



# **Te Rere Hau Windfarm Annual Noise Monitoring Report**

**2020—2021**

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## Contents

<b>1.0</b>	<b>Purpose</b>	<b>3</b>
<b>2.0</b>	<b>Compliance with Conditions 4, 5, and 5A—5C</b>	<b>3</b>
<b>3.0</b>	<b>Wind turbine alterations</b>	<b>3</b>
<b>4.0</b>	<b>Complaints register</b>	<b>4</b>
<b>5.0</b>	<b>Community Liaison Group meeting minutes</b>	<b>7</b>
5.1	2020	7
5.2	18 May 2021	7
<b>6.0</b>	<b>Noise Monitoring Terminal</b>	<b>8</b>
<b>7.0</b>	<b>Analysis of operational data</b>	<b>9</b>
7.1	WNW	9
7.2	NNW	9
7.3	SSE	10
7.4	ESE	10
<b>8.0</b>	<b>Comments</b>	<b>10</b>
<b>9.0</b>	<b>Complaints Assessment</b>	<b>11</b>
9.1	Comments	13
	<b>Calibration certificate for sound level meter</b>	<b>15</b>
	<b>Calibration certificate for field calibrator</b>	<b>16</b>

## 1.0 Purpose

This annual noise monitoring report for the year through March 2021 has been prepared by TRH Services on behalf of NZ Windfarms to fulfil our resource consent s128 review Condition 20, with contributions by Marshall Day Acoustics as noted.

As required by Condition 19.4, a copy of this report in draft form was distributed to Community Liaison Group members prior to a group meeting held on 18 May with feedback reflected in the minutes included in this report.

## 2.0 Compliance with Conditions 4, 5, and 5A—5C

To demonstrate compliance with these conditions, refer to report “Rp 009 R01 2011095W” prepared by Marshall Day Acoustics with TRH Services, and submitted to Council on 1 Feb 2019. Taken with the remainder of this report, which indicates no adverse alterations to wind turbines with respect to noise emissions during the preceding year, we submit that we remain in compliance with the conditions.

The Condition 5C noise curtailment regime active on turbines 88, 103, and 104 prevented approximately 466 turbine-hours of running. The curtailment parameters are unchanged from last year. A further 1,944 turbine-hours of low-wind start-ups and generation were voluntarily curtailed by noise curtailment across the fleet.

## 3.0 Wind turbine alterations

The year included the following significant repairs and machinery replacements

- Blade leading edge tape repairs to 25 out of 65 turbines
- Gearbox replacement (like-for-like, turbines 003, 009, 012, 054, 056, 058, 080, and 084)
- Generator replacement (like-for-like, turbines 030, 031, 047, 050, and 073)
- Blade movements (turbines 012, 013, 015, 016, 034 and 036)

Marshall Day Acoustics provided the following Acoustic Impact statement:

Generator, blade and gearbox replacements where the replacement parts are the same as those removed will not have a significant effect on noise emissions.

Blade leading edge tape repairs are an ongoing maintenance item which will generally reduce the high-frequency whistle of blade rotation, which would normally accumulate slowly as the leading edge tape wears or becomes damaged. We understand that priority of these repairs is given to turbines which contribute more significantly to noise received at residences. This work is expected to reduce noise levels.

None of the repair or maintenance items carried out on the TRH wind farm over the 2020 – 2021 operating year will cause an increase in noise emissions. Leading edge tape repairs will have reduced noise emissions.

