	1681.9
*138	8.5	8.5	12:20:39	51	234.2	6.3	16.3	959.3	1717.3
*139	8.5	8.3	12:20:59	50.9	220.4	6.5	16.3	959.3	1584.9
*140	8.5	8.5	12:28:09	50.9	231.8	7.4	16.3	959.3	1733.2
*141	8.5	8.3	12:29:19	51.8	219	5.4	16.3	959.4	1623.4
*142	8.5	8.6	12:29:29	51.3	230.3	5	16.3	959.3	1788.9
*143	8.5	8.5	12:29:39	50.8	223.9	5.4	16.3	959.4	1713.6
*144	8.5	8.3	12:29:49	51.1	216.7	5.8	16.3	959.4	1622.5
*145	8.5	8.5	12:29:59	51.1	219.5	6.5	16.3	959.3	1693.3
*146	8.5	8.6	14:13:39	51.4	218.4	7.8	18.9	957.9	1780.8
*147	8.5	8.4	14:43:29	50.7	203.6	7.5	18.9	957.7	1684.1

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*148	8.5	8.3	14:43:39	51	203.2	6.5	18.9	957.7	1606.2
*149	8.5	8.4	14:43:59	50.8	208	6.4	18.9	957.7	1683.8
*150	8.5	8.4	14:44:09	51.2	202.4	6.3	18.9	957.7	1680.1
*151	8.5	8.6	14:46:59	50.7	219.8	9.3	19	957.5	1788.2
*152	8.5	8.4	14:47:19	50.6	208.3	8.1	19	957.6	1647.4
*153	8.5	8.7	14:47:59	51.5	206.7	6.6	19	957.6	1829.4
*154	8.5	8.7	14:52:19	51.1	210	6.7	19.2	957.6	1836.8
*155	8.5	8.6	14:52:29	52.4	201.4	9.2	19.2	957.5	1765.5
*156	8.5	8.7	14:52:49	51.9	223.6	7.8	19.2	957.5	1853.6
*157	8.5	8.6	16:10:39	50.5	203.2	9.5	18.6	957	1762
*158	8.5	8.7	16:16:09	51.5	192.7	8.1	18.6	957.1	1828.1
*159	8.5	8.5	16:18:09	51.8	207.1	6.8	18.7	957	1725.7
*160	8.5	8.7	16:18:19	51.8	202	8.6	18.7	957.1	1812.5
*161	9	9.2	11:28:59	51.3	217.8	8.9	14.3	959.5	2082.5
*162	9	8.8	11:29:39	51.1	217	6.7	14.3	959.6	1905.1
*163	9	9	11:29:49	50.5	212.8	6	14.3	959.5	1983.9
*164	9	9	11:30:19	51.1	216	6.6	14.3	959.5	1992.4
*165	9	8.8	11:31:19	51.1	229.2	6.7	14.3	959.5	1891.5
*166	9	9	11:31:39	50.9	218.7	7.4	14.3	959.5	1968.3
*167	9	8.9	11:31:49	51.1	218.6	6.8	14.3	959.5	1938.1
*168	9	9.2	11:31:59	51.2	220.4	6.9	14.3	959.5	2084.4
*169	9	9.2	11:32:09	51	213.7	7	14.4	959.5	2079.6
*170	9	8.9	11:32:39	51.6	213.9	6.6	14.4	959.5	1948.4
*171	9	9	11:35:29	50.8	215.2	7.1	14.5	959.5	1992.6
*172	9	9.1	11:36:29	51.2	216.4	6.2	14.5	959.5	2051.4
*173	9	9.1	11:36:39	51.7	221.2	6.6	14.5	959.6	2024.1
*174	9	9.1	11:41:49	51.1	217	6.3	14.8	959.5	2034.4
*175	9	8.8	11:41:59	50.8	213.3	7.8	14.8	959.5	1874.1
*176	9	8.9	11:42:59	51.3	218.9	7.1	14.8	959.4	1937.3
*177	9	8.9	11:44:29	51.3	224	8.4	14.9	959.4	1911.6
*178	9	9.2	11:44:59	51	212.8	6.4	14.9	959.4	2070.5
*179	9	9.2	11:46:19	51.1	216	8.2	15	959.4	2097.4
*180	9	9.1	11:46:29	51.3	216.1	8.8	15	959.4	2026.5
*181	9	9.1	11:46:39	51	217.7	7.9	15	959.3	2049.5
*182	9	8.8	11:46:59	51.1	226.3	6.9	15	959.4	1903.9
*183	9	8.8	11:47:59	51.4	213.3	8.6	15	959.4	1888
*184	9	9.1	11:48:09	51.6	224.1	7.8	15	959.4	2047.9
*185	9	8.8	11:50:09	50.9	226.1	7.7	15	959.3	1891.7
*186	9	9.1	11:50:39	51.3	220.2	6.6	15	959.5	2016.4
*187	9	8.9	11:50:59	51.3	219.1	6.3	15.1	959.5	1921.2
*188	9	8.9	11:51:29	50.8	229.4	7.4	15.1	959.5	1959
*189	9	9.1	11:54:49	51.4	215.2	6.2	15.3	959.4	2025.9
*190	9	8.9	11:54:59	51.3	213.3	6.8	15.3	959.5	1912.5
*191	9	8.8	11:55:09	50.9	217.4	6.9	15.3	959.4	1869.2
*192	9	8.9	11:56:09	51.5	230.8	5.6	15.4	959.3	1911.6
*193	9	8.8	11:56:19	51.2	220.4	4.9	15.4	959.5	1880.1
*194	9	9	11:56:49	51.2	214.1	7.9	15.4	959.5	1984.8
*195	9	9.1	11:58:29	51.5	230.8	6.3	15.5	959.5	2047.8
*196	9	8.8	11:59:29	51.2	218.2	6.6	15.6	959.4	1880.6

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*197	9	9	12:00:29	51.3	228	7.1	15.7	959.5	1988.7
*198	9	9	12:01:39	51.3	222.1	5.9	15.7	959.5	2008.9
*199	9	9.2	12:03:09	51.7	213.7	7	15.8	959.5	2070.9
*200	9	9.1	12:04:49	51.5	219.6	6.8	15.8	959.5	2043.7
*201	9	8.9	12:04:59	51.4	215.7	7.6	15.8	959.5	1951.7
*202	9	9.1	12:05:19	51.6	218.9	8.3	15.8	959.5	2044.2
*203	9	9	12:05:29	51	219.3	7.1	15.8	959.5	1971.3
*204	9	9.1	12:09:39	50.8	222.8	8.1	15.9	959.3	2046
*205	9	8.8	12:09:49	51	222.7	7.6	15.9	959.3	1894.2
*206	9	9	12:11:19	51.4	230.7	9.6	16	959.3	1995.1
*207	9	9.1	12:11:29	51.1	229.7	7.9	16	959.4	2053.5
*208	9	9.2	12:12:49	51.1	229.5	10.4	16	959.3	2077.2
*209	9	8.8	12:12:59	50.8	223.1	10.5	16	959.3	1871.8
*210	9	9.2	12:14:09	50.7	226.2	8.5	16	959.3	2077.9
*211	9	9.2	12:17:29	51.2	218.9	7.3	16.1	959.4	2076.6
*212	9	9.2	12:18:29	51.8	227.3	9.1	16.2	959.4	2065.8
*213	9	9.1	12:18:49	50.7	233.4	7	16.2	959.4	2049.2
*214	9	8.8	12:19:29	51.4	231	9.2	16.3	959.3	1876
*215	9	9.1	12:19:39	51.3	228.5	8.4	16.3	959.3	2050.6
*216	9	9	12:27:09	51.2	217.8	10.8	16.3	959.3	1978
*217	9	9	12:27:49	51.2	225.2	8.4	16.3	959.3	2000.6
*218	9	9.1	12:27:59	51.1	226.4	7.3	16.3	959.3	2048.2
*219	9	9.1	12:32:19	51.2	229.3	7	16.6	959.3	2029
*220	9	8.9	12:34:29	51.1	228.9	8.5	16.7	959.3	1963.7
*221	9	9	14:11:09	51.5	200.7	7.2	18.9	957.9	2007.6
*222	9	8.9	14:12:59	51.4	211.5	8.4	18.9	957.9	1920.5
*223	9	8.8	14:16:09	52.1	207.5	7.3	19	957.8	1877.2
*224	9	8.8	14:30:59	51.7	202.8	7.7	18.7	957.8	1903.6
*225	9	8.9	14:32:59	50.7	209.7	8.4	18.8	957.8	1945
*226	9	9.1	14:33:09	50.7	204.9	9.3	18.8	957.8	2027.4
*227	9	8.9	14:33:19	51.8	205.7	8.9	18.8	957.8	1940.6
*228	9	9	14:36:49	51.4	210.6	11.4	18.7	957.7	2009.3
*229	9	9	14:43:19	50.9	200.6	8.4	18.8	957.6	1974.2
*230	9	8.9	14:43:49	50.8	198.8	6.7	18.9	957.6	1944.6
*231	9	8.8	14:46:49	51	218.6	9.3	19	957.5	1900.9
*232	9	9.1	14:51:19	51.6	218.4	9.9	19.1	957.5	2042.4
*233	9	9.2	14:51:49	51	211	9.6	19.1	957.6	2070.3
*234	9	9	14:52:09	51.3	219.5	8	19.2	957.6	2007.2
*235	9	9.2	14:52:39	51.4	214.2	8	19.2	957.5	2092.6
*236	9	8.9	14:52:59	51.5	217.9	7	19.3	957.6	1947.1
*237	9	9.1	16:10:09	50.8	205.4	8.6	18.6	957	2048.3
*238	9	9.1	16:15:39	51.5	200.5	9.7	18.6	957.1	2038.7
*239	9	8.9	16:15:49	51.2	207.9	8.9	18.6	957	1911.4
*240	9	8.9	16:16:19	51.6	201	7.4	18.6	957.1	1923.2
*241	9	9.2	16:16:29	51.4	195.7	7.8	18.6	957.1	2102.2
*242	9	9.2	16:17:49	51.5	208.5	6.6	18.7	957	2060.8
*243	9	8.9	16:17:59	51.4	203.3	5.6	18.7	957.1	1950
*244	9	8.8	16:18:39	51.3	197.6	7.4	18.7	957	1887.7
*245	9	9	16:19:09	51.5	195.2	5.9	18.7	957	1988.4

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*246	9	9.2	16:30:39	51.3	198.6	9.8	18.2	957	2105.5
*247	9	9.2	16:30:49	51.7	198.6	10.1	18.2	957	2093.6
*248	9	9.2	16:33:59	51.4	198.8	9.2	18	957	2080.1
*249	9	9.1	16:34:39	51.7	199	11.3	18	957	2046
*250	9	9	16:34:49	51.2	202.5	8.9	18	957	2003.8
*251	9	9.2	16:37:29	51.2	195.4	6.6	18	957	2075
*252	9	9.2	16:38:09	51.7	200.7	8.1	18	957	2085.4
*253	9	9.1	16:38:19	51.1	196.7	9.1	18	957	2020.5
*254	9	9	16:38:29	51.4	203.9	8.5	18	957	1980.7
*255	9.5	9.4	11:28:49	51.2	213.2	9	14.3	959.5	2171
*256	9.5	9.3	11:30:49	51.8	227.7	7.6	14.3	959.5	2120.5
*257	9.5	9.4	11:31:09	51.1	234.3	6.5	14.3	959.5	2167.5
*258	9.5	9.3	11:32:19	51.1	213.8	7	14.4	959.5	2108.6
*259	9.5	9.6	11:32:49	51.4	214.2	6.9	14.4	959.5	2269.4
*260	9.5	9.7	11:33:39	51.4	214.3	7.9	14.4	959.5	2308.6
*261	9.5	9.5	11:33:49	51.4	215.7	8.1	14.4	959.5	2216.1
*262	9.5	9.6	11:34:29	51.3	211.2	9.4	14.5	959.5	2256.7
*263	9.5	9.4	11:34:39	51.5	208.5	9.3	14.5	959.6	2158.7
*264	9.5	9.4	11:35:19	51.2	218.8	7.8	14.5	959.5	2179.6
*265	9.5	9.5	11:35:59	51.6	217.6	7.3	14.5	959.5	2212
*266	9.5	9.3	11:36:09	51.8	218.6	7	14.5	959.5	2122.6
*267	9.5	9.3	11:36:19	51.6	222.1	6.1	14.5	959.5	2107.9
*268	9.5	9.7	11:36:49	51.7	225	5.9	14.5	959.5	2325.9
*269	9.5	9.5	11:36:59	51.4	226	4.9	14.5	959.5	2221.1
*270	9.5	9.7	11:39:29	51.6	215.1	6.1	14.7	959.5	2302.6
*271	9.5	9.5	11:39:39	51.8	210.2	6.4	14.7	959.5	2233.7
*272	9.5	9.5	11:40:19	51.6	217.5	7.7	14.7	959.5	2237.8
*273	9.5	9.7	11:40:59	51.2	224.9	7.5	14.7	959.4	2291.7
*274	9.5	9.6	11:42:49	51.5	220.1	6.6	14.8	959.5	2245.6
*275	9.5	9.7	11:44:39	51.1	214.3	8.2	14.9	959.4	2296.3
*276	9.5	9.6	11:44:49	50.5	206.5	7.2	14.9	959.4	2265.6
*277	9.5	9.5	11:45:09	51.6	207.4	7.1	14.9	959.4	2235.4
*278	9.5	9.3	11:47:09	51.5	220.7	8.4	15	959.4	2119.7
*279	9.5	9.5	11:47:39	51.2	222.5	8.3	15	959.4	2198.1
*280	9.5	9.3	11:47:49	51.4	226.9	8.6	15	959.4	2133.2
*281	9.5	9.7	11:48:19	51.5	222.5	7.9	15	959.3	2301
*282	9.5	9.6	11:49:59	51	221	7.3	15	959.4	2251.5
*283	9.5	9.6	11:50:49	51	223.4	6.3	15	959.5	2247.3
*284	9.5	9.3	11:51:09	51.7	218.3	6.5	15.1	959.4	2130.4
*285	9.5	9.3	11:51:19	51.7	229.6	6.9	15.1	959.4	2115.2
*286	9.5	9.3	11:58:39	51.3	218	5	15.5	959.5	2122.7
*287	9.5	9.7	11:58:49	51.4	211.5	5.1	15.6	959.4	2335.2
*288	9.5	9.5	11:58:59	50.6	215.9	5.3	15.6	959.4	2239.9
*289	9.5	9.7	12:04:09	51.2	225.1	6.2	15.8	959.5	2310.6
*290	9.5	9.7	12:04:29	50.9	230.8	6.8	15.8	959.4	2301.5
*291	9.5	9.4	12:04:39	51	221.7	6	15.8	959.5	2194.1
*292	9.5	9.7	12:07:39	52.1	224.4	6.5	15.9	959.5	2300.8
*293	9.5	9.4	12:11:39	51.3	232.1	8.7	16	959.3	2160.1
*294	9.5	9.5	12:11:49	52	220.8	10.8	16	959.4	2207.4

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*295	9.5	9.6	12:18:39	51.1	232.8	8.5	16.2	959.5	2264.9
*296	9.5	9.7	12:20:09	50.9	228	7.5	16.3	959.3	2309.3
*297	9.5	9.4	12:27:19	51.8	216.3	9.8	16.3	959.3	2187.8
*298	9.5	9.5	12:27:29	51.6	222.1	9.2	16.3	959.3	2216.7
*299	9.5	9.5	12:27:39	51	227.4	8.6	16.3	959.3	2232.3
*300	9.5	9.3	12:30:09	51.9	227.9	7.5	16.4	959.3	2114.4
*301	9.5	9.7	12:30:19	51.4	221.2	6	16.4	959.4	2329.1
*302	9.5	9.6	12:30:29	51.7	216	7	16.4	959.4	2272.5
*303	9.5	9.4	12:32:09	51.1	223	7.2	16.6	959.4	2179.8
*304	9.5	9.5	12:32:29	51	234.2	7.7	16.6	959.3	2223.7
*305	9.5	9.7	12:32:39	51.3	226.8	6.9	16.6	959.3	2330.8
*306	9.5	9.6	12:32:59	51.6	216.5	8.4	16.6	959.4	2259.4
*307	9.5	9.4	12:34:19	51.5	234.6	8.5	16.7	959.3	2155.1
*308	9.5	9.4	14:11:59	51.4	209.5	8.3	18.9	958	2159.3
*309	9.5	9.3	14:12:09	51.6	211.4	7.9	18.9	957.9	2124.9
*310	9.5	9.4	14:12:19	51.5	204.9	6.8	18.9	957.9	2171.3
*311	9.5	9.7	14:12:29	51.4	208.3	7.6	18.9	957.9	2322.1
*312	9.5	9.3	14:12:39	51.5	204.7	8.3	18.9	957.9	2117.1
*313	9.5	9.4	14:12:49	51.4	206.9	8.9	18.9	957.9	2184.4
*314	9.5	9.3	14:13:09	51.8	213.5	9.9	18.9	957.9	2117.3
*315	9.5	9.6	14:19:29	51.7	214.2	10	18.8	957.8	2273.7
*316	9.5	9.7	14:19:49	51.7	205.7	10.8	18.8	957.9	2323.1
*317	9.5	9.7	14:19:59	52	206	9.5	18.7	957.9	2330.1
*318	9.5	9.7	14:20:49	51	218.8	8.1	18.8	957.8	2298
*319	9.5	9.7	14:31:59	50.2	204.7	7.6	18.7	957.8	2327.3
*320	9.5	9.7	14:32:09	50.7	203.3	10	18.7	957.8	2306.3
*321	9.5	9.5	14:32:29	51.1	206.3	9.9	18.7	957.8	2227.6
*322	9.5	9.7	14:32:49	50.3	206.7	7.5	18.8	957.8	2320.3
*323	9.5	9.6	14:33:29	52.2	202.3	10.1	18.8	957.8	2254.1
*324	9.5	9.7	14:36:39	51.9	203.2	11.3	18.8	957.8	2300.3
*325	9.5	9.7	14:42:39	50.9	205.9	7.5	18.8	957.7	2297.2
*326	9.5	9.3	14:42:49	50.9	209.6	9.1	18.9	957.6	2109.8
*327	9.5	9.3	14:42:59	51.6	203	9.8	18.9	957.7	2149.6
*328	9.5	9.5	14:43:09	51.1	196.6	9	18.9	957.7	2219.7
*329	9.5	9.7	14:44:29	51	211.9	6.4	18.9	957.7	2291.8
*330	9.5	9.6	14:45:09	51	196.9	9.7	19	957.7	2267.6
*331	9.5	9.6	14:46:19	52.3	206.1	6	19	957.6	2280
*332	9.5	9.3	14:46:29	51.5	197	9	19	957.6	2151.2
*333	9.5	9.6	14:46:39	50.8	206.4	9.6	19	957.6	2262.8
*334	9.5	9.3	14:48:39	51.2	214.4	5.6	19	957.6	2138.4
*335	9.5	9.3	14:51:29	51.5	216.7	9.2	19.1	957.5	2139.7
*336	9.5	9.3	14:51:39	51.3	209.9	8.6	19.1	957.5	2122.7
*337	9.5	9.6	14:51:59	51.4	216.2	6.1	19.1	957.6	2261.4
*338	9.5	9.3	14:53:09	51.3	205.1	10.3	19.3	957.6	2133.6
*339	9.5	9.7	14:53:19	51.8	205.9	11.1	19.3	957.6	2307.5
*340	9.5	9.5	16:09:59	51.2	208.3	8.9	18.6	957	2213.7
*341	9.5	9.5	16:10:19	51.2	198.5	7.6	18.6	957	2214.4
*342	9.5	9.3	16:10:29	50.7	198.2	9	18.6	957	2144.2
*343	9.5	9.4	16:11:19	51.5	203.5	8.7	18.6	957.1	2192.4

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*344	9.5	9.6	16:16:39	52.1	195.6	6.5	18.6	957.1	2289
*345	9.5	9.6	16:17:19	50.8	201.5	7.1	18.7	957.2	2252.5
*346	9.5	9.6	16:17:29	51.3	207.2	7.8	18.7	957.2	2245.6
*347	9.5	9.6	16:17:39	52	209.5	7.3	18.7	957.1	2266.5
*348	9.5	9.6	16:18:49	52.2	197.5	7.4	18.7	957.1	2265.8
*349	9.5	9.6	16:23:39	49.9	202.9	7	18.6	957	2278.4
*350	9.5	9.5	16:23:49	51.3	200.1	8.6	18.6	957	2210.3
*351	9.5	9.7	16:33:49	52.4	198.9	8.9	18	957	2316.9
*352	9.5	9.4	16:34:59	51.7	190	8.9	18	957.1	2159.2
*353	9.5	9.5	16:37:39	51.5	203	6.7	18	957	2233.7
*354	9.5	9.7	16:38:39	51.9	201.6	7.4	18	957.1	2326
*355	10	9.9	11:33:29	51.1	215.8	6.8	14.4	959.5	2403.7
*356	10	9.8	11:37:09	51.9	219.1	5.5	14.6	959.5	2380.2
*357	10	9.9	11:37:39	52.1	207.4	7.9	14.6	959.5	2385.8
*358	10	9.8	11:39:49	51.6	211	6.4	14.7	959.5	2362
*359	10	10	11:40:09	51.3	210.7	8.3	14.7	959.5	2430.6
*360	10	9.8	11:45:29	51.8	212.7	8.9	14.9	959.4	2360
*361	10	9.8	11:48:29	51.4	216.7	8	15	959.4	2371.1
*362	10	10.1	11:49:39	51.2	226.7	8.4	15	959.3	2469.5
*363	10	10.2	11:49:49	50.9	219.4	7.5	15	959.4	2479.2
*364	10	9.8	12:01:19	51.2	222.5	7.8	15.7	959.4	2355.5
*365	10	9.8	12:03:49	50.9	215.3	8.6	15.8	959.5	2351.3
*366	10	10.1	12:03:59	50.8	225.4	8.5	15.8	959.5	2464.9
*367	10	9.8	12:12:09	52.1	221.1	8.2	16	959.4	2364.2
*368	10	9.9	12:30:39	52.2	215.6	7.7	16.4	959.3	2383.1
*369	10	9.9	12:31:49	50.9	213.3	8.3	16.5	959.4	2404.1
*370	10	9.9	12:31:59	50.7	216.4	8.1	16.5	959.4	2423.9
*371	10	9.8	12:33:09	51.9	217.8	8.8	16.6	959.3	2345.9
*372	10	9.9	14:10:59	50.7	205.5	7.6	18.9	957.9	2411.7
*373	10	9.9	14:11:19	51.6	202	8.1	18.9	957.9	2414.5
*374	10	10	14:13:19	51.4	209.5	8.4	18.9	957.9	2451.4
*375	10	10.1	14:18:49	50.8	204.3	9.2	18.8	957.9	2474.9
*376	10	9.9	14:19:39	52.3	203.6	10.9	18.8	957.9	2388.7
*377	10	10.1	14:20:19	51.6	200.1	10.7	18.8	957.9	2469.5
*378	10	10.2	14:22:29	50.2	212.3	6.6	18.8	957.9	2482.9
*379	10	10.2	14:30:09	51.2	210.5	9.6	18.6	957.8	2489.7
*380	10	10	14:30:19	51.4	206.9	8.8	18.6	957.8	2430.9
*381	10	10.1	14:30:49	50.9	204.3	8.9	18.7	957.8	2461.9
*382	10	10.1	14:31:09	51.8	200.7	6.4	18.7	957.9	2473.3
*383	10	10	14:32:19	51.2	206	11.4	18.7	957.8	2427.2
*384	10	9.8	14:32:39	51.1	207.7	9.5	18.8	957.8	2336.6
*385	10	10.2	14:34:39	50.9	207.5	10.3	18.8	957.8	2488.8
*386	10	10.2	14:35:59	50.2	200.4	7	18.8	957.7	2484.2
*387	10	10	14:36:29	50.9	210	10.5	18.8	957.8	2456.5
*388	10	10.1	14:39:39	49.9	216.5	10.7	18.7	957.5	2470.9
*389	10	10	14:41:09	50	213.2	7.4	18.8	957.6	2436.7
*390	10	10.2	14:42:19	50.6	201.4	8	18.8	957.7	2481.1
*391	10	10.1	14:44:19	51	203.4	6.6	18.9	957.7	2473.6
*392	10	9.8	14:44:39	51	206.4	6.8	18.9	957.6	2359.5

Wind bin list - total noise:									
No.	**Wind**	**Vs**	**Time**	**LAeq**	**Windd.**	**Winds.**	**T**	**Pressure**	**Power**
	Bin	**[m/s]**		**[dB(A)]**	**[°]**	**[m/s]**	**[°C]**	**[hPa]**	**[kW]**
*393	10	9.8	14:46:09	51.2	209.4	7.7	19	957.6	2354.7
*394	10	10.2	16:07:19	49.6	194.9	9.7	18.5	957.1	2479.2
*395	10	9.8	16:15:29	51.3	198.9	7.8	18.6	957.1	2338.6
*396	10	9.8	16:18:59	51.3	205.5	7.3	18.7	957	2346.3
*397	10	10.2	16:21:49	50.3	203.5	9.1	18.7	957	2478.5
*398	10	10.1	16:22:09	50.8	208	9.6	18.6	956.9	2474.1
*399	10	10	16:27:09	50.3	193.9	10	18.4	957	2442.6
*400	10	9.8	16:30:09	50.6	200	8.4	18.2	957	2370
*401	10	10	16:30:19	50.8	198.6	8.5	18.2	957	2445.7
*402	10	10.2	16:30:29	51.2	200.5	9.9	18.2	957	2486.3
*403	10	10.2	16:33:19	50	199.1	9.5	18.1	957	2487.5
*404	10	10.2	16:34:09	52	198.1	10	18	957	2480.7
*405	10	9.8	16:36:59	51.1	197.2	7.4	18	957	2373.9
*406	10	9.8	16:37:09	51.8	201.4	7.4	18	957	2379.6
*407	10	9.8	16:37:19	51.3	199.7	6.8	18	957	2367.3
*408	10.5	10.4	11:28:39	51.4	212.7	9.2	14.3	959.5	2512.2
*409	10.5	10.7	11:30:59	51.2	232.8	6.8	14.3	959.5	2569.4
*410	10.5	10.7	11:32:59	51	216.7	7	14.4	959.6	2567.8
*411	10.5	10.6	11:33:09	51.2	212.1	6.7	14.4	959.6	2552
*412	10.5	10.5	11:33:59	51.4	213.7	9.3	14.5	959.5	2525.3
*413	10.5	10.7	11:34:19	50.9	214.5	8.7	14.5	959.6	2565
*414	10.5	10.6	11:34:49	51.4	211.4	8.9	14.5	959.5	2544.1
*415	10.5	10.7	11:35:09	51.1	219	8.1	14.5	959.5	2572.1
*416	10.5	10.4	11:39:59	51.5	209.1	7.6	14.7	959.5	2517.8
*417	10.5	10.5	11:40:29	51.2	221.4	7.8	14.7	959.4	2530.7
*418	10.5	10.5	11:47:29	50.7	219.5	7.1	15	959.5	2530.9
*419	10.5	10.4	11:48:39	52	219	7.9	15	959.4	2515.1
*420	10.5	10.6	12:03:19	51.7	218.1	7.2	15.8	959.5	2557.4
*421	10.5	10.7	12:08:19	50.3	217.2	9.8	15.9	959.5	2563.9
*422	10.5	10.3	12:08:29	50.8	224.4	9.7	15.9	959.5	2505.7
*423	10.5	10.6	12:08:49	51	233.7	8.4	15.9	959.4	2544.5
*424	10.5	10.4	12:11:59	51.7	221.7	8.4	16	959.4	2512.6
*425	10.5	10.6	12:12:39	50.5	227.2	8.5	16	959.3	2552.3
*426	10.5	10.6	12:13:59	50.1	230.8	8.6	16	959.3	2556.7
*427	10.5	10.5	12:30:49	51.5	217.9	6.7	16.4	959.3	2528.7
*428	10.5	10.3	12:32:49	51.1	221.4	7.2	16.6	959.4	2493.3
*429	10.5	10.6	12:33:19	51.7	225.1	6.3	16.6	959.4	2555.3
*430	10.5	10.6	14:11:29	52.1	202	7.8	18.9	957.9	2551.1
*431	10.5	10.7	14:11:49	52.4	206.2	6.5	18.9	958	2558.9
*432	10.5	10.5	14:13:29	50.4	204.4	9.3	18.9	958	2527.3
*433	10.5	10.4	14:16:59	50.7	205.3	8.8	18.9	957.9	2508.1
*434	10.5	10.7	14:17:09	51.2	208.1	11.4	18.9	957.9	2573.3
*435	10.5	10.3	14:19:19	51	215.1	9.3	18.8	957.8	2506.4
*436	10.5	10.5	14:22:39	50.7	217.4	7	18.8	957.8	2535.6
*437	10.5	10.4	14:24:19	51.3	210.4	11.9	18.9	957.8	2510.3
*438	10.5	10.4	14:26:59	49.4	195.8	10.1	18.6	957.8	2509.6
*439	10.5	10.5	14:27:59	50.2	196.3	9.7	18.6	957.8	2526.1
*440	10.5	10.5	14:28:19	50.8	202.9	8.8	18.6	957.8	2539.3
*441	10.5	10.7	14:29:49	50.7	213.9	9.5	18.6	957.8	2566.1

