

Baseline Vibration and Noise  
Monitoring Report 2023  
for  
Kilwex Ltd  
at  
Timahoe, Coolenabacky, Co. Laois.

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## 1.0 Introduction

This report presents the findings of the baseline vibration and noise monitoring undertaken at the Nearest Sensitive location to the *Kilwex site at Coolnabacky, Co. Laois*.

This report summarises the results of the vibration and noise monitoring undertaken during the period 20<sup>th</sup> February 2023 to the 25<sup>th</sup> February 2023.

Monitoring was carried out by setting down a vibration meter and a noise meter at a previously agreed location by a Coyle Environmental Technician. Noise and vibration data was analysed by a technician.

### 1.1 Guidelines

#### 1.1.1 Vibration

The NRA has published Guidelines on the management of Noise and Vibration on construction works<sup>1</sup>.

- The NRA's *Guidelines* point out that there are two separate considerations for vibration during the construction phase: that which affects human comfort and that which affects cosmetic or structural damage to buildings. The *Guidelines* suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively.
- The NRA's *Guidelines* sets out the following indicative levels of acceptability for construction, "To avoid the risk of even cosmetic damage to buildings, the *Guidelines* suggest that vibration levels should be limited to 8mm/s, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above".

Table 1 Ground Vibration Limits

Table 1 Ground Vibration Limits

Frequency	Peak Particle Velocity (ppv) mm/s
at frequencies of less than 10Hz	8
at frequencies of between 10Hz and 50Hz	12.5

<sup>1</sup> Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes March 2014

Vibration measurements are undertaken in accordance with **BS 7385-1:1990, (ISO 4866:1990) Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings.**

Ground vibration can be defined as regularly repeated movement of a physical object about a fixed point. The parameter most commonly utilised to evaluate ground vibration is the peak particle velocity (ppv) expressed in millimetres per second (mm/s). Further the amplitude and frequency of the motion are measured in the three orthogonal directions generally in terms of velocity which is considered to be the best descriptor for assessing human comfort and the potential damage response of structures. Vibration can cause varying degrees of damage in buildings and affect vibration-sensitive machinery or equipment. Its effect on people may be to cause disturbance or annoyance or, at higher levels, to affect a person's ability to work. The potential negative effects of ground vibration are a function of the intensity and the frequency.

### **1.1.2 Noise**

- The survey was carried out in accordance with ISO 1996 Part 1 (Description and Measurement of Environmental Noise - Part 1: Basic Quantities and Procedures) The noise monitoring equipment was positioned proximal to NSRs correctly located at 1.5m above ground level and away from reflecting surfaces.
- Acoustic instrumentation was field calibrated before and after the survey
  - No drift of calibration was observed (calibration level 114 dB at 1000 Hz).

#### **Defining the Existing Noise Environment**

##### **Step 1 Quiet area screening of the development location**

It was determined at the preliminary screening stage that the proposed site does not meet the necessary criteria and is therefore not considered to be a quiet area as per the EPA definition.

##### **Step 2 Baseline Environmental Noise Survey**

- An Environmental noise survey was carried out to establish the existing ambient and background noise levels in the area.
- the baseline noise monitoring survey was carried out in accordance with ISO 1996 Part 1 (Description and Measurement of Environmental Noise - Part 2: Determination of environmental noise levels).
- The survey was carried out at a single strategically chosen noise sensitive receptors (NSR) proximal to the proposed development.

Traditionally environmental noise limits have been stated over daytime and night-time periods only.

With this in mind the baseline noise data has been divided into these distinct time categories<sup>2</sup>.

- Daytime Period            07:00 – 22:00
- Night Period                22:00 – 07:00

The existing ambient (LAeq) and background noise (LA90) levels in the areas of the proposed development were established during a period of continuous monitoring at a single representative location over the period 20<sup>th</sup> to the 25<sup>th</sup> February 2023.

At the measurement positions, the following noise level indices were recorded:

- LAeq,T is the A-weighted equivalent continuous noise level over the measurement period, and effectively represents an “average” value.
- LA90,T is the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.
- LA10,T is the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe traffic noise.

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<sup>2</sup> ISO 1996-1. Acoustics — Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures

## 2.0 Monitoring location

*Kilwex- Nearest Sensitive Location 1*

Table 2 Monitoring Location details

*Table 2 Locations*

Location	Eastings	Northings	Address
<a href="#">N01</a>	52.979443	-7.208092	Esker, Timahoe, Coolnabacky Co. Laois
<a href="#">V01</a>	52.979238	-7.207673	Esker, Timahoe, Coolnabacky Co.Laois

Figure 1 Location map



*Figure 1 Area Location*



Figure 2 Vibration meter location



Figure 2 Vibration meter pin drop

Figure 3 Noise Meter Location

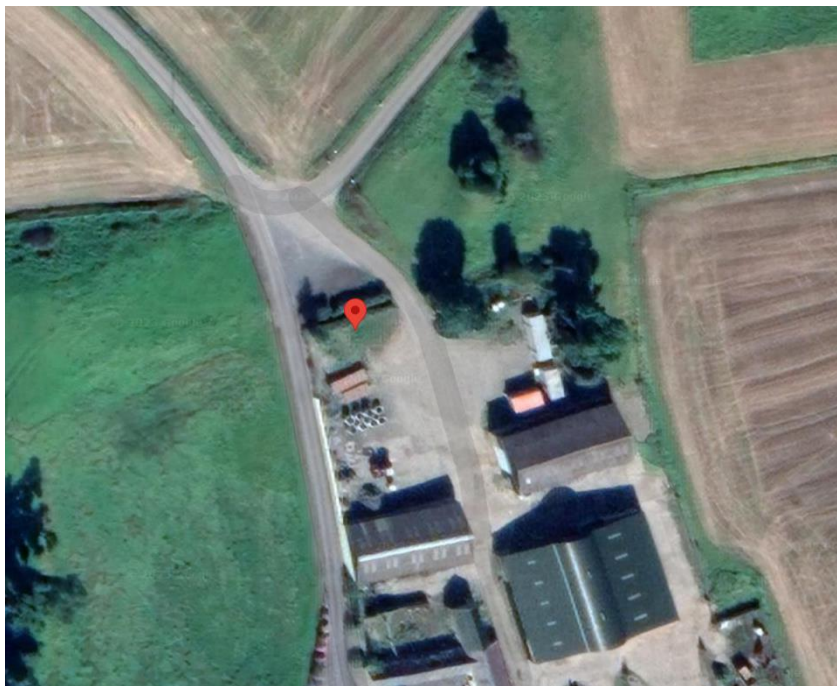


Figure 3 Noise Meter pin drop



## 3.0 Methodology

### 3.1 Vibration

- Vibration measurements were taken during calm and good weather conditions.
- A Micromate vibration monitor, and protection case was set down at a previously agreed area at the Nearest Sensitive Location proximal to the proposed development.
- Ground conditions were analysed and a ground level check was carried out before measurement started.
- Monitoring location for vibration were selected to coincide with local residence
- Measurements were undertaken during weekday and weekend periods

### 3.2 Noise

- A noise meter was set up. Apparatus include a Larson Davis LXT Precision integrating Sound Level Analyser, wind shield and microphone stand.
- Measurement of ambient noise levels were taken during good weather conditions using instruments of Class 1 specification.
- Weather variables including rainfall and wind speed were recorded for the duration of the survey.
  - Wind speeds <3 m/s
  - No precipitation
- Monitoring locations were selected to coincide with local residence
- Measurements were undertaken during weekday and weekend periods

### 3.3 Instrumentation

Table 3 Instrumentation used

*Table 3 instrumentation used*

<b>Location</b>	<b>Vibration</b>
V01	<i>One no. InstanTel MicroMate (20<sup>th</sup> February to 25<sup>th</sup> February 2023)</i>
	<b>Noise</b>
N02	<i>One no. Larson Davis LXT Precision Integrating Sound Level Analyser/Data logger Wind Shields Type: Larson Davis 2120 Windscreen (20<sup>th</sup> February to 25<sup>th</sup> February 2023)</i>

## 4.0 Results

### 4.1 Vibration Monitoring Results

- During the period 20<sup>th</sup> February to 25<sup>th</sup> February an InstanTel MicroMate instrument was installed to monitor vibration at the side of a farm shed at the nearest sensitive location reference NSL01.
- The vibration monitor was set to measure any vibration detection in 5 minute intervals.
  
- During the period between 20<sup>th</sup> – 25<sup>th</sup> February there have been no instances of vibration that have exceed the following indicative levels of acceptability for construction of 8 ppv mm/s or 12.5 ppv mm/s respectively.
  
- It was noted that most vibration was detected between the hours of 10 and 11:30 am during this period.
  
- All vibration measured and detected is well within the maximum allowable limit for vibration.
  
- Summary data is illustrated in figure 4. The vibration technician report is available in appendix 1. The full data set data is available in appendix 2