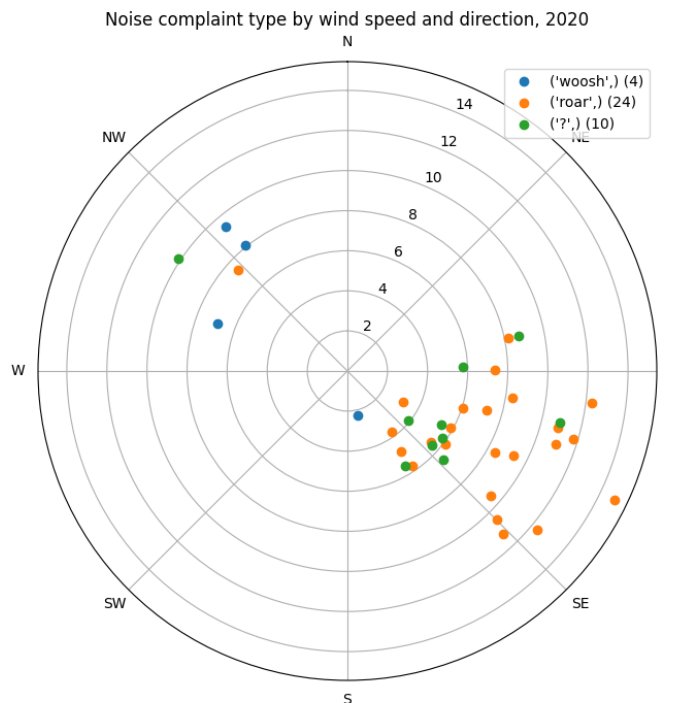
## 4.0 Complaints register

The following complaints were received during 2020.

ID	Name	Address	Date	Time	Complaint Description	Wind Speed [m/s]	Wind Direction [deg]
119	Ellingham, Sue	47 Ridgeview Rd	1/01/2020	22:15	Whoosh whoosh noise	7	290
120	Ellingham, Sue	47 Ridgeview Rd	2/01/2020	08:15	Whoosh whoosh noise	9	320
121	Ellingham, Sue	47 Ridgeview Rd	5/01/2020	08:45	Whoosh whoosh noise	8	321
122	Ellingham, Sue	47 Ridgeview Rd	16/01/2020	22:15	Roar noise	4	144
123	Ellingham, Sue	47 Ridgeview Rd	17/01/2020	07:30	Roar noise	6	146
124	Ellingham, Sue	47 Ridgeview Rd	17/01/2020	22:00	Roar noise	6	127
125	Ellingham, Sue	47 Ridgeview Rd	20/01/2020	07:30	Roar noise	3	119
126	Ellingham, Sue	47 Ridgeview Rd	20/01/2020	22:00	Roar noise	11	109
127	Nicky Banks	48 Ridgeview Rd	22/01/2020	22:59	Loud noise coming from Te Rere Hau windfarm	10	304
128	Ellingham, Sue	47 Ridgeview Rd	24/02/2020	21:00	Roar noise	11	105
129	Ellingham, Sue	47 Ridgeview Rd	26/02/2020	09:30	Loud roar	7	90
130	Ellingham, Sue	47 Ridgeview Rd	5/03/2020	11:45	Loud roar noise	5	125
131	Ellingham, Sue	47 Ridgeview Rd	6/03/2020	20:30	Loud roar noise	7	106
132	Ellingham, Sue	47 Ridgeview Rd	13/03/2020	08:45	Loud roar	9	131
133	Ellingham, Sue	47 Ridgeview Rd	15/03/2020	07:00	loud roar continual all Sunday morning	11	93
134	Ellingham, Sue	47 Ridgeview Rd	15/03/2020	21:30	Loud roar	8	83
135	Bev Martin	58 County Heights Dr	18/05/2020	16:17	Bassy/wobbly sound coming from the 2 bladed mills. Caller didn't know the name or exact location of the windfarm. Described as a sickening rhythmic whirly bass sound.	2	167
136	Ellingham, Sue	47 Ridgeview Rd	27/05/2020	19:00	Loud roar	9	131
137	Ellingham, Sue	47 Ridgeview Rd	27/05/2020	07:00	Loud roar continuation from previous evening	7	129
138	Sue Ellingham	47 Ridgeview Road	2/06/2020	11:10	Called to report that there is a continual roar coming from the windfarm. This also affected her on Sunday and Monday.	7	313
139	Sue Ellingham	47 Ridgeview Road	19/06/2020	11:07	Loud roaring noise from TRH,.	12	97
140	Nicky Banks	48 Ridgeview Road	19/06/2020	11:20	Stiff easterly. Lot of noise coming from the wind farm today	11	104
141	Sue Ellingham	47 Ridgeview Road	23/06/2020	10:07	The wind was very loud last night and in the early hours of last night it was soo loud they had to change the window.	6	88
142	Nicky Banks	48 Ridgeview Road	24/06/2020	22:47	The caller said it seems like a calm night but the noise from the wind farm is loud so is must be windy up there.	6	125
143	Sue Ellingham	47 Ridgeview Road	25/06/2020	13:56	Te Re Hau Wind farm noise was very loud last night. Caller said she had to shut the window and doors.	6	149
144	Nicky Banks	48 Ridgeview Road	25/06/2020	17:44	Caller has advised that the noise started before 4pm this afternoon, Caller has advised they only hear this noise when there is an easterly. Caller has rated the noise a 4.5 out of 5.	6	132
145	Nicky Banks	48 Ridgeview Road	26/06/2020	08:28	Calm where the caller is calling from but there must be a high easterly wind up at the windfarm which is causing a roaring noise.	8	119