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*442	10.5	10.5	14:29:59	50.8	207.8	9.8	18.6	957.8	2527.9
*443	10.5	10.4	14:30:29	51.7	212.8	8.6	18.7	957.8	2510.1
*444	10.5	10.6	14:31:49	49.3	206.4	9.5	18.7	957.8	2556.3
*445	10.5	10.3	14:33:59	49.9	201.6	7.7	18.8	957.8	2496.6
*446	10.5	10.4	14:34:09	50.2	197.4	7.3	18.8	957.7	2523.9
*447	10.5	10.6	14:35:09	50.1	210.6	9.9	18.8	957.8	2546.4
*448	10.5	10.5	14:35:49	49	206.3	7.8	18.8	957.8	2528.3
*449	10.5	10.7	14:36:09	50.9	209.8	6.6	18.8	957.7	2560.5
*450	10.5	10.7	14:37:09	52.1	206.8	9.4	18.7	957.7	2567.9
*451	10.5	10.4	14:39:09	50	212.3	10.4	18.7	957.7	2508.9
*452	10.5	10.7	14:39:19	50.8	213.8	9.1	18.7	957.7	2564.2
*453	10.5	10.7	14:39:29	49.7	220.1	10.7	18.7	957.5	2573.4
*454	10.5	10.5	14:39:49	50.6	201.7	9.2	18.7	957.7	2529.4
*455	10.5	10.6	14:40:49	49.6	200.4	9.3	18.7	957.8	2550.7
*456	10.5	10.3	14:40:59	49.7	206	8.8	18.8	957.7	2504.3
*457	10.5	10.4	14:41:19	50.4	218.3	6.2	18.8	957.6	2514.4
*458	10.5	10.3	14:48:29	50.2	202.1	7.2	19	957.7	2494.6
*459	10.5	10.5	14:48:49	51.2	215.9	7.2	19.1	957.6	2532.2
*460	10.5	10.6	14:54:19	51.7	209.5	6.8	19.3	957.6	2544
*461	10.5	10.4	14:54:39	50.1	201.6	9.7	19.3	957.6	2510.3
*462	10.5	10.4	14:56:09	49.1	201.1	11.6	19.2	957.5	2513.5
*463	10.5	10.6	14:56:19	49.9	199.3	10.4	19.2	957.5	2550.9
*464	10.5	10.6	14:57:29	50.2	207.9	9.1	19.1	957.6	2547
*465	10.5	10.7	14:58:09	50.1	200.3	10.6	19.1	957.6	2568.3
*466	10.5	10.6	14:58:19	50.6	195.8	9	19.1	957.6	2542.9
*467	10.5	10.7	14:58:29	51	198.5	9.6	19.1	957.6	2557.9
*468	10.5	10.7	15:01:39	50.9	202.5	9.5	19.1	957.5	2565.1
*469	10.5	10.7	15:02:39	50.8	199.5	10.1	19.1	957.5	2568.4
*470	10.5	10.7	15:04:39	50.2	199.2	8.9	19	957.5	2573.9
*471	10.5	10.6	15:05:39	49.8	198.3	11.1	19	957.5	2552.6
*472	10.5	10.7	15:07:09	49.7	198.1	9.6	19	957.5	2565.2
*473	10.5	10.6	15:07:19	50.4	203.6	10.5	19	957.5	2544.2
*474	10.5	10.5	16:12:09	50.9	204	7.4	18.6	957.1	2537.4
*475	10.5	10.7	16:13:39	49.8	207.9	8.2	18.6	957.1	2573.3
*476	10.5	10.7	16:15:09	49.9	205.3	10.1	18.6	957.1	2558.8
*477	10.5	10.3	16:19:19	51.6	193	6.4	18.7	957	2502
*478	10.5	10.7	16:20:59	49.6	204.3	9	18.7	957	2570.1
*479	10.5	10.3	16:21:09	49.4	196.3	12	18.7	957	2496.7
*480	10.5	10.5	16:21:19	49.1	196.8	11.6	18.7	957	2525.5
*481	10.5	10.3	16:21:29	49.9	201.4	10.9	18.7	957	2507.4
*482	10.5	10.4	16:21:59	50.8	205.7	9.9	18.6	956.9	2513.6
*483	10.5	10.6	16:24:59	51.2	196.5	7.5	18.5	957	2543.8
*484	10.5	10.7	16:25:09	51.5	195.5	7.3	18.5	957	2561.7
*485	10.5	10.6	16:26:59	49.7	197	9.6	18.4	957	2546.4
*486	10.5	10.5	16:28:19	50.1	198.1	10	18.3	957	2528.1
*487	10.5	10.4	16:28:49	50.4	203.5	10.5	18.3	957.1	2512.9
*488	10.5	10.7	16:28:59	51.2	205	11.4	18.3	957.1	2568.1
*489	10.5	10.6	16:29:39	49.2	196.6	8.9	18.3	957.1	2555.2
*490	10.5	10.6	16:29:49	50.3	195.9	8.2	18.2	957.1	2542

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*491	10.5	10.4	16:32:19	49.7	193.1	10.3	18.1	957	2515.3
*492	10.5	10.5	16:35:59	50.2	206.6	8.8	18	957	2528.3
*493	11	10.9	11:40:49	51.5	222.8	6.9	14.7	959.4	2600.3
*494	11	10.8	11:48:49	51.7	220.2	9.5	15	959.3	2586.3
*495	11	10.9	12:00:59	51.6	222.1	7.3	15.7	959.5	2602.4
*496	11	10.8	12:13:19	52.1	216	8.8	16	959.5	2586.3
*497	11	11	12:13:39	50.9	218.3	7.9	15.9	959.4	2685.9
*498	11	11.1	12:30:59	51.3	219.8	6	16.4	959.4	2720.3
*499	11	10.8	12:31:29	50.3	221.2	7.6	16.5	959.4	2584.4
*500	11	10.8	12:31:39	50.7	218.6	8.7	16.5	959.4	2587.9
*501	11	10.9	12:33:49	51.4	233.5	9.3	16.7	959.4	2594.1
*502	11	10.8	12:33:59	51.7	233.6	9.5	16.7	959.3	2589.8
*503	11	11	12:34:09	50.9	232.9	7.7	16.7	959.4	2608.4
*504	11	10.9	14:17:59	49.8	207.2	12.3	18.8	957.8	2604.6
*505	11	10.8	14:18:29	49.6	200.8	10.1	18.8	957.9	2579
*506	11	10.8	14:19:09	50.3	216.5	8.8	18.8	957.8	2586.3
*507	11	10.8	14:23:19	50.9	204.1	10.3	18.9	957.9	2579.7
*508	11	10.8	14:23:29	51.2	205.6	11.1	18.9	957.9	2581.7
*509	11	11	14:24:09	50.5	201.8	11.4	18.9	957.8	2609
*510	11	10.9	14:24:29	51.5	198.6	11.1	18.8	957.9	2599.8
*511	11	10.8	14:29:39	50.1	210.5	9.3	18.6	957.8	2590.2
*512	11	10.9	14:30:39	51.3	213.8	8.3	18.7	957.8	2607.4
*513	11	11.1	14:31:29	49.5	196.2	8.5	18.7	957.8	2655.3
*514	11	11.1	14:33:49	50.7	202.1	9	18.8	957.8	2700.8
*515	11	10.8	14:34:29	50.7	197.6	9.1	18.8	957.8	2578.9
*516	11	11.1	14:34:49	51	210.4	9.2	18.8	957.8	2658.9
*517	11	10.9	14:35:39	49.8	208.4	9.2	18.8	957.7	2593
*518	11	10.9	14:37:39	50	196.9	7.2	18.8	957.7	2602.9
*519	11	10.9	14:38:39	50.6	203.7	8.7	18.7	957.8	2606.1
*520	11	10.9	14:38:59	49.7	213.8	9.4	18.7	957.6	2597.6
*521	11	10.9	14:39:59	50.1	200.9	9.8	18.7	957.7	2596.1
*522	11	10.9	14:40:29	50.2	203.4	7	18.7	957.7	2607.1
*523	11	10.9	14:40:39	49.7	202.1	8.6	18.8	957.7	2591.5
*524	11	10.9	14:41:29	50.7	208.6	6.6	18.8	957.7	2591.8
*525	11	11	14:41:39	51.3	203.5	7.8	18.8	957.7	2611.2
*526	11	10.9	14:42:09	50.3	198.2	8.7	18.8	957.7	2601
*527	11	10.9	14:44:49	50.6	210.5	6.6	19	957.6	2599.9
*528	11	11.1	14:45:19	51.5	200.9	9.6	19	957.7	2644.2
*529	11	10.8	14:45:59	51.6	212.4	9.9	19	957.6	2590.3
*530	11	10.9	14:48:09	52	200.3	7.4	19	957.7	2602
*531	11	11	14:48:59	51.8	207.6	7.5	19.1	957.6	2615.3
*532	11	11.2	14:49:09	51.1	217.6	8.3	19.1	957.6	2719.2
*533	11	10.9	14:49:29	49.8	206.6	6.8	19.1	957.7	2603.6
*534	11	11	14:49:39	50.3	209.5	6.2	19.1	957.6	2609.4
*535	11	11	14:49:49	50.6	210.5	7.5	19.1	957.7	2631.8
*536	11	10.8	14:50:29	52.1	212.6	8.3	19.1	957.5	2577.2
*537	11	10.8	14:54:29	49.7	197.5	7.2	19.3	957.6	2586.3
*538	11	10.9	14:54:49	50.3	203.3	8.9	19.3	957.6	2597.4
*539	11	10.9	14:55:39	50.5	207	10.2	19.2	957.5	2605

Wind bin list - total noise:									
No.	**Wind**	**Vs**	**Time**	**LAeq**	**Windd.**	**Winds.**	**T**	**Pressure**	**Power**
	Bin	**[m/s]**		**[dB(A)]**	**[°]**	**[m/s]**	**[°C]**	**[hPa]**	**[kW]**
*540	11	10.9	14:56:29	50.2	201.8	10.7	19.1	957.5	2601.8
*541	11	10.9	14:57:19	49.6	202.9	9.8	19.1	957.6	2606.3
*542	11	10.8	14:57:39	50.2	199.9	9.2	19.1	957.6	2589.4
*543	11	10.8	14:57:49	50	198.6	11.4	19.1	957.6	2590.2
*544	11	10.8	14:57:59	49.7	202.5	10.8	19.1	957.5	2579.3
*545	11	10.9	15:00:49	50.4	196.9	10.2	19.1	957.5	2603
*546	11	11	15:03:39	50.2	200.9	12.4	19	957.5	2609.2
*547	11	10.9	15:04:19	50	202.9	8.9	19	957.5	2606.8
*548	11	10.8	15:04:29	50.4	198.5	9.2	19	957.5	2576.6
*549	11	11	15:04:49	50.4	208.8	8.2	19	957.5	2614.8
*550	11	10.9	15:05:49	50.3	197.9	10.6	19	957.5	2594
*551	11	11	15:05:59	50.3	199.5	10.6	19	957.5	2671.4
*552	11	11.1	15:06:09	50.9	204.1	11.4	19	957.5	2658.2
*553	11	11.1	15:06:19	50.9	195.7	10	19	957.5	2733.4
*554	11	10.9	15:06:59	49.7	197.9	11.3	19	957.5	2606.9
*555	11	10.8	15:07:29	50.3	204.3	11.3	19	957.5	2584
*556	11	10.8	16:07:29	49.7	195.5	9.7	18.5	957.1	2578.4
*557	11	10.9	16:07:39	49.7	202.3	9.8	18.5	957	2594.4
*558	11	10.9	16:08:09	51.4	202.7	12.7	18.5	957	2603.4
*559	11	10.8	16:09:49	50.6	204.8	10.9	18.6	957	2578.7
*560	11	11	16:11:59	50.9	198.9	5.7	18.6	957	2615.8
*561	11	10.8	16:12:19	51.3	197.8	6.6	18.7	957.1	2576.8
*562	11	11	16:13:29	49.5	196.8	9.7	18.6	957.1	2614.2
*563	11	10.9	16:14:09	49.4	201.4	9.1	18.6	957.1	2593.8
*564	11	10.8	16:14:19	49.7	203	8.4	18.6	957	2580.7
*565	11	10.8	16:15:19	50.3	199.7	9	18.6	957.1	2582.9
*566	11	10.8	16:16:49	51.7	198.9	7.1	18.6	957.1	2590.7
*567	11	10.8	16:21:39	49.6	203.5	10.2	18.7	957	2588.1
*568	11	10.8	16:23:29	49.7	208.2	7	18.6	956.9	2588.3
*569	11	11.1	16:23:59	51.1	197.4	9.4	18.6	957	2663.9
*570	11	10.8	16:24:29	50.9	203.9	9.1	18.5	957	2584.1
*571	11	10.8	16:26:29	51.4	191.3	9.6	18.5	956.9	2590.9
*572	11	10.9	16:26:49	50.5	192.1	10.6	18.4	957	2605.9
*573	11	10.9	16:28:09	49.8	199.6	8.9	18.3	957.1	2591.9
*574	11	10.9	16:28:29	50.5	202.4	10.4	18.3	957.1	2597.9
*575	11	10.9	16:28:39	49.8	202.4	10.9	18.3	957.1	2599.1
*576	11	10.8	16:29:59	50.6	199.2	8.4	18.2	957	2584.2
*577	11	11.1	16:30:59	52.3	193.1	8.9	18.2	957.1	2711.3
*578	11	10.9	16:32:29	49.9	198.6	9.2	18.1	957	2597.1
*579	11	10.9	16:32:49	49.8	204.4	8.8	18.1	957	2595.4
*580	11	11	16:32:59	49.8	198.8	8.7	18.1	957	2611.8
*581	11	10.8	16:33:09	49.7	196.6	11.1	18.1	957	2584.4
*582	11	10.9	16:33:29	50.5	193.4	9	18.1	957	2607.1
*583	11	11.1	16:35:19	51.4	198.3	8.2	18	957	2628.3
*584	11	11.1	16:35:29	52.4	196.6	7.7	18	957	2694.7
*585	11	10.9	16:36:09	50.6	202	8.7	18	957	2597.6
*586	11	10.9	16:36:49	50.4	189.9	8	18	957	2607.2
*587	11	11	16:37:59	51.6	202.6	8.1	18	957.1	2612.2
*588	11	10.9	16:39:29	51.2	195.2	8.6	17.9	957.1	2605.5

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*589	11	10.9	16:39:49	49.8	203.8	7.5	17.9	957.2	2594.3
*590	11.5	11.3	11:49:29	50.8	226.4	8.3	15	959.3	2659.6
*591	11.5	11.4	14:18:59	50.3	197.4	8.6	18.8	957.9	2660.8
*592	11.5	11.3	14:22:49	51.4	215.2	5.9	18.8	957.8	2675.2
*593	11.5	11.5	14:23:39	51	205	9.3	18.9	957.9	2617.9
*594	11.5	11.4	14:24:49	51.3	198.4	10.1	18.8	957.9	2700.4
*595	11.5	11.4	14:24:59	51.3	197.1	8.5	18.8	957.9	2719.2
*596	11.5	11.5	14:25:49	52.2	195.2	12.3	18.7	957.8	2679.3
*597	11.5	11.5	14:28:29	51.1	208.9	7	18.6	957.8	2679.1
*598	11.5	11.4	14:28:59	51	216.3	10.6	18.6	957.7	2655.4
*599	11.5	11.5	14:29:19	51	210.4	11.5	18.6	957.8	2715.4
*600	11.5	11.4	14:45:49	50.7	209.2	6.5	19	957.6	2689.4
*601	11.5	11.6	14:48:19	50.9	209.9	6.7	19	957.7	2716.9
*602	11.5	11.7	14:56:39	51.4	198.7	12.3	19.1	957.6	2692.3
*603	11.5	11.5	14:58:49	51.1	205.7	7.4	19.1	957.6	2719.8
*604	11.5	11.7	14:58:59	51.1	197.1	6.8	19.1	957.5	2698.8
*605	11.5	11.3	16:12:39	50.9	192.1	5.8	18.7	957.1	2738
*606	11.5	11.3	16:17:09	50.7	199.7	7.6	18.7	957.1	2709.2
*607	11.5	11.6	16:25:29	51.8	190.5	7.6	18.5	957	2707.2
*608	11.5	11.4	16:25:49	50	191.9	8.7	18.5	957	2678.7
*609	11.5	11.6	16:25:59	50.8	198.6	10.1	18.5	957	2618.1
*610	11.5	11.7	16:29:19	51.6	208	9.2	18.3	957.1	2713.6
*611	11.5	11.4	16:35:39	51.1	195.4	8.5	18	957	2712
*612	11.5	11.4	16:38:59	51.7	197.6	7.3	18	957.1	2717
*613	11.5	11.4	16:39:09	51.6	192.9	6.7	18	957.1	2726.1
*614	12	12.1	14:16:49	49.9	201	9.1	18.9	958	2622.9
*615	12	12.2	14:17:29	50.8	206.4	8.7	18.9	957.9	2724.4
*616	12	12.1	14:20:39	50.9	215.6	9.9	18.7	957.8	2645.1
*617	12	12.1	14:21:29	51.6	207.9	7.5	18.8	957.9	2721.8
*618	12	11.9	14:21:59	51.4	196.4	9.4	18.8	957.8	2722.2
*619	12	11.9	14:22:59	51.1	206.8	6.2	18.9	957.9	2729.3
*620	12	12	14:23:49	50.5	203	8.2	18.9	957.8	2664.4
*621	12	12.2	14:28:49	51.2	215.2	6.6	18.6	957.8	2681.4
*622	12	12.2	14:29:09	51.1	214.3	9.7	18.6	957.8	2681.2
*623	12	12.1	14:49:59	51.2	206.7	9.9	19.1	957.6	2647.4
*624	12	11.8	14:53:39	51.6	197.1	8.4	19.2	957.6	2715.3
*625	12	12	14:54:59	50.3	195.5	9.5	19.3	957.5	2616.7
*626	12	11.9	16:14:29	50.6	202.4	9.4	18.6	957	2666.9
*627	12	11.9	16:19:49	51.9	192.9	6.7	18.7	957	2727.6
*628	12	12.2	16:27:19	51.1	207.8	8.7	18.4	957	2652.2
*629	12	11.9	16:27:39	51.2	204.9	10.8	18.4	957	2681.9
*630	12	11.9	16:29:09	51.8	197.5	10.4	18.3	957.1	2698.4
*631	12	12.2	16:31:29	51	188.3	9.3	18.1	957	2724.5
*632	12.5	12.4	14:18:19	49.6	196.3	9.6	18.8	957.9	2644.2
*633	12.5	12.5	14:22:19	49.2	211.5	6.4	18.8	957.8	2625.4
*634	12.5	12.6	14:28:09	50.4	203	8.8	18.6	957.9	2647.6
*635	12.5	12.3	14:29:29	50	212.8	10.7	18.6	957.8	2688.7
*636	12.5	12.4	14:31:19	51.4	198.8	6.7	18.7	957.8	2648.7
*637	12.5	12.4	14:35:19	51.6	204.4	10.5	18.8	957.8	2621.7

Wind bin list - total noise:									
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure	Power
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]	[kW]
*638	12.5	12.6	14:35:29	51.5	209.6	9.8	18.8	957.8	2630.4
*639	12.5	12.4	14:36:19	51	213	8.2	18.8	957.7	2632.4
*640	12.5	12.6	14:38:09	51.6	197.5	7.4	18.7	957.7	2724.1
*641	12.5	12.4	14:49:19	50.4	213.6	6.4	19.1	957.6	2695.7
*642	12.5	12.6	15:01:59	51.3	197.2	10.1	19.1	957.5	2655.5
*643	12.5	12.3	15:06:29	51	209.9	10.1	19	957.5	2649.6
*644	12.5	12.6	16:07:59	49.7	205.1	9.6	18.5	957	2659
*645	12.5	12.7	16:14:39	51	196	9.2	18.6	957.1	2715.3
*646	12.5	12.5	16:20:09	50.7	192.5	8.2	18.7	957	2704.6
*647	12.5	12.3	16:22:49	51.3	199.2	9.4	18.6	957.1	2726.5
*648	12.5	12.3	16:23:09	50.3	188.3	8.6	18.6	957	2722.4
*649	12.5	12.5	16:25:39	51.1	188.7	8.8	18.5	956.9	2706
*650	12.5	12.4	16:26:09	50.8	202.7	9.7	18.5	957	2682.6
*651	12.5	12.4	16:26:19	49.9	200.1	10	18.5	957	2630.4
*652	12.5	12.4	16:27:49	51.3	205.7	10.9	18.3	957.1	2718.8
*653	12.5	12.7	16:31:39	50.8	192.2	11	18.1	957	2704.6
*654	12.5	12.5	16:31:59	51.5	194.3	10.1	18.1	957	2664.7
*655	12.5	12.4	16:39:19	50.8	198.8	6.4	18	957.1	2666.6
*656	12.5	12.4	16:39:39	50.5	205.1	6.5	17.9	957.1	2714.8
* Wind bin for tonality analysed									

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
*1	7.5	7.6	12:36:19	39	218.9	6.4	16.8	959.3
2	7.5	7.3	12:36:49	38.7	227.9	6.1	16.8	959.3
3	7.5	7.5	12:36:59	38.7	229.3	6.3	16.8	959.3
4	7.5	7.5	12:37:09	37.4	229.5	6.3	16.8	959.3
5	7.5	7.6	12:43:29	36.6	216.3	6.4	17.3	959.1
6	7.5	7.5	12:44:19	37.5	219.1	6.3	17.4	959.2
7	7.5	7.5	12:44:49	37.8	224.3	6.3	17.4	959.2
8	7.5	7.3	12:48:19	39.2	233.1	6.2	17.8	959.1
9	7.5	7.7	13:10:39	41.4	224	6.5	18.5	958.8
10	7.5	7.3	13:19:29	39.1	238.5	6.2	18.8	958.5
*11	8	8	12:37:39	38.7	222.4	6.7	16.9	959.3
12	8	8	12:37:49	38.1	217.6	6.7	16.9	959.3
13	8	8.2	12:38:59	37	223.1	6.9	17	959.3
14	8	8.1	12:39:09	36.5	227.5	6.8	17	959.3
15	8	8.1	12:40:09	37.1	227.6	6.8	17.1	959.2
16	8	7.8	12:41:39	36	222.6	6.5	17.2	959.2
17	8	8.1	12:43:59	37.2	222.5	6.8	17.4	959.2
18	8	7.9	12:44:29	37.7	219.8	6.6	17.4	959.2
19	8	8	12:44:59	38.6	222.4	6.8	17.5	959.2
20	8	8.2	12:46:39	40	230.5	6.9	17.6	959.2
21	8	8	12:48:39	40.1	224.8	6.7	17.8	959.2
22	8	8.1	12:48:49	39.3	230.8	6.8	17.8	959.1
23	8	8.1	12:49:59	40.1	228.9	6.8	18	959.1
24	8	8.2	12:50:29	39.3	212.7	6.9	18	959.1

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
25	8	8	13:05:09	40.5	226.3	6.7	18.3	958.8
26	8	8.2	13:20:29	40.5	235.6	6.9	18.9	958.5
27	8	8.2	15:21:09	40.9	203.7	6.8	19.4	957.3
28	8	8.1	15:21:49	38.5	201.8	6.8	19.5	957.3
29	8	7.9	15:21:59	39.8	193.2	6.7	19.5	957.3
30	8	7.8	15:22:49	40.8	191.5	6.6	19.5	957.3
*31	8.5	8.3	12:35:49	41.1	225.3	7	16.8	959.4
32	8.5	8.4	12:36:09	40.6	221.9	7.1	16.8	959.4
33	8.5	8.4	12:36:29	38.9	224.9	7	16.8	959.3
34	8.5	8.3	12:37:29	38.5	228.1	7	16.8	959.3
35	8.5	8.6	12:38:49	38.4	220.5	7.2	17	959.2
36	8.5	8.3	12:40:29	36.2	232.2	7	17.1	959.2
37	8.5	8.4	12:41:09	36.3	232.2	7.1	17.2	959.2
38	8.5	8.4	12:44:39	37.3	214.9	7.1	17.4	959.1
39	8.5	8.7	12:47:09	40.1	227.9	7.3	17.6	959.1
40	8.5	8.6	12:47:59	41.3	233.1	7.2	17.7	959.1
41	8.5	8.4	12:48:09	40	230.9	7.1	17.7	959.1
42	8.5	8.5	12:48:29	41.9	232.6	7.1	17.8	959.1
43	8.5	8.5	12:49:09	39	231.1	7.1	17.9	959.1
44	8.5	8.4	12:50:19	41.2	229.2	7.1	18	959
45	8.5	8.7	12:55:49	39.2	234.8	7.3	18.3	958.9
46	8.5	8.6	12:57:29	39.6	226.8	7.2	18.3	959
47	8.5	8.6	12:58:19	38.5	233.8	7.2	18.3	958.9
48	8.5	8.6	12:58:39	40.1	224.6	7.3	18.3	958.9
49	8.5	8.6	12:58:49	38.8	221	7.2	18.3	958.9
50	8.5	8.4	12:59:19	40.5	231.5	7.1	18.4	958.8
51	8.5	8.3	13:05:19	39.4	229.1	7	18.3	958.8
52	8.5	8.3	13:23:09	39.4	239	7	19.1	958.5
53	8.5	8.5	15:20:59	41	202.6	7.1	19.4	957.3
54	8.5	8.4	15:22:09	40.4	190.5	7.1	19.5	957.3
55	8.5	8.5	15:22:59	40.8	188	7.2	19.5	957.2
*56	9	8.9	12:36:39	38.6	215.6	7.4	16.8	959.3
57	9	8.8	12:38:29	38.3	220.8	7.4	17	959.3
58	9	9.2	12:43:19	37.3	230.4	7.8	17.3	959.1
59	9	9.1	12:46:19	37.4	227.4	7.7	17.5	959.1
60	9	8.9	12:48:59	39.5	228	7.5	17.8	959.1
61	9	9	12:49:19	39.9	230.8	7.6	17.9	959.1
62	9	8.8	12:50:49	39.2	227.4	7.4	18.1	959
63	9	9.1	12:55:59	38.7	228.8	7.6	18.3	959
64	9	9.1	12:59:09	39.3	225.7	7.7	18.4	958.8
65	9	9.1	13:04:59	42.6	224.2	7.7	18.3	958.8
66	9	8.8	13:05:29	40.8	235.2	7.4	18.3	958.8
67	9	9.1	13:05:39	40.7	224.9	7.6	18.3	958.8
68	9	9.1	13:05:49	41.3	230.4	7.6	18.4	958.8
69	9	9.1	13:06:19	43.4	224.4	7.7	18.4	958.8
70	9	8.9	13:17:19	41.1	231.5	7.5	18.6	958.6
71	9	9	13:17:39	40.9	236	7.5	18.6	958.5
72	9	8.8	13:19:49	38.5	238.2	7.4	18.9	958.5
73	9	8.9	13:20:09	37.5	236.3	7.5	18.9	958.5