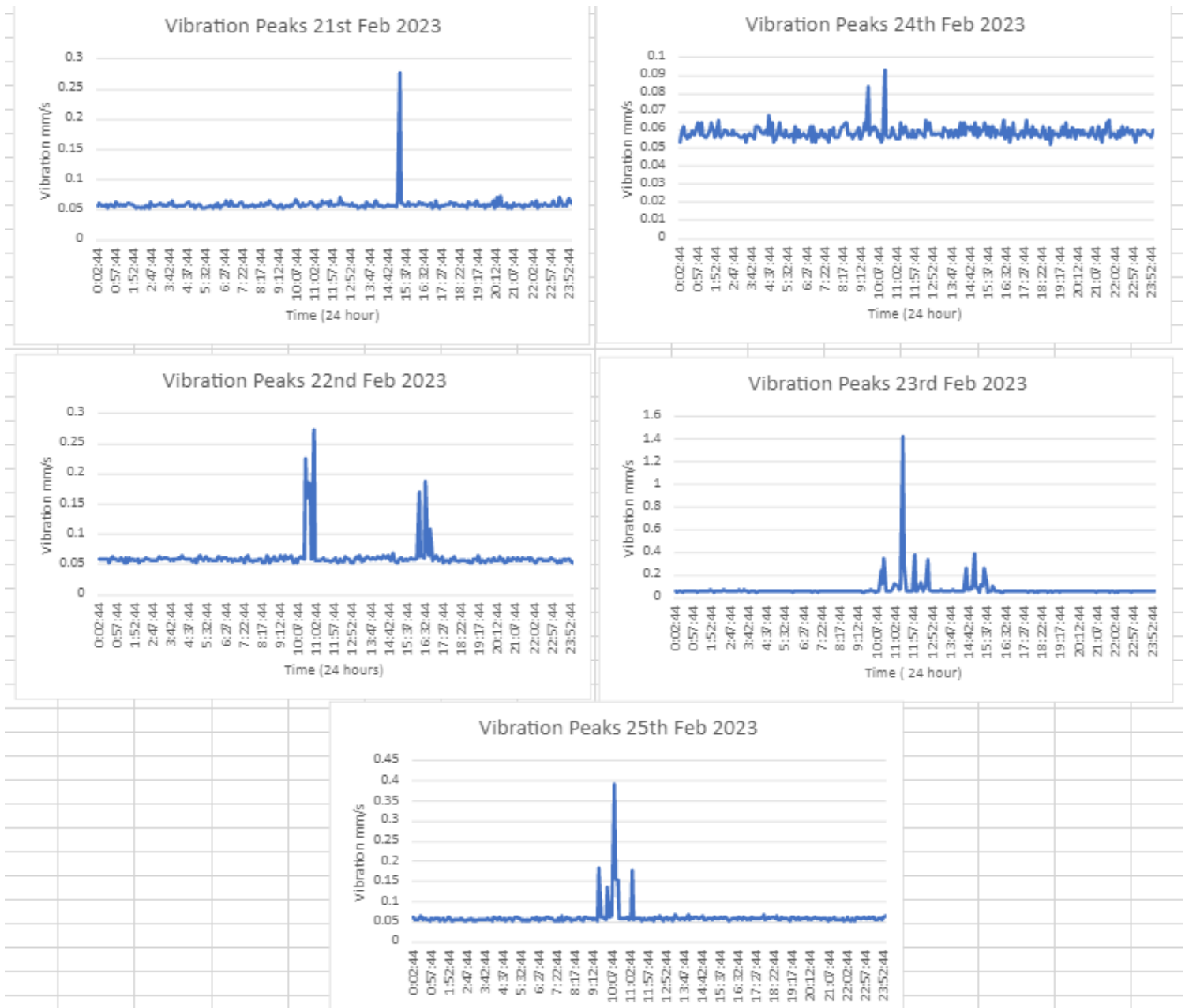


Figure 4 Kilwex V01 Vibration data 20th-25th February 2023

## 4.2 Noise results

The complete dataset from the baseline study is presented in appendix 3.

A summary of the interval (mean & modal values) measurements is given in Table 4 and illustrated in figure 5 below.

Table 4 Baseline noise levels

Table 4 Baseline Noise Levels

Monitoring Location id		Day-time Noise levels dB(A)			Night-time Noise levels dB(A)		
		LeqT	L <sub>10</sub>	L <sub>90</sub>	LeqT	L <sub>10</sub>	L <sub>90</sub>
NM01	Mean	42	44	33	30	33	25
	Mode	41	44	33	29	33	25

Figure 5 Survey noise levels

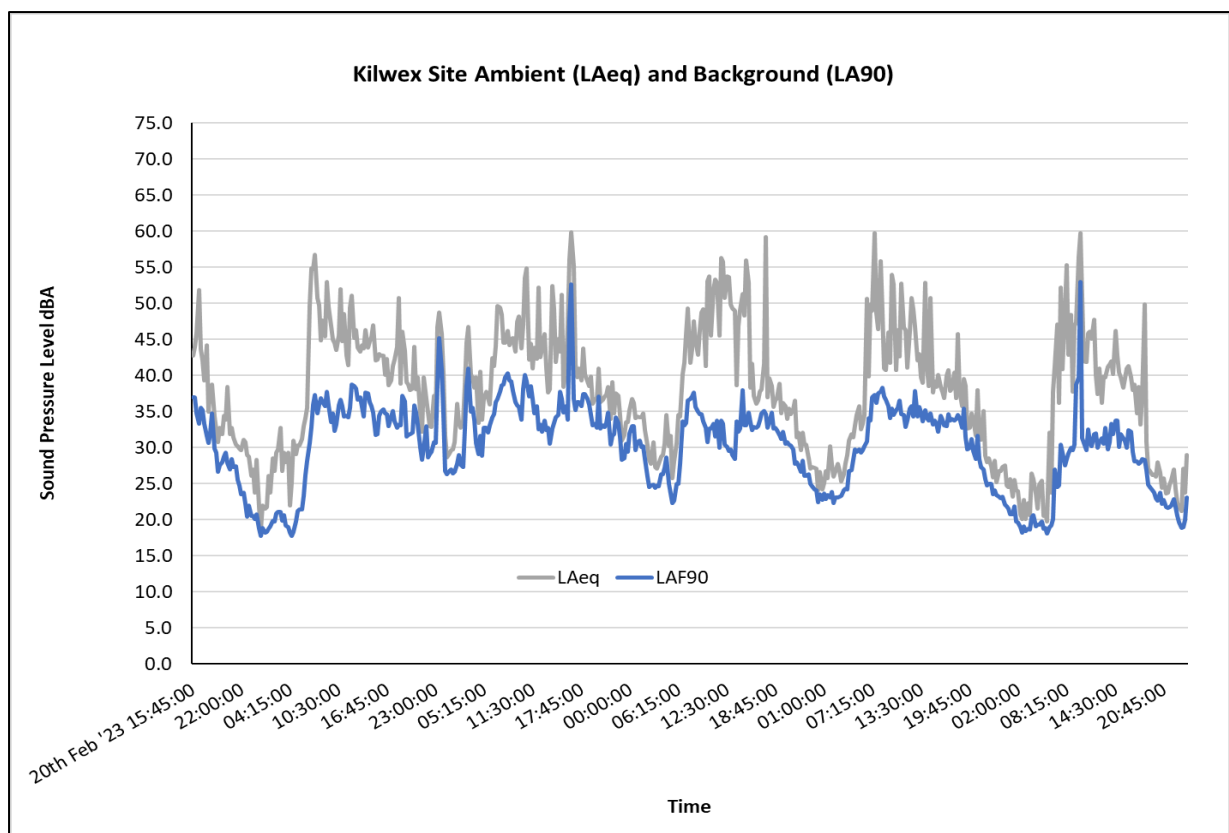


Figure 5 V01 Baseline Noise 20<sup>th</sup>-25<sup>th</sup> February 2023

## 5.0 Conclusion

Monitoring data demonstrates baseline noise and vibration activity prior to construction commencement.

The results conclude that there is minimal noise and vibration activity at this location prior to construction during the period of monitoring. It is expected that noise and vibration levels at this location may fluctuate seasonally due to farm operations.

## Appendices

### **Appendix 1 – Vibration data**



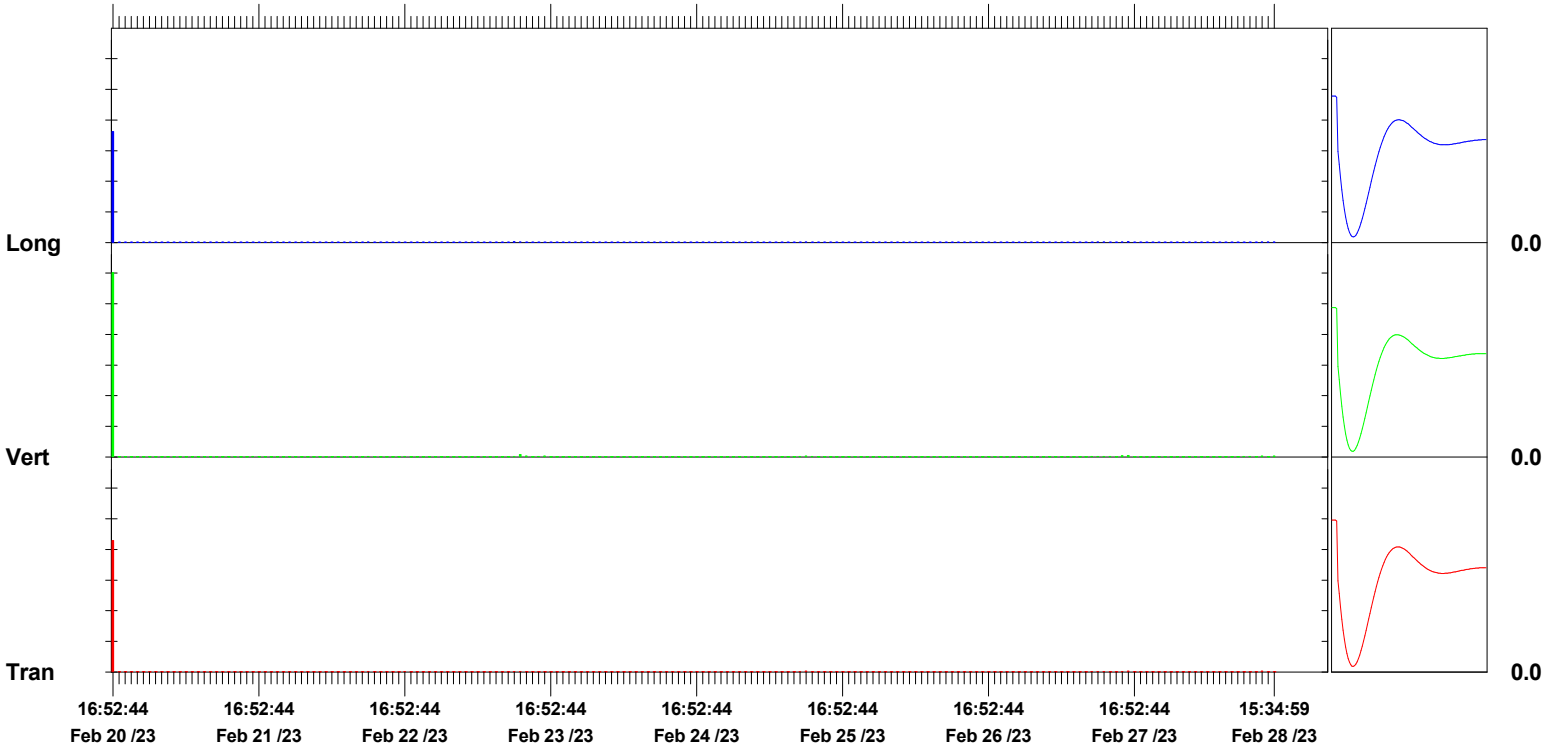
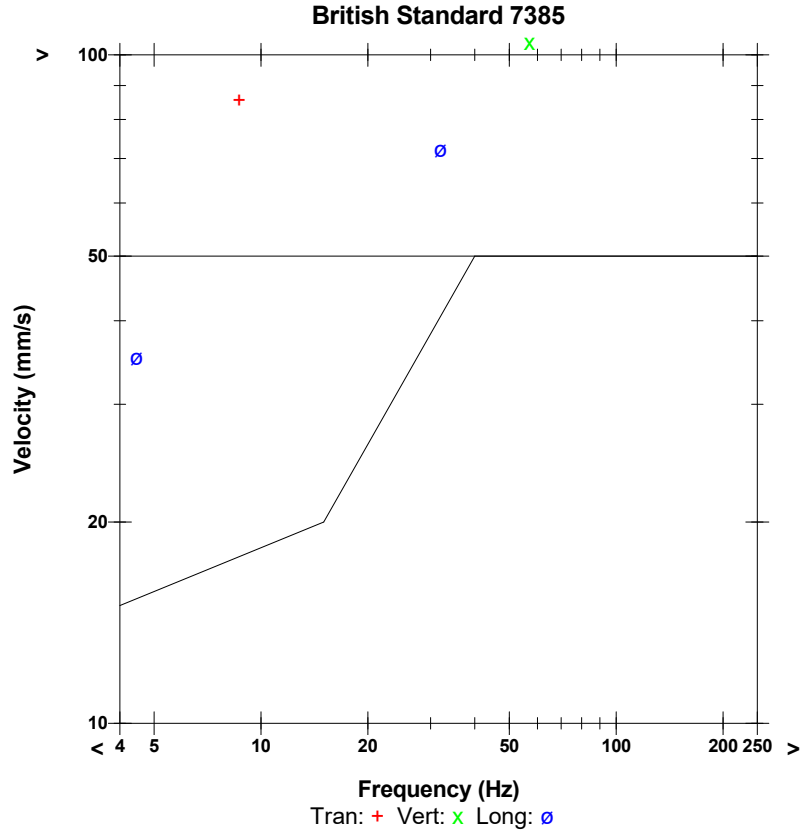
**Histogram Start Time** 15:52:44 February 20, 2023  
**Histogram Finish Time** 15:34:59 February 28, 2023  
**Number of Intervals** 2300.45 at 5 minutes  
**Range** Geo:254.0 mm/s  
**Sample Rate** 1024sps  
**Operator/Setup:** Operator/SITE.MMB