146	Sue Ellingham	47 Ridgeview Road	26/06/2020	11:58	Roaring noise coming from the windmills.	8	99
147	Nicky Banks	48 Ridgeview Rd	15/07/2020	23:03	Caller described the noise as a loud engine roar. Tends to start up when there is a heavy south easterly above the hill.	11	136
148	Nicky Banks	48 Ridgeview Rd	16/07/2020	08:50	Caller is complaining about the noise from the windfarm. It is roaring up there. But a light breeze down where she is.	12	130
149	Sue Ellingham	47 Ridgeview Road	16/07/2020	09:24	Caller advises windfarm is really loud today. Easterly wind so they are roaring.	5	146
150	Sue Ellingham	47 Ridgeview Rd	17/07/2020	08:24	Roaring horrendous noise today	9	117
151	Nicky Banks	48 Ridgeview Rd	17/07/2020	14:03	Calm at Nickys farm, but there is strong SE wind up at the windfarm which is causing a roaring noise.	15	116
152	Sue Ellingham	47 Ridgeview Rd	19/07/2020	12:07	Complaint about the windfarm noise - noticed the issue around 9.30am	4	129
153	Nicky Banks	48 Ridgeview Rd	19/07/2020	14:27	100m lower light breezes and roaring SE up there. Constant machine roar.	12	107
154	Sue Ellingham	47 Ridgeview Rd	9/10/2020	08:37	Caller has advised that the noise is loud today with the easterly wind.	9	113
155	Sue Ellingham	47 Ridgeview Rd	16/10/2020	09:22	Caller has advised that the noise is not as loud today with the easterly wind but can be heard inside the home.	8	130
156	Sue Ellingham	47 Ridgeview Rd	2/12/2020	07:45	Sue has called this morning to complain about noise coming from wind turbines. Easterly wind and that is when they can hear it the most.	10	74

The following figure shows all complaints categorized based on the text of the complaint and plotted according to the wind speed and direction at the time of the of the complaint.



Generally, for the affected residents, “roar” noise is heard in easterly winds and “woosh” noise in westerly winds. Uncategorized noise complaints (“?”) have all been through notes taken from phone calls to PNCC which don’t contain descriptions of the sound heard e.g. “Loud noise coming from Te Rere Hau windfarm”.

In addition, throughout the year our technicians carried out monthly visits to turbines 84 through 104 (the ones nearest residents to the SW) to listen from the ground while generating. These inspections led to blade repairs on one turbine and teeter damper replacements on one turbine.

## 5.0 Community Liaison Group meeting minutes

### 5.1 2020

No group meetings were held in 2020 due to COVID-19 travel restrictions.

### 5.2 18 May 2021

18:30 Aokautere school hall

Attendees;

NZWF, Warren Koia, Adam Radich, Peter Darke

Residents, Joseph Poff, Morris McDonald, Nikki Banks, Clel Wallace, Ash Kells, Stephen

PNCC, Head planner Simon Mori

Welcome and NZ renewable generation industry overview

Presentation given on annual noise report.

Joe Poff asked about potential for hydrogen uptake in NZ, Adam commented on unsolved storage issues and the necessity for the hydrogen to be made using renewable energy resources.

Ash Kells; Asked about battery technology and if it was possible, Adam comment around capacity and development of sizable batteries and also regarding battery technology under test in Australia.

Morris McDonald; Asked about turbine lifespan and options moving forward. Adam answered regarding 20 year life with some of fleet already being at 16yrs, we are strategically looking at best way forward whether that be a life extension or a repower is currently undecided.