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
74	9	8.8	13:22:29	39.4	244.8	7.4	19.1	958.4
75	9	9.1	13:22:59	38.5	243.2	7.6	19.1	958.5
76	9	9	13:28:29	42.1	237	7.6	18.9	958.4
77	9	9.2	13:30:29	41.5	230.6	7.7	18.9	958.4
78	9	9.1	15:10:59	42.5	192.5	7.7	19	957.5
79	9	8.8	15:20:39	39.7	202	7.4	19.3	957.4
80	9	9.1	15:21:29	39.7	208.5	7.6	19.5	957.3
81	9	8.9	15:22:29	40.3	192.2	7.5	19.5	957.3
82	9	8.9	15:22:39	41.1	193.1	7.4	19.5	957.3
83	9	8.8	15:59:29	39.2	205.8	7.4	18.7	957.1
84	9	9.1	16:00:29	40.9	196.7	7.6	18.7	957.1
*85	9.5	9.4	12:38:39	36.7	220.9	7.9	17	959.3
86	9.5	9.7	12:39:49	36.8	225.2	8.2	17.1	959.2
87	9.5	9.4	12:39:59	36.7	227.2	7.9	17.1	959.2
88	9.5	9.3	12:40:19	37.1	234.7	7.8	17.1	959.1
89	9.5	9.7	12:40:49	36.4	227.4	8.2	17.2	959.2
90	9.5	9.7	12:40:59	36.1	226.2	8.1	17.2	959.2
91	9.5	9.4	12:42:49	36.3	224.1	7.9	17.3	959.2
92	9.5	9.7	12:43:09	37.5	231.4	8.2	17.3	959.1
93	9.5	9.6	12:45:09	38.3	214.6	8.1	17.5	959.2
94	9.5	9.4	12:45:19	39.1	222.4	7.9	17.5	959.2
95	9.5	9.3	12:45:59	38.1	220.4	7.8	17.5	959.1
96	9.5	9.7	12:46:29	38.4	222.6	8.2	17.5	959.1
97	9.5	9.6	12:50:39	38.9	219.4	8.1	18.1	959
98	9.5	9.7	12:50:59	41.3	228.9	8.1	18.1	959
99	9.5	9.5	12:54:09	39.7	233.6	8	18.2	958.9
100	9.5	9.7	12:55:09	41.1	226.4	8.2	18.3	959
101	9.5	9.5	12:55:19	40.1	233.2	8	18.2	958.9
102	9.5	9.7	12:57:49	39.4	223.5	8.2	18.3	958.9
103	9.5	9.7	13:04:19	41.3	218.6	8.1	18.3	958.8
104	9.5	9.5	13:10:59	43.1	221.6	8	18.5	958.7
105	9.5	9.7	13:13:19	43.1	226.5	8.2	18.5	958.7
106	9.5	9.7	13:13:29	41.7	219.6	8.2	18.5	958.6
107	9.5	9.5	13:13:39	41.9	228.4	8	18.5	958.6
108	9.5	9.7	13:16:39	41.7	226.7	8.1	18.6	862.7
109	9.5	9.4	13:16:59	42.2	229.2	7.9	18.6	958.5
110	9.5	9.3	13:20:19	39	239.5	7.8	18.9	958.5
111	9.5	9.5	13:22:49	39	242.7	8	19.1	958.4
112	9.5	9.4	13:24:59	38.8	242.5	7.9	19.1	958.5
113	9.5	9.7	13:25:09	41.2	228.1	8.2	19.1	958.5
114	9.5	9.4	13:25:59	41.5	236.6	7.9	19.1	958.5
115	9.5	9.7	13:29:29	40.3	234.3	8.2	18.8	958.4
116	9.5	9.6	15:09:59	43.3	196.3	8.1	19	957.4
117	9.5	9.6	15:10:09	42.4	199.6	8	19	957.5
118	9.5	9.7	15:17:29	40.5	198.6	8.2	19.1	957.4
119	9.5	9.4	15:21:39	39.4	205	7.9	19.5	957.3
120	9.5	9.4	15:22:19	40.6	202.4	7.9	19.5	957.2
121	9.5	9.7	15:38:49	38.9	206.1	8.2	19.1	957.2
122	9.5	9.6	15:40:39	37.8	197.5	8.1	19.1	957.2

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
123	9.5	9.4	15:41:09	38.8	208.1	7.9	19.1	957.2
124	9.5	9.5	15:45:29	41.2	202.9	8	19.1	957
125	9.5	9.7	15:48:19	40.8	197.8	8.1	19.1	957
126	9.5	9.6	15:48:29	41.2	195.9	8.1	19.1	957
127	9.5	9.6	15:50:19	43.6	200.2	8.1	19.1	957
128	9.5	9.4	15:50:49	44.1	191.3	7.9	19.1	957.1
129	9.5	9.4	15:56:49	43.6	202	7.9	18.7	957.2
130	9.5	9.7	15:58:29	39.6	199.4	8.2	18.7	957.2
131	9.5	9.3	15:58:39	39.8	202.1	7.8	18.7	957.2
132	9.5	9.4	15:58:49	39.8	200.1	7.9	18.7	957.2
133	9.5	9.4	15:58:59	39.9	196.5	7.9	18.7	957.2
*134	10	10.1	12:35:59	41.1	230.9	8.5	16.8	959.3
135	10	10	12:39:39	36.6	228.9	8.4	17.1	959.1
136	10	10.2	12:41:49	36	217.4	8.6	17.3	959.2
137	10	10.2	12:42:59	36.5	226.6	8.6	17.3	959.1
138	10	10	12:45:49	37.7	226.1	8.4	17.5	959.1
139	10	9.9	12:54:59	42.3	224.8	8.3	18.3	959
140	10	10.2	12:56:29	40.5	228.4	8.6	18.3	863
141	10	9.8	12:57:39	40.3	227.5	8.2	18.3	958.9
142	10	9.9	12:57:59	39.5	229.4	8.3	18.3	958.9
143	10	9.9	12:59:49	44.4	220	8.3	18.4	958.8
144	10	10.2	13:02:39	40.6	222.4	8.6	18.3	958.8
145	10	10	13:02:49	43.1	230.9	8.4	18.3	958.8
146	10	10.2	13:03:09	42.2	226	8.6	18.3	958.8
147	10	9.9	13:06:09	42.7	226.4	8.3	18.4	958.7
148	10	10	13:08:49	39.2	236	8.4	18.4	958.7
149	10	10.1	13:10:49	40.7	223.4	8.5	18.5	958.8
150	10	10.1	13:11:39	40	224.3	8.5	18.5	958.7
151	10	9.9	13:17:09	40.2	233.9	8.3	18.6	958.5
152	10	9.8	13:17:29	41.6	229.6	8.3	18.6	958.5
153	10	10	13:18:09	38.5	240.6	8.4	18.7	958.6
154	10	9.9	13:18:19	38.4	240.8	8.4	18.7	958.5
155	10	9.9	13:21:39	39.3	236.7	8.3	19	958.4
156	10	9.9	13:25:49	41.4	233.9	8.3	19.1	958.4
157	10	9.8	13:27:39	40.9	232.8	8.2	18.9	958.3
158	10	9.8	13:27:49	40.6	230.9	8.2	18.9	958.4
159	10	10	13:29:09	39.9	239.8	8.4	18.8	958.3
160	10	10	13:30:19	44.3	239	8.4	18.8	958.3
161	10	10	15:10:49	43	206.5	8.4	19	957.3
162	10	10.1	15:14:59	41.6	194.2	8.5	19.1	957.4
163	10	10	15:15:09	41.3	205.5	8.4	19.1	957.4
164	10	10.1	15:15:29	42.8	201.2	8.5	19.1	957.4
165	10	10.1	15:20:49	40	206.4	8.4	19.4	957.3
166	10	9.9	15:23:09	41.9	189.6	8.3	19.6	957.2
167	10	10	15:35:59	43.2	204	8.4	19	957.3
168	10	9.8	15:38:39	40.5	206.4	8.3	19.1	957.3
169	10	10	15:39:29	40.5	205.2	8.4	19.1	957.2
170	10	10.1	15:41:29	39.3	208	8.5	19.1	957.1
171	10	10.2	15:50:59	43.3	186.1	8.6	19.1	957

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
172	10	10.1	15:57:09	39.5	202.8	8.5	18.7	957.2
173	10	9.9	15:57:59	41.7	194.7	8.3	18.7	957.2
*174	10.5	10.7	12:40:39	36.7	227.1	9	17.2	959.2
175	10.5	10.4	12:41:59	35	218.5	8.8	17.3	959.1
176	10.5	10.6	12:42:09	35.5	225.9	8.9	17.3	959.1
177	10.5	10.4	12:42:29	36.2	234.9	8.8	17.3	959.1
178	10.5	10.5	12:42:39	35.5	226.1	8.8	17.3	959.1
179	10.5	10.5	12:43:49	37.5	226.8	8.8	17.4	959.1
180	10.5	10.4	12:46:09	37.7	227.8	8.8	17.5	959.1
181	10.5	10.6	12:47:29	39.7	231.5	8.9	17.7	959.1
182	10.5	10.5	12:47:39	41.3	232.9	8.9	17.7	959.1
183	10.5	10.7	12:53:49	39.9	229.3	9	18.2	958.9
184	10.5	10.4	12:56:09	39.8	231.1	8.7	18.3	959
185	10.5	10.5	12:57:09	40.3	227.3	8.9	18.3	959
186	10.5	10.5	12:58:09	38.5	227.4	8.8	18.3	958.9
187	10.5	10.3	12:58:59	38.8	222.7	8.7	18.4	958.9
188	10.5	10.5	13:00:49	44.1	231	8.8	18.4	958.8
189	10.5	10.7	13:01:49	41.3	224.6	9	18.4	958.8
190	10.5	10.3	13:02:29	42.8	226.4	8.6	18.3	958.8
191	10.5	10.5	13:04:49	42.4	227	8.9	18.3	958.8
192	10.5	10.4	13:08:29	41	227.7	8.8	18.4	958.7
193	10.5	10.6	13:08:59	40.2	234.1	8.9	18.4	958.7
194	10.5	10.4	13:10:29	41.2	232.4	8.7	18.5	958.6
195	10.5	10.7	13:12:59	39.8	237.4	9	18.5	958.6
196	10.5	10.6	13:13:49	41.3	229.6	8.9	18.5	958.5
197	10.5	10.7	13:14:59	45.2	237	9	18.5	958.6
198	10.5	10.3	13:17:49	39.9	234	8.6	18.6	958.6
199	10.5	10.5	13:17:59	39	232.7	8.9	18.6	958.5
200	10.5	10.4	13:19:59	37.8	237.3	8.8	18.9	958.5
201	10.5	10.4	13:21:49	38.2	228.8	8.7	19.1	958.4
202	10.5	10.6	13:22:09	38.6	231.2	8.9	19.1	958.3
203	10.5	10.6	13:23:39	39.8	244.9	8.9	19.1	958.3
204	10.5	10.6	13:28:19	41.6	240.1	8.9	18.9	958.3
205	10.5	10.5	13:28:39	41.3	237.7	8.8	18.9	958.4
206	10.5	10.5	13:28:49	40.2	235.9	8.8	18.8	958.3
207	10.5	10.6	13:29:19	40.9	237.7	8.9	18.8	958.3
208	10.5	10.5	13:29:39	40.7	237.6	8.8	18.8	958.4
209	10.5	10.5	15:10:19	42.1	192	8.8	19	957.4
210	10.5	10.4	15:14:39	41.3	199.7	8.7	19.1	957.5
211	10.5	10.3	15:17:19	40.8	204.5	8.6	19.1	957.3
212	10.5	10.5	15:21:19	39.7	205.9	8.8	19.4	957.3
213	10.5	10.7	15:25:49	40.9	199.1	9	19.3	957.3
214	10.5	10.5	15:30:39	43.6	195.5	8.8	19	957.3
215	10.5	10.4	15:30:59	42.7	195.9	8.8	19	957.3
216	10.5	10.7	15:31:19	43	185.7	9	19	957.3
217	10.5	10.4	15:35:49	44.6	206	8.7	19	957.3
218	10.5	10.6	15:38:29	40.5	209.5	8.9	19.1	957.2
219	10.5	10.7	15:41:19	39.5	206.9	9	19.1	957.2
220	10.5	10.6	15:41:49	39.2	200.7	8.9	19.1	957.1

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
221	10.5	10.7	15:43:49	43.2	187.9	9	19.1	957
222	10.5	10.3	15:46:29	41.1	195.5	8.7	19.1	957
223	10.5	10.6	15:47:59	41.6	195.4	8.9	19.1	957
224	10.5	10.3	15:48:39	41.4	194.6	8.7	19.1	957
225	10.5	10.6	15:54:19	43.1	200.8	8.9	18.8	957.1
226	10.5	10.7	15:55:09	41.7	189.8	9	18.8	957.1
227	10.5	10.4	15:56:59	40.4	196.8	8.7	18.7	957.2
228	10.5	10.6	15:57:19	40	186.1	8.9	18.7	957.2
229	10.5	10.7	15:58:19	39.5	194.2	9	18.7	957.2
230	10.5	10.7	16:00:19	41.8	202.2	9	18.7	957.2
*231	11	11.2	12:45:39	38	221.9	9.4	17.5	959.1
232	11	10.8	12:54:29	40.2	227.9	9.1	18.2	959
233	11	11.1	12:56:19	40.7	229.3	9.4	18.3	959
234	11	10.9	12:57:19	41.1	226.8	9.2	18.3	958.9
235	11	11	12:59:29	42.7	221.6	9.3	18.4	958.8
236	11	11.2	13:00:09	45.3	223.3	9.4	18.4	958.8
237	11	11.2	13:00:19	43.6	222	9.4	18.4	958.8
238	11	11.1	13:04:29	40.3	216.5	9.4	18.3	958.8
239	11	10.9	13:08:19	41.8	232.4	9.2	18.4	958.6
240	11	11.1	13:08:39	39.1	228.9	9.4	18.4	958.7
241	11	11	13:10:09	40.1	236.9	9.2	18.4	958.6
242	11	10.9	13:14:29	44.2	231.5	9.2	18.5	958.6
243	11	10.9	13:21:59	38.5	238.9	9.2	19.1	958.4
244	11	11.2	13:25:29	42.2	232.1	9.4	19.1	958.4
245	11	11.2	13:25:39	40.7	234.1	9.4	19.1	958.4
246	11	10.9	13:26:19	44.5	227.9	9.2	19.1	958.4
247	11	11	13:27:29	40.6	234.5	9.2	19	958.4
248	11	10.9	13:28:59	39.8	236.8	9.1	18.8	958.4
249	11	11	13:30:39	42.6	236.1	9.2	18.9	958.3
250	11	11	15:09:19	40.5	198.1	9.3	19	957.5
251	11	11.1	15:10:29	43	195.7	9.3	19	957.5
252	11	11.1	15:15:49	42.2	201	9.3	19.1	957.3
253	11	10.8	15:19:09	40.1	204.9	9.1	19.2	957.4
254	11	11.1	15:26:39	45.1	196.9	9.3	19.2	957.2
255	11	10.9	15:29:19	42.8	192.5	9.2	19.1	957.3
256	11	10.8	15:31:09	44.4	202.5	9.1	19	957.3
257	11	11	15:37:09	42.3	208	9.3	19	957.3
258	11	11	15:37:29	43.2	208.3	9.3	19	957.3
259	11	11	15:41:59	39.6	197	9.3	19.1	957.2
260	11	10.8	15:42:09	39.7	199.2	9	19.1	957.1
261	11	11	15:46:19	41.9	204.9	9.3	19.1	957
262	11	10.8	15:46:39	41.3	192.6	9	19.1	957
263	11	10.9	15:49:59	42.7	194.7	9.2	19.1	957
264	11	11.1	15:50:09	41.8	208	9.4	19.1	957
265	11	10.8	15:52:49	42.7	195.7	9.1	18.9	957.1
266	11	11.2	15:54:29	42.4	195.2	9.4	18.8	957.1
267	11	10.9	15:55:59	44	189.2	9.1	18.7	957.2
268	11	11.1	15:56:09	42.8	207.3	9.3	18.7	957.1
269	11	11	15:57:39	40.7	197.4	9.3	18.7	957.2

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
270	11	11.2	16:00:09	42.7	206.9	9.4	18.7	957.1
*271	11.5	11.5	12:43:39	38	224.1	9.7	17.4	959.1
272	11.5	11.6	12:53:39	42.1	233.6	9.7	18.2	958.9
273	11.5	11.5	13:00:39	42.8	228.2	9.7	18.4	958.8
274	11.5	11.6	13:00:59	44.6	223.7	9.8	18.4	958.7
275	11.5	11.6	13:02:09	46	228.1	9.8	18.3	958.8
276	11.5	11.3	13:02:19	43.4	236	9.5	18.3	958.7
277	11.5	11.5	13:02:59	45.1	218.2	9.7	18.3	958.8
278	11.5	11.7	13:03:19	43.3	227.8	9.8	18.3	958.7
279	11.5	11.3	13:07:19	46.2	221	9.5	18.4	958.7
280	11.5	11.7	13:07:29	45.7	225.8	9.8	18.4	958.6
281	11.5	11.4	13:09:29	43.1	228.2	9.5	18.4	958.6
282	11.5	11.3	13:10:19	40.5	242.2	9.5	18.4	958.6
283	11.5	11.5	13:11:09	40.6	221.3	9.7	18.5	958.7
284	11.5	11.3	13:12:19	42.8	226.9	9.5	18.5	958.5
285	11.5	11.5	13:14:49	42	233.3	9.7	18.5	958.5
286	11.5	11.4	13:16:49	41.4	225.1	9.6	18.6	958.6
287	11.5	11.7	13:27:59	41.6	234.3	9.8	18.9	958.3
288	11.5	11.4	13:30:49	44.5	242.3	9.6	18.9	958.3
289	11.5	11.6	15:09:49	41.1	198.5	9.7	19	957.5
290	11.5	11.7	15:11:39	42.5	193.6	9.8	19	957.5
291	11.5	11.3	15:14:49	41.1	202.3	9.5	19.1	957.4
292	11.5	11.7	15:15:59	42.6	195.9	9.8	19.1	957.4
293	11.5	11.4	15:16:09	43.1	205.6	9.6	19.1	957.3
294	11.5	11.6	15:16:39	43.1	200.2	9.7	19.1	957.4
295	11.5	11.6	15:16:59	43.5	200.3	9.8	19.1	957.4
296	11.5	11.4	15:17:09	41.6	193.5	9.6	19.1	957.4
297	11.5	11.4	15:17:39	45.9	195	9.6	19.1	957.4
298	11.5	11.3	15:18:19	44.2	206.3	9.5	19.2	957.4
299	11.5	11.3	15:18:59	40.7	203.3	9.5	19.2	957.3
300	11.5	11.7	15:28:09	41.6	194.4	9.8	19.1	957.3
301	11.5	11.7	15:39:59	40.1	208.9	9.8	19.1	957.1
302	11.5	11.6	15:48:09	42.3	196.6	9.8	19.1	957
303	11.5	11.4	15:49:09	42.7	198.6	9.6	19.1	957
304	11.5	11.4	15:57:49	41.2	195.7	9.6	18.7	957.2
305	11.5	11.5	15:58:09	38.9	187.6	9.7	18.7	957.2
306	11.5	11.5	15:59:39	40.3	204.2	9.7	18.7	957.1
307	11.5	11.6	15:59:49	39.6	209.8	9.7	18.7	957.1
*308	12	12.1	12:45:29	38.4	226.9	10.2	17.5	959.1
309	12	12.2	12:52:19	41	231.8	10.2	18.2	958.9
310	12	11.8	12:54:49	42.8	230.9	9.9	18.3	959
311	12	12	12:56:39	39.3	230.3	10.1	18.3	958.9
312	12	11.9	12:59:59	44.4	217.7	10	18.4	958.8
313	12	12	13:04:09	42.7	216.4	10.1	18.3	958.7
314	12	11.9	13:04:39	39.6	218.9	10	18.3	958.8
315	12	11.8	13:07:09	44.7	223.1	9.9	18.4	958.7
316	12	11.9	13:07:49	42.8	220	10	18.4	958.7
317	12	12.2	13:09:49	40.5	228.4	10.3	18.4	958.6
318	12	11.9	13:09:59	40.9	228.7	10	18.4	958.6

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
319	12	12	13:11:29	40.3	228	10.1	18.5	958.7
320	12	12	13:11:49	41.1	220.5	10.1	18.5	958.7
321	12	12.1	13:12:39	39.7	235.9	10.2	18.5	958.6
322	12	12.2	13:22:19	38.7	238.4	10.2	19.1	958.4
323	12	11.8	13:23:29	39.6	243	9.9	19.1	958.4
324	12	11.8	13:24:49	39.5	237.8	9.9	19.1	958.3
325	12	11.8	13:26:29	42.8	236.2	9.9	19.1	958.4
326	12	11.8	13:27:09	41.5	235.5	9.9	19	958.4
327	12	12.1	13:27:19	41.1	230.2	10.2	19	958.4
328	12	12.1	13:29:49	39.6	234.7	10.1	18.9	958.3
329	12	12.2	13:29:59	39.4	236.8	10.3	18.8	958.3
330	12	11.9	15:15:39	42.3	193	10	19.1	957.3
331	12	11.9	15:17:49	44.6	195.7	10	19.1	957.4
332	12	12.1	15:18:49	41	204.4	10.2	19.2	957.3
333	12	12	15:23:19	40	186.3	10.1	19.6	957.2
334	12	12.1	15:24:19	44.7	190.9	10.1	19.5	957.3
335	12	12.2	15:24:39	45	191.6	10.2	19.4	957.3
336	12	11.9	15:24:49	44	193.6	10	19.4	957.2
337	12	11.9	15:24:59	44.2	196.8	10	19.4	957.3
338	12	12.1	15:25:59	42.1	196	10.1	19.3	957.3
339	12	12	15:27:29	45.3	196.7	10.1	19.2	957.4
340	12	11.8	15:28:19	43.5	199	9.9	19.1	957.3
341	12	12.1	15:30:49	42.4	189	10.1	19	957.3
342	12	12.2	15:33:39	43.4	207.6	10.3	19	957.3
343	12	12.1	15:35:09	42	205.1	10.2	19	957.3
344	12	11.8	15:37:19	42.3	206	9.9	19	957.3
345	12	11.9	15:43:29	40.4	202.7	10	19.1	957.1
346	12	12.1	15:43:39	41.1	192.6	10.2	19.1	957
347	12	12.2	15:44:39	45.3	199.8	10.2	19.1	957.1
348	12	12.2	15:45:39	43.2	195.2	10.3	19.1	957.1
349	12	11.9	15:56:19	43.3	203.6	10	18.7	957.2
350	12	11.9	15:56:29	42.7	200.3	10	18.7	957.2
351	12	12.1	15:56:39	41.4	202.6	10.2	18.7	957.2
*352	12.5	12.3	12:51:19	43.2	218.9	10.4	18.1	959
353	12.5	12.6	12:51:39	42.6	221.4	10.6	18.1	959
354	12.5	12.7	12:56:49	39.4	221.7	10.7	18.3	958.9
355	12.5	12.7	13:00:29	43.3	221.9	10.7	18.4	958.8
356	12.5	12.4	13:01:59	43.4	231.3	10.4	18.3	958.7
357	12.5	12.4	13:03:29	42.7	221.4	10.4	18.3	958.8
358	12.5	12.6	13:06:59	42.4	221.9	10.6	18.4	958.7
359	12.5	12.7	13:07:39	45.2	225.1	10.7	18.4	958.7
360	12.5	12.3	13:07:59	40.6	224.9	10.3	18.4	958.7
361	12.5	12.3	13:08:09	40.3	226.5	10.4	18.4	958.7
362	12.5	12.5	13:09:09	39.7	229.4	10.5	18.4	958.6
363	12.5	12.4	13:09:19	41.2	233.1	10.4	18.4	958.6
364	12.5	12.3	13:09:39	41.3	225.5	10.4	18.4	958.7
365	12.5	12.4	13:12:29	40	227.2	10.4	18.5	958.5
366	12.5	12.7	13:12:49	40.4	234.2	10.7	18.5	958.6
367	12.5	12.4	13:14:19	42	232.7	10.4	18.5	958.5

Wind bin list - background noise:								
No.	Wind	Vs	Time	LAeq	Windd.	Winds.	T	Pressure
	Bin	[m/s]		[dB(A)]	[°]	[m/s]	[°C]	[hPa]
368	12.5	12.7	13:14:39	41.6	231.8	10.7	18.5	958.5
369	12.5	12.3	13:28:09	41.7	226.4	10.3	18.9	958.3
370	12.5	12.3	15:09:39	40.9	195.8	10.4	19	957.5
371	12.5	12.3	15:10:39	42.3	207.3	10.3	19	957.4
372	12.5	12.4	15:19:39	44.4	207.7	10.4	19.3	957.4
373	12.5	12.6	15:23:29	41.6	190.5	10.6	19.5	957.3
374	12.5	12.5	15:24:29	42.5	195.8	10.5	19.5	957.3
375	12.5	12.4	15:25:39	41	194	10.4	19.3	957.3
376	12.5	12.5	15:26:29	45.4	188.2	10.5	19.2	957.2
377	12.5	12.4	15:26:49	44.2	198.7	10.4	19.2	957.2
378	12.5	12.3	15:27:09	45.7	197.1	10.3	19.2	957.3
379	12.5	12.4	15:28:29	42.6	196.4	10.4	19.1	957.3
380	12.5	12.7	15:29:29	42.4	197.8	10.6	19.1	957.3
381	12.5	12.4	15:30:09	44.1	189.9	10.4	19.1	957.3
382	12.5	12.4	15:35:19	43.4	192.4	10.4	19	957.3
383	12.5	12.7	15:35:39	42.8	198.2	10.7	19	957.3
384	12.5	12.3	15:36:09	43.2	204.9	10.3	19	957.3
385	12.5	12.4	15:36:39	42.6	208.3	10.4	19	957.3
386	12.5	12.4	15:36:49	42.4	206.5	10.4	19	957.2
387	12.5	12.6	15:44:29	42.5	196.9	10.6	19.1	957
388	12.5	12.3	15:45:09	43.6	207.1	10.4	19.1	957.1
389	12.5	12.4	15:46:09	43.3	207.5	10.4	19.1	957
390	12.5	12.6	15:48:49	41.5	191.6	10.6	19.1	957
391	12.5	12.5	15:49:19	42.3	194.9	10.5	19.1	957
392	12.5	12.6	15:51:09	44.1	193.7	10.6	19	957
393	12.5	12.6	15:51:59	44.9	191.3	10.6	19	957
394	12.5	12.7	15:54:09	43.6	206.9	10.6	18.8	957
395	12.5	12.3	15:54:49	43	194.6	10.4	18.8	957.2
396	12.5	12.5	15:55:49	43.8	189.8	10.5	18.7	957.1
* Wind bin for tonality analysed								