**Serial Number** UM18157 V 10-90 Micromate ISEE  
**Battery Level** 3.8 Volts  
**Unit Calibration** June 21, 2022 by  
**File Name** UM18157\_20230220155244.IDFH

**Notes**  
 Location:  
 Client:  
 User Name:  
 General:

**Post Event Notes**  
 Coolnabackey, County Laois  
 User: Coyle Environmental

	Tran	Vert	Long	
PPV	85.62	120.2	72.33	mm/s
ZC Freq	8.7	57	32	Hz
Date	Feb 20 /23	Feb 20 /23	Feb 20 /23	
Time	16:02:44	16:02:44	16:02:44	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	4.0	4.6	4.5	
Peak Vector Sum	138.7 mm/s on February 20, 2023 at 16:02:44			



Time Scale: 1 hour /div Amplitude Scale: Geo: 20.00 mm/s/div

## Appendices

### Appendix 2 – Vibration data set

**Vibration over 24 hours 20-25th Feb 2023**

	Time	mm/s	Time	mm/s	Time	mm/s	
20th	20th		21st		22nd		
	15:57:44	36.2		00:02:44	0.057	00:02:44	0.058
	16:02:44	138.7		00:07:44	0.06	00:07:44	0.058
	16:07:44	0.057		00:12:44	0.056	00:12:44	0.058
	16:12:44	0.056		00:17:44	0.056	00:17:44	0.058
	16:17:44	0.475		00:22:44	0.057	00:22:44	0.058
	16:22:44	0.057		00:27:44	0.059	00:27:44	0.058
	16:27:44	0.058		00:32:44	0.053	00:32:44	0.053
	16:32:44	0.056		00:37:44	0.058	00:37:44	0.061
	16:37:44	0.062		00:42:44	0.058	00:42:44	0.062
	16:42:44	0.055		00:47:44	0.056	00:47:44	0.058
	16:47:44	0.056		00:52:44	0.055	00:52:44	0.059
	16:52:44	0.058		00:57:44	0.062	00:57:44	0.056
	16:57:44	0.062		01:02:44	0.058	01:02:44	0.057
	17:02:44	0.056		01:07:44	0.057	01:07:44	0.061
	17:07:44	0.056		01:12:44	0.058	01:12:44	0.058
	17:12:44	0.057		01:17:44	0.056	01:17:44	0.053
	17:17:44	0.057		01:22:44	0.058	01:22:44	0.061
	17:22:44	0.058		01:27:44	0.057	01:27:44	0.053
	17:27:44	0.059		01:32:44	0.06	01:32:44	0.061
	17:32:44	0.064		01:37:44	0.06	01:37:44	0.056
	17:37:44	0.062		01:42:44	0.058	01:42:44	0.059
	17:42:44	0.059		01:47:44	0.058	01:47:44	0.056
	17:47:44	0.057		01:52:44	0.056	01:52:44	0.056
	17:52:44	0.065		01:57:44	0.053	01:57:44	0.058
	17:57:44	0.056		02:02:44	0.055	02:02:44	0.053
	18:02:44	0.062		02:07:44	0.055	02:07:44	0.056
	18:07:44	0.058		02:12:44	0.053	02:12:44	0.057
	18:12:44	0.058		02:17:44	0.055	02:17:44	0.056
	18:17:44	0.058		02:22:44	0.053	02:22:44	0.061
	18:22:44	0.059		02:27:44	0.056	02:27:44	0.058
	18:27:44	0.059		02:32:44	0.057	02:32:44	0.058
	18:32:44	0.053		02:37:44	0.053	02:37:44	0.057
	18:37:44	0.057		02:42:44	0.062	02:42:44	0.057
	18:42:44	0.057		02:47:44	0.058	02:47:44	0.057
	18:47:44	0.057		02:52:44	0.056	02:52:44	0.056
	18:52:44	0.064		02:57:44	0.057	02:57:44	0.057
	18:57:44	0.064		03:02:44	0.059	03:02:44	0.063
	19:02:44	0.058		03:07:44	0.058	03:07:44	0.06
	19:07:44	0.06		03:12:44	0.06	03:12:44	0.058
	19:12:44	0.062		03:17:44	0.056	03:17:44	0.061
	19:17:44	0.058		03:22:44	0.058	03:22:44	0.06
	19:22:44	0.059		03:27:44	0.056	03:27:44	0.06
	19:27:44	0.06		03:32:44	0.057	03:32:44	0.058
	19:32:44	0.058		03:37:44	0.06	03:37:44	0.056
	19:37:44	0.06		03:42:44	0.058	03:42:44	0.058
	19:42:44	0.058		03:47:44	0.064	03:47:44	0.056
	19:47:44	0.057		03:52:44	0.056	03:52:44	0.058

19:52:44	0.062	03:57:44	0.057	03:57:44	0.058
19:57:44	0.059	04:02:44	0.055	04:02:44	0.06
20:02:44	0.057	04:07:44	0.057	04:07:44	0.059
20:07:44	0.053	04:12:44	0.056	04:12:44	0.064
20:12:44	0.06	04:17:44	0.056	04:17:44	0.06
20:17:44	0.058	04:22:44	0.057	04:22:44	0.058
20:22:44	0.057	04:27:44	0.059	04:27:44	0.058
20:27:44	0.058	04:32:44	0.06	04:32:44	0.058
20:32:44	0.062	04:37:44	0.062	04:37:44	0.059
20:37:44	0.058	04:42:44	0.057	04:42:44	0.057
20:42:44	0.058	04:47:44	0.056	04:47:44	0.055
20:47:44	0.057	04:52:44	0.058	04:52:44	0.058
20:52:44	0.058	04:57:44	0.053	04:57:44	0.053
20:57:44	0.057	05:02:44	0.057	05:02:44	0.062
21:02:44	0.056	05:07:44	0.058	05:07:44	0.064
21:07:44	0.056	05:12:44	0.058	05:12:44	0.058
21:12:44	0.058	05:17:44	0.052	05:17:44	0.057
21:17:44	0.056	05:22:44	0.053	05:22:44	0.06
21:22:44	0.056	05:27:44	0.053	05:27:44	0.062
21:27:44	0.058	05:32:44	0.055	05:32:44	0.056
21:32:44	0.058	05:37:44	0.055	05:37:44	0.059
21:37:44	0.056	05:42:44	0.056	05:42:44	0.057
21:42:44	0.058	05:47:44	0.055	05:47:44	0.057
21:47:44	0.061	05:52:44	0.053	05:52:44	0.057
21:52:44	0.058	05:57:44	0.058	05:57:44	0.056
21:57:44	0.056	06:02:44	0.055	06:02:44	0.062
22:02:44	0.061	06:07:44	0.061	06:07:44	0.062
22:07:44	0.056	06:12:44	0.053	06:12:44	0.056
22:12:44	0.059	06:17:44	0.056	06:17:44	0.061
22:17:44	0.06	06:22:44	0.058	06:22:44	0.06
22:22:44	0.053	06:27:44	0.058	06:27:44	0.061
22:27:44	0.062	06:32:44	0.064	06:32:44	0.056
22:32:44	0.057	06:37:44	0.057	06:37:44	0.059
22:37:44	0.06	06:42:44	0.056	06:42:44	0.059
22:42:44	0.056	06:47:44	0.064	06:47:44	0.055
22:47:44	0.058	06:52:44	0.057	06:52:44	0.058
22:52:44	0.059	06:57:44	0.056	06:57:44	0.057
22:57:44	0.058	07:02:44	0.056	07:02:44	0.056
23:02:44	0.056	07:07:44	0.057	07:07:44	0.056
23:07:44	0.06	07:12:44	0.06	07:12:44	0.061
23:12:44	0.057	07:17:44	0.062	07:17:44	0.057
23:17:44	0.056	07:22:44	0.058	07:22:44	0.053
23:22:44	0.056	07:27:44	0.055	07:27:44	0.061
23:27:44	0.056	07:32:44	0.056	07:32:44	0.065
23:32:44	0.053	07:37:44	0.055	07:37:44	0.057
23:37:44	0.06	07:42:44	0.056	07:42:44	0.056
23:42:44	0.06	07:47:44	0.057	07:47:44	0.055
23:47:44	0.057	07:52:44	0.059	07:52:44	0.056
23:52:44	0.057	07:57:44	0.055	07:57:44	0.056
23:57:44	0.053	08:02:44	0.057	08:02:44	0.057