Joe Poff; Asked about Mod 7 gears, Adam commented as third stages fail we are continuing to put in Mod 7 gear sets.

Clel Wallace; Asked about combined noise with Turitea, Adam commented Turitea consent requires them to look at the combined noise effects and this has no material impact on our farm operation.

Clel Wallace; Asked about consent for new turbines, Adam commented that we would be required to get a new consent for new turbines or at least a variation to our current consent as current consent is for W500 turbines specifically.

Nikki Banks; Asked what is our preferred way for residents to make complaints, Adam commented that via our system is best as saves council undertaking unnecessary admin.

Nikki Banks; Commented on behalf of herself and Sue Ellingham that they are truly grateful for the efforts of NZWF to provide noise relief as the curtailment has been truly beneficial.

## 6.0 Noise Monitoring Terminal

Noise monitoring at a permanent noise monitoring terminal (NMT) at the Irvin Property (Site 4, 38 Ridgeview Road) is required in Condition 13. This was completed in May 2018, with calibration completed by 10 June. The NMT gathers A-weighted noise statistics including  $L_{A90}$  as required by NZS6808:2010, and stores audio data to a hard disk, which is regularly exchanged and archived by NZWL.

The NMT is a Norsonic NOR140 sound level meter connected to a class 1 measurement microphone with an outdoor windscreen and protection kit, located at approximately the same location as used during the 2011 – 2013 monitoring exercise. This location complies with the requirements of clause 7.1.6 in New Zealand Standard NZS 6808:2010 “Acoustics – Wind farm noise”.

The measurement system is calibrated periodically by NZWL staff using a class 1 compliant field calibrator. Both the meter/microphone system and the field calibrator are subject to periodic laboratory calibration, which is undertaken at the prescribed intervals by NZWL.  $L_{A90}$  statistics are collected continuously in 10-minute intervals as required by NZS6808:2010 and stored on a web server.

The logger was installed and went live on 7 Jun 2018 at 13:30. In the year through 31 Mar 2021 it operated continuously except for the lost data below, for a total of 8322 hours.

	Minutes of missing noise data
2020-04	100
2020-05	17050
2020-06	290
2020-07	50
2020-08	80
2020-09	7520
2020-10	0
2020-11	180
2020-12	0
2021-01	840
2021-02	70
2021-03	80

The missing data in May 2020 was due to the sound level meter being sent away for calibration.

Outages can be caused by power failures, or power spikes which may cause a reset of the remote on site PC. Some are also caused by outages in the cellular system, which disrupt the data upload to the web site.



## 7.0 Analysis of operational data

This section has been provided by Marshall Day Acoustics.

We have compared the collected  $L_{A90}$ (10-min) sound level measurements with the wind speed measurements taken at the reference met mast, and applied the operational filters described in Condition 7 (ensuring most turbines are operating, including nearest turbines and T103-T104, excluding curtailed periods, assessing only night-time data, and restricting assessments to the operating wind speeds).

These data are presented as scatter plots and regression lines relating to the four critical wind sectors (WNW, NNW, SSE, ESE). These plots can be compared with the plots presented in the *Compliance Assessment Report Rp 009 R01 2011095W* relating to Site 4. Tables are provided to summarise the compliance status of these measurements, and additional graphs are provided to visually summarise the regression lines of background, limit, 2011-2013 measurements, the results from previous annual reports, and current year measurements.

The data collected during the 2011-2013 period excluded high background noise periods where possible to reflect the most exposed periods of turbine noise – during both “shutdown” and “operational” measurements. By contrast the current year measurements (and those of previous annual assessments) have not been so selected (aside from removing rainfall periods) and so include increased traffic periods and seasonal effects.

Therefore, when evaluating trends of operational noise, the values between annual reporting periods are most usefully compared.