APPENDIX F:
REPORT CHECKLIST

Report Checklist		
Items 1 to 26: IEC61400-11, Section 10.2, Characterization of the wind turbine		
1. manufacturer	Section 2	✓
2. model number	Section 2	✓
3. serial number/turbine ID	Section 2	✓
Operating details:		
4. vertical or horizontal axis wind turbine	Section 2	✓
5. upwind or downwind rotor	Section 2	✓
6. hub height	Section 2	✓
7. horizontal distance from rotor centre to tower axis	Section 2	✓
8. diameter of rotor	Section 2	✓
9. tower type (lattice or tube)	Section 2	✓
10. passive stall, active stall, or pitch controlled turbine	Section 2	✓
11. constant or variable speed	Section 2	✓
12. power curve (if required for wind speed determination)	Section 2	✓
13. rotational speed at each integer wind bin	Section 2	✓
14. rated power output	Section 2	✓
15. control software version	Section 2	✓
Rotor details:		
16. rotor control devices	Section 2	✓
17. presence of vortex generators, stall strips, serrated trailing edges	Section 2	✓
18. blade type	Section 2	✓
19. serial number	Section 2	✓
20. number of blades	Section 2	✓
Gearbox details:		
21. manufacturer	Section 2	✓
22. model number	Section 2	✓
23. serial number	Section 2	✓
Generator details:		
24. manufacturer	Section 2	✓
25. model number	Section 2	✓
26. serial number	Section 2	✓

Report Checklist		
Items 27 to 33; IEC61400-11, Section 10.3, Physical Environment		
27. details of the site including location, site map and other relevant information;	Section 3 and Figure 1	✓
28. type of topography/terrain (hilly, flat, cliffs, mountains, etc.) in surrounding area (nearest 1 km);	Section 3	✓
29. surface characteristics (such as grass, sand, trees, bushes, water surfaces);	Section 3	✓
30. nearby reflecting structures such as buildings or other structures, cliffs, trees, water surfaces;	Section 3	✓
31. other nearby sound sources possibly affecting background noise level, such as other wind turbines, highways, industrial complexes, airports;	Section 3	✓
32. two photos, one taken in the direction of the turbine from the reference microphone position, and one taken from the wind mast toward the turbine;	Appendix A	✓
33. a photo of the microphone on the measurement board positioned on the ground and immediate surroundings;	Appendix A	✓
Items 34 to 39; IEC61400-11, Section 10.4, Instrumentation		
34. the manufacturer(s);	Section 4	✓
35. the instrument name and type;	Section 4	✓
36. serial number(s);	Section 4	✓
37. other relevant information (such as last calibration date, calibration certificate(s));	Section 4	✓
38. met mast anemometer position and height for each measurement series;	Section 4	✓
39. influence of secondary wind screen, if used.	Section 4	✓
Items 40 to 52; IEC61400-11, Section 10.5, Acoustic Data		
40. the measured position of each microphone for each measurement series;	Section 3	✓
41. LWA,k, where LWA,k is the apparent sound power level, at bin centre wind speeds at hub height;	Section 5	✓
42. LWA,k, where LWA,k is the apparent sound power level, at wind speeds at 10 m height;	Section 5	✓
43. a plot showing all measured data pairs at position 1 of the wind turbine sound and background noise (with different symbols);	Figure 3	✓
44. a plot showing all measured total noise versus electrical power data;	Figure 4	✓
45. table and plot of sound power spectrum in third octaves for each relevant wind speed;	Appendix C	✓
46. table showing total noise and background noise;	Section 5	✓
For each relevant wind speed (k):		
47. ΔLtn,j,k (for j = 1, 2, 3,…12) for each identified tone;	Appendix D	✓
48. ΔLk for each identified tone, where Lk is the sound pressure level;	Appendix D	✓
49. ΔLa,k for each identified tone, where La,k is the tonal audibility;	Appendix D	✓
50. frequency of the tone(s);	Appendix D	✓
51. narrowband spectra of total and background noise as an overlay plot per bin;	Appendix D	✓
52. time and date of each measurement series.	Appendix E	✓

END OF DOCUMENT

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 ACOUSTIC REPORT SUMMARY

Version 1

Grand Valley Wind Farms, Phase 3

Grand Valley, Ontario

Report Number: 02200226.006

Project Number: 02200226

Prepared for:

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

Prepared by:

Nathan Gara, C.E.T., EIT

LICENSED PROFESSIONAL ENGINEER
R. B. HOWE
Dec 22, 2023
PROVINCE OF ONTARIO

Reviewed by:

Brian Howe, MEng, MBA, LLM, PEng

December 22, 2023

VERSION CONTROL

Version	Date	Version Description
1	December 22, 2023	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 two wind turbine generators, each while operating in a normal and uprated power mode, at the Grand Valley Wind Farms Phase 3 project near Grand Valley, Ontario. This report provides a summary of the measurements of the test wind turbine generators completed between the fall of 2022 and the winter of 2023.

HGC Engineering has assessed two Siemens SWT 3.0-113 wind turbine generators ("WTG"), designated T101 and T115, in accordance with IEC 61400-11:2018-06. WTG T101 has a rated electrical power of 2648 kW and WTG T115 has a rated power of 2483 kW. Both wind turbines were also tested while operating in an uprated power mode, rated at 2772 kW.

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 and the Amendment to Renewable Energy Approval Number 76457-9L6QLC.

TABLE OF CONTENTS

EXECUTIVE SUMMARY....................2
1 INTRODUCTION....................5
2 MEASUREMENTS AND RESULTS....................5
3 CONCLUSIONS....................7

ATTACHED:

REPORT 02200226.002 – ACOUSTIC TEST REPORT, WTG T101 (2648 kW)

REPORT 02200226.003 – ACOUSTIC TEST REPORT, WTG T101 (2772 kW)

REPORT 02200226.004 – ACOUSTIC TEST REPORT, WTG T115 (2483 kW)

REPORT 02200226.005 – ACOUSTIC TEST REPORT, WTG T115 (2772 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 two Siemens SWT 3.0-113 Wind Turbine Generators ("WTG"), each while operating in a normal and uprated power mode, to determine the sound power level of the WTGs. The 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. This report represents measurements of the test wind turbine generator completed between the fall of 2022 and the winter of 2023.

The applicable sound power level limit for the normal turbine operation 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 ("MECP"). The applicable sound power level for the uprated turbine operating mode (2772 kW) is provided in an amendment to the REA, issued by the MECP on September 7, 2022 [2], which itself references the sound power level provided in a letter provided by Siemens Gamesa Renewable Energy on December 12, 2021.

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" [3].

2 MEASUREMENTS AND RESULTS

Sound level measurements were conducted at WTG T101 and WTG T115 on the following dates:

- WTG T101 (2648 kW), November 4, 2022
- WTG T101 (2772 kW), May 19 and October 22, 2023
- WTG T115 (2483 kW), November 15, 2023
- WTG T115 (2772 kW), November 13, 2023

Additional details related to instrumentation, measurement procedures, and detailed results are provided in the attached Acoustic Test Reports. The overall results are shown in Table 1 through

Table 2, below, and compared to the sound power level specified in the REA and REA Amendment for WTGs T101 and T115.

Table 1: Emission Testing Summary Results, T101 (2483 kW)

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)	**101.2**	**101.5**	**101.7**	**101.7**	**101.9**	**101.5**	**101.0**	**100.9**	**101.3**	**101.3**	**100.8**
Sound Power Level Specified in REA [dBA]	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
Tonal Audibility, ΔL_{ak} in 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 $u_{LWA,k}$ in dB:	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9

Table 2: Emission Testing Summary Results, T101 (2772 kW)

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)	**100.6**	**102.0**	**102.1**	**102.3**	**102.2**	**102.1**	**101.8**	**101.9**	**101.6**	**101.8**	**101.9**#
Sound Power Level Specified in REA Amendment [dBA]	103	103	103	103	103	103	103	103	103	103	103
Tonal Audibility, ΔL_{ak} in dB:	<-3.0	-2.5	-2.9	-2.6	-1.9	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0	<-3.0/ <-3.0^
Total Uncertainty $u_{LWA,k}$ in dB:	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9/ 0.8^

^ Results from measurements conducted on May 19 and October 22, 2023 (May 19/Oct 22).
# Determined by combining May 19 and October 22 results in accordance with the method provided in Annex H of IEC 61400-11.

Table 3: Emission Testing Summary Results, T115 (2483 kW)

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)	**98.8**	**98.9**	**99.2**	**99.4**	**99.4**	**99.5**	**99.7**	**99.6**	**99.6**	**99.4**	**98.9**
Sound Power Level Specified in REA [dBA]	101.5	101.5	101.5	101.5	101.5	101.5	101.5	101.5	101.5	101.5	101.5
Tonal Audibility, ΔL_{ak} in dB:	<-3.0	-2.7	-2.2	-1.8	-1.3	<-3.0	-2.8	-2.1	-2.6	-1.9	0.4
Total Uncertainty $u_{LWA,k}$ in dB:	0.9	0.8	0.7	0.7	0.8	0.7	0.8	0.8	0.7	0.7	0.8

Table 3: Emission Testing Summary Results, T115 (2772 kW)

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)	**100.7**	**101.8**	**102.0**	**102.1**	**102.1**	**102.2**	**102.3**	**101.9**	**101.5**	**101.4**	**101.3**
Sound Power Level Specified in REA Amendment [dBA]	103	103	103	103	103	103	103	103	103	103	103
Tonal Audibility, ΔL_{ak} in dB:	<-3.0	<-3.0	<-3.0	-2.6	-2.7	0.3	-2	-0.1	<-3.0	<-3.0	<-3.0
Total Uncertainty $u_{LWA,k}$ in dB:	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.8

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] and the Amendment to Renewable Energy Approval Number 76457-9L6QLC [2].

Detailed results are provided in the attached Acoustic Test Reports.

REFERENCES

1. Ontario Ministry of the Environment Renewable Energy Approval Number 6457-9L6QLC, dated October 15, 2014.
2. Ontario Ministry of the Environment Amendment to Renewable Energy Approval Number 6457-9L6QLC, dated September 7, 2022.
3. International Electrotechnical Commission, 61400-11:2018-06 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*.

Appendix B.4 Siemens Contract Acoustic Emission, SWT-3.2 113, Hub Height 99.5 m

SWT-3.2-113, Rev. 0, Max. Power 2648 kW Contract Acoustic Emission, Hub Height 99.5 m Ontario - Canada

Sound Power Levels

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

Wind speed [m/s]	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Up to cut-out**
Max. Power 2648kW	95.3	99.7	102.4	102.5	102.5	102.5	102.5	102.5	102.5	102.5

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

Typical Sound Power Frequency Distribution

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

	Wind Speed (m/s)				
Octave band, centre frequency [Hz]	**6**	**7**	**8**	**9**	**10**
63	89.5	89.9	91.5	91.6	91.3
125	92.6	93.0	93.0	92.5	91.7
250	96.4	96.5	95.4	94.8	94.1
500	94.9	94.8	94.4	94.2	94.0
1000	95.0	94.9	95.0	94.9	95.2
2000	94.1	94.0	95.1	95.2	95.9
4000	91.2	91.8	91.8	93.6	93.9
8000	81.8	81.9	84.1	84.1	84.1

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

Tonality

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

Measurement Uncertainty

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

Grand Valley 3 - SWT-3.2-113 IIA - Rev1 Standard 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 1	92.6	96.5	99.5	103.2	105.0	105.0	105.0	105.0	105.0
Mode 2	92.6	96.5	99.5	103.2	104.0	104.0	104.0	104.0	104.0
Mode 3	92.6	96.5	99.5	103.0	103.0	103.0	103.0	103.0	103.0
Mode 4	92.6	96.5	99.5	102.0	102.0	102.0	102.0	102.0	102.0
Mode 5	92.6	96.5	99.5	101.0	101.0	101.0	101.0	101.0	101.0
Mode 6	92.6	96.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0
Mode 7	92.6	96.5	97.0	97.0	97.0	97.0	97.0	97.0	97.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 10 kHz)

Wind speed [m/s]	5	6	7	8	9	10	11	12	13	14
Mode 1	83.5	86.9	89.7	93.4	95.0	95.0	95.1	95.5	95.5	95.5
Mode 2	79.8	85.8	89.0	92.8	93.9	93.7	92.3	92.5	92.5	92.5
Mode 3	79.8	85.8	89.0	92.6	92.9	92.7	91.3	91.5	91.5	91.5
Mode 4	79.8	85.8	87.2	90.2	90.5	90.6	90.5	90.8	90.8	90.8
Mode 5	79.8	85.8	87.2	89.2	89.5	89.6	89.5	89.8	89.8	89.8
Mode 6	83.6	87.9	89.5	90.2	90.2	90.2	90.0	89.2	89.2	89.2
Mode 7	82.1	86.0	86.8	87.4	88.3	88.6	88.4	87.9	87.9	87.9

Table 2: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 160 Hz)

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 centre 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.	63	125	250	500	1000	2000	4000	8000
Mode 1	77.7	81.9	81.0	83.3	86.2	87.1	84.9	72.1
Mode 2	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 3	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 4	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 5	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 6	77.3	82.3	82.6	83.7	86.3	87.0	83.6	70.3
Mode 7	76.6	80.5	82.9	84.0	86.4	87.2	83.8	70.5

Table 3: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 5 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	80.1	85.7	85.6	87.1	89.9	91.3	88.5	77.8
Mode 2	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 3	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 4	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 5	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 6	81.3	86.6	87.0	87.7	90.4	90.8	86.5	73.7
Mode 7	80.5	84.4	86.8	87.9	90.3	91.1	87.7	74.4

Table 4: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 6 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	83.5	88.3	88.2	90.0	93.3	94.3	91.4	81.2
Mode 2	81.9	87.9	90.6	91.5	92.5	92.8	92.2	82.5
Mode 3	81.9	87.9	90.6	91.5	92.5	92.8	92.2	82.5
Mode 4	80.1	86.1	89.4	92.0	93.4	93.6	91.3	80.7
Mode 5	80.1	86.1	89.4	92.0	93.4	93.6	91.3	80.7
Mode 6	84.0	87.9	88.9	90.7	93.6	93.8	90.9	80.4
Mode 7	81.5	85.1	87.5	88.6	90.6	91.5	88.2	74.8

Table 5: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 7 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	87.6	91.9	92.0	93.5	97.0	98.1	94.9	84.7
Mode 2	86.9	91.3	93.8	95.0	96.9	96.8	95.2	86.0
Mode 3	86.7	91.1	93.6	94.8	96.7	96.6	95.0	85.8
Mode 4	83.2	89.1	91.7	94.2	96.0	96.1	93.8	83.9
Mode 5	82.2	88.1	90.7	93.2	95.0	95.1	92.8	82.9
Mode 6	84.7	88.7	89.4	91.1	94.0	94.4	91.4	80.8
Mode 7	81.7	85.8	87.3	88.3	90.6	91.4	88.2	75.1

Table 6: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 8 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	88.6	93.8	94.2	95.3	99.0	99.8	96.5	86.4
Mode 2	88.0	92.4	94.0	95.1	97.7	98.3	95.6	88.2
Mode 3	87.0	91.4	93.0	94.1	96.7	97.3	94.6	87.2
Mode 4	83.8	89.3	91.2	94.0	96.1	96.1	93.9	84.3
Mode 5	82.8	88.3	90.2	93.0	95.1	95.1	92.9	83.3
Mode 6	84.8	88.6	89.0	90.6	93.9	94.6	91.7	81.4
Mode 7	84.3	85.9	86.6	87.6	90.4	91.6	88.6	75.5

Table 7: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 9 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	88.9	93.6	94.1	95.2	99.0	99.8	96.6	86.4
Mode 2	88.2	92.0	93.8	94.8	97.5	98.3	95.8	90.0
Mode 3	87.2	91.0	92.8	93.8	96.5	97.3	94.8	89.0
Mode 4	85.1	89.0	90.6	93.4	96.1	96.3	94.3	85.4
Mode 5	84.1	88.0	89.6	92.4	95.1	95.3	93.3	84.4
Mode 6	85.4	88.2	88.7	90.4	93.9	94.7	91.9	81.8
Mode 7	84.9	86.0	86.3	86.9	90.3	91.7	88.9	75.8

Table 8: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 10 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	89.9	93.4	94.0	94.9	98.8	99.9	97.0	87.4
Mode 2	87.2	90.5	93.2	94.6	97.7	98.7	95.9	90.6
Mode 3	86.2	89.5	92.2	93.6	96.7	97.7	94.9	89.6
Mode 4	85.2	88.8	90.3	93.2	96.5	96.3	94.1	84.6
Mode 5	84.2	87.8	89.3	92.2	95.5	95.3	93.1	83.6
Mode 6	85.1	88.1	88.7	90.2	94.1	94.7	91.8	81.5
Mode 7	84.0	86.2	85.7	86.2	90.5	91.9	89.2	76.0

Table 9: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 11 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 10: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 12 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 11: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 13 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 12: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 14 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	36.5	41.8	47.4	52.6	56.6	60.9	66.0	72.9	71.5	74.1	76.1	76.8	78.3
Mode 2	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 3	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 4	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 5	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 6	36.0	42.1	48.2	53.7	57.3	62.9	65.3	70.7	72.0	74.1	77.1	77.4	78.1
Mode 7	34.9	40.2	45.5	51.3	55.5	60.1	63.8	70.7	70.2	73.8	75.1	75.6	76.5

Table 13: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 5 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	40.8	46.3	51.3	57.4	61.3	65.4	68.4	73.8	74.1	77.3	79.8	81.1	81.7
Mode 2	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 3	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 4	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 5	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 6	41.5	46.8	52.4	57.6	61.9	66.1	69.5	73.4	76.0	78.7	81.2	81.7	82.6
Mode 7	38.8	44.1	49.4	55.2	59.4	64.0	67.7	74.6	74.1	77.7	79.0	79.5	80.4

Table 14: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 6 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	43.4	49.3	55.3	61.0	65.2	68.5	72.0	75.1	79.6	80.0	82.5	83.8	84.1
Mode 2	41.7	46.5	52.8	58.4	62.7	66.8	70.5	73.4	77.0	79.2	82.2	83.1	84.0
Mode 3	41.7	46.5	52.8	58.4	62.7	66.8	70.5	73.4	77.0	79.2	82.2	83.1	84.0
Mode 4	39.4	45.8	51.1	56.5	60.3	64.4	67.9	70.7	76.0	77.1	80.4	81.3	82.2
Mode 5	39.4	45.8	51.1	56.5	60.3	64.4	67.9	70.7	76.0	77.1	80.4	81.3	82.2
Mode 6	44.0	49.6	55.1	60.4	64.4	68.2	71.6	75.0	80.7	80.0	82.1	83.4	83.7
Mode 7	45.1	48.8	52.4	56.6	60.6	64.6	68.4	75.5	74.5	78.9	79.5	80.3	81.1

Table 15: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 7 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	46.6	52.5	58.7	64.3	68.4	72.1	75.2	78.3	83.2	84.8	86.2	87.2	87.8
Mode 2	45.2	50.3	56.4	61.9	67.0	70.9	74.8	77.6	82.5	84.1	85.8	86.5	87.3
Mode 3	45.0	50.1	56.2	61.7	66.8	70.7	74.6	77.4	82.3	83.9	85.6	86.3	87.1
Mode 4	42.6	47.8	53.5	60.3	63.1	66.9	70.3	73.2	80.0	79.4	83.1	84.9	84.7
Mode 5	41.6	46.8	52.5	59.3	62.1	65.9	69.3	72.2	79.0	78.4	82.1	83.9	83.7
Mode 6	44.4	49.4	54.9	61.2	64.6	68.3	71.9	75.4	81.6	80.6	82.8	84.5	84.2
Mode 7	49.2	52.0	55.8	59.5	62.3	65.9	69.5	77.0	75.9	77.8	80.4	81.1	81.5

Table 16: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 8 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.2	54.3	60.3	65.9	70.5	73.8	77.0	80.1	83.0	86.2	88.0	89.0	89.8
Mode 2	47.2	52.2	57.5	63.6	69.0	72.2	76.1	79.0	82.9	85.6	86.9	87.6	88.4
Mode 3	46.2	51.2	56.5	62.6	68.0	71.2	75.1	78.0	81.9	84.6	85.9	86.6	87.4
Mode 4	43.4	48.1	53.7	60.7	63.5	67.2	70.6	73.8	80.4	80.2	82.8	85.7	84.6
Mode 5	42.4	47.1	52.7	59.7	62.5	66.2	69.6	72.8	79.4	79.2	81.8	84.7	83.6
Mode 6	44.6	49.5	54.9	63.2	64.6	68.1	71.6	75.6	81.9	80.5	82.4	84.8	83.9
Mode 7	49.1	52.4	57.0	60.5	62.3	66.2	69.9	81.2	76.7	79.7	81.2	80.9	81.2

Table 17: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 9 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	47.9	54.1	59.9	65.6	71.2	73.4	76.3	79.7	82.7	87.0	87.7	89.0	89.7
Mode 2	48.4	52.4	57.1	62.7	69.5	72.0	75.8	78.6	83.2	85.8	86.5	87.3	87.9
Mode 3	47.4	51.4	56.1	61.7	68.5	71.0	74.8	77.6	82.2	84.8	85.5	86.3	86.9
Mode 4	47.3	51.4	56.0	64.3	65.5	68.7	72.3	75.4	82.4	80.6	82.8	85.3	84.1
Mode 5	46.3	50.4	55.0	63.3	64.5	67.7	71.3	74.4	81.4	79.6	81.8	84.3	83.1
Mode 6	45.5	50.0	55.1	64.5	64.7	68.1	71.6	75.9	82.9	80.4	82.0	84.6	83.4
Mode 7	53.0	56.1	60.2	62.9	64.0	67.0	70.3	82.3	77.6	79.2	81.3	81.2	81.1

Table 18: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 10 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	47.7	54.0	60.2	65.8	72.1	73.7	75.9	79.5	82.8	88.5	87.6	88.7	89.4
Mode 2	48.5	52.5	56.6	62.0	69.2	70.4	74.1	77.1	82.3	84.9	84.8	85.7	86.5
Mode 3	47.5	51.5	55.6	61.0	68.2	69.4	73.1	76.1	81.3	83.9	83.8	84.7	85.5
Mode 4	45.9	50.3	55.7	64.6	65.8	69.1	72.9	75.8	82.2	81.0	82.8	85.1	83.9
Mode 5	44.9	49.3	54.7	63.6	64.8	68.1	71.9	74.8	81.2	80.0	81.8	84.1	82.9
Mode 6	45.4	49.7	55.0	64.2	64.4	68.0	71.6	75.3	82.9	79.9	81.5	84.7	83.1
Mode 7	54.6	57.9	61.4	65.0	65.8	68.0	70.8	79.5	77.9	79.9	81.0	82.0	81.2

Table 19: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 11 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 20: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 12 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 21: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 13 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 22: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz 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.

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

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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 1	92.6	96.5	99.5	103.2	105.0	105.0	105.0	105.0	105.0
Mode 2	92.6	96.5	99.5	103.2	104.0	104.0	104.0	104.0	104.0
Mode 3	92.6	96.5	99.5	103.0	103.0	103.0	103.0	103.0	103.0
Mode 4	92.6	96.5	99.5	102.0	102.0	102.0	102.0	102.0	102.0
Mode 5	92.6	96.5	99.5	101.0	101.0	101.0	101.0	101.0	101.0
Mode 6	92.6	96.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0
Mode 7	92.6	96.5	97.0	97.0	97.0	97.0	97.0	97.0	97.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 10 kHz)

Wind speed [m/s]	5	6	7	8	9	10	11	12	13	14
Mode 1	83.5	86.9	89.7	93.4	95.0	95.0	95.1	95.5	95.5	95.5
Mode 2	79.8	85.8	89.0	92.8	93.9	93.7	92.3	92.5	92.5	92.5
Mode 3	79.8	85.8	89.0	92.6	92.9	92.7	91.3	91.5	91.5	91.5
Mode 4	79.8	85.8	87.2	90.2	90.5	90.6	90.5	90.8	90.8	90.8
Mode 5	79.8	85.8	87.2	89.2	89.5	89.6	89.5	89.8	89.8	89.8
Mode 6	83.6	87.9	89.5	90.2	90.2	90.2	90.0	89.2	89.2	89.2
Mode 7	82.1	86.0	86.8	87.4	88.3	88.6	88.4	87.9	87.9	87.9

Table 2: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 160 Hz)

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 centre 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.	63	125	250	500	1000	2000	4000	8000
Mode 1	77.7	81.9	81.0	83.3	86.2	87.1	84.9	72.1
Mode 2	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 3	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 4	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 5	73.9	78.4	81.2	82.5	85.5	88.5	85.2	74.2
Mode 6	77.3	82.3	82.6	83.7	86.3	87.0	83.6	70.3
Mode 7	76.6	80.5	82.9	84.0	86.4	87.2	83.8	70.5

Table 3: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 5 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	80.1	85.7	85.6	87.1	89.9	91.3	88.5	77.8
Mode 2	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 3	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 4	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 5	79.3	84.6	87.3	88.1	89.2	90.3	89.7	79.3
Mode 6	81.3	86.6	87.0	87.7	90.4	90.8	86.5	73.7
Mode 7	80.5	84.4	86.8	87.9	90.3	91.1	87.7	74.4

Table 4: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 6 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	83.5	88.3	88.2	90.0	93.3	94.3	91.4	81.2
Mode 2	81.9	87.9	90.6	91.5	92.5	92.8	92.2	82.5
Mode 3	81.9	87.9	90.6	91.5	92.5	92.8	92.2	82.5
Mode 4	80.1	86.1	89.4	92.0	93.4	93.6	91.3	80.7
Mode 5	80.1	86.1	89.4	92.0	93.4	93.6	91.3	80.7
Mode 6	84.0	87.9	88.9	90.7	93.6	93.8	90.9	80.4
Mode 7	81.5	85.1	87.5	88.6	90.6	91.5	88.2	74.8

Table 5: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 7 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	87.6	91.9	92.0	93.5	97.0	98.1	94.9	84.7
Mode 2	86.9	91.3	93.8	95.0	96.9	96.8	95.2	86.0
Mode 3	86.7	91.1	93.6	94.8	96.7	96.6	95.0	85.8
Mode 4	83.2	89.1	91.7	94.2	96.0	96.1	93.8	83.9
Mode 5	82.2	88.1	90.7	93.2	95.0	95.1	92.8	82.9
Mode 6	84.7	88.7	89.4	91.1	94.0	94.4	91.4	80.8
Mode 7	81.7	85.8	87.3	88.3	90.6	91.4	88.2	75.1

Table 6: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 8 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	88.6	93.8	94.2	95.3	99.0	99.8	96.5	86.4
Mode 2	88.0	92.4	94.0	95.1	97.7	98.3	95.6	88.2
Mode 3	87.0	91.4	93.0	94.1	96.7	97.3	94.6	87.2
Mode 4	83.8	89.3	91.2	94.0	96.1	96.1	93.9	84.3
Mode 5	82.8	88.3	90.2	93.0	95.1	95.1	92.9	83.3
Mode 6	84.8	88.6	89.0	90.6	93.9	94.6	91.7	81.4
Mode 7	84.3	85.9	86.6	87.6	90.4	91.6	88.6	75.5