08:07:44	0.057	08:07:44	0.058
08:12:44	0.056	08:12:44	0.058
08:17:44	0.061	08:17:44	0.053
08:22:44	0.056	08:22:44	0.053
08:27:44	0.056	08:27:44	0.058
08:32:44	0.06	08:32:44	0.064
08:37:44	0.058	08:37:44	0.053
08:42:44	0.065	08:42:44	0.059
08:47:44	0.06	08:47:44	0.057
08:52:44	0.058	08:52:44	0.062
08:57:44	0.056	08:57:44	0.057
09:02:44	0.055	09:02:44	0.057
09:07:44	0.053	09:07:44	0.058
09:12:44	0.056	09:12:44	0.065
09:17:44	0.058	09:17:44	0.059
09:22:44	0.053	09:22:44	0.057
09:27:44	0.053	09:27:44	0.064
09:32:44	0.056	09:32:44	0.058
09:37:44	0.056	09:37:44	0.061
09:42:44	0.055	09:42:44	0.064
09:47:44	0.059	09:47:44	0.056
09:52:44	0.056	09:52:44	0.053
09:57:44	0.061	09:57:44	0.059
10:02:44	0.066	10:02:44	0.053
10:07:44	0.065	10:07:44	0.058
10:12:44	0.056	10:12:44	0.062
10:17:44	0.055	10:17:44	0.06
10:22:44	0.06	10:22:44	0.058
10:27:44	0.057	10:27:44	0.226
10:32:44	0.057	10:32:44	0.16
10:37:44	0.059	10:37:44	0.185
10:42:44	0.058	10:42:44	0.164
10:47:44	0.062	10:47:44	0.058
10:52:44	0.06	10:52:44	0.273
10:57:44	0.056	10:57:44	0.056
11:02:44	0.056	11:02:44	0.056
11:07:44	0.053	11:07:44	0.056
11:12:44	0.058	11:12:44	0.056
11:17:44	0.056	11:17:44	0.058
11:22:44	0.065	11:22:44	0.06
11:27:44	0.061	11:27:44	0.057
11:32:44	0.061	11:32:44	0.057
11:37:44	0.062	11:37:44	0.056
11:42:44	0.056	11:42:44	0.055
11:47:44	0.064	11:47:44	0.056
11:52:44	0.058	11:52:44	0.056
11:57:44	0.056	11:57:44	0.061
12:02:44	0.058	12:02:44	0.055
12:07:44	0.058	12:07:44	0.053
12:12:44	0.058	12:12:44	0.058

12:17:44	0.071	12:17:44	0.055
12:22:44	0.059	12:22:44	0.055
12:27:44	0.061	12:27:44	0.062
12:32:44	0.058	12:32:44	0.06
12:37:44	0.058	12:37:44	0.059
12:42:44	0.059	12:42:44	0.057
12:47:44	0.056	12:47:44	0.053
12:52:44	0.06	12:52:44	0.053
12:57:44	0.056	12:57:44	0.058
13:02:44	0.057	13:02:44	0.062
13:07:44	0.056	13:07:44	0.059
13:12:44	0.053	13:12:44	0.064
13:17:44	0.055	13:17:44	0.055
13:22:44	0.056	13:22:44	0.058
13:27:44	0.056	13:27:44	0.056
13:32:44	0.053	13:32:44	0.062
13:37:44	0.062	13:37:44	0.062
13:42:44	0.056	13:42:44	0.059
13:47:44	0.058	13:47:44	0.059
13:52:44	0.057	13:52:44	0.061
13:57:44	0.055	13:57:44	0.058
14:02:44	0.062	14:02:44	0.058
14:07:44	0.064	14:07:44	0.062
14:12:44	0.056	14:12:44	0.061
14:17:44	0.057	14:17:44	0.059
14:22:44	0.056	14:22:44	0.064
14:27:44	0.055	14:27:44	0.062
14:32:44	0.055	14:32:44	0.06
14:37:44	0.056	14:37:44	0.064
14:42:44	0.059	14:42:44	0.058
14:47:44	0.057	14:47:44	0.057
14:52:44	0.056	14:52:44	0.069
14:57:44	0.057	14:57:44	0.057
15:02:44	0.057	15:02:44	0.053
15:07:44	0.055	15:07:44	0.053
15:12:44	0.064	15:12:44	0.059
15:17:44	0.278	15:17:44	0.061
15:22:44	0.06	15:22:44	0.057
15:27:44	0.061	15:27:44	0.057
15:32:44	0.056	15:32:44	0.058
15:37:44	0.056	15:37:44	0.056
15:42:44	0.062	15:42:44	0.059
15:47:44	0.057	15:47:44	0.061
15:52:44	0.059	15:52:44	0.059
15:57:44	0.059	15:57:44	0.058
16:02:44	0.058	16:02:44	0.059
16:07:44	0.057	16:07:44	0.06
16:12:44	0.059	16:12:44	0.169
16:17:44	0.062	16:17:44	0.062
16:22:44	0.058	16:22:44	0.064

16:27:44	0.06	16:27:44	0.06
16:32:44	0.059	16:32:44	0.188
16:37:44	0.059	16:37:44	0.071
16:42:44	0.057	16:42:44	0.064
16:47:44	0.058	16:47:44	0.108
16:52:44	0.06	16:52:44	0.057
16:57:44	0.053	16:57:44	0.058
17:02:44	0.056	17:02:44	0.064
17:07:44	0.064	17:07:44	0.061
17:12:44	0.056	17:12:44	0.056
17:17:44	0.053	17:17:44	0.058
17:22:44	0.056	17:22:44	0.063
17:27:44	0.057	17:27:44	0.053
17:32:44	0.056	17:32:44	0.056
17:37:44	0.058	17:37:44	0.057
17:42:44	0.059	17:42:44	0.053
17:47:44	0.058	17:47:44	0.059
17:52:44	0.062	17:52:44	0.057
17:57:44	0.061	17:57:44	0.062
18:02:44	0.056	18:02:44	0.056
18:07:44	0.06	18:07:44	0.057
18:12:44	0.059	18:12:44	0.055
18:17:44	0.057	18:17:44	0.056
18:22:44	0.057	18:22:44	0.056
18:27:44	0.059	18:27:44	0.056
18:32:44	0.056	18:32:44	0.056
18:37:44	0.056	18:37:44	0.055
18:42:44	0.053	18:42:44	0.056
18:47:44	0.062	18:47:44	0.053
18:52:44	0.058	18:52:44	0.053
18:57:44	0.058	18:57:44	0.058
19:02:44	0.06	19:02:44	0.058
19:07:44	0.056	19:07:44	0.056
19:12:44	0.064	19:12:44	0.064
19:17:44	0.057	19:17:44	0.053
19:22:44	0.057	19:22:44	0.056
19:27:44	0.057	19:27:44	0.056
19:32:44	0.059	19:32:44	0.053
19:37:44	0.053	19:37:44	0.056
19:42:44	0.058	19:42:44	0.058
19:47:44	0.059	19:47:44	0.056
19:52:44	0.057	19:52:44	0.055
19:57:44	0.061	19:57:44	0.06
20:02:44	0.065	20:02:44	0.057
20:07:44	0.052	20:07:44	0.056
20:12:44	0.07	20:12:44	0.056
20:17:44	0.056	20:17:44	0.062
20:22:44	0.072	20:22:44	0.057
20:27:44	0.057	20:27:44	0.059
20:32:44	0.056	20:32:44	0.053



20:37:44	0.057	20:37:44	0.055
20:42:44	0.06	20:42:44	0.06
20:47:44	0.053	20:47:44	0.056
20:52:44	0.056	20:52:44	0.056
20:57:44	0.053	20:57:44	0.061
21:02:44	0.061	21:02:44	0.058
21:07:44	0.056	21:07:44	0.056
21:12:44	0.057	21:12:44	0.06
21:17:44	0.058	21:17:44	0.056
21:22:44	0.058	21:22:44	0.057
21:27:44	0.056	21:27:44	0.061
21:32:44	0.053	21:32:44	0.058
21:37:44	0.059	21:37:44	0.059
21:42:44	0.056	21:42:44	0.06
21:47:44	0.056	21:47:44	0.056
21:52:44	0.057	21:52:44	0.06
21:57:44	0.062	21:57:44	0.056
22:02:44	0.059	22:02:44	0.055
22:07:44	0.056	22:07:44	0.053
22:12:44	0.064	22:12:44	0.059
22:17:44	0.053	22:17:44	0.058
22:22:44	0.058	22:22:44	0.059
22:27:44	0.058	22:27:44	0.057
22:32:44	0.056	22:32:44	0.057
22:37:44	0.06	22:37:44	0.056
22:42:44	0.058	22:42:44	0.057
22:47:44	0.057	22:47:44	0.056
22:52:44	0.057	22:52:44	0.06
22:57:44	0.057	22:57:44	0.058
23:02:44	0.065	23:02:44	0.056
23:07:44	0.058	23:07:44	0.057
23:12:44	0.057	23:12:44	0.053
23:17:44	0.056	23:17:44	0.056
23:22:44	0.07	23:22:44	0.053
23:27:44	0.066	23:27:44	0.056
23:32:44	0.056	23:32:44	0.058
23:37:44	0.058	23:37:44	0.056
23:42:44	0.056	23:42:44	0.058
23:47:44	0.064	23:47:44	0.058
23:52:44	0.069	23:52:44	0.057
23:57:44	0.061	23:57:44	0.052