### 7.1 WNW

#### Site 4, WNW

Wind Speed (m/s):	6	7	8	9	10	11	12	13	14	15
Background Noise Level (dB $L_{A90}$ ):	24	26	28	30	32	34	36	38	40	42
Operational Noise Level (dB $L_{A90}$ ):	27	28	30	32	34	36	38	40	42	44
Noise Limit (dB $L_{A90}$ ):	35	40	40	40	40	40	41	43	45	47
Turbine Noise Level (dB $L_{A90}$ ):	22	24	26	28	30	32	33	35	37	40
Exceedance (dB):	0	0	0	0	0	0	0	0	0	0

### 7.2 NNW

#### Site 4, NNW

Wind Speed (m/s):	6	7	8	9	10	11	12	13	14	15
Background Noise Level (dB $L_{A90}$ ):	25	26	28	30	32	34	36	38	40	42
Operational Noise Level (dB $L_{A90}$ ):	28	30	32	34	36	38	40	42	44	46
Noise Limit (dB $L_{A90}$ ):	35	40	40	40	40	40	41	43	45	47
Turbine Noise Level (dB $L_{A90}$ ):	25	27	30	32	34	36	38	40	42	44
Exceedance (dB):	0	0	0	0	0	0	0	0	0	0

### 7.3 SSE

Site 4, SSE										
Wind Speed (m/s):	6	7	8	9	10	11	12	13	14	15
Background Noise Level (dB LA90):	24	27	29	32	35	38	41	44	47	50
Operational Noise Level (dB LA90):	30	33	36	39	41	43	45	47	49	50
Noise Limit (dB LA90):	35	40	40	40	40	43	46	49	52	55
Turbine Noise Level (dB LA90):	29	32	35	38	40	42	43	44	44	--
Exceedance (dB):	0	0	0	0	0	0	0	0	0	--

### 7.4 ESE

Site 4, ESE										
Wind Speed (m/s):	6	7	8	9	10	11	12	13	14	15
Background Noise Level (dB LA90):	25	31	35	38	41	43	44	45	46	48
Operational Noise Level (dB LA90):	35	38	40	42	44	46	47	49	50	51
Noise Limit (dB LA90):	35	40	40	43	46	48	49	50	51	53
Turbine Noise Level (dB LA90):	34	37	39	40	41	43	45	46	48	48
Exceedance (dB):	0	0	0	0	0	0	0	0	0	0

## 8.0 Comments

This section has been provided by Marshall Day Acoustics.

The regression lines plotted through the 2020-2021 data all show compliance with the high-amenity noise limit under all wind conditions. Where there are differences from previous measurements, it is generally because of the high background sound levels which make the determination of “turbine noise level” very sensitive to small changes in average measured operational noise level.

No curtailments are reflected in this data – periods where turbines have been shut down or have not started due to curtailment requirements have been excluded from this data. If these data points were included, this would further reduce the average sound levels during the relevant wind conditions.

No significant trend in noise level increasing or decreasing over time is evident by the comparison of the “annual report” data sets.

## 9.0 Complaints Assessment

This section has been provided by Marshall Day Acoustics.

NZWL has provided a register of complaints which included the current assessment period 1 Apr 2020 – 31 Mar 2021. This is included in Section **Error! Reference source not found.**

The register shows 22 complaints over this period, all but one of which were received from 48 Ridgeview Road (the property adjacent to the permanent monitoring location) and 47 Ridgeview Road which is directly opposite the monitoring location. The noise level recorded by the NMT provides a relevant point of reference for these complaints. The remaining complaint (shaded blue) was received from 58 Country Heights Drive, which is approximately 700 metres northwest of the measurement location.

All complaints except the 2 June 2020 entry occurred when winds were from a general southeast direction. The complaints have been sorted by date received. The time and text of the complaint are included, and the noise level and wind farm state are described. We note that the time of the complaint may not correspond directly to the time that the problem noise occurred.

The “Full Operation” column describes whether enough turbines were enabled to comply with the requirements of Condition 7.4 for valid sound level reporting. The “Curtailed” column describes whether any turbines were shut down in response to either mandatory or voluntary curtailment programming.