Table 7: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 9 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	88.9	93.6	94.1	95.2	99.0	99.8	96.6	86.4
Mode 2	88.2	92.0	93.8	94.8	97.5	98.3	95.8	90.0
Mode 3	87.2	91.0	92.8	93.8	96.5	97.3	94.8	89.0
Mode 4	85.1	89.0	90.6	93.4	96.1	96.3	94.3	85.4
Mode 5	84.1	88.0	89.6	92.4	95.1	95.3	93.3	84.4
Mode 6	85.4	88.2	88.7	90.4	93.9	94.7	91.9	81.8
Mode 7	84.9	86.0	86.3	86.9	90.3	91.7	88.9	75.8

Table 8: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 10 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	89.9	93.4	94.0	94.9	98.8	99.9	97.0	87.4
Mode 2	87.2	90.5	93.2	94.6	97.7	98.7	95.9	90.6
Mode 3	86.2	89.5	92.2	93.6	96.7	97.7	94.9	89.6
Mode 4	85.2	88.8	90.3	93.2	96.5	96.3	94.1	84.6
Mode 5	84.2	87.8	89.3	92.2	95.5	95.3	93.1	83.6
Mode 6	85.1	88.1	88.7	90.2	94.1	94.7	91.8	81.5
Mode 7	84.0	86.2	85.7	86.2	90.5	91.9	89.2	76.0

Table 9: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 11 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 10: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 12 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 11: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 13 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Mode 1	90.4	93.7	94.1	94.7	98.7	99.9	96.8	87.3
Mode 2	87.7	90.6	93.2	94.5	97.8	99.0	95.7	89.5
Mode 3	86.7	89.6	92.2	93.5	96.8	98.0	94.7	88.5
Mode 4	85.6	89.0	89.9	92.9	96.6	96.4	94.1	85.1
Mode 5	84.6	88.0	88.9	91.9	95.6	95.4	93.1	84.1
Mode 6	84.2	87.3	88.4	90.1	94.3	94.8	92.0	82.0
Mode 7	82.6	86.1	86.1	86.5	90.5	91.8	89.3	76.1

Table 12: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 14 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	36.5	41.8	47.4	52.6	56.6	60.9	66.0	72.9	71.5	74.1	76.1	76.8	78.3
Mode 2	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 3	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 4	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 5	32.2	37.5	43.5	48.2	52.5	57.3	61.1	70.6	66.0	69.5	73.1	73.1	74.6
Mode 6	36.0	42.1	48.2	53.7	57.3	62.9	65.3	70.7	72.0	74.1	77.1	77.4	78.1
Mode 7	34.9	40.2	45.5	51.3	55.5	60.1	63.8	70.7	70.2	73.8	75.1	75.6	76.5

Table 13: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 5 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	40.8	46.3	51.3	57.4	61.3	65.4	68.4	73.8	74.1	77.3	79.8	81.1	81.7
Mode 2	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 3	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 4	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 5	38.0	42.8	50.8	54.1	58.5	63.2	66.6	75.1	72.5	75.5	79.5	79.3	80.6
Mode 6	41.5	46.8	52.4	57.6	61.9	66.1	69.5	73.4	76.0	78.7	81.2	81.7	82.6
Mode 7	38.8	44.1	49.4	55.2	59.4	64.0	67.7	74.6	74.1	77.7	79.0	79.5	80.4

Table 14: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 6 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	43.4	49.3	55.3	61.0	65.2	68.5	72.0	75.1	79.6	80.0	82.5	83.8	84.1
Mode 2	41.7	46.5	52.8	58.4	62.7	66.8	70.5	73.4	77.0	79.2	82.2	83.1	84.0
Mode 3	41.7	46.5	52.8	58.4	62.7	66.8	70.5	73.4	77.0	79.2	82.2	83.1	84.0
Mode 4	39.4	45.8	51.1	56.5	60.3	64.4	67.9	70.7	76.0	77.1	80.4	81.3	82.2
Mode 5	39.4	45.8	51.1	56.5	60.3	64.4	67.9	70.7	76.0	77.1	80.4	81.3	82.2
Mode 6	44.0	49.6	55.1	60.4	64.4	68.2	71.6	75.0	80.7	80.0	82.1	83.4	83.7
Mode 7	45.1	48.8	52.4	56.6	60.6	64.6	68.4	75.5	74.5	78.9	79.5	80.3	81.1

Table 15: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 7 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	46.6	52.5	58.7	64.3	68.4	72.1	75.2	78.3	83.2	84.8	86.2	87.2	87.8
Mode 2	45.2	50.3	56.4	61.9	67.0	70.9	74.8	77.6	82.5	84.1	85.8	86.5	87.3
Mode 3	45.0	50.1	56.2	61.7	66.8	70.7	74.6	77.4	82.3	83.9	85.6	86.3	87.1
Mode 4	42.6	47.8	53.5	60.3	63.1	66.9	70.3	73.2	80.0	79.4	83.1	84.9	84.7
Mode 5	41.6	46.8	52.5	59.3	62.1	65.9	69.3	72.2	79.0	78.4	82.1	83.9	83.7
Mode 6	44.4	49.4	54.9	61.2	64.6	68.3	71.9	75.4	81.6	80.6	82.8	84.5	84.2
Mode 7	49.2	52.0	55.8	59.5	62.3	65.9	69.5	77.0	75.9	77.8	80.4	81.1	81.5

Table 16: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 8 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.2	54.3	60.3	65.9	70.5	73.8	77.0	80.1	83.0	86.2	88.0	89.0	89.8
Mode 2	47.2	52.2	57.5	63.6	69.0	72.2	76.1	79.0	82.9	85.6	86.9	87.6	88.4
Mode 3	46.2	51.2	56.5	62.6	68.0	71.2	75.1	78.0	81.9	84.6	85.9	86.6	87.4
Mode 4	43.4	48.1	53.7	60.7	63.5	67.2	70.6	73.8	80.4	80.2	82.8	85.7	84.6
Mode 5	42.4	47.1	52.7	59.7	62.5	66.2	69.6	72.8	79.4	79.2	81.8	84.7	83.6
Mode 6	44.6	49.5	54.9	63.2	64.6	68.1	71.6	75.6	81.9	80.5	82.4	84.8	83.9
Mode 7	49.1	52.4	57.0	60.5	62.3	66.2	69.9	81.2	76.7	79.7	81.2	80.9	81.2

Table 17: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 9 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	47.9	54.1	59.9	65.6	71.2	73.4	76.3	79.7	82.7	87.0	87.7	89.0	89.7
Mode 2	48.4	52.4	57.1	62.7	69.5	72.0	75.8	78.6	83.2	85.8	86.5	87.3	87.9
Mode 3	47.4	51.4	56.1	61.7	68.5	71.0	74.8	77.6	82.2	84.8	85.5	86.3	86.9
Mode 4	47.3	51.4	56.0	64.3	65.5	68.7	72.3	75.4	82.4	80.6	82.8	85.3	84.1
Mode 5	46.3	50.4	55.0	63.3	64.5	67.7	71.3	74.4	81.4	79.6	81.8	84.3	83.1
Mode 6	45.5	50.0	55.1	64.5	64.7	68.1	71.6	75.9	82.9	80.4	82.0	84.6	83.4
Mode 7	53.0	56.1	60.2	62.9	64.0	67.0	70.3	82.3	77.6	79.2	81.3	81.2	81.1

Table 18: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 10 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	47.7	54.0	60.2	65.8	72.1	73.7	75.9	79.5	82.8	88.5	87.6	88.7	89.4
Mode 2	48.5	52.5	56.6	62.0	69.2	70.4	74.1	77.1	82.3	84.9	84.8	85.7	86.5
Mode 3	47.5	51.5	55.6	61.0	68.2	69.4	73.1	76.1	81.3	83.9	83.8	84.7	85.5
Mode 4	45.9	50.3	55.7	64.6	65.8	69.1	72.9	75.8	82.2	81.0	82.8	85.1	83.9
Mode 5	44.9	49.3	54.7	63.6	64.8	68.1	71.9	74.8	81.2	80.0	81.8	84.1	82.9
Mode 6	45.4	49.7	55.0	64.2	64.4	68.0	71.6	75.3	82.9	79.9	81.5	84.7	83.1
Mode 7	54.6	57.9	61.4	65.0	65.8	68.0	70.8	79.5	77.9	79.9	81.0	82.0	81.2

Table 19: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 11 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 20: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 12 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 21: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 13 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mode 1	48.1	54.5	60.6	66.3	73.2	74.3	77.2	80.4	83.1	88.9	87.8	88.9	89.8
Mode 2	47.1	51.3	56.0	61.9	69.6	70.2	74.3	77.2	81.8	85.8	84.8	85.6	86.8
Mode 3	46.1	50.3	55.0	60.9	68.6	69.2	73.3	76.2	80.8	84.8	83.8	84.6	85.8
Mode 4	47.8	51.9	56.6	64.9	66.8	70.1	73.6	76.8	82.5	81.5	83.3	85.3	83.8
Mode 5	46.8	50.9	55.6	63.9	65.8	69.1	72.6	75.8	81.5	80.5	82.3	84.3	82.8
Mode 6	45.7	49.9	54.8	62.9	64.3	68.1	71.6	74.9	82.0	78.8	80.8	83.9	82.4
Mode 7	56.0	59.0	62.3	66.0	66.9	68.7	70.9	77.4	77.7	78.3	80.1	82.6	81.0

Table 22: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 14 m/s

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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
Standard setting	93.4	96.6	99.9	103.7	105.9	106.0	106.0	106.0	106.0
-1dB	93.4	96.6	99.9	103.1	104.9	105.0	105.0	105.0	105.0
-2dB	93.4	96.6	99.9	102.3	103.9	104.0	104.0	104.0	104.0
-3dB	93.4	96.4	99.5	101.5	102.9	103.0	103.0	103.0	103.0
-4dB	93.4	96.2	98.7	100.5	101.9	102.0	102.0	102.0	102.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 10 kHz)

Wind speed [m/s]	8	9	11	12
Standard setting	90.9	93.1	92.5	92.5
-1dB	90.8	92.6	92.2	92.2
-2dB	90.5	92.1	91.9	91.9
-3dB	90.2	91.6	91.5	91.5
-4dB	89.9	91.3	91.2	91.2

Table 2: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 160 Hz)

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 centre frequencies are tabulated below for 8, 9, 10, 11, 12, 13, 14 and 15 m/s referenced to hub height.

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Standard setting	85.2	89.4	94.1	96.5	99.5	97.0	91.5	77.5
-1dB	85.2	89.2	95.5	96.6	98.1	95.4	91.1	76.0
-2dB	85.0	88.9	95.4	96.1	96.7	94.1	90.6	76.0
-3dB	84.9	88.6	95.1	95.6	95.3	92.7	90.0	75.8
-4dB	84.6	88.2	94.8	94.3	93.6	91.7	89.2	75.6

Table 3: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 8 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	87.4	91.6	96.3	98.7	101.7	99.2	93.7	79.7
-1dB	87.0	91.0	97.3	98.4	99.9	97.2	92.9	77.8
-2dB	86.6	90.5	97.0	97.7	98.3	95.7	92.2	77.6
-3dB	86.3	90.0	96.5	97.0	96.7	94.1	91.4	77.2
-4dB	86.0	89.6	96.2	95.7	95.0	93.1	90.6	77.0

Table 4: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 9 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	86.2	91.7	96.5	98.6	101.6	99.6	94.2	80.4
-1dB	86.0	91.6	97.5	98.3	99.9	97.2	93.5	77.9
-2dB	85.6	91.0	97.2	97.6	98.3	95.7	92.8	77.7
-3dB	85.4	90.2	95.8	96.1	97.3	95.9	91.6	78.5
-4dB	85.1	89.8	95.4	94.9	95.9	94.8	90.7	78.0

Table 5: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 10 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	85.0	91.5	96.1	98.4	101.7	99.8	94.4	80.8
-1dB	84.8	91.1	96.4	97.2	100.1	98.9	93.6	80.8
-2dB	84.6	90.8	94.7	96.3	99.3	97.8	92.5	79.3
-3dB	84.4	90.3	94.9	95.0	97.8	96.9	91.6	79.2
-4dB	84.2	90.0	94.4	93.8	96.4	95.8	90.6	78.6

Table 6: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 11 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	85.0	91.5	96.1	98.4	101.7	99.8	94.4	80.8
-1dB	84.8	91.1	96.4	97.2	100.1	98.9	93.6	80.8
-2dB	84.6	90.8	94.7	96.3	99.3	97.8	92.5	79.3
-3dB	84.4	90.3	94.9	95.0	97.8	96.9	91.6	79.2
-4dB	84.2	90.0	94.4	93.8	96.4	95.8	90.6	78.6

Table 7: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 12 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	83.8	89.5	94.3	98.1	101.9	100.4	95.0	81.5
-1dB	84.9	90.5	95.7	97.0	100.0	99.1	95.4	80.7
-2dB	84.6	90.1	94.0	96.0	99.2	98.0	94.3	79.2
-3dB	84.5	90.3	94.7	94.8	97.6	97.1	92.5	79.4
-4dB	84.3	89.9	94.2	93.6	96.3	96.0	91.5	78.8

Table 8: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 13 m/s

1/1 oct. band, center freq.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Standard setting	83.4	89.4	94.0	97.7	101.9	100.6	95.3	81.9
-1dB	84.6	89.8	95.1	96.7	100.2	99.3	95.5	80.6
-2dB	84.3	89.4	93.3	95.7	99.3	98.3	94.4	79.1
-3dB	84.3	89.9	94.2	94.5	97.8	97.3	92.6	79.4
-4dB	84.1	89.6	93.8	93.3	96.4	96.3	91.7	78.8

Table 9: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 14 m/s

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Standard setting	83.0	89.2	93.7	97.4	101.8	100.9	95.5	82.3
-1dB	84.3	89.2	94.6	96.4	100.3	99.6	95.6	80.4
-2dB	84.0	88.8	92.7	95.4	99.4	98.7	94.5	78.9
-3dB	84.1	89.6	93.7	94.2	97.9	97.6	92.7	79.3
-4dB	83.9	89.3	93.4	93.0	96.5	96.7	91.8	78.8

Table 10: Typical 1/1 octave band spectrum for 63 Hz to 8 kHz at 15 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Standard setting	40.6	45.6	52.8	58.6	63.8	67.9	72.9	75.5	78.0	83.7	83.1	85.2	85.2
-1dB	40.8	45.8	53.0	58.8	64.0	68.1	73.0	75.6	78.0	83.7	83.0	85.1	85.0
-2dB	40.8	45.8	53.0	58.8	63.9	68.0	72.9	75.4	77.8	83.4	82.7	84.7	84.6
-3dB	40.9	45.9	53.1	58.9	64.0	68.0	72.9	75.4	77.7	83.3	82.5	84.4	84.2
-4dB	40.9	45.9	53.1	58.8	63.9	67.9	72.8	75.2	77.6	83.0	82.2	84.0	83.8

Table 11: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 8 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Standard setting	42.8	47.8	55.0	60.8	66.0	70.1	75.1	77.7	80.2	85.9	85.3	87.4	87.4
-1dB	42.6	47.6	54.8	60.6	65.8	69.9	74.8	77.4	79.8	85.5	84.8	86.9	86.8
-2dB	42.4	47.4	54.6	60.4	65.5	69.6	74.5	77.0	79.4	85.0	84.3	86.3	86.2
-3dB	42.3	47.3	54.5	60.3	65.4	69.4	74.3	76.8	79.1	84.7	83.9	85.8	85.6
-4dB	42.3	47.3	54.5	60.2	65.3	69.3	74.2	76.6	79.0	84.4	83.6	85.4	85.2

Table 12: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 9 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Standard setting	42.6	48.0	52.9	59.1	63.7	68.8	76.3	77.0	79.1	82.7	84.7	87.3	87.6
-1dB	42.6	48.0	52.9	59.1	63.7	68.7	76.2	76.9	78.9	82.5	84.4	87.0	87.2
-2dB	42.6	48.0	52.9	59.1	63.6	68.7	76.1	76.7	78.7	82.2	84.1	86.6	86.8
-3dB	42.6	48.0	52.9	59.0	63.6	68.6	76.0	76.6	78.5	82.0	83.8	86.2	86.3
-4dB	42.6	48.0	52.9	59.0	63.5	68.5	75.9	76.4	78.4	81.7	83.5	85.9	85.9

Table 13: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 11 m/s

1/3 oct. band, center freq.	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Standard setting	42.6	48.0	52.9	59.1	63.7	68.8	76.3	77.0	79.1	82.7	84.7	87.3	87.6
-1dB	42.6	48.0	52.9	59.1	63.7	68.7	76.2	76.9	78.9	82.5	84.4	87.0	87.2
-2dB	42.6	48.0	52.9	59.1	63.6	68.7	76.1	76.7	78.7	82.2	84.1	86.6	86.8
-3dB	42.6	48.0	52.9	59.0	63.6	68.6	76.0	76.6	78.5	82.0	83.8	86.2	86.3
-4dB	42.6	48.0	52.9	59.0	63.5	68.5	75.9	76.4	78.4	81.7	83.5	85.9	85.9

Table 14: Typical 1/3 octave band spectrum for 10 Hz to 160 Hz at 12 m/s

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

SIEMENS

Tuesday, January 10, 2011

Subject: Regarding noise assessment for Wind farms

To whom it may concern:

The Wind test Report WT 4498/05 for the SWT 2.3-93 wind turbine generator is relevant for assessment of the SWT 2.3-101 wind turbine generator tonality as the nacelle and frequency converter are identical for both the SWT 2.3-93 and the SWT 2.3-101. There are no other components on the SWT 2.3-101 that result in ascertainable tonalities determined in accordance with IEC 61400-11.

Regards,

Anders J. Jensen
Senior Proposals Manager

Siemens Energy Inc.

Siemens Energy, Inc.

4400 Alafaya Trail, MC
Orlando, FL 32826-2399

EXECUTIVE SUMMARY

Howe Gastmeier Chapnik Limited ("HGC Engineering") was retained by Siemens Gamesa Renewable Energy to complete an Acoustic Noise test in accordance with IEC 61400-11 of Wind Turbine Generator ("WTG") T8, part of the Grand Valley Wind Farms Phase 1 & 2 project near Grand Valley, Ontario. The measurements were completed on November 4, 2020.

HGC Engineering has assessed the acoustic emissions of WTG T8, a Siemens SWT-2.3-101 wind turbine, rated at 2221 kW, in accordance with IEC 61400-11:2018-06. A summary of the acoustic results is provided in the following tables:

Hub Height Wind Speed [m/s]	**7.5**	**8**	**8.5**	**9**	**9.5**	**10**	**10.5***	**11***	**11.5***	**12***	**12.5***	**13***
Sound Power Level $L_{WA,K}$ in dB(A)	**100.7**	**101.6**	**102.6**	**103.3**	**103.7**	**103.9**	**104.0**	**104.2**	**104.0**	**104.0**	**103.9**	**104.0**
Tonal Audibility, ΔL_{ak} in dB:	-1.3	-2.3	2.5	3.9	4.6	4.2	1.9	1.4	2.8	1.8	1.9	2
Total Uncertainty $u_{LWA,k}$ in dB:	0.8	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.7

* Above *allowed range* of the power curve.

10m Height Wind Speed [m/s]	**6**	**7**	**8***	**9***
Theoretical active power in kW:	1388	1818	2178	2218
Sound Power Level $L_{WA,k}$ in dB(A):	102.3	104.2	104.4	103.9
Total Uncertainty $u_{LWA,10m,k}$ in dB:	0.7	0.7	0.7	0.8

* Above *allowed range* of the power curve.

GE Energy

Technical Documentation
Wind Turbine Generator System
GE 1.5sl/sle 50 & 60 Hz

Noise emission characteristics

Normal operation
according to IEC

GE imagination at work

GE Energy

GE Wind Energy GmbH
Germany
Holsterfeld 16
48499 Salzbergen
T +49 0 5971 980 0
F +49 0 5971 980 1090

Gepower.com

Visit us at
www.gewindenergy.com

All technical data is subject to change in line with ongoing technical development!

GE imagination at work

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4 Tonality 6
5 Third Octave Band and Octave Band Spectra 7

1 Introduction

The noise emission characteristics of the GE Energy wind turbine series GE 1.5sl and 1.5sle with a rotor diameter of 77-m, 50 and 60 Hz versions, including Cold Weather Extreme versions, comprise sound power level data, tonality values, third octave band and octave band spectra.

This document describes the noise characteristics of the turbine for normal operation. Noise-reduced operation (NRO) is described in document [1.5sl_sle_SCD_allcomp_NRO].

The data here provided is calculated from simulations and has been confirmed by several measurements, including those performed by independent institutes.

The sound power level (L_{WA}) is calculated at hub height over the entire wind speed range from cut-in wind speed to cut out wind speed. For the maximum sound power level a reference value and uncertainty band are specified. Tabled L_{WA}-values are given as function of hub height wind speed (reference values) and as a function of wind speed at 10-m height, assuming standard hub height and logarithmic wind profile for surface roughness ($z_{0, ref}$) = 0.03 m, see section 2.2. Characteristics as a function of wind speed at 10-meter height for different combinations of hub height and wind shear profile can be provided at request.

If a wind turbine noise performance test is carried out, it needs to be done in accordance with the regulations of the international standard IEC 61400-11: 2002 (abstract available upon request).

2 Sound Power Level Data

2.1 L_{WA} as a function of hub height wind speed

The following table provides the calculated reference mean sound power level values as a function of wind speed.

Wind speed at hub height [m/s]	GE 1.5 sl/sle all hub heights L_{WA} [dB]
3	< 96
4	< 96
5	< 96
6	96.6
7	99.8
8	102.7
9 – cut out	≤ 104.0

Table 2-1: Mean sound power level as function of hub height wind speed

2.2 L_{WA} as a function of wind speed at 10-m height

Following are tabled values for the L_{WA} as a function of the wind speed at 10-meter height for different hub heights. The wind speed is converted using a standard logarithmic wind profile, in this case using a surface roughness of (z_{0ref}) = 0.03 m, which is representative for average terrain conditions.

$$V_{10m\ height} = V_{hub} \frac{\ln\left({10m}/{z_{0ref}} \right)}{\ln\left({hub\ height}/{z_{0ref}} \right)} \quad [1]$$

Characteristics for other combinations of surface roughness and hub height are available upon request.

Wind speed at 10-m height [m/s]	GE 1.5 sl/sle 61.4-m HH L_{WA} [dB]	GE 1.5 sl/sle 70-m HH L_{WA} [dB]	GE 1.5 sl/sle 80-m HH L_{WA} [dB]	GE 1.5 sl/sle 85-m HH L_{WA} [dB]	GE 1.5 sl/sle 100-m HH L_{WA} [dB]
3	< 96	< 96	< 96	< 96	< 96
4	< 96	< 96	< 96	< 96	96.1
5	98.4	98.7	99.1	99.3	99.7
6	102.4	102.8	103.0	103.1	103.3
7– cut out	≤ 104	≤ 104	≤ 104	≤ 104	≤ 104

Table 2-2: Sound power level characteristics for different hub heights as function of wind speed at 10 m height

3 Uncertainty Levels

Mean uncertainty levels for the sound power, or K-factors, are derived from independent measurements. Their value depends on the applied probability level and standard deviation for reproducibility (σ_R), as described in the IEC 61400-14 TS ed. 1[2]. Because the K-factor depends on the quality of the measurements, the number of the measurements, and on local regulations, a fixed value is here used instead to define the uncertainty band with respect to the reference sound power level.

For all 1.5sl and 1.5sle turbines an uncertainty band of **(K) = ± 2.0 dB** is defined.

4 Tonality

At the reference measuring point R_o, a ground distance from the turbine base equal to hub height plus half the rotor diameter, the GE 1.5sl/sle turbine has a value for tonality of **(ΔL_a) ≤ 4 dB**, irrespective of wind speed, turbine type, hub height, and grid frequency.[3]

1 Simplified from IEC 61400-11: 2002 equation 7

2 Here referring to the unofficial release of the IEC 61400-14 TS ed. 1, labeled as 'CDV' (committee draft for voting)

3 R_0 and ΔL_a are defined here according to IEC 61400-11: 2002

5 Third Octave Band and Octave Band Spectra

Following is a table with the octave and third octave band values with a sum of 104 dB.

Note: these values are informative only.

A-weighted octave band and third octave band sound power level spectra												
Frequency [Hz]	50	**63**	80	100	**125**	160	200	**250**	315	400	**500**	630
L_{WA} [dB] 1/3 octave	76.2	79.9	82.6	84.8	86.7	92.4	90.7	92	94	94.3	93.8	93.2
L_{WA} [dB] octave	85.1			94.0			97.2			98.6		
Frequency [Hz]	800	**1000**	1250	1600	**2000**	2500	3150	**4000**	5000	6300	**8000**	10000
L_{WA} [dB] 1/3 octave	94	92.8	92.3	91.5	89.6	87.1	84.8	82.2	78.6	75.9	71.3	70.8
L_{WA} [dB] octave	97.9			94.5			87.3			78.1		

Table 5-1: Third octave band and octave band spectra

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

DETERMINATION OF SOUND POWER LEVELS OF A TRANSFORMER AND A REACTOR

Prepared for:

David Hayles
Grand Valley 2 Limited Partnership
222 – 3rd Avenue S.W.
Suite 900, Livingston Place, South Tower
Calgary, AB
T2P 0B4

November 30, 2016

1 INTRODUCTION

HGC Engineering was retained by the Grand Valley 2 Limited Partnership to complete acoustic measurements of the Grand Valley Wind Farm Phase 3 project transformer substation to satisfy Condition E3 of the Renewable Energy Approval ("REA") Number 6457- 9L6QLC, issued to the site by the Ontario Ministry of Environment and Climate Change ("MOECC"), dated October 15, 2014 and amended on June 30, 2015 and December 14, 2015.

The audit condition in the REA requires the determination of the sound power levels of the substation for comparison with the specification included in the Noise Assessment Report for the project, dated September 18, 2015 [1], completed by others, and Schedule B of the REA. The sound power levels of the transformer and reactor were measured on July 12, 2016, utilizing methods from IEC Standard 60076-10 titled Power transformers – Part 10: Determination of sound levels [2].

2 SOUND SOURCE UNDER TEST

The components of the substation include a transformer manufactured by Pennsylvania Transformer Technology, Inc. and a reactor manufactured by Virginia Transformer Corp. The station is situated within Dufferin County, approximately 8 km northwest of the town of Grand Valley, Ontario. The substation is nominally rated at 45 MVA. The transformer utilizes cooling fans and the reactor utilizes natural cooling without fans. The overall dimensions of the transformer, including the affixed cooling fans and radiators, are approximately 6.4 metres wide, 6.7 metres in length and 3.9 metres in height. The overall dimensions of the reactor, including the affixed radiators, are approximately 1.5 metres wide, 2.2 metres in length and 2.3 metres in height. Photos of the transformer and reactor are provided in Figures 1 and 2.

Acoustically, the sound of both the transformer core and reactor were found to be tonal in the nearfield (the transformer fans emitted broadband sound). A tonal sound is defined as one which has a "pronounced audible tonal quality such as a whine, screech, buzz or hum". A/C transformers and reactors typically exhibit a humming character at twice the line frequency (120 Hz) and harmonics thereof, as a result of magnetostrictive forces in the windings and semiconductors. The sound level measurements indicated tones at 120 Hz and harmonics thereof. The units were operating normally during the test period.

3 ACOUSTIC ENVIRONMENT

The measurements were conducted outdoors at the Grand Valley Wind Farm Phase 3 substation, in Dufferin County, Ontario. The sound of the substation was steady, with little background sound in the vicinity, and the weather conditions during the test period remained relatively constant with clear skies, an air temperature of approximately 28° Celsius, and negligible wind at the site. Accordingly, the environment was suitable to conduct acoustical measurements.