Time	mm/s	Time	mm/s	Time	mm/s
23rd		24th		25th	
00:02:44	0.059	00:02:44	0.053	00:02:44	0.06
00:07:44	0.053	00:07:44	0.058	00:07:44	0.056
00:12:44	0.056	00:12:44	0.062	00:12:44	0.055
00:17:44	0.057	00:17:44	0.057	00:17:44	0.055
00:22:44	0.053	00:22:44	0.055	00:22:44	0.064
00:27:44	0.058	00:27:44	0.057	00:27:44	0.06
00:32:44	0.058	00:32:44	0.056	00:32:44	0.056
00:37:44	0.061	00:37:44	0.059	00:37:44	0.057
00:42:44	0.057	00:42:44	0.058	00:42:44	0.056
00:47:44	0.056	00:47:44	0.057	00:47:44	0.055
00:52:44	0.056	00:52:44	0.062	00:52:44	0.053
00:57:44	0.057	00:57:44	0.064	00:57:44	0.057
01:02:44	0.055	01:02:44	0.057	01:02:44	0.056
01:07:44	0.053	01:07:44	0.064	01:07:44	0.058
01:12:44	0.058	01:12:44	0.057	01:12:44	0.058
01:17:44	0.055	01:17:44	0.056	01:17:44	0.057
01:22:44	0.061	01:22:44	0.056	01:22:44	0.053
01:27:44	0.062	01:27:44	0.057	01:27:44	0.056
01:32:44	0.056	01:32:44	0.06	01:32:44	0.057
01:37:44	0.056	01:37:44	0.064	01:37:44	0.053
01:42:44	0.057	01:42:44	0.059	01:42:44	0.056
01:47:44	0.064	01:47:44	0.056	01:47:44	0.06
01:52:44	0.057	01:52:44	0.057	01:52:44	0.061
01:57:44	0.053	01:57:44	0.065	01:57:44	0.053
02:02:44	0.06	02:02:44	0.058	02:02:44	0.053
02:07:44	0.055	02:07:44	0.056	02:07:44	0.056
02:12:44	0.058	02:12:44	0.058	02:12:44	0.056
02:17:44	0.056	02:17:44	0.06	02:17:44	0.055
02:22:44	0.056	02:22:44	0.059	02:22:44	0.056
02:27:44	0.069	02:27:44	0.057	02:27:44	0.057
02:32:44	0.057	02:32:44	0.058	02:32:44	0.056
02:37:44	0.056	02:37:44	0.057	02:37:44	0.053
02:42:44	0.058	02:42:44	0.06	02:42:44	0.053
02:47:44	0.058	02:47:44	0.057	02:47:44	0.055
02:52:44	0.056	02:52:44	0.058	02:52:44	0.056
02:57:44	0.058	02:57:44	0.057	02:57:44	0.058
03:02:44	0.06	03:02:44	0.056	03:02:44	0.052
03:07:44	0.056	03:07:44	0.056	03:07:44	0.056
03:12:44	0.065	03:12:44	0.056	03:12:44	0.053
03:17:44	0.056	03:17:44	0.057	03:17:44	0.056
03:22:44	0.057	03:22:44	0.053	03:22:44	0.056
03:27:44	0.068	03:27:44	0.056	03:27:44	0.056
03:32:44	0.062	03:32:44	0.058	03:32:44	0.055
03:37:44	0.061	03:37:44	0.057	03:37:44	0.056
03:42:44	0.053	03:42:44	0.056	03:42:44	0.055
03:47:44	0.057	03:47:44	0.055	03:47:44	0.059
03:52:44	0.055	03:52:44	0.062	03:52:44	0.056

03:57:44	0.056	03:57:44	0.062	03:57:44	0.056
04:02:44	0.053	04:02:44	0.061	04:02:44	0.053
04:07:44	0.053	04:07:44	0.059	04:07:44	0.061
04:12:44	0.059	04:12:44	0.058	04:12:44	0.057
04:17:44	0.058	04:17:44	0.058	04:17:44	0.056
04:22:44	0.057	04:22:44	0.06	04:22:44	0.061
04:27:44	0.059	04:27:44	0.057	04:27:44	0.056
04:32:44	0.056	04:32:44	0.068	04:32:44	0.056
04:37:44	0.056	04:37:44	0.057	04:37:44	0.057
04:42:44	0.057	04:42:44	0.064	04:42:44	0.053
04:47:44	0.058	04:47:44	0.053	04:47:44	0.056
04:52:44	0.056	04:52:44	0.055	04:52:44	0.058
04:57:44	0.057	04:57:44	0.058	04:57:44	0.058
05:02:44	0.061	05:02:44	0.064	05:02:44	0.053
05:07:44	0.055	05:07:44	0.057	05:07:44	0.057
05:12:44	0.055	05:12:44	0.058	05:12:44	0.06
05:17:44	0.058	05:17:44	0.056	05:17:44	0.06
05:22:44	0.055	05:22:44	0.06	05:22:44	0.057
05:27:44	0.058	05:27:44	0.057	05:27:44	0.057
05:32:44	0.062	05:32:44	0.056	05:32:44	0.053
05:37:44	0.057	05:37:44	0.057	05:37:44	0.056
05:42:44	0.057	05:42:44	0.058	05:42:44	0.053
05:47:44	0.056	05:47:44	0.053	05:47:44	0.056
05:52:44	0.053	05:52:44	0.062	05:52:44	0.052
05:57:44	0.062	05:57:44	0.056	05:57:44	0.056
06:02:44	0.056	06:02:44	0.06	06:02:44	0.057
06:07:44	0.058	06:07:44	0.056	06:07:44	0.057
06:12:44	0.058	06:12:44	0.057	06:12:44	0.056
06:17:44	0.062	06:17:44	0.058	06:17:44	0.06
06:22:44	0.056	06:22:44	0.056	06:22:44	0.053
06:27:44	0.056	06:27:44	0.055	06:27:44	0.057
06:32:44	0.057	06:32:44	0.057	06:32:44	0.056
06:37:44	0.057	06:37:44	0.062	06:37:44	0.057
06:42:44	0.056	06:42:44	0.053	06:42:44	0.056
06:47:44	0.062	06:47:44	0.062	06:47:44	0.061
06:52:44	0.053	06:52:44	0.053	06:52:44	0.06
06:57:44	0.06	06:57:44	0.058	06:57:44	0.058
07:02:44	0.055	07:02:44	0.056	07:02:44	0.059
07:07:44	0.053	07:07:44	0.057	07:07:44	0.055
07:12:44	0.06	07:12:44	0.06	07:12:44	0.053
07:17:44	0.06	07:17:44	0.056	07:17:44	0.053
07:22:44	0.056	07:22:44	0.058	07:22:44	0.057
07:27:44	0.057	07:27:44	0.056	07:27:44	0.053
07:32:44	0.061	07:32:44	0.053	07:32:44	0.065
07:37:44	0.059	07:37:44	0.06	07:37:44	0.053
07:42:44	0.057	07:42:44	0.057	07:42:44	0.056
07:47:44	0.058	07:47:44	0.061	07:47:44	0.061
07:52:44	0.062	07:52:44	0.056	07:52:44	0.058
07:57:44	0.055	07:57:44	0.056	07:57:44	0.058
08:02:44	0.057	08:02:44	0.056	08:02:44	0.053

08:07:44	0.058	08:07:44	0.058	08:07:44	0.056
08:12:44	0.056	08:12:44	0.062	08:12:44	0.056
08:17:44	0.057	08:17:44	0.062	08:17:44	0.056
08:22:44	0.058	08:22:44	0.064	08:22:44	0.061
08:27:44	0.056	08:27:44	0.064	08:27:44	0.06
08:32:44	0.056	08:32:44	0.057	08:32:44	0.056
08:37:44	0.058	08:37:44	0.058	08:37:44	0.053
08:42:44	0.06	08:42:44	0.057	08:42:44	0.061
08:47:44	0.057	08:47:44	0.055	08:47:44	0.061
08:52:44	0.056	08:52:44	0.058	08:52:44	0.058
08:57:44	0.059	08:57:44	0.058	08:57:44	0.058
09:02:44	0.057	09:02:44	0.061	09:02:44	0.057
09:07:44	0.058	09:07:44	0.055	09:07:44	0.056
09:12:44	0.059	09:12:44	0.055	09:12:44	0.058
09:17:44	0.06	09:17:44	0.06	09:17:44	0.056
09:22:44	0.053	09:22:44	0.064	09:22:44	0.053
09:27:44	0.053	09:27:44	0.06	09:27:44	0.184
09:32:44	0.058	09:32:44	0.084	09:32:44	0.062
09:37:44	0.056	09:37:44	0.057	09:37:44	0.062
09:42:44	0.058	09:42:44	0.061	09:42:44	0.058
09:47:44	0.065	09:47:44	0.06	09:47:44	0.056
09:52:44	0.058	09:52:44	0.062	09:52:44	0.136
09:57:44	0.056	09:57:44	0.06	09:57:44	0.061
10:02:44	0.053	10:02:44	0.056	10:02:44	0.097
10:07:44	0.058	10:07:44	0.058	10:07:44	0.064
10:12:44	0.059	10:12:44	0.053	10:12:44	0.392
10:17:44	0.237	10:17:44	0.055	10:17:44	0.157
10:22:44	0.126	10:22:44	0.093	10:22:44	0.154
10:27:44	0.346	10:27:44	0.057	10:27:44	0.057
10:32:44	0.061	10:32:44	0.056	10:32:44	0.057
10:37:44	0.056	10:37:44	0.056	10:37:44	0.058
10:42:44	0.056	10:42:44	0.057	10:42:44	0.057
10:47:44	0.062	10:47:44	0.061	10:47:44	0.059
10:52:44	0.068	10:52:44	0.057	10:52:44	0.062
10:57:44	0.122	10:57:44	0.055	10:57:44	0.056
11:02:44	0.111	11:02:44	0.055	11:02:44	0.058
11:07:44	0.105	11:07:44	0.055	11:07:44	0.177
11:12:44	0.067	11:12:44	0.064	11:12:44	0.056
11:17:44	0.081	11:17:44	0.058	11:17:44	0.058
11:22:44	1.429	11:22:44	0.059	11:22:44	0.057
11:27:44	0.282	11:27:44	0.062	11:27:44	0.057
11:32:44	0.062	11:32:44	0.056	11:32:44	0.058
11:37:44	0.055	11:37:44	0.058	11:37:44	0.053
11:42:44	0.055	11:42:44	0.056	11:42:44	0.058
11:47:44	0.056	11:47:44	0.06	11:47:44	0.056
11:52:44	0.063	11:52:44	0.056	11:52:44	0.056
11:57:44	0.376	11:57:44	0.056	11:57:44	0.057
12:02:44	0.057	12:02:44	0.06	12:02:44	0.056
12:07:44	0.057	12:07:44	0.06	12:07:44	0.058
12:12:44	0.096	12:12:44	0.058	12:12:44	0.053