Date	Time	Complaint Description	Wind Direction [deg]	Wind Speed [m/s]	Noise Level (dB LA90, Site 4)	Full Operation?	Curtailed?
5/18/2020	16:17	Bassy/wobbly sound coming from the 2 bladed mills. Caller didn't know the name or exact location of the windfarm. Described as a sickening rhythmic whirly bass sound.	175	2	-	Yes	No
5/27/2020	7:00	Loud roar continuation from previous evening	129	7	37	Yes	No
5/27/2020	19:00	Loud roar	131	9	38	Yes	No
6/2/2020	11:10	Called to report that there is a continual roar coming from the windfarm. This also affected her on Sunday and Monday.	312	7	32	Yes	No
6/19/2020	11:07	Loud roaring noise from TRH..	102	11	41	No	No
6/19/2020	11:20	Stiff easterly. Lot of noise coming from the wind farm today	104	11	41	No	No
6/23/2020	10:07	The wind was very loud last night and in the early hours of last night it was soo loud they had to change the window.	88	6	33	No	No
6/24/2020	22:47	The caller said it seems like a calm night but the noise from the wind farm is loud so is must be windy up there.	122	8	37	No	Yes
6/25/2020	17:44	Caller has advised that the noise started before 4pm this afternoon, Caller has advised they only hear this noise when there is an easterly. Caller has rated the noise a 4.5 out of 5.	131	6	41	No	No
6/25/2020	13:56	Te Re Re Hau Wind farm noise was very loud last night. Caller said she had to shut the window and doors.	140	7	39	No	No
6/26/2020	11:58	Roaring noise coming from the windmills.	104	6	37	No	No
6/26/2020	8:28	Calm where the caller is calling from but there must be a high easterly wind up at the windfarm which is causing a roaring noise.	112	8	38	No	No

Date	Time	Complaint Description	Wind Direction [deg]	Wind Speed [m/s]	Noise Level (dB LA90, Site 4)	Full Operation?	Curtailed?
7/15/2020	23:03	Caller described the noise as a loud engine roar. Tends to start up when there is a heavy south easterly above the hill.	139	11	44	No	Yes
7/16/2020	8:50	Caller is complaining about the noise from the windfarm. It is roaring up there. But a light breeze down where she is.	130	12	43	No	No
7/16/2020	9:24	Caller advises windfarm is really loud today. Easterly wind so they are roaring.	135	8	41	Yes	No
7/17/2020	14:03	Calm at caller's farm, but there is strong SE wind up at the windfarm which is causing a roaring noise.	117	14	44	Yes	No
7/17/2020	8:24	Roaring horrendous noise today	120	10	41	Yes	No
7/19/2020	14:27	100m lower light breezes and roaring SE up there. Constant machine roar.	99	11	39	Yes	No
7/19/2020	12:07	Complaint about the windfarm noise - noticed the issue around 9.30am	110	8	40	Yes	No
10/9/2020	8:37	Caller has advised that the noise is loud today with the easterly wind.	121	6	39	No	No
16/10/2020	9:22	Caller has advised that the noise is not as loud today with the easterly wind but can be heard inside the home.	129	5	38	Yes	No
2/12/2020	7:45	Caller has called this morning to complain about noise coming from wind turbines. Easterly wind and that is when they can hear it the most.	77	9	37	Yes	No

## 9.1 Comments

Many of the complaints arise at times of relatively low noise levels - ones which are below the compliance noise limit individually. However, in some cases, indicated by red shading, the individual 10-minute noise measurements (comprising both turbine noise and noise from other sources) are higher than the noise limit for the relevant wind conditions.

The complaint from 58 County Heights Drive coincides with a period of low wind speed where it is likely that turbines are starting or stopping in response to local wind conditions, and this may be responsible for particularly audible sound.

As a general comment, neither the objective nor the complaints records indicate a significant difference in the level or the character of the turbine noise output, aside from the County Heights Drive report which may have been a spurious occurrence.

## Calibration certificate for sound level meter

Page 1 of 1



**(IANZ Accredited laboratory)**

Calibration, Sales & Service of Audiological and Acoustical Equipment

**TEST REPORT FOR A SOUND LEVEL METER - PERIODIC TESTS: SO012835-1407102**

TRH SERVICES LTD  
C/O 138 Benmore Ave  
Cloverlea  
Palmerston North

**Job Number:** SO012835-1407102      **Date of report:** 19 May, 2020

**Measurement Procedure:** The above instrument was tested using Diatec procedure ECSP10 and to the requirements of IEC 61672-3:2006 Electroacoustics - Sound Level Meters - Part 3: Periodic Tests. The laboratory is accredited for compliance to ISO/IEC 17025. All tests and measurements reported here are traceable to New Zealand and Australian National Standards. Measurement results reported are traceable to SI units via recognised National Standards.