4 INSTRUMENTATION

The sound level measurements were conducted using a Brüel & Kjær Hand-held Analyzer Type 2270, equipped with Sound Intensity software BZ-7233, a Brüel & Kjær model 3654 Sound Intensity Probe and a pair of phase-matched model 4197 microphones. The calibration of instrumentation was field verified before and after the measurements using a Brüel & Kjær model 4231 sound level calibrator with a dual microphone coupler. Laboratory calibration certificates for the equipment are included as Appendix A.

5 MEASUREMENT PROCEDURE

A sketch of the measurement setup is appended as Figure 3. As per the IEC Standard 60076-10, measurements of sound intensity were conducted at 1/2 height of the transformer and reactor at 1 meter intervals around all four sides of the units. Measurements were conducted at an offset distance of 0.3 meters from the tank and radiator surfaces without the cooling fans operating. With the fans operating, the measurements were conducted 0.3 metres from the tank, and at 2 metres from the fans and radiator surfaces. Note that recent research into methods of measuring sound levels from electrical transformers indicates that measurements completed utilizing sound intensity methods provide results which are more accurate than measurements of sound pressure [3]. Unlike a simple sound level meter with an omni-directional microphone, sound intensity instrumentation utilizes a highly directional probe and sophisticated analyzer to measure both the magnitude and direction of sound. This approach therefore has excellent immunity to background noise, acoustical reflections and cross-interference from sources located close together.

6 MEASUREMENT RESULTS

Table I provides the average octave band sound intensity levels of the transformer and reactor, measured utilizing methods from IEC Standard 60076-10. Note that, without the cooling fans operating, measurements were conducted at 15 unique locations around the transformer, and with the cooling fans operating, the transformer was measured at 23 unique locations, as described in the previous section. Measurements were conducted in 6 unique locations around the reactor, also as described in the previous section.

Table I: Sound Intensity Levels [dB]

Octave Band Centre Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	Overall [dBA]
45 MVA Transformer	58.3	64.6	59.5	58.4	51.9	43.2	36.8	32.4	**58.6**
Reactor	48.4	57.1	64.0	66.4	59.4	46.4	41.3	31.9	**65.3**

Appendix B contains the detailed one-third octave band sound intensity level results.

The conversion from sound intensity level to sound power level is based on the area of the imaginary surface enclosing the source, at the specified reference distance from the equipment. In this case, the enclosing surface areas for the transformer without and with the fans operating are 165 m^2 and 256 m^2, respectively, and the enclosing surface area of the reactor is 31 m^2, including the top surfaces.

The overall octave band sound power level calculated from the measured sound intensity levels of the substation are presented in Table II, below.

Table II: Measured Sound Power Levels [dBA & dB re 10^{-12} Watts], Calculated Using Sound Intensity Measurements

Octave Band Centre Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	Overall [dBA]
Transformer Substation (Transformer & Reactor)	83.1	92.8	89.1	90.2	82.0	70.0	64.4	58.6	**89.2**

*sound power levels include the +5 dBA tonal adjustment applied to transformer core & reactor

Table III shows the sound power levels utilized in the assessment of the transformer substation, as outlined in [1] and Schedule B of the REA. Further details are provided in Appendix C.

Table III: Specified Sound Power Level [dBA & dB re 10^{-12} Watts]

Octave Band Centre Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	Overall [dBA]
Transformer Substation	95.6	97.6	92.6	92.6	86.6	81.6	76.6	69.6	**93.0**

*sound power levels include the +5 dBA tonal adjustment

The sound level measurements indicate that the octave band and overall A-weighted sound power levels of the substation meet the specified sound power levels outlined in [1] and Schedule B of the REA.

7 CONCLUSIONS

HGC Engineering completed an Acoustic Audit of the Grand Valley Wind Farms Phase 3 project substation, located in Dufferin County, Ontario. Sound level measurements were completed on July 12, 2016 utilizing methods from IEC Standard 60076-10 titled Power transformers – Part 10: Determination of sound levels. The sound level measurements and calculations indicate the octave band and overall A-weighted sound power levels of the substation are less than the specified sound levels in the Environmental Noise Impact Assessment [1] and Schedule B of the REA.

Howe Gastmeier Chapnik Limited Reviewed by

LICENSED PROFESSIONAL ENGINEER
I. R. BONSMA
100100550
Nov 30/16
PROVINCE OF ONTARIO

Andrew Dobson, BSc, INCE Ian Bonsma, PEng

REFERENCES

[1] Zephyr North, "Noise Assessment Report – Revision 5, Grand Valley Wind Farms – Phase 3 Wind Project", September 18, 2015.

[2] IEC Standard 60076-10 titled Power transformers – Part 10: Determination of sound levels.

[3] Andrew Dobson, "Addressing the Complexities, Limitations and Benefits Involved in Conducting Near-Field Sound Power Measurements of Large Electrical Transformers", Internoise Innsbruck, September 2013.

Figure 1: Transformer

Figure 2: Reactor

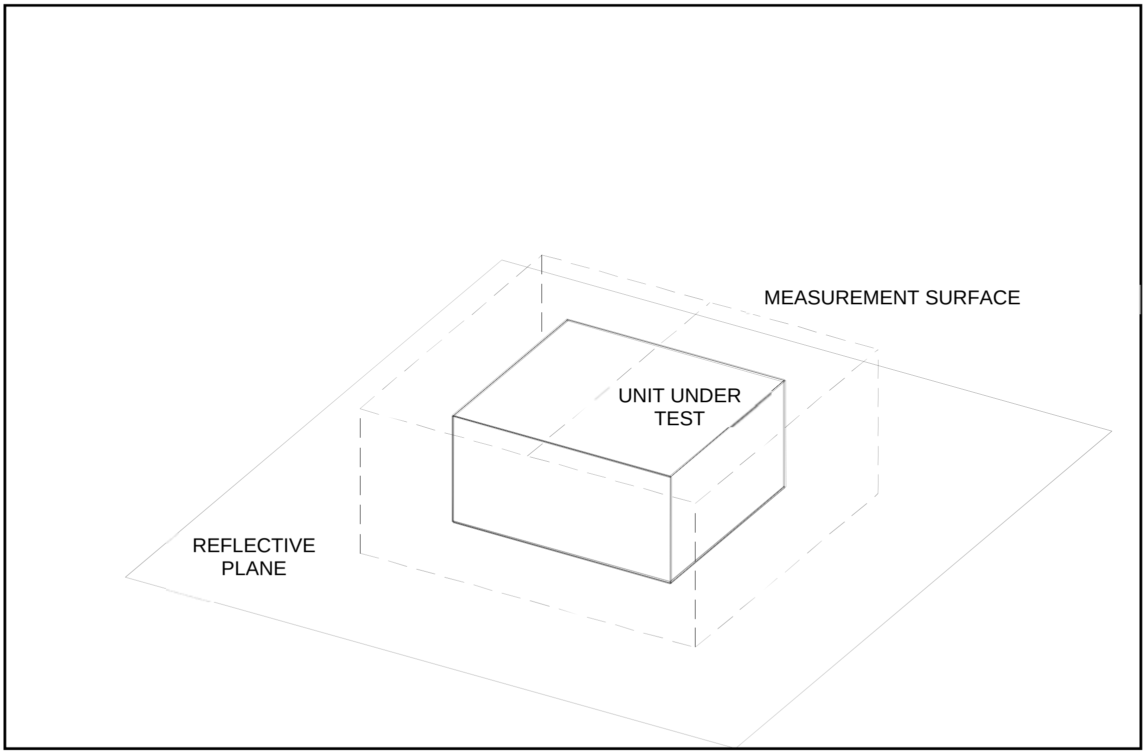


Figure 3: Sketch of Measurement Surface

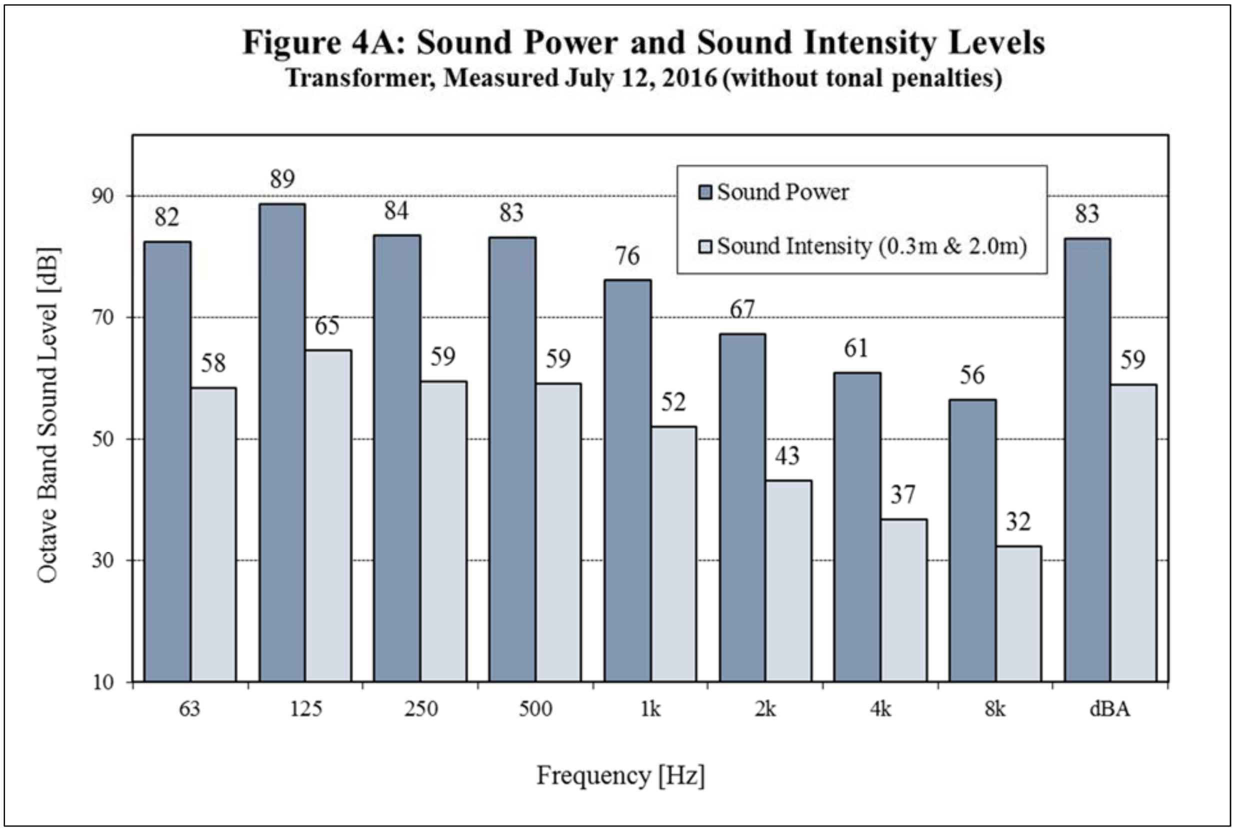


Figure 4A: Sound Power and Sound Intensity Levels
Transformer, Measured July 12, 2016 (without tonal penalties)
Sound Power
Sound Intensity (0.3m & 2.0m)
Octave Band Sound Level [dB]
Frequency [Hz]
63
125
250
500
1k
2k
4k
8k
dBA
82
58
89
65
84
59
83
59
76
52
67
43
61
37
56
32
83
59

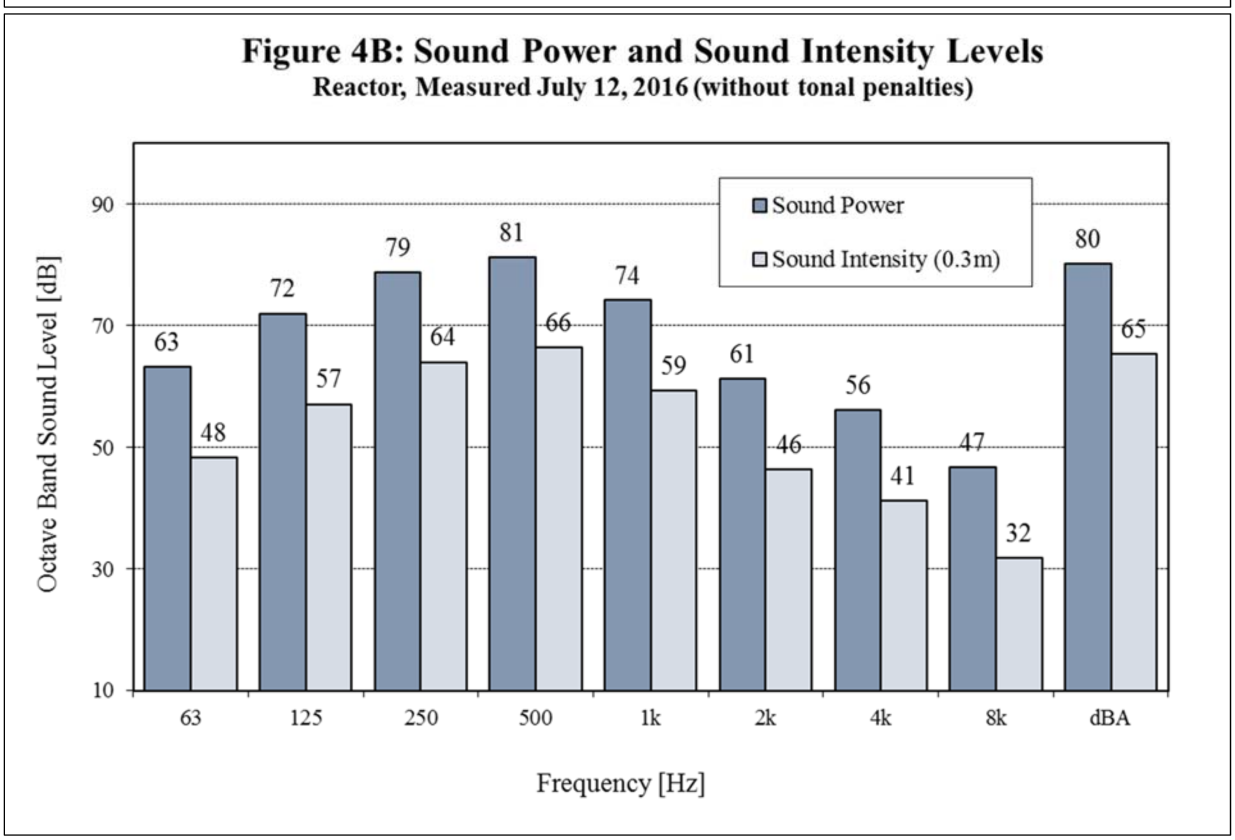


Figure 4B: Sound Power and Sound Intensity Levels
Reactor, Measured July 12, 2016 (without tonal penalties)
Sound Power
Sound Intensity (0.3m)
Octave Band Sound Level [dB]
Frequency [Hz]
63
125
250
500
1k
2k
4k
8k
dBA
63
48
72
57
79
64
81
66
74
59
61
46
56
41
47
32
80
65

APPENDIX A
Instrument Calibration Certificates

CERTIFICATE of CALIBRATION

Make : Bruel & Kjaer

Model : 2270

Descr. : Sound Level Meter Type 1

Serial # : 3003000

Asset # : 1

Reference # : 142244

Customer : HGC Engineering
Mississauga, ON

P. Order : Sean Richarson

Cal. status : Received in spec's, no adjustment made.
System with 2683 s#2792546

4 JAN 2016

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.

Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.

Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Dec 30, 2015

Cal. Due : Dec 30, 2016

By : J. Raposo

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-303 J-512

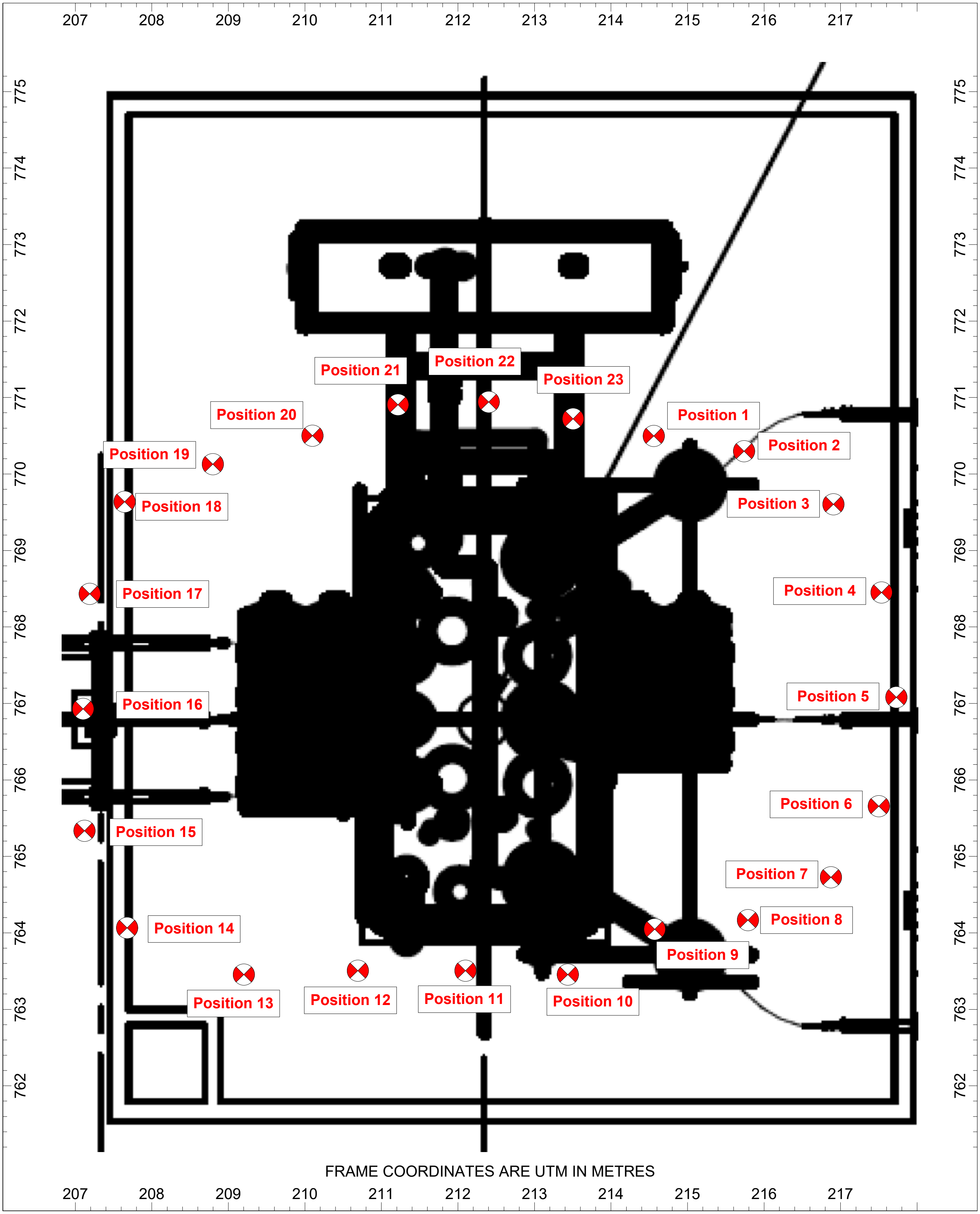
Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST

6375 Dixie Rd. Mississauga, ON, L5T 2E7
Phone : 905 565 1584
Fax: 905 565 8325
http: // www.navair.com
e-Mail: navair @ navair.com

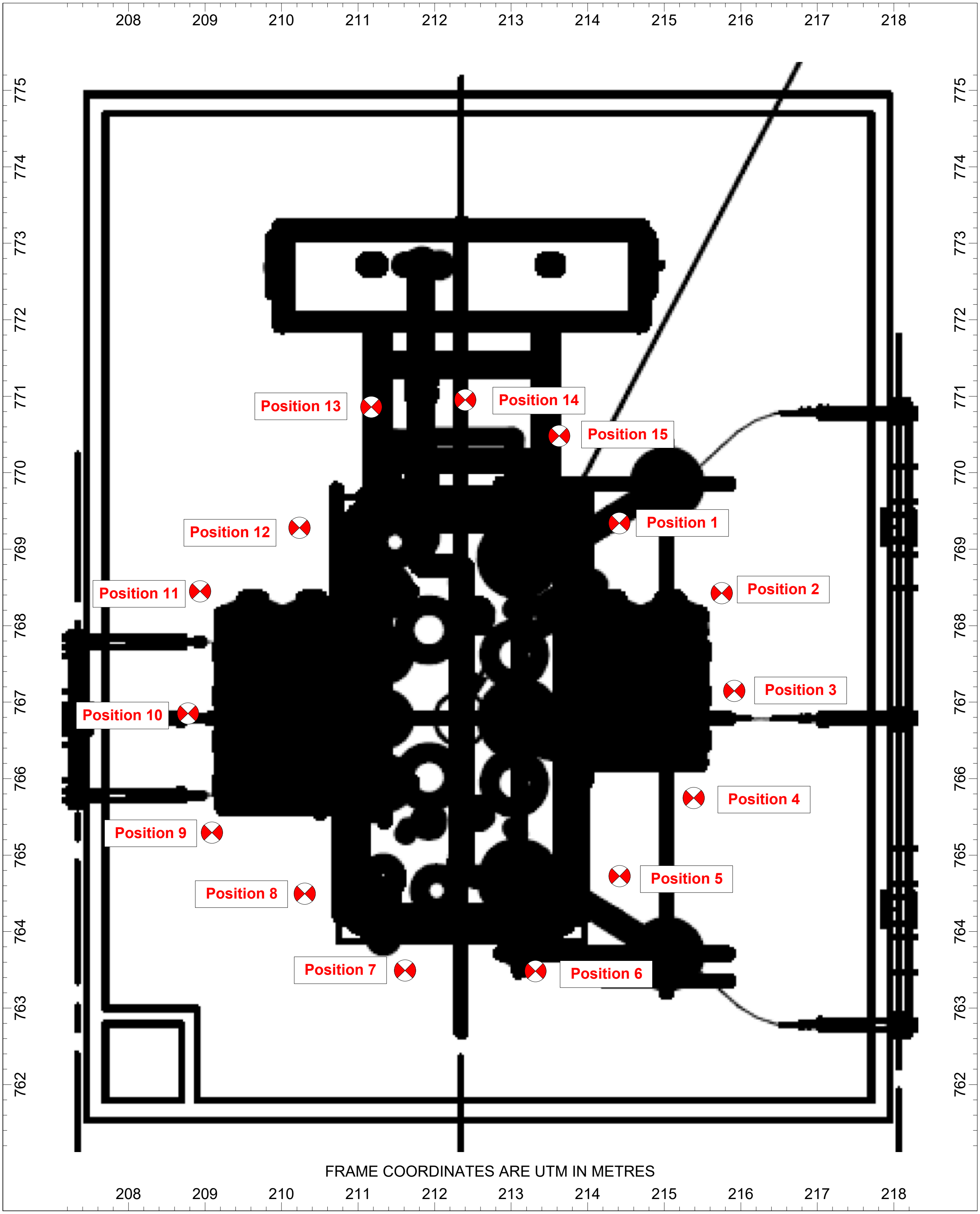
APPENDIX B
Detailed Measurement Results & Equipment Drawings

One-Third Octave Frequency [Hz]	Measured Transformer Sound Intensity Levels - With Fans Operating [dB] Microphone Location (Height = 2 Metres Above Grade)																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
25	73	76	67	58	nil	nil	nil	65	64	nil	nil	nil	nil	67	74	nil	59	nil	nil	nil	65	nil	nil
32	69	70	60	54	nil	nil	nil	60	62	54	nil	nil	nil	69	73	nil	63	nil	nil	nil	nil	nil	nil
40	66	48	nil	nil	nil	nil	47	58	55	nil	nil	48	nil	nil	69	nil	50	nil	nil	nil	61	nil	nil
50	60	nil	61	nil	nil	49	49	53	49	41	nil	nil	nil	nil	68	nil	51	nil	nil	nil	54	nil	nil
63	57	nil	60	46	46	47	51	48	nil	32	43	nil	nil	nil	63	51	49	nil	nil	nil	nil	nil	nil
80	53	nil	48	45	46	48	46	48	46	38	36	46	nil	nil	58	nil	49	nil	nil	nil	55	nil	nil
100	61	54	50	53	53	52	48	49	49	44	41	51	nil	46	41	51	51	59	56	nil	51	nil	54
125	75	65	60	64	63	60	59	51	54	55	56	66	61	62	54	60	50	64	61	53	nil	58	66
160	53	51	51	53	54	53	51	51	52	49	44	47	55	52	54	58	52	51	55	55	53	50	50
200	49	49	52	52	53	52	51	48	51	45	41	45	50	50	51	56	54	53	52	53	49	41	49
250	53	55	56	56	56	56	59	nil	61	44	53	49	58	54	53	nil	nil	54	56	57	61	61	63
315	56	55	56	57	56	57	52	53	53	55	54	53	54	52	54	58	52	55	54	55	55	47	53
400	56	58	55	53	53	56	52	53	54	59	59	58	55	53	54	55	nil	54	52	54	60	50	55
500	58	49	54	50	51	53	51	51	52	48	56	56	51	54	54	nil	52	52	54	54	45	59	56
630	51	52	51	49	49	49	50	50	50	50	50	49	51	49	52	51	49	51	52	53	49	55	51
800	50	48	46	44	43	44	49	51	51	42	42	42	49	48	50	48	nil	49	51	53	49	54	52
1000	48	46	44	44	41	43	47	48	47	39	36	39	49	48	47	44	nil	47	50	52	52	44	46
1250	47	45	42	40	39	41	45	45	45	34	37	34	47	46	45	38	38	45	48	50	45	38	42
1600	43	41	38	36	34	37	41	41	41	31	31	32	43	43	41	34	nil	41	45	46	37	36	41
2000	42	40	36	33	31	34	37	37	36	28	25	25	39	37	37	nil	nil	38	44	45	35	30	39
2500	38	37	32	29	26	29	35	36	35	23	22	24	38	37	34	27	30	37	40	42	30	25	32
3150	35	34	30	27	25	28	34	35	33	23	20	22	37	36	33	nil	nil	34	38	40	29	19	32
4000	36	34	30	24	16	24	32	33	30	20	19	24	33	33	31	nil	nil	33	37	38	26	18	29
5000	37	33	29	27	nil	12	28	32	29	18	nil	19	31	30	28	nil	nil	32	35	36	27	21	35
6300	37	31	24	22	nil	nil	27	29	25	19	14	17	28	27	26	nil	18	32	34	34	24	20	33
8000	33	30	nil	nil	nil	nil	24	29	23	19	16	12	27	28	27	9	nil	31	33	32	21	16	31
10000	29	27	nil	nil	nil	nil	22	29	nil	18	7	13	24	28	27	23	nil	29	31	30	20	14	28
A-Weighted	62	58	58	57	56	57	57	57	58	57	58	58	58	58	58	57	53	58	59	60	60	60	60