12:17:44	0.132	12:17:44	0.058	12:17:44	0.062
12:22:44	0.058	12:22:44	0.056	12:22:44	0.057
12:27:44	0.079	12:27:44	0.065	12:27:44	0.058
12:32:44	0.105	12:32:44	0.06	12:32:44	0.065
12:37:44	0.333	12:37:44	0.064	12:37:44	0.056
12:42:44	0.064	12:42:44	0.06	12:42:44	0.053
12:47:44	0.056	12:47:44	0.057	12:47:44	0.057
12:52:44	0.061	12:52:44	0.058	12:52:44	0.06
12:57:44	0.061	12:57:44	0.057	12:57:44	0.056
13:02:44	0.062	13:02:44	0.058	13:02:44	0.058
13:07:44	0.062	13:07:44	0.058	13:07:44	0.058
13:12:44	0.059	13:12:44	0.058	13:12:44	0.053
13:17:44	0.064	13:17:44	0.056	13:17:44	0.066
13:22:44	0.058	13:22:44	0.061	13:22:44	0.06
13:27:44	0.056	13:27:44	0.06	13:27:44	0.059
13:32:44	0.062	13:32:44	0.059	13:32:44	0.056
13:37:44	0.061	13:37:44	0.056	13:37:44	0.059
13:42:44	0.056	13:42:44	0.06	13:42:44	0.058
13:47:44	0.059	13:47:44	0.058	13:47:44	0.056
13:52:44	0.064	13:52:44	0.056	13:52:44	0.057
13:57:44	0.056	13:57:44	0.06	13:57:44	0.068
14:02:44	0.055	14:02:44	0.057	14:02:44	0.056
14:07:44	0.062	14:07:44	0.056	14:07:44	0.061
14:12:44	0.058	14:12:44	0.064	14:12:44	0.057
14:17:44	0.061	14:17:44	0.057	14:17:44	0.061
14:22:44	0.057	14:22:44	0.064	14:22:44	0.06
14:27:44	0.057	14:27:44	0.057	14:27:44	0.059
14:32:44	0.261	14:32:44	0.062	14:32:44	0.058
14:37:44	0.064	14:37:44	0.061	14:37:44	0.062
14:42:44	0.071	14:42:44	0.06	14:42:44	0.064
14:47:44	0.088	14:47:44	0.062	14:47:44	0.056
14:52:44	0.082	14:52:44	0.057	14:52:44	0.056
14:57:44	0.384	14:57:44	0.064	14:57:44	0.058
15:02:44	0.103	15:02:44	0.056	15:02:44	0.057
15:07:44	0.068	15:07:44	0.061	15:07:44	0.058
15:12:44	0.053	15:12:44	0.057	15:12:44	0.055
15:17:44	0.107	15:17:44	0.06	15:17:44	0.062
15:22:44	0.098	15:22:44	0.06	15:22:44	0.058
15:27:44	0.265	15:27:44	0.064	15:27:44	0.058
15:32:44	0.142	15:32:44	0.057	15:32:44	0.058
15:37:44	0.053	15:37:44	0.062	15:37:44	0.062
15:42:44	0.06	15:42:44	0.056	15:42:44	0.058
15:47:44	0.061	15:47:44	0.062	15:47:44	0.061
15:52:44	0.104	15:52:44	0.062	15:52:44	0.06
15:57:44	0.057	15:57:44	0.056	15:57:44	0.056
16:02:44	0.061	16:02:44	0.06	16:02:44	0.053
16:07:44	0.059	16:07:44	0.058	16:07:44	0.055
16:12:44	0.059	16:12:44	0.058	16:12:44	0.058
16:17:44	0.053	16:17:44	0.057	16:17:44	0.057
16:22:44	0.053	16:22:44	0.065	16:22:44	0.058

16:27:44	0.057	16:27:44	0.055	16:27:44	0.055
16:32:44	0.061	16:32:44	0.056	16:32:44	0.06
16:37:44	0.056	16:37:44	0.061	16:37:44	0.057
16:42:44	0.057	16:42:44	0.053	16:42:44	0.056
16:47:44	0.057	16:47:44	0.056	16:47:44	0.062
16:52:44	0.057	16:52:44	0.064	16:52:44	0.058
16:57:44	0.055	16:57:44	0.057	16:57:44	0.056
17:02:44	0.058	17:02:44	0.057	17:02:44	0.058
17:07:44	0.062	17:07:44	0.055	17:07:44	0.056
17:12:44	0.059	17:12:44	0.057	17:12:44	0.061
17:17:44	0.056	17:17:44	0.059	17:17:44	0.058
17:22:44	0.057	17:22:44	0.058	17:22:44	0.057
17:27:44	0.057	17:27:44	0.056	17:27:44	0.057
17:32:44	0.057	17:32:44	0.065	17:32:44	0.059
17:37:44	0.052	17:37:44	0.058	17:37:44	0.057
17:42:44	0.057	17:42:44	0.06	17:42:44	0.061
17:47:44	0.057	17:47:44	0.056	17:47:44	0.067
17:52:44	0.057	17:52:44	0.062	17:52:44	0.056
17:57:44	0.053	17:57:44	0.057	17:57:44	0.057
18:02:44	0.057	18:02:44	0.06	18:02:44	0.06
18:07:44	0.053	18:07:44	0.058	18:07:44	0.058
18:12:44	0.056	18:12:44	0.056	18:12:44	0.06
18:17:44	0.056	18:17:44	0.056	18:17:44	0.06
18:22:44	0.055	18:22:44	0.062	18:22:44	0.059
18:27:44	0.062	18:27:44	0.06	18:27:44	0.064
18:32:44	0.057	18:32:44	0.055	18:32:44	0.055
18:37:44	0.053	18:37:44	0.055	18:37:44	0.056
18:42:44	0.057	18:42:44	0.061	18:42:44	0.06
18:47:44	0.056	18:47:44	0.052	18:47:44	0.057
18:52:44	0.053	18:52:44	0.059	18:52:44	0.057
18:57:44	0.058	18:57:44	0.057	18:57:44	0.059
19:02:44	0.056	19:02:44	0.058	19:02:44	0.056
19:07:44	0.058	19:07:44	0.058	19:07:44	0.053
19:12:44	0.053	19:12:44	0.056	19:12:44	0.06
19:17:44	0.058	19:17:44	0.058	19:17:44	0.06
19:22:44	0.056	19:22:44	0.062	19:22:44	0.058
19:27:44	0.06	19:27:44	0.057	19:27:44	0.056
19:32:44	0.058	19:32:44	0.064	19:32:44	0.062
19:37:44	0.057	19:37:44	0.056	19:37:44	0.056
19:42:44	0.057	19:42:44	0.059	19:42:44	0.059
19:47:44	0.057	19:47:44	0.056	19:47:44	0.058
19:52:44	0.057	19:52:44	0.061	19:52:44	0.058
19:57:44	0.058	19:57:44	0.06	19:57:44	0.062
20:02:44	0.056	20:02:44	0.055	20:02:44	0.056
20:07:44	0.057	20:07:44	0.06	20:07:44	0.058
20:12:44	0.057	20:12:44	0.06	20:12:44	0.055
20:17:44	0.056	20:17:44	0.057	20:17:44	0.057
20:22:44	0.058	20:22:44	0.06	20:22:44	0.06
20:27:44	0.056	20:27:44	0.057	20:27:44	0.057
20:32:44	0.055	20:32:44	0.058	20:32:44	0.058

20:37:44	0.06	20:37:44	0.058	20:37:44	0.058
20:42:44	0.058	20:42:44	0.056	20:42:44	0.056
20:47:44	0.057	20:47:44	0.058	20:47:44	0.058
20:52:44	0.058	20:52:44	0.061	20:52:44	0.058
20:57:44	0.056	20:57:44	0.057	20:57:44	0.058
21:02:44	0.053	21:02:44	0.055	21:02:44	0.053
21:07:44	0.056	21:07:44	0.058	21:07:44	0.057
21:12:44	0.062	21:12:44	0.062	21:12:44	0.055
21:17:44	0.055	21:17:44	0.055	21:17:44	0.057
21:22:44	0.056	21:22:44	0.053	21:22:44	0.06
21:27:44	0.059	21:27:44	0.06	21:27:44	0.055
21:32:44	0.059	21:32:44	0.058	21:32:44	0.056
21:37:44	0.061	21:37:44	0.064	21:37:44	0.056
21:42:44	0.053	21:42:44	0.065	21:42:44	0.056
21:47:44	0.056	21:47:44	0.056	21:47:44	0.057
21:52:44	0.057	21:52:44	0.058	21:52:44	0.053
21:57:44	0.053	21:57:44	0.058	21:57:44	0.056
22:02:44	0.056	22:02:44	0.056	22:02:44	0.061
22:07:44	0.053	22:07:44	0.055	22:07:44	0.056
22:12:44	0.058	22:12:44	0.059	22:12:44	0.051
22:17:44	0.058	22:17:44	0.056	22:17:44	0.057
22:22:44	0.056	22:22:44	0.062	22:22:44	0.053
22:27:44	0.055	22:27:44	0.057	22:27:44	0.057
22:32:44	0.055	22:32:44	0.058	22:32:44	0.062
22:37:44	0.056	22:37:44	0.061	22:37:44	0.057
22:42:44	0.056	22:42:44	0.059	22:42:44	0.058
22:47:44	0.053	22:47:44	0.058	22:47:44	0.058
22:52:44	0.058	22:52:44	0.06	22:52:44	0.06
22:57:44	0.057	22:57:44	0.058	22:57:44	0.057
23:02:44	0.06	23:02:44	0.053	23:02:44	0.058
23:07:44	0.056	23:07:44	0.057	23:07:44	0.062
23:12:44	0.057	23:12:44	0.06	23:12:44	0.057
23:17:44	0.056	23:17:44	0.057	23:17:44	0.06
23:22:44	0.055	23:22:44	0.058	23:22:44	0.061
23:27:44	0.058	23:27:44	0.06	23:27:44	0.055
23:32:44	0.06	23:32:44	0.059	23:32:44	0.056
23:37:44	0.059	23:37:44	0.058	23:37:44	0.058
23:42:44	0.058	23:42:44	0.057	23:42:44	0.057
23:47:44	0.062	23:47:44	0.057	23:47:44	0.056
23:52:44	0.059	23:52:44	0.056	23:52:44	0.06
23:57:44	0.059	23:57:44	0.06	23:57:44	0.064