**Item tested:**

Sound Level Meter:	Norsonic	Nor140	Serial No:	1407102
Designation:	Class: 1			
Firmware version:	4.0.1120			
Microphone:	Norsonic	1227	Serial No:	151749
Applied data:	Body - Norsonic, Nor140. Windscreen - Default, Flat			
Notes:	Fitted a new set of batteries as none were supplied.			
Date of test:	19 May, 2020			
Tested by:	RJ			

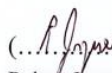
**Ambient conditions at the time of tests:**


Temperature: 23.0 °C      Humidity: 48 %RH      Atmospheric pressure: 1016.5hPa

Tests Performed:	Clause	Result
Absolute Calibration	9	Pass
Acoustical Frequency Weighting	11	Pass
Self Generated Noise	10.1	Pass
Electrical Noise	10.2	Pass
Electrical Frequency Weightings	12	Pass
Frequency and Time Weightings	13	Pass
Reference Level Linearity	14	Pass
Toneburst	16	Pass
Peak C Sound Level	17	Pass
Overload Indicator	18	Pass

**Result:** Passed all tests.

**Statement of Compliance:** The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organisation responsible for approving the results of pattern evaluation tests performed in accordance with IES 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2002.

()  
Robert Jaques  
Authorised IANZ signatory

()  
Alex Dalay  
Report checked

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## Calibration certificate for field calibrator

Page 1 of 1



**(IANZ Accredited laboratory)**

**Calibration, Sales & Service of Audiological and Acoustical Equipment**

### ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE

19 May 2020

TRH Services Ltd  
C/O 138 Benmore Ave  
Cloverlea  
Palmerston North

**IANZ Accredited Laboratory 537**

<b>Make:</b> Norsonic	<b>Type:</b> Nor1256	<b>Serial No:</b> 125626090
<b>Date Tested:</b> 19 May 2020	<b>By:</b> RJ	<b>Job No:</b> SO012835-125626090

A measurement of the output sound pressure level of the calibrator was made by the insert voltage method, using a microphone of known sensitivity. Testing has been conducted in accordance with IEC60942 (2017) Annex B - Periodic Verification Tests. Tested using Diatec procedure; Proc\_Sound\_Calibrators.

#### Results

Measurement results reported are traceable to SI units via recognised National Standards.

**Reference Microphone:** Bruel & Kjaer 4134      **Serial No:** 1094890 fitted with protection grid.

**Ambient Temperature:** 23.0°C ± 1°C      **Ambient Pressure:** 1021.5 hPa

Calibrator frequency was **251.2**Hz on the 250Hz setting  
Calibrator frequency was **1000.0**Hz on the 1kHz setting  
Distortion was **0.26** % THD+N on the 250Hz setting @114dB  
Distortion was **0.21** % THD+N on the 1kHz setting @114dB

The sound pressure level measured **94.04** dBSPL re 20 µPa on the 250 Hz @ 94dB setting.

The sound pressure level measured **114.03** dBSPL re 20 µPa on the 250 Hz @ 114dB setting.


The sound pressure level measured **94.12** dBSPL re 20 µPa on the 1 kHz @ 94dB setting.


The sound pressure level measured **114.09** dBSPL re 20 µPa on the 1 kHz @ 114dB setting.

The expanded uncertainty was calculated using a coverage factor of 2.04 and is estimated to be ±0.06 dB with a confidence level of 95%. The sound calibrator was tested with the ½ inch aperture.

The sound calibrator was tested against Class 1 tolerance limits of the standard and has been shown to meet periodic verification criteria described in IEC60942:2017 for the sound pressure level(s), distortion and frequency(ies) stated, for the environmental conditions under which tests were performed.

**Note 1:** The manufacturer of this model of calibrator does not claim type approval conformance to IEC60942 (2017 edition) as it was manufactured before this standard was written.

  
(Robert Jaques)  
Authorised IANZ signatory

  
(Alex Dalry)  
Report Checked

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