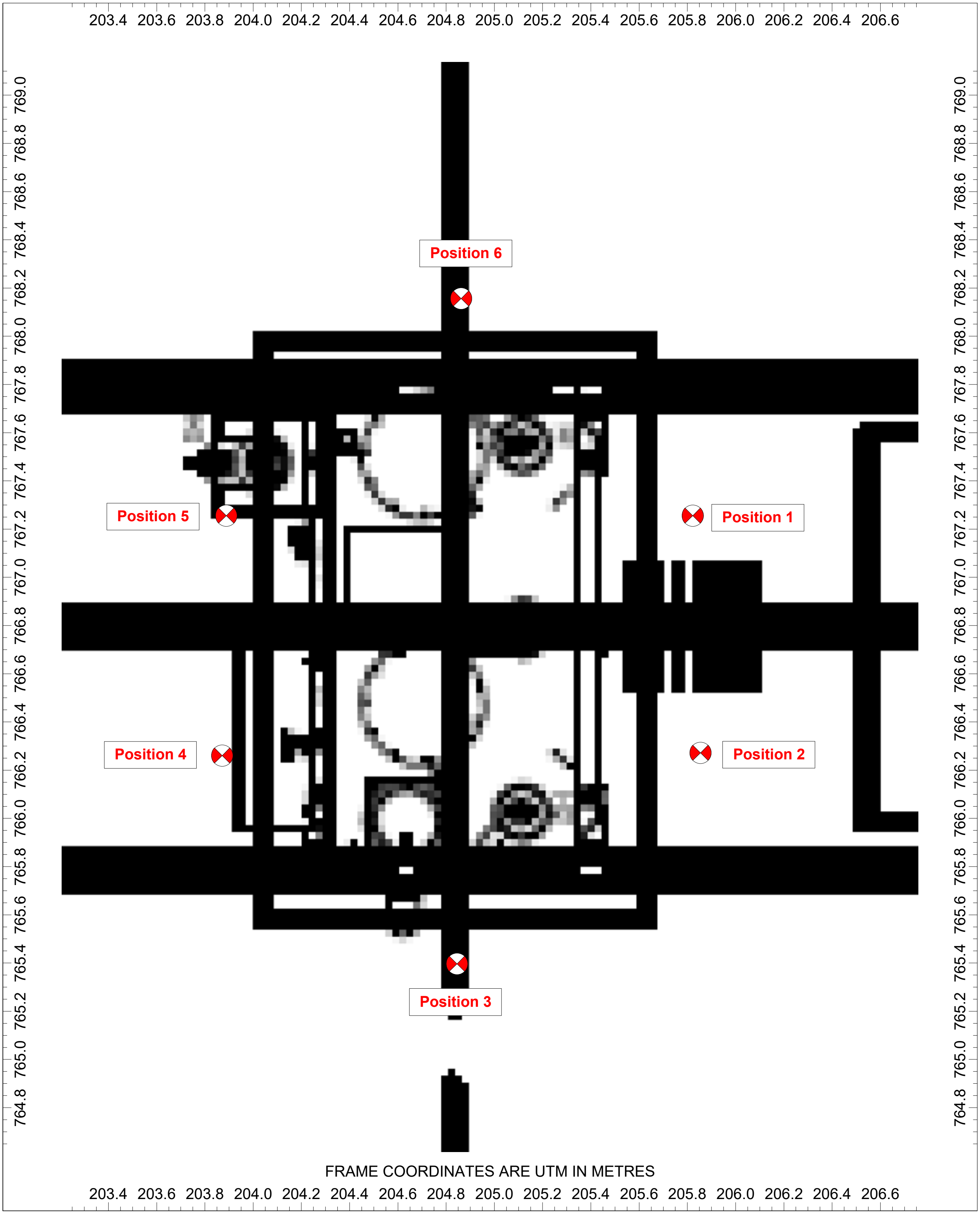
Microphone Positions Around Transformer (Fans Operating)
Microphone Height = 2 Metres, Offset = 0.3 Metre from Tank and 2 Metres from Fans/Rads

One-Third Octave Frequency [Hz]	Measured Transformer Sound Intensity Levels - Without Fans Operating [dB] Microphone Location (Height = 2 Metres Above Grade)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
25	nil	nil	nil	nil	nil	nil	nil	69	nil	nil	49	nil	66	nil	nil
32	nil	40	nil	nil	nil	nil	nil	67	nil	nil	nil	43	60	nil	nil
40	nil	44	37	42	nil	nil	49	57	nil	nil	46	nil	57	40	43
50	42	39	39	36	40	nil	nil	49	43	nil	37	50	38	44	38
63	37	38	nil	37	39	nil	42	55	52	nil	48	nil	nil	38	27
80	37	nil	41	38	nil	nil	nil	48	49	nil	26	nil	36	nil	nil
100	59	54	nil	41	39	nil	45	48	48	nil	50	51	nil	nil	nil
125	73	68	64	69	62	43	60	64	61	53	64	64	58	nil	nil
160	49	45	40	44	42	33	37	40	33	35	39	40	37	nil	nil
200	43	45	41	43	46	46	44	36	46	33	47	26	33	46	38
250	57	60	57	58	60	61	59	49	62	nil	61	43	34	61	59
315	57	56	54	59	53	54	52	51	52	43	nil	52	53	49	52
400	54	56	55	63	58	59	57	56	57	47	nil	57	57	53	55
500	49	48	57	52	53	50	54	54	nil	54	49	nil	56	58	61
630	47	54	53	60	63	57	52	47	59	46	nil	52	52	54	49
800	46	49	54	48	45	47	46	40	nil	nil	nil	42	55	52	51
1000	39	40	43	34	37	40	38	35	45	41	46	34	42	41	46
1250	31	36	34	31	30	nil	36	30	36	30	41	35	36	36	42
1600	29	31	28	29	26	nil	28	27	32	26	30	nil	23	32	33
2000	30	34	26	19	29	33	24	20	16	nil	28	nil	nil	27	26
2500	20	22	19	nil	17	13	19	21	22	nil	20	nil	nil	20	23
3150	18	21	20	nil	nil	21	16	16	nil	nil	19	nil	nil	3	28
4000	25	28	22	nil	15	18	14	17	nil	nil	19	nil	nil	21	29
5000	28	31	27	27	22	17	15	12	nil	nil	6	nil	2	22	31
6300	27	31	25	nil	23	18	16	13	nil	nil	nil	nil	9	21	31
8000	13	26	15	nil	nil	20	14	11	nil	nil	15	nil	11	18	28
10000	nil	20	nil	nil	nil	22	14	6	nil	nil	23	nil	nil	15	25
A-Weighted	59	59	59	63	62	60	58	56	60	53	55	56	59	59	60

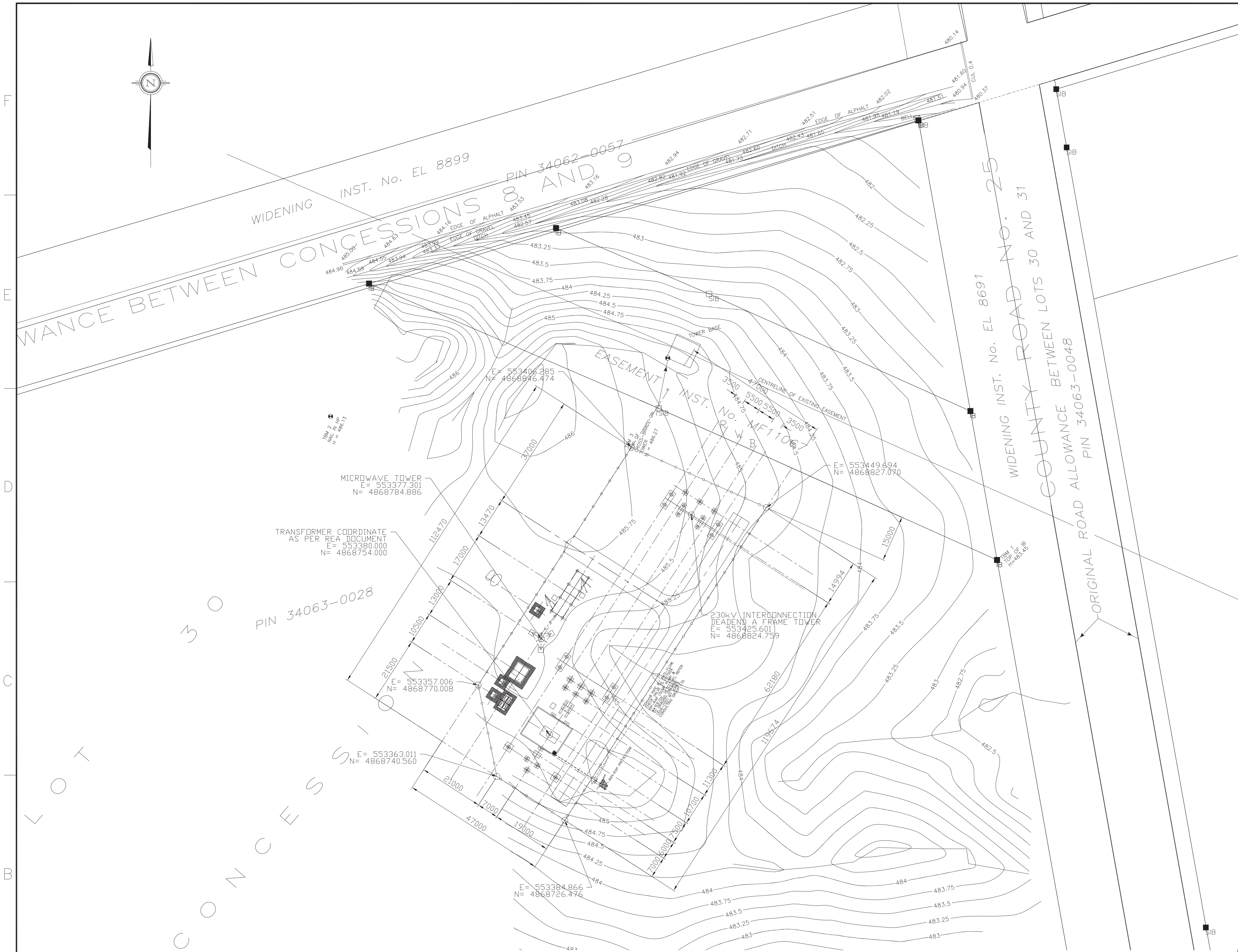


Microphone Positions Around Transformer (Fans Not Operating)
Microphone Height = 2 Metres, Offset = 0.3 Metre from Tank and Fans/Rads

One-Third Octave Frequency [Hz]	Measured Reactor Sound Intensity Levels [dB] Microphone Location (Height = 3 Metres Above Grade)					
	1	2	3	4	5	6
25	47	nil	nil	nil	nil	65
32	54	48	56	nil	52	nil
40	49	50	53	nil	nil	nil
50	45	41	51	40	47	nil
63	41	nil	45	nil	45	50
80	32	34	31	nil	31	nil
100	nil	nil	46	48	49	42
125	nil	nil	59	62	57	nil
160	nil	nil	35	38	39	nil
200	46	50	43	37	43	49
250	62	65	57	52	nil	64
315	59	49	67	47	42	57
400	64	54	72	51	49	62
500	61	62	54	nil	62	56
630	51	51	50	49	49	47
800	66	47	49	49	47	50
1000	54	41	45	43	45	44
1250	46	44	42	38	41	44
1600	44	42	45	41	38	42
2000	44	43	41	42	41	43
2500	41	39	37	39	38	38
3150	38	41	37	37	37	35
4000	37	39	38	35	35	37
5000	35	33	33	31	32	36
6300	31	30	30	27	27	31
8000	25	30	29	23	24	27
10000	15	24	21	20	20	22
A-Weighted	68	62	69	55	60	62



Microphone Positions Around Reactor
Microphone Height = 2 Metres, Offset = 0.3 Metre from Tank and Rads



OVERALL FOUNDATION SITE PLAN

GENERAL NOTES:

1. FOR OVERALL SITE PLAN, REFER TO DWG#1504-E001.
2. FOR SUBSTATION GENERAL LAYOUT PLAN & SECTION VIEW, REFER TO DWG#1504-E002 & #1504-E003.
3. FOR SITE GRADING AND DETAILS, REFER TO DWG#1504-C001 TO #1504-C003.
4. FOR FOUNDATION DETAILS, REFER TO DWG#1504-C014 TO #1504-C023.
5. FOR ANCHOR BOLT DETAILS, REFER TO DWG#1504-C013.
6. ALL DIMENSIONS AS SHOWN ARE METRIC IN MILLIMETER U.N.O.
7. ALL COORDINATES & ELEVATIONS AS SHOWN ARE METRIC IN METER U.N.O.
8. DESIGN CODES TO BE USED: CSA A23.1-14/A23.2-14, CSA A23.3-14, CSA G30.18-09(R2014)

DESIGN NOTES:

1. FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL REPORT PREPARED BY LUM INC. BH-SS1-14 TO BH-SS3-14 BORE HOLE INFORMATION HAS BEEN USED FOR SUBSTATION FOUNDATION DESIGN, REF. NO. 160-P-0006766-0-01-100-GE-R-0001-00, DATED ON JANUARY 13, 2015.
2. GROUND WATER LEVEL IS AT GROUND LEVEL.
3. FOR CONVENTIONAL SPREAD FOOTINGS FOUNDED ON THE UNDISTURBED NATIVE SOIL AT 1.5m DEPTH. THE ALLOWABLE BEARING PRESSURE IS 150kPa.
4. FROST DEPTH IS 1.5m(5ft) BELOW GRADE.
5. WHERE LOOSE MATERIALS ARE FOUND AT THE FOUNDATION BEARING SURFACE, THEY SHALL BE SUBEXCAVATED AND REPLACED WITH A MINIMUM 300mm OF GRANULAR B TYPE II AND COMPACTED TO 100% SPMDD. THE GRANULAR LAYER SHALL EXTEND MIN. 1m BEYOND THE PERIMETER OF THE FOUNDATION FOOTING. EACH FOUNDATION BEARING SURFACE SHOULD BE CAREFULLY CHECKED WITH REGARD TO COMPETENCE OF THE SOIL MATERIAL AND ACTUAL ALLOWABLE BEARING PRESSURE SHALL BE VERIFIED BY THE GEOTECHNICAL SPECIALIST.

MATERIAL & CONSTRUCTION NOTES:

1. CONCRETE MATERIAL DESIGN, TESTING AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH CSA STANDARD CAN/CSA A23.1-14/A23.2-14 SERIES.
2. CONCRETE SPECIFICATION
   SUPPLY AND DELIVERY OF CONCRETE SHALL BE AS FOLLOWS:
   - MINIMUM COMPRESSION STRENGTH: 30MPa AT 28 DAYS;
   - PORTLAND CEMENT: TYPE GU NORMAL PORTLAND CEMENT, EXPOSURE CLASS F-1;
   - MAX. SIZE OF AGGREGATE 14MM-20MM;
   - 5%-8% AIR CONTENT;
   - SLUMP: 75mm±20mm;
   - MIN. 3 CYLINDERS TESTING WITH ONE AT 7 DAYS AND TWO AT 28 DAYS ARE REQUIRED.
3. UNLESS OTHERWISE SPECIFIED, MINIMUM CONCRETE COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:
   - CONCRETE CAST AGAINST SOIL = 75mm(3")
   - FORMED CONCRETE WITH DIRECT CONTACT TO SOIL = 50mm(2")
   - CONCRETE SURFACE EXPOSED TO WEATHER = 50mm(2")
4. REINFORCING STEEL SHALL BE DEFORMED STEEL BAR WITH MINIMUM YIELD STRENGTH OF 400MPa(58ksi) AND CONFORMING TO CSA G30.18 GR.400. EXCEPT TIES AND STIRRUPS WHICH SHALL BE GRADE 300.
5. MINIMUM SPLICES, LAPS AND HOOKS SHALL BE IN ACCORDANCE WITH CAN A23.3-14.
6. ALL EXCAVATIONS SHALL BE PERFORMED IN A MANNER THAT SHALL ENSURE PROPER DRAINAGE DURING THE COURSE OF WORK. FLOODED EXCAVATIONS SHALL BE DEWATERED AND ALL MUCK SHALL BE REMOVED BEFORE PROCEEDING WITH WORK. ALL EXCAVATIONS SHALL BE SUFFICIENTLY SUPPORTED TO PREVENT COLLAPSE.
7. AFTER EXCAVATION, EXPOSED SOIL SURFACES SHALL BE PROTECTED PRIOR TO CONCRETE CASTING. 50MM-80MM THICK LEAN CONCRETE (5MPA MUD SLAB) IS RECOMMENDED TO BE PLACED IN THE FOOTING AREA TO PROTECT THE FOUNDING SOIL.
8. PRIOR TO THE PLACEMENT OF CONCRETE, BOTTOM OF FOUNDATIONS SHALL BE INSPECTED BY QUALIFIED GEOTECHNICAL PERSONNEL TO CONFIRM THAT THE SOIL PROPERTIES ARE CONSISTENT WITH THE GEOTECHNICAL INVESTIGATION REPORT.
9. BEFORE PLACING CONCRETE, CONTRACTOR SHALL VERIFY ANCHOR BOLTS AND LOCATIONS OF ALL MECHANICAL, UTILITY SERVICES FOR EMBEDDED ITEMS, HOLES, ETC.
10. PROPER VIBRATION METHODS SHALL BE USED DURING CONCRETING.
11. CONCRETE AFTER POURING SHALL BE ADEQUATELY CURED BY ADDITIONAL MOISTURE AND/OR COVERED BY WATER RETAINING MATERIAL.
12. ALL EXPOSED CONCRETE EDGES SHALL HAVE A 25mm CHAMFER.
13. ALL BACKFILL SURROUNDING FOUNDATIONS SHALL BE GRANULAR B TYPE I COMPACTED TO 95% SPMDD WITH MAX. LIFT OF 300mm.
14. ALL BACKFILL UNDER FOUNDATIONS SHALL BE GRANULAR B TYPE II COMPACTED TO 100% SPMDD WITH MAX. LIFT OF 300mm AND EXTENDED MIN. 1m BEYOND THE PERIMETER OF FOUNDATION FOOTINGS.
15. MIN. 150mm OF GRANULAR A COMPACTED TO 100% SPMDD SHALL BE APPLIED BEFORE PLACING INSULATION. THE COMPACTED GRANULAR LAYER SHALL BE EXTENDED MIN. 500mm BEYOND THE PERIMETER OF FOUNDATION FOOTINGS.
16. ALL T.O.C. ELEVATION SHALL BE VERIFIED FOR COMPLIANCE WITH THE FINAL GRADING AND EQUIPMENT LAYOUT.
17. FOR DISC. SWITCH, METERING TRANSFORMER & CIRCUIT BREAKER ONLY, NON-SHRINK GROUT (MAX.50mm) WITH MINIMUM COMPRESSIVE STRENGTH OF 35MPa SHALL BE APPLIED TO THE SPACE BETWEEN THE TOP OF CONCRETE AND BOTTOM OF BASE PLATE.

LEGEND:

EXTERIOR PARKING & ACCESS ROAD

AS-BUILT DRAWING

THE ACCURACY OF INFORMATION SHOWN ON THIS AS-BUILT DRAWING IS BASED ON THE INFORMATION PROVIDED BY THE CONTRACTOR, AND ALL PHYSICAL CONSTRUCTIONS OF THE DESIGN SHOWN ON THIS DRAWING WERE COMPLETED AS PER THE DRAWING ISSUED FOR CONSTRUCTION WITH THE EXCEPTION OF THOSE CHANGES DETAILED IN THE INFORMATION PROVIDED.

THE ENGINEER SHALL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE FIELD INFORMATION PROVIDED.

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
AB	15/01/16	AS-BUILT	V.W.	E.K.	K.W.			
1	03/07/15	RELEASE HOLD	M.W.	M.C.	K.W.			
0	21/05/15	ISSUED FOR CONSTRUCTION	F.W.	W.L.	K.W.			
A	29/04/15	PRELIMINARY ISSUED FOR PRICING	M.W.	E.K.				

ISS	D/M/Y	APP	ISSUED FOR
AB	15/01/16	K.W.	AS-BUILT
1	03/07/15	K.W.	RELEASE HOLD
0	21/05/15	K.W.	ISSUED FOR CONSTRUCTION
A	29/04/15		PRELIMINARY ISSUED FOR PRICING

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | PACKAGE CODE

SCALE: N.T.S.

	BY	D/M/Y
DSN.	E.KWONG	25/02/15
DRN.	D.MAO	25/02/15

AREA

SUBJECT
GRAND VALLEY 3 WIND FARM
230/34.5kV COLLECTOR SUBSTATION
OVERALL FOUNDATION SITE PLAN

res CANADA

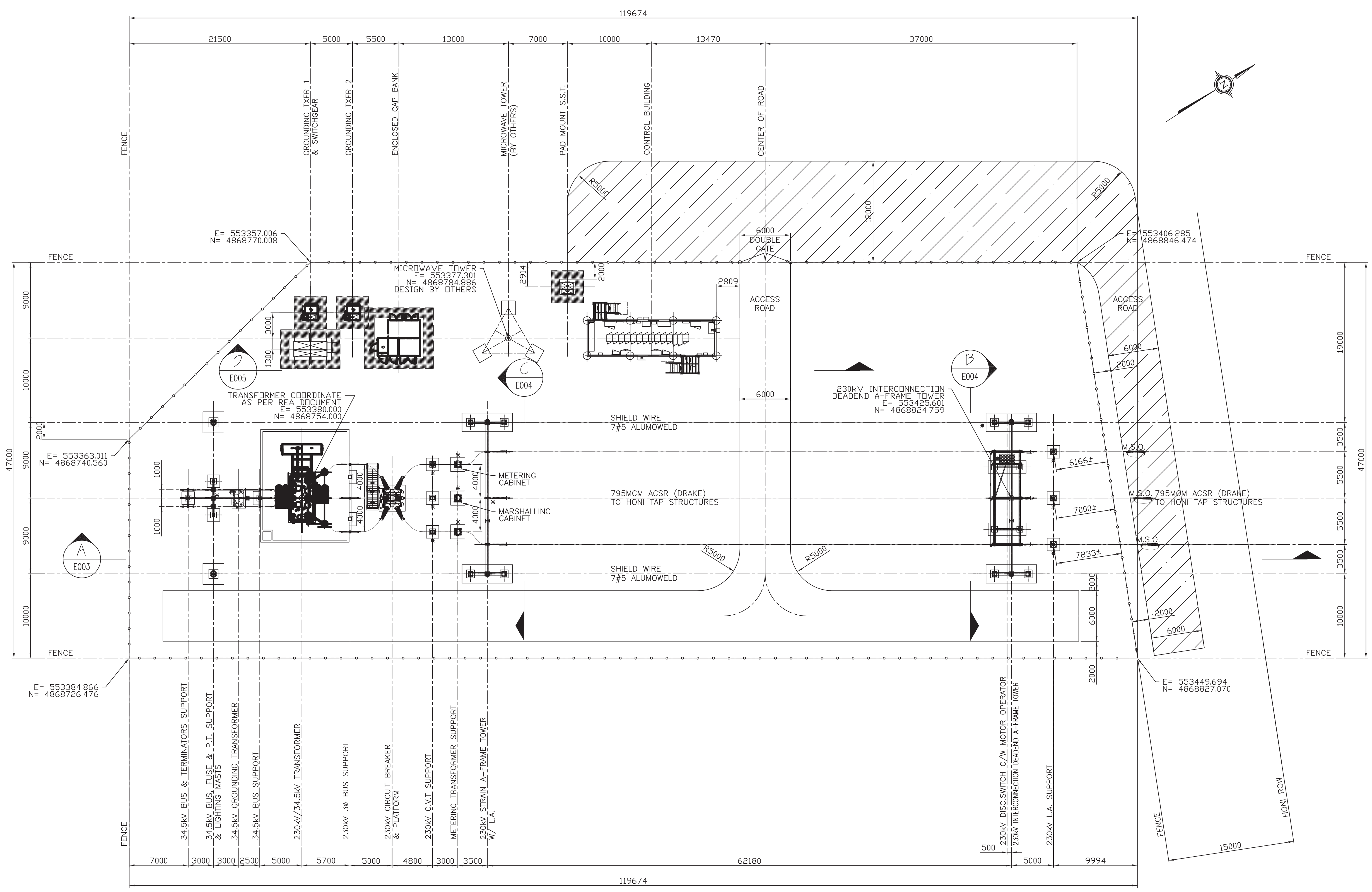
EPTCON LTD. ELECTRICAL POWER & TRANSMISSION CONSTRUCTION
560 SHELDON DRIVE, UNIT #1, CAMBRIDGE, ONTARIO N1T 0A4
TEL: (519) 620-4414 FAX: (519) 620-4413

Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1504-C011 REV. AB

CADD FILE ADDRESS 1504-C011-AB



NOTES:

1. FOR OVERALL SITE PLAN, SEE DWG# 1504-E001.
2. FOR SECTION VIEW, SEE DWG# 1504-E003 & E004.
3. SITE LAYOUT PLAN IS BASED ON SITE SURVEY INFORMATION (TOPO-PT-LT30 (22253-14-120) UTM 2010 r2.DWG) BY EPTCON LTD. COORDINATES & ELEVATIONS SHOWN ARE UTM COORDINATES IN METERS. THESE SHALL BE CONFIRMED BY FIELD SURVEY PRIOR TO COMMENCEMENT OF FIELD WORK.
4. ALL DIMENSIONS ARE IN mm, COORDINATES IN UTM, METER, UNLESS NOTED OTHERWISE.
5. FOR SINGLE LINE DIAGRAM, SEE DWG#14074-EPT-D1-100 REV. D BY ONE LINE ENGINEERING.
6. 230kV OUTDOOR SUBSTATION DESIGN CLEARANCE
   - VERTICAL ISOLATION OF LIVE PART 5900mm
   - PHASE TO GROUND 2300mm
   - PHASE TO PHASE (BETWEEN LIVE PART) 2670mm
   - DISC. SWITCH SPACING 3960mm
   - HORN-GAP SWITCH SPACING 5500mm

   34.5kV OUTDOOR SUBSTATION DESIGN CLEARANCE
   - VERTICAL ISOLATION OF LIVE PART 4300mm
   - PHASE TO GROUND 380mm
   - PHASE TO PHASE (BETWEEN LIVE PART) 460mm
7. GRAND VALLEY 3 WIND FARM INTERCONNECTION DEADEND TOWER SHALL BE DESIGNED TO THE FOLLOWINGS:
   7.1. PROPOSED CONDUCTOR ATTACHMENT HEIGHT SHALL BE 12M (39.37') ABOVE GRADE.
   7.2. MAXIMUM CONDUCTOR INCOMING ANGLE OF 15°.
   7.3. MAXIMUM CONDUCTOR TENSION - 4500LBF.
   7.4. MAXIMUM OPGW & OHGW TENSION - 1500LBF (IF REQUIRED).
8. FOR CONDUIT AND CABLE TRAY/TRENCH LAYOUT, SEE DWG#14074-EPT-D10-100 REV. 1 BY ONE LINE ENGINEERING.
9. FOR FURTHER DETAILS OF MICROWAVE TOWER, REFER TO DRAWING NO. 301008A01 BY WESTOWER COMMUNICATIONS.
10. '*' DENOTES ORIENTATION MARK.

AS-BUILT DRAWING

THE ACCURACY OF INFORMATION SHOWN ON THIS AS-BUILT DRAWING IS BASED ON THE INFORMATION PROVIDED BY THE CONTRACTOR, AND ALL PHYSICAL CONSTRUCTIONS OF THE DESIGN SHOWN ON THIS DRAWING WERE COMPLETED AS PER THE DRAWING ISSUED FOR CONSTRUCTION WITH THE EXCEPTION OF THOSE CHANGES DETAILED IN THE INFORMATION PROVIDED.

THE ENGINEER SHALL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE FIELD INFORMATION PROVIDED.

SUBSTATION LAYOUT PLAN

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
AB-1	15/01/16	AS-BUILT - ADDED DRAWING NUMBERS TO NOTES 5,8,9	V.W.	E.K.	K.W.			
AB	17/11/15	TRANSFORMER COORDINATE AS-BUILT	J.C.	M.H.				
1	03/07/15	RELEASE HOLD AND REV. AS NOTED	M.W.	M.C.	K.W.			
0	21/05/15	ISSUED FOR CONSTRUCTION	D.M.	W.L.	K.W.			
B	29/04/15	ISSUED FOR REVIEW	D.M.	E.K.				
A	30/03/15	ISSUED FOR REVIEW	D.M.	E.K.				