## Appendices

### **Appendix 3 – Noise data set**

Kilwex Baseline Noise Data 20th-25th February 2023

Date	Time	LAeq	LAFmin	LAFmax	LAF5	LAF10	LAF50	LAF90
20/02/2023	15:45:00	42.8	34.4	63.6	46.7	44.7	40.3	37
20/02/2023	16:00:00	44	34.6	66.7	46.7	43.6	39.4	37
20/02/2023	16:15:00	45.9	30.2	68.5	48.3	45.2	38.4	34.7
20/02/2023	16:30:00	51.9	29.6	79.1	55.8	47.2	37.8	33.3
20/02/2023	16:45:00	43.6	28.5	64.2	48	45	38.9	35.5
20/02/2023	17:00:00	42.1	29.1	62.1	46.6	44	39.2	35.2
20/02/2023	17:15:00	39.3	29.5	60.3	42.7	41.2	36.7	33.3
20/02/2023	17:30:00	44.2	28	73.2	41.4	39	34.4	31.6
20/02/2023	17:45:00	35	27.7	52.3	38.8	37.7	33.6	30.6
20/02/2023	18:00:00	38.2	28.6	57.1	42.2	40.6	35.6	32.1
20/02/2023	18:15:00	38.7	30.5	57.1	42.2	41.1	37.7	34.7
20/02/2023	18:30:00	34.3	26.1	41.6	37.9	37.1	33.4	29.9
20/02/2023	18:45:00	32.5	26.3	41.3	35.8	34.9	31.8	29.3
20/02/2023	19:00:00	30.8	24.3	42.4	34.9	33.2	29.4	26.6
20/02/2023	19:15:00	32.8	23.9	44.6	37.3	35.9	30.8	27.5
20/02/2023	19:30:00	31.9	25.1	43	35.9	34.3	30.6	28
20/02/2023	19:45:00	34.4	25.8	45.2	39.1	37.5	32.7	28.7
20/02/2023	20:00:00	33.9	26.1	45.3	37.6	36.4	32.6	29.3
20/02/2023	20:15:00	38.4	25.2	62.6	40.1	37.5	31.3	27.9
20/02/2023	20:30:00	31.9	24.2	44	36	34.7	30.2	27
20/02/2023	20:45:00	32.7	24.8	44.5	36.6	35.5	31.5	28.4
20/02/2023	21:00:00	31.4	25.2	43.2	35.9	34	29.6	27.3
20/02/2023	21:15:00	30.4	24.4	44.2	34	32.6	29.1	27.4
20/02/2023	21:30:00	30.2	22.4	42.8	34.6	33	28.4	25.5
20/02/2023	21:45:00	29.9	22.2	46.2	34.7	33	27.3	24.7
20/02/2023	22:00:00	29.6	21.8	43	34.9	33.6	26.3	23.5
20/02/2023	22:15:00	31.1	21.2	47.2	36.7	34.8	26.3	23.7
20/02/2023	22:30:00	30.7	20.5	51.3	36.5	33.8	25.4	22.2
20/02/2023	22:45:00	29	19	51.2	34.3	32.1	23.7	20.4
20/02/2023	23:00:00	28.7	19.1	44.2	33.7	31.6	25.6	22
20/02/2023	23:15:00	26.1	18.4	46.4	30.2	28	23	20.5
20/02/2023	23:30:00	27	19.1	42.5	32.7	30.6	23.1	20.5
20/02/2023	23:45:00	23.7	18.7	37.8	28.2	26	21.6	20.1
21/02/2023	00:00:00	28.3	18.9	46.6	34.4	31.3	23.1	20.8
21/02/2023	00:15:00	21.6	17.7	40.3	23.8	22.2	20.2	18.7
21/02/2023	00:30:00	18.6	17.2	31.2	19.9	19.4	18.2	17.8
21/02/2023	00:45:00	22	17.9	40.6	25.7	22.2	19.6	18.9
21/02/2023	01:00:00	21.5	17.5	42.1	24.7	21.9	19	18.2
21/02/2023	01:15:00	21.7	17.6	40.2	25.3	22.2	19.1	18.3
21/02/2023	01:30:00	26.1	17.9	47.3	30.9	27.8	19.9	18.7
21/02/2023	01:45:00	23.7	18.1	46.6	27.5	25.4	20.4	19.1
21/02/2023	02:00:00	28.5	18.6	45.7	35	31.5	21.3	19.9
21/02/2023	02:15:00	26.8	18.6	44.7	32.7	29.7	21.4	19.8
21/02/2023	02:30:00	29.3	19.3	46.1	35.5	32.2	23.6	20.9
21/02/2023	02:45:00	29.8	19.9	47.1	36.1	32.3	23.1	21.1
21/02/2023	03:00:00	32.8	18.8	52.5	38.1	35	24.7	21.1
21/02/2023	03:15:00	26.7	18.5	43	33.1	30.4	21.3	19.9
21/02/2023	03:30:00	29.3	19.6	50.6	35.7	32.8	22.6	20.6

21/02/2023	03:45:00	28	18.1	46.4	35.9	29.4	20.6	19.2
21/02/2023	04:00:00	29.3	18.1	49.3	36.3	31.7	20.2	19
21/02/2023	04:15:00	22	17.3	36.9	26.6	24.2	19.7	18.2
21/02/2023	04:30:00	25.2	17.2	43.1	30.5	26.1	18.4	17.7
21/02/2023	04:45:00	31	17.5	51.2	38.3	32.2	19.4	18.3
21/02/2023	05:00:00	29.1	18.4	47.4	35	32.8	22.3	19.8
21/02/2023	05:15:00	30.3	19.9	51.1	36.2	33	23.4	21.2
21/02/2023	05:30:00	30.3	19.8	45.8	36.1	34.1	25.7	21.4
21/02/2023	05:45:00	31.2	19.8	47.3	37.4	35	25.7	21.4
21/02/2023	06:00:00	33	20.6	49.6	38.5	36.1	28.7	23.3
21/02/2023	06:15:00	34.1	22.8	50.7	39.3	37.4	31.3	26.2
21/02/2023	06:30:00	35.5	24.3	48.8	40.9	39.1	32.8	28.2
21/02/2023	06:45:00	49.6	24.9	72.3	54.1	43.8	36.8	30.6
21/02/2023	07:00:00	54.9	27.5	73.3	62.4	55.6	38.6	32.9
21/02/2023	07:15:00	54.7	31.3	72.4	60.9	47.5	40.7	36
21/02/2023	07:30:00	56.7	30.3	74.8	64.1	61.1	44.5	37.3
21/02/2023	07:45:00	50.8	30.3	76.3	51.5	47.8	40	34.8
21/02/2023	08:00:00	49.7	31.3	72.3	49.7	47	40.4	36
21/02/2023	08:15:00	44.9	31.5	69.5	47.1	45.7	40.8	36.9
21/02/2023	08:30:00	47.6	30.6	71.3	51	47.2	40.5	36.3
21/02/2023	08:45:00	45.4	31.5	67.9	50	46.6	40	35.8
21/02/2023	09:00:00	53	31.7	69.1	60	57.5	44.7	37.8
21/02/2023	09:15:00	49.5	30.6	65.8	57.4	53.8	40.9	35.9
21/02/2023	09:30:00	46.9	29.3	70	51.2	45.9	37.4	33.5
21/02/2023	09:45:00	45	30.5	66	49.3	46.5	39.2	34.7
21/02/2023	10:00:00	44.5	28.7	72.1	49.7	47.2	37.4	32.3
21/02/2023	10:15:00	43.5	30.4	66	47.2	44.5	37.8	33.2
21/02/2023	10:30:00	45.5	30.9	72.7	50	48.2	41.2	35.9
21/02/2023	10:45:00	52	30.8	74.3	54.5	50.7	41.8	36.6
21/02/2023	11:00:00	44.8	31.4	67.5	49.1	46.4	40	35.7
21/02/2023	11:15:00	48.5	30.1	69.6	54.5	50.9	41	34.3
21/02/2023	11:30:00	42.8	30.2	61.8	48	45.4	38.7	34.4
21/02/2023	11:45:00	41.4	30.7	61.1	46.5	44	37.9	34.2
21/02/2023	12:00:00	49.4	32.5	73.8	53.8	48.5	39.5	35.5
21/02/2023	12:15:00	51.1	36.3	70.8	57.3	53.1	42.8	38.8
21/02/2023	12:30:00	45.2	36.3	65.1	50.6	48.6	41.9	38.5
21/02/2023	12:45:00	46.3	35.7	74.3	49.5	46.5	41.1	38.2
21/02/2023	13:00:00	43.9	35	68.1	49.4	45.6	39.1	36.6
21/02/2023	13:15:00	43.3	31.1	62.2	48.5	46.3	39.9	37
21/02/2023	13:30:00	44.2	31.7	65.6	50	47.1	39.7	35.6
21/02/2023	13:45:00	43.8	30.3	66.3	48.6	45.7	38.5	34.3
21/02/2023	14:00:00	46.3	32.8	66.3	51.2	48.4	41.7	37.6
21/02/2023	14:15:00	43.9	35.5	60.8	49	46.2	40.5	37.5
21/02/2023	14:30:00	44.8	33	65.8	48.8	45.5	40.5	36.3
21/02/2023	14:45:00	45.3	33.2	68.7	48.8	45.1	39.5	35.7
21/02/2023	15:00:00	47	29.9	68.8	49.8	45.6	39.3	34.9
21/02/2023	15:15:00	42.1	27.4	69.1	45.6	43.1	36.7	31.8
21/02/2023	15:30:00	42.2	29.6	65.1	47.5	44.4	36.2	31.9
21/02/2023	15:45:00	43	30.9	61.6	48.4	46.2	39.5	34.4
21/02/2023	16:00:00	42.8	31.7	67.1	47.3	45.1	39.2	35