ISS	D/M/Y	APP	ISSUED FOR
AB-1	15/01/16	K.W.	AS-BUILT
AB	17/11/15		REA SUBMISSION
1	03/07/15	K.W.	RELEASE HOLD AND REV. AS NOTED
0	21/05/15	K.W.	ISSUED FOR CONSTRUCTION
B	29/04/15		ISSUED FOR PERMIT
A	30/03/15		ISSUED FOR PERMIT

REF	NUMBER	TITLE
REFERENCES		

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | PACKAGE CODE

SCALE: N.T.S.

	BY	D/M/Y
DSN.	E.KWONG	25/02/15
DRN.	D.MAO	25/02/15

res CANADA

EPTCON LTD. ELECTRICAL POWER & TRANSMISSION CONSTRUCTION
560 SHELDON DRIVE, UNIT #1, CAMBRIDGE, ONTARIO N1T 0A4
TEL: (519) 620-4414 FAX: (519) 620-4413

Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

AREA

SUBJECT
GRAND VALLEY 3 WIND FARM
230/34.5kV COLLECTOR SUBSTATION
SUBSTATION LAYOUT PLAN

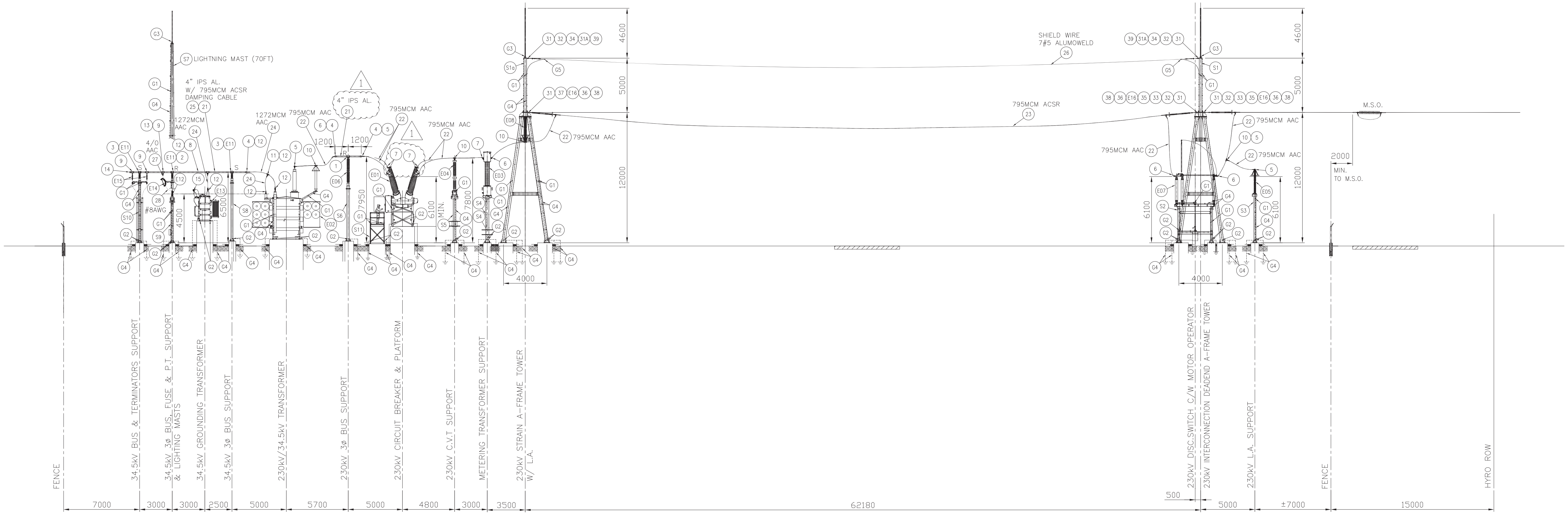
CLIENT DWG. NO.

DRAWING NO. 1504-E002 | REV. AB

CADD FILE ADDRESS
1504-E002-AB

NOTES:

1. FOR OVERALL SITE PLAN, SEE DWG# 1504-E001.
2. FOR SECTION VIEW, SEE DWG# 1504-E003.
3. ALL DIMENSIONS ARE IN mm, UNLESS NOTED OTHERWISE.



SECTION A

AS-BUILT DRAWING

THE ACCURACY OF INFORMATION SHOWN ON THIS AS-BUILT DRAWING IS BASED ON THE INFORMATION PROVIDED BY THE CONTRACTOR, AND ALL PHYSICAL CONSTRUCTIONS OF THE DESIGN SHOWN ON THIS DRAWING WERE COMPLETED AS PER THE DRAWING ISSUED FOR CONSTRUCTION WITH THE EXCEPTION OF THOSE CHANGES DETAILED IN THE INFORMATION PROVIDED.

THE ENGINEER SHALL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE FIELD INFORMATION PROVIDED.

res CANADA

EPTCON LTD. ELECTRICAL POWER & TRANSMISSION CONSTRUCTION
560 SHELDON DRIVE, UNIT #1, CAMBRIDGE, ONTARIO N1T 0A4
TEL: (519) 620-4414 FAX: (519) 620-4413

Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
AB	15/01/16	AS-BUILT	V.W.	E.K.	K.W.			
1	03/07/15	RELEASE HOLD AND REV. BILL OF MATERIAL AS NOTED	M.W.	W.L.	K.W.			
0	21/05/15	ISSUED FOR CONSTRUCTION	D.M.	W.L.	K.W.			
B	29/04/15	ISSUED FOR REVIEW	D.M.	E.K.				
A	30/03/15	ISSUED FOR REVIEW	D.M.	E.K.				

ISS	D/M/Y	APP	ISSUED FOR
AB	15/01/16	K.W.	AS-BUILT
1	03/07/15	K.W.	REV. BILL OF MATERIAL AS NOTED
0	21/05/15	K.W.	ISSUED FOR CONSTRUCTION
B	29/04/15		ISSUED FOR REVIEW
A	30/03/15		ISSUED FOR PERMIT

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA

PROJECT NO. | ACTIVITY NO. | PACKAGE CODE

SUBJECT: GRAND VALLEY 3 WIND FARM 230/34.5kV COLLECTOR SUBSTATION SECTION VIEW A

CLIENT DWG. NO.

SCALE		BY	D/M/Y
N.T.S.	DSN.	E.KWONG	25/02/15
	DRN.	D.MAO	25/02/15

DRAWING NO. 1504-E003 REV. AB

CADD FILE ADDRESS 1504-E003-AB

APPENDIX C
Maximum Sound Power Spectrum – Transformer Substation

Recent correspondence with Zephyr North Ltd. indicated the octave band sound power spectrum specified in the Noise Assessment Report [1] was incorrectly listed as an A-weighted spectrum, despite being referenced as a linear spectrum. Zephyr North provided the corrected, linear spectrum in an e-mail dated November 25, 2016, appended below. Accordingly, we have assessed the measured octave band sound power levels of the transformer substation with respect to the octave band spectrum provided.

Andrew Dobson

From: Jim Salmon <Jim.Salmon@ZephyrNorth.com>
Sent: Friday, November 25, 2016 2:48 PM
To: Ian Bonsma
Cc: Meaghan Brown; Hali Martin; David Hayles; Andrew Dobson
Subject: VGV11: Grand Valley 3: Project transformer sound levels - Clarification/correction

Hi Ian,

I have checked Table 5-6 and it is consistent, and the A-weighted broadband sound power levels are correct.

However, I am embarrassed to report that on further scrutiny, the octave band values in the table were accidentally double A-weighted. The correct linear octave band source sound power levels are as follows.

Freq.	SPoL (dBLin)	Tonal Penalty (dB)	Net SPoL (dBLin)
63 Hz	90.6	5.0	95.6
125 Hz	92.6	5.0	97.6
250 Hz	87.6	5.0	92.6
500 Hz	87.6	5.0	92.6
1 kHz	81.6	5.0	86.6
2 kHz	76.6	5.0	81.6
4 kHz	71.6	5.0	76.6
8 kHz	64.6	5.0	69.6

SPoL: Source Sound Power Level

Don't hesitate to contact me if you have any further questions.

--

Cheers, Jim

Jim Salmon

Zephyr North Ltd.
20-850 LEGION ROAD
BURLINGTON ON L7S 1T5
CANADA

Phone: +01 905-335-9670
Fax: +01 905-335-0119
Email: Jim.Salmon@ZephyrNorth.com

Appendix B.5 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.

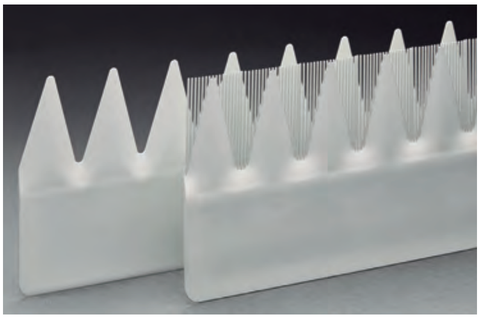
Operation of turbines within certain noise levels is crucial for a significant percentage of onshore wind projects. To comply with local noise regulations, many wind turbines must run at curtailed power outputs, thus producing less energy (typically 2-4% AEP per dB). However, silent wind turbines can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

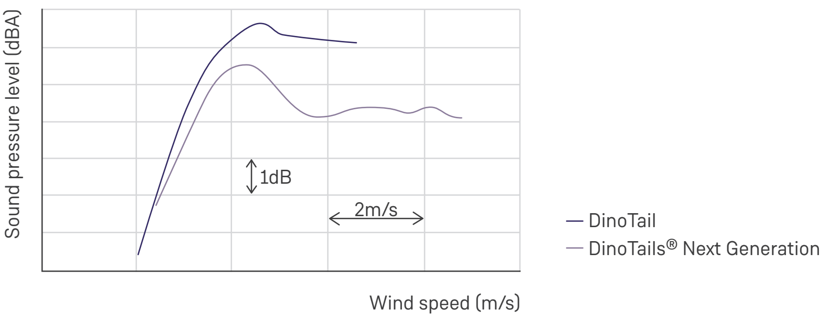
Siemens Gamesa has tested DinoTails® Next Generation using advanced validation methods, combining acoustic and aerodynamic wind tunnel tests with highly accelerated lifetime and power/noise curve measurements in the field. The results have shown robust performance with a significant noise reduction at 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
onshoresales@siemensgamesa.com
www.siemensgamesa.com

11/2021

Appendix C Consultation

Appendix C.1 Property Owners within 550 m of the Project Location

Landowners within 550 m of the Project Location

Last Name	Address	City	Prov	Postal	Date Sent	Comments
Occupant	24 Douglas Street	Grand Valley	ON	L9W 5N7	5-Jul	Stantec sent via standard post.
Occupant	073084 Side Road 24-25	Grand Valley	ON	L9W 0J1	5-Jul	Stantec sent via standard post.
Occupant	174483 County Road 25	Grand Valley	ON	L9W 0L9	5-Jul	Stantec sent via standard post.
Occupant	362374 Concession 8-9	Grand Valley	ON	L9W 0Y5	5-Jul	Stantec sent via standard post.
Occupant	362405 Concession 8-9	Grand Valley	ON	L9W 0Y5	5-Jul	Stantec sent via standard post.
Occupant	253504 9th Line	Amaranth	ON	L9W 0H9	5-Jul	Stantec sent via standard post.
Occupant	94 Lakeview Court S	Orangeville	ON	L9W 4P3	5-Jul	Stantec sent via standard post.
Occupant	434201 - 4th Line	Amaranth	ON	L9W 2Z3	5-Jul	Stantec sent via standard post.
Occupant	295 Southgate Drive	Guelph	ON	N1G 4P5	5-Jul	Stantec sent via standard post.
Occupant	402201 County Rd 15	Grand Valley	ON	L9W 0Z4	5-Jul	Stantec sent via standard post.
Occupant	174503 County Road 25	Grand Valley	ON	L9W 0L9	5-Jul	Stantec sent via standard post.
Occupant	114633 Sideroad 27-28	Grand Valley	ON	L9W 0L3	5-Jul	Stantec sent via standard post.
Occupant	362262 Concession Road 8-9	Grand Valley	ON	L9W 0Y3	5-Jul	Stantec sent via standard post.
Occupant	241112 Con Rd 2-3	Grand Valley	ON	L9W 0R7	5-Jul	Stantec sent via standard post.
Occupant	282115 Concession 4-5	Grand Valley	ON	L9W 0V9	5-Jul	Stantec sent via standard post.
Occupant	115271 SDRD 27-28	Grand Valley	ON	L0N 1G0	5-Jul	Stantec sent via standard post.
Occupant	282303 Concession 4-5	Grand Valley	ON	L9W 0W4	5-Jul	Stantec sent via standard post.
Occupant	282252 Concession 4-5	Grand Valley	ON	L9W 0W4	5-Jul	Stantec sent via standard post.
Occupant	173405 County Road 25	Grand Valley	ON	L9W 0L7	5-Jul	Stantec sent via standard post.
Occupant	501270 Hwy 89	Grand Valley	ON	L9W 3W5	5-Jul	Stantec sent via standard post.
Occupant	160 Grey Street East Box #514	Dundalk	ON	N0C 1B0	5-Jul	Stantec sent via standard post.
Occupant	4 Miller Street	Guelph	ON	N1L 1P1	5-Jul	Stantec sent via standard post.
Occupant	22 Mill Street East	Grand Valley	ON	L0N 1G0	5-Jul	Stantec sent via standard post.
Occupant	114173 Sideroad 27/28	Grand Valley	ON	L0N 1G0	5-Jul	Stantec sent via standard post.
Occupant	281367 Concession 4-5	Grand Valley	ON	L9W 0W4	5-Jul	Stantec sent via standard post.
Occupant	262233 Concession 3 and 4 PO Box 165	Grand Valley	ON	L9W 7G1	5-Jul	Stantec sent via standard post.
Occupant	362321 Concession Road 8-9	Grand Valley	ON	L9W 0Y3	5-Jul	Stantec sent via standard post.
Occupant	1265 Strasburg Road	Kitchener	ON	N2R 1S6	5-Jul	Stantec sent via standard post.
Occupant	075034 Side Road 24/25	Grand Valley	ON	L9W 0J5	5-Jul	Stantec sent via standard post.
Occupant	198098 Amansnth East Luther	Grand Valley	ON	L9W 0M3	5-Jul	Stantec sent via standard post.
Occupant	670 Talbot Street	London	ON	N6A 2T9	5-Jul	Stantec sent via standard post.
Occupant	38 Commerce Cres.	Acton	ON	L7J 2X3	5-Jul	Stantec sent via standard post.
Occupant	17 Emma St. N	Grand Valley	ON	L9W 5N8	5-Jul	Stantec sent via standard post.

Appendix C.2 Notification to Stakeholders and Indigenous Communities

From:	Curtis, Carrie
To:	Planning@grandriver.ca
Cc:	Dave Hayles; information@gvwindfarms.com
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:24:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Grand River Conservation Authority,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	jsimons@grandriver.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:14:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Jenn Simons,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From: Curtis, Carrie
To: karla.barboza@ontario.ca
Cc: information@gvwindfarms.com; Dave Hayles
Subject: Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date: Monday, July 8, 2024 4:17:00 PM
Attachments: GV2LP_Notice_20240705.pdf

Dear Karla Barboza,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	enviropermissions@ontario.ca; aaron.todd@ontario.ca; brandan.chowan@ontario.ca; khaleed.khalfan@ontario.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:16:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Aaron Todd, Brandan Chowan, & Khaleed Khalfan,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	mtownsend@townofgrandvalley.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:13:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Meghan Townsend,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	mdunne@dufferincounty.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:11:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Michelle Dunne,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From: Curtis, Carrie
To: "crystal.lafrance@ontario.ca"; "ian.thornton@ontario.ca"
Cc: "information@gvwindfarms.com"; Dave Hayles
Subject: Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date: Monday, July 8, 2024 4:17:00 PM
Attachments: GV2LP_Notice_20240705.pdf

Dear Crystal Lafrance & Ian Thornton

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	landuse@navcanada.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:09:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Robert Davidge,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From: Curtis, Carrie
To: nmartin@amaranth.ca
Cc: information@gvwindfarms.com; Dave Hayles
Subject: Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date: Monday, July 8, 2024 4:13:00 PM
Attachments: GV2LP_Notice_20240705.pdf

Dear Nicole Martin,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	monique.mousseau@tc.gc.ca; enviroont@tc.gc.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:10:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Monique Mousseau,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	LindaN@metisnation.org; consultations@metisnation.org
Cc:	Dave Hayles; information@gvwindfarms.com
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 3:48:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Linda Norheim,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	cngr.chief@sixnations.ca; htpa@sixnations.ca; petergraham@sixnations.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 3:56:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Chief Sherri-Lyn Hill, Clair Pietron, & Peter Graham,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	council@chimnissing.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 3:52:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Joanne P. Sandy & Whitney Walsh,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	"donna.bigcanoe@georginaisland.com"; "natasha.charles@georginaisland.com"
Cc:	"information@gvwindfarms.com"; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:01:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Donna Big Canoe & Natasha Charles,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	chief@nawash.ca; sao@nawash.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:05:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Chief Gregory Nadjiwon & Michael Earl,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	admin@ramafirstnation.ca; evelynb@ramafirstnation.ca; consultation@ramafirstnation.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:02:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Evelyn Ball,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	peterc1908@hotmail.com; GreatLakesMetis@gmail.com
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:07:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Peter Coture,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From: Curtis, Carrie
To: info@hdi.land
Cc: information@gvwindfarms.com; Dave Hayles
Subject: Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date: Monday, July 8, 2024 3:58:00 PM
Attachments: GV2LP_Notice_20240705.pdf

Dear Hohahes Leroy Hill,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	lrcs@sixnations.ca
Cc:	information@gvwindfarms.com; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:30:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Peter Graham,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

From:	Curtis, Carrie
To:	"conrad.ritchie@saugeen.org"; "manager@saugeenojibwaynation.ca"; "bnickel.energy@saugeenojibwaynation.ca"; "sfn@saugeen.org"
Cc:	"information@gvwindfarms.com"; Dave Hayles
Subject:	Notice of Technical Amendment to Renewable Energy Approval 6457-9L6QLC for Grand Valley 2 Limited Partnership Project
Date:	Monday, July 8, 2024 4:04:00 PM
Attachments:	GV2LP_Notice_20240705.pdf

Dear Chief Conrad Ritchie, Riel Warrilow, & Bob Nickel,

Please find the attached notice regarding a technical Amendment to the Renewable Energy Approval Summary for the Independent Electricity System Operator (IESO) FIT Contract Identification # F-002179-WIN-130-601 for Grand Valley 2 LP (GV2LP) Project in Dufferin County, Ontario.

Renewable Energy Approval (REA) Approval Number: 6457-9L6QLC

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

Should you have any questions or require additional information regarding this project, please refer to the notice for project contact information.

The *Grand Valley Wind Farms Phase 3 Renewable Energy Modification Report* completed by Stantec Consulting Ltd. July 2024 pertains to details summarizing proposed technical changes. This report and other documents are also publicly available on the Project website: www.gvwf3.ca.

Thank you,

Development Team

Grand Valley 2 Limited Partnership (GV2LP)
Phone: +1 (519) 216-5856
Email: information@gvwindfarms.com
Project Website: www.gvwf3.ca

Appendix C.3 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

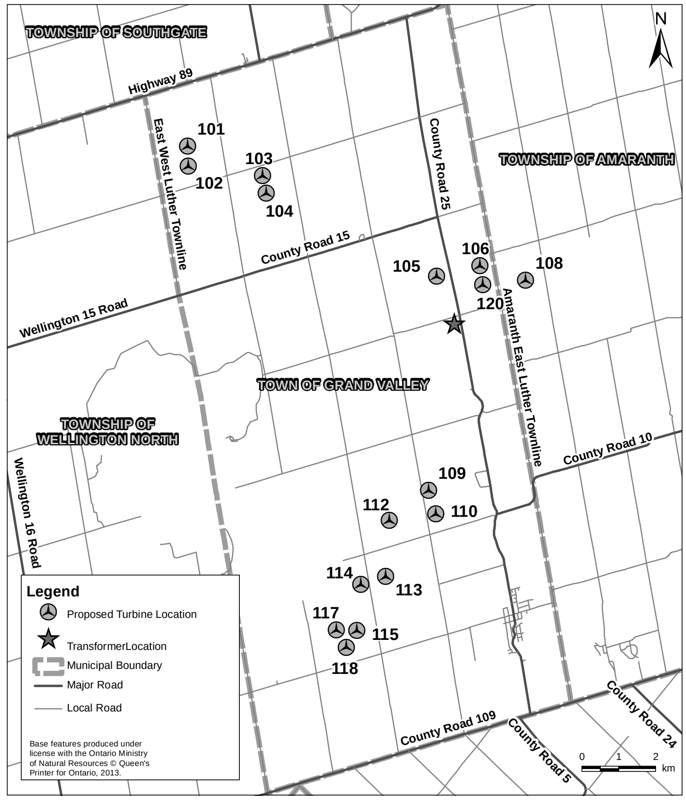
FIT Reference Number: FIT-002179-WIN-130-601

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

https://www.orangeville.com/news/public-notices/dufferin-county/notice-of-proposed-change-to-an-approved-renewable-energy-project/article_f14c8403-d9c3-521a-b747-250bb5fc6c2d.html

DUFFERIN COUNTY PUBLIC NOTICES

NOTICE OF PROPOSED CHANGE TO AN APPROVED RENEWABLE ENERGY PROJECT

Grand Valley Wind Farms Phase 3

REA Approval Number: 6457-9L6QLC

THE ORANGEVILLE Banner

Jul 8, 2024

Article was updated 4 hrs ago

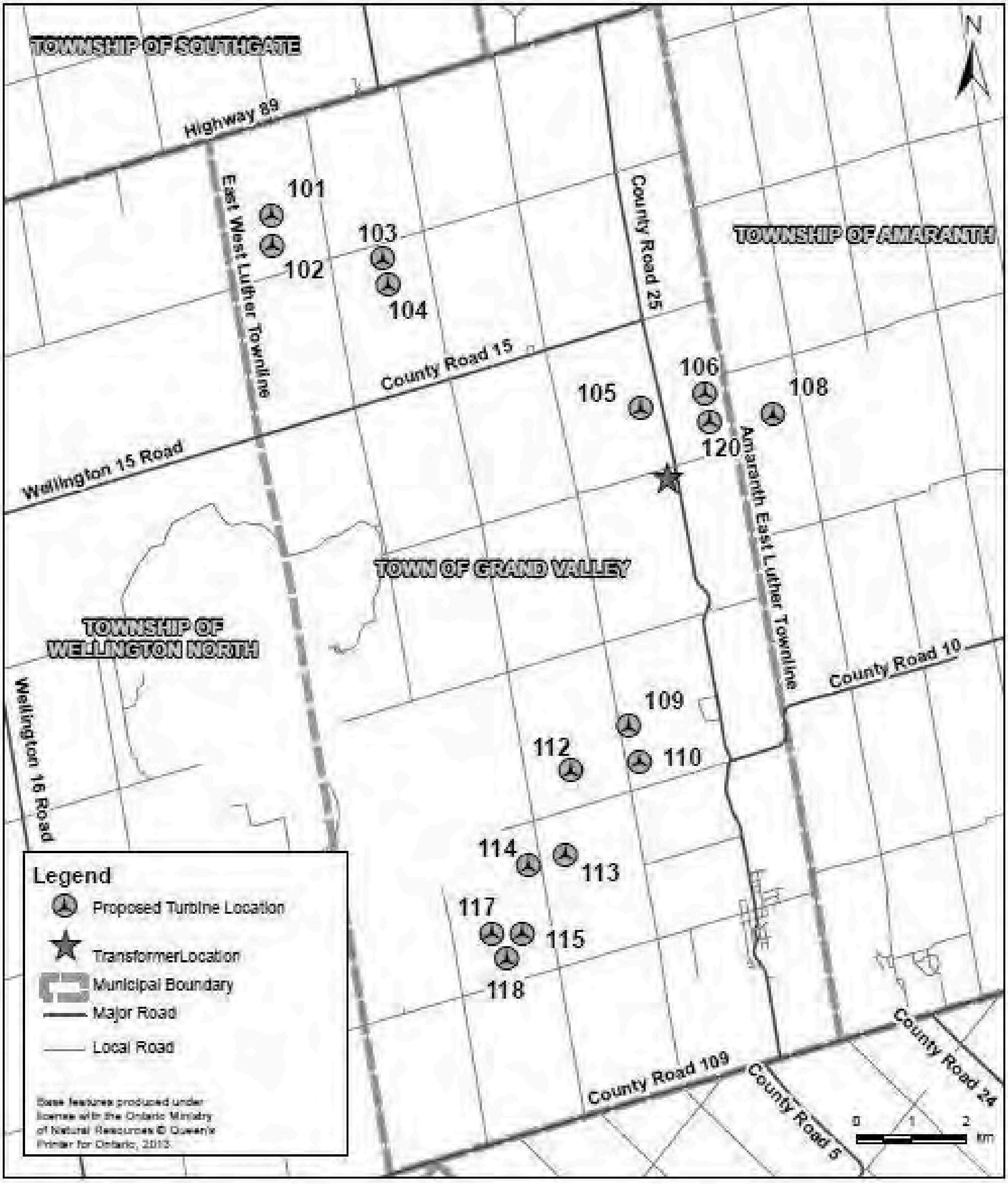
Shutterstock photo

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 5th day of July 2024.



Grand Valley Wind Farms Phase 3 Map.

Contributed

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 14 turbines to 2.648 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 is proposed to be increased to 42.638 MW as a result of proposed increased maximum power capacity for each turbine. The turbines are currently 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 July 2024), a copy of which can be found on the Project website at: www.gvwf3.ca. The Noise Impact Assessment Report (2024) 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

Appendix C.4 Evidence of the Posting on the Project Website

Subject: FW: Website Request for GV3 REA

From: Young, Mathew (Ottawa) <Mathew.Young@stantec.com>
Sent: Wednesday, July 3, 2024 2:21 PM
To: Curtis, Carrie <Carrie.Curtis@stantec.com>
Cc: Zeldin, Dominique <Dominique.Zeldin@stantec.com>; Greener, Leslie <Leslie.Greener@stantec.com>
Subject: RE: Website Request for GV3 REA

No problem Carrie, I've made the updates to the site: https://gvwf3.ca/documentation.html

Thanks,
Matt

From: Curtis, Carrie <Carrie.Curtis@stantec.com>
Sent: Wednesday, July 3, 2024 2:10 PM
To: Young, Mathew (Ottawa) <Mathew.Young@stantec.com>
Cc: Zeldin, Dominique <Dominique.Zeldin@stantec.com>; Greener, Leslie <Leslie.Greener@stantec.com>
Subject: Website Request for GV3 REA

Hi Matt,

I hope you're doing well! Could we please get your help adding the noise and modification reports attached above (server paths below as well) to the Grand Valley Wind Farm website?

Noise Report: \\cd1004-f01\01609\active\160901137\05_report_deliv\Client_Supplied_Data\Sent by Client on June 10
Modification Report: \\cd1004-f01\01609\active\160901137\05_report_deliv

Project No. 160901137
Task No. 100

Thank you kindly,

Carrie

Carrie Curtis MPH, BSc.
Environmental Coordinator, Assessment and Permitting

Direct: +1 416-598-7142
carrie.curtis@stantec.com

Stantec
100-401 Wellington Street West
Toronto ON M5V 1E7

Stantec