21/02/2023	16:15:00	42.7	31.7	66.2	47.1	45	39.2	35.3
21/02/2023	16:30:00	40.1	30.7	59.6	44.7	42.9	37.9	34.7
21/02/2023	16:45:00	42.3	31.3	60.5	47.9	44.7	38.6	34.6
21/02/2023	17:00:00	38.6	28.7	50.5	42.8	41.6	37.5	33
21/02/2023	17:15:00	39.3	30.1	52.5	43.1	41.9	38.1	34.3
21/02/2023	17:30:00	41.3	31	58.8	45.7	43.9	39.5	35.1
21/02/2023	17:45:00	42.2	28.8	71	44.3	42.6	37.6	33.6
21/02/2023	18:00:00	44	28.6	66.1	44.9	43.3	38.1	32.7
21/02/2023	18:15:00	50.8	29.3	72.5	57.3	52.6	38.7	33.2
21/02/2023	18:30:00	38.9	29.3	58.4	42.8	41.8	37.4	33.1
21/02/2023	18:45:00	46.1	32.4	64.2	51.6	48.9	42.2	37.2
21/02/2023	19:00:00	43.4	32.1	59.1	48.7	46.7	40.9	36.4
21/02/2023	19:15:00	39.1	27.9	54.3	44	42.3	36.5	31.5
21/02/2023	19:30:00	38.8	27.1	56.9	43.2	41.4	36.1	31.8
21/02/2023	19:45:00	38	27.9	56.6	42.2	40.8	36.4	31.9
21/02/2023	20:00:00	38.2	27.3	51.1	42.8	41.3	36.2	32.1
21/02/2023	20:15:00	44	29.8	59	50	45	40	35.9
21/02/2023	20:30:00	38.1	32.2	48	41.8	40.6	37.2	34.9
21/02/2023	20:45:00	39.8	30.7	50.5	43.9	43	38.5	33.2
21/02/2023	21:00:00	34.7	28	52.8	39.1	37.2	32.3	30
21/02/2023	21:15:00	32.2	26.1	46.4	36.6	34.8	30.3	28.3
21/02/2023	21:30:00	39.7	27.3	49	43.3	42.8	39.5	30
21/02/2023	21:45:00	36.7	30.2	47.6	40	38.9	35.8	33
21/02/2023	22:00:00	34.9	26.4	45.8	38.7	37.9	34.1	28.6
21/02/2023	22:15:00	33	27.3	47.5	36.7	35.1	31.2	29.1
21/02/2023	22:30:00	32.9	27.3	47.2	36.3	35.1	31.7	29.4
21/02/2023	22:45:00	37.2	28.3	50.7	41.2	40.3	36	30.7
21/02/2023	23:00:00	34.6	28.1	46.8	38.6	37.3	33.2	30.6
21/02/2023	23:15:00	46.8	34.9	59.5	52.7	50.6	43	38.7
21/02/2023	23:30:00	48.7	42.1	58.8	52	51.1	47.9	45.2
21/02/2023	23:45:00	45.8	37.5	56	49.3	48.4	45	40.7
22/02/2023	00:00:00	40.3	31.9	58.5	45	43.3	37.9	34.6
22/02/2023	00:15:00	31.6	24.4	46.9	34.7	33.9	30.4	26.8
22/02/2023	00:30:00	28.6	24.8	38.4	31.5	30.2	27.8	26.3
22/02/2023	00:45:00	29.2	24.9	38.4	32.5	31.6	28.3	26.8
22/02/2023	01:00:00	29.6	25	38.7	33	31.4	29	27
22/02/2023	01:15:00	29.8	24.8	37.6	34	33	28.5	26.4
22/02/2023	01:30:00	30.7	25	46.2	35	32.7	28.9	26.6
22/02/2023	01:45:00	36.1	25.5	50.9	43.9	38.2	30.5	27.8
22/02/2023	02:00:00	33.5	27	44.6	38.1	36.4	31.5	29
22/02/2023	02:15:00	32.8	25.6	44.6	37	35.8	31.8	27.6
22/02/2023	02:30:00	33.7	24.6	42.7	38.5	37.3	32.4	27.3
22/02/2023	02:45:00	38.7	29.4	47.6	43.1	41.8	37.2	32.6
22/02/2023	03:00:00	44.5	34.4	54.8	49.5	47.4	42.8	38.5
22/02/2023	03:15:00	46.8	35.9	57.3	51	49.7	44.9	41
22/02/2023	03:30:00	40.1	32.5	50.1	44.6	43.3	38.5	35
22/02/2023	03:45:00	39.7	33.1	45.4	43	42.4	39.1	35.5
22/02/2023	04:00:00	38.3	31.3	45.9	42.2	41.3	37.1	33.9
22/02/2023	04:15:00	39.8	28	57.1	46.1	43.7	33.9	30.6
22/02/2023	04:30:00	33.4	26.8	42	37.6	36.7	31.8	29.1

22/02/2023	04:45:00	40.5	29.7	57.7	46.2	43.7	34.4	31.6
22/02/2023	05:00:00	33.9	26.3	49.7	38.7	37.2	31.1	28.9
22/02/2023	05:15:00	36.8	28.3	48.6	40.1	39.2	35.8	32.7
22/02/2023	05:30:00	37.8	30.1	48.8	41.9	40.8	36.6	32.8
22/02/2023	05:45:00	36.9	30.2	49.5	41	39.8	35.4	32.1
22/02/2023	06:00:00	36	30.9	48.4	39.4	37.9	34.8	33.1
22/02/2023	06:15:00	42.4	31.8	61	48.3	44.4	37.8	34.2
22/02/2023	06:30:00	41.3	32.8	70.1	41.9	40.7	37.4	34.6
22/02/2023	06:45:00	44.1	33.7	67.4	49.5	47	39.1	36.3
22/02/2023	07:00:00	49.6	34.3	67.9	56.1	47.9	39.7	36.7
22/02/2023	07:15:00	49.4	34.4	71.3	56.2	51.1	41.5	37.8
22/02/2023	07:30:00	48.4	34.7	65.4	54.8	52.4	42.9	38.6
22/02/2023	07:45:00	44.5	36.1	66.2	46	44.6	41.1	38.7
22/02/2023	08:00:00	44.5	35.4	66.4	47.4	46	42.7	39.8
22/02/2023	08:15:00	46.2	37.4	75.5	47.3	46	42.7	40.3
22/02/2023	08:30:00	44.2	36.9	61.9	47.7	46.3	42.3	39.3
22/02/2023	08:45:00	45.1	36.2	63.4	49.5	47.2	42.1	39.2
22/02/2023	09:00:00	45.2	35.4	63.6	50.2	47.6	41.4	37.9
22/02/2023	09:15:00	43.3	34.1	62.8	48.6	44.9	38.3	36.3
22/02/2023	09:30:00	47.4	33.7	70.5	52.3	46.2	38.3	35.9
22/02/2023	09:45:00	48.2	33.2	71.4	51.2	48	39.3	35.6
22/02/2023	10:00:00	43.8	31	66.4	49.1	45.2	37.6	33.9
22/02/2023	10:15:00	47	35	64.2	53.2	49.7	41.7	38.2
22/02/2023	10:30:00	53.5	36.2	73.6	60.2	55.4	47.7	40.1
22/02/2023	10:45:00	54.9	34.3	74.7	61.8	56.9	43.2	39.2
22/02/2023	11:00:00	42.2	33.4	62.4	45.6	44	40.5	37.1
22/02/2023	11:15:00	44.4	34.9	63.5	48.6	46.3	41.5	38.5
22/02/2023	11:30:00	41	33.6	60.6	44.5	43	39.1	36.7
22/02/2023	11:45:00	43.9	31.3	65	49.3	45.4	38.6	34.7
22/02/2023	12:00:00	42.3	32.2	57.6	47.6	45.6	39.4	35.8
22/02/2023	12:15:00	52.2	29.5	73.8	55.8	50.6	36.9	32.5
22/02/2023	12:30:00	42.5	29.7	66.5	45.8	42.4	36.1	33.2
22/02/2023	12:45:00	43.8	27.6	69	49.4	45.4	35.9	32.2
22/02/2023	13:00:00	45.7	29.6	72.8	47	44.2	37.4	33.8
22/02/2023	13:15:00	41	29.2	67.3	40.5	39	35.4	32.4
22/02/2023	13:30:00	37.6	29.6	50.8	41.6	40.4	36.4	32.8
22/02/2023	13:45:00	38.1	26.8	56	42.5	40.8	35	30.5
22/02/2023	14:00:00	52.4	29.4	68.5	59.9	56.8	41.9	32.6
22/02/2023	14:15:00	49.2	29.9	69.5	56.2	53.1	39.6	33.4
22/02/2023	14:30:00	41.9	30.7	60.2	46.9	45.2	38.9	34.2
22/02/2023	14:45:00	45.1	31.5	61.8	51.2	49	40.7	34.5
22/02/2023	15:00:00	43.3	34.3	60	48.7	46.4	40.5	37.8
22/02/2023	15:15:00	51.2	33.8	71.1	58.5	55.2	41.1	36.8
22/02/2023	15:30:00	38.4	31	53.9	42	41	37.1	34.9
22/02/2023	15:45:00	41	31.6	66.5	45	43.2	38.5	35.7
22/02/2023	16:00:00	47	30	63.6	49.9	49.2	46.6	33.9
22/02/2023	16:15:00	56.1	45.5	76.7	63	60.5	48.6	47.7
22/02/2023	16:30:00	59.9	51.4	80	66	64.3	53.3	52.6
22/02/2023	16:45:00	55.2	32.4	74.7	61.4	53	40.4	36.7
22/02/2023	17:00:00	41.5	31.8	55.6	47.6	44.8	38	35.2

22/02/2023	17:15:00	39.8	33	54.8	42.9	41.9	39.1	36.3
22/02/2023	17:30:00	41	32	62.3	43.5	42.1	39.2	36.3
22/02/2023	17:45:00	39.3	32.8	48.1	42.5	41.6	38.7	35.7
22/02/2023	18:00:00	43.7	34.3	68.8	46.3	44.4	40.1	37.4
22/02/2023	18:15:00	40.2	35.3	61.2	42.8	41.9	39.3	37.4
22/02/2023	18:30:00	39.2	34.8	53.7	41.7	41.1	38.7	36.8
22/02/2023	18:45:00	38.5	33.9	47.8	41.1	40.3	38.1	36
22/02/2023	19:00:00	39.9	30.6	54.2	45.4	43.1	37.1	34.5
22/02/2023	19:15:00	36.1	31.1	45.5	39.5	38.3	35.2	33.1
22/02/2023	19:30:00	36.8	30.8	46.3	40.3	39.2	35.8	33.3
22/02/2023	19:45:00	36.7	31	47.8	40.8	39.4	35.4	32.8
22/02/2023	20:00:00	41	34.2	51.3	44.1	43	39.7	37.1
22/02/2023	20:15:00	36.3	29.9	49.4	39.7	38.7	35.2	32.6
22/02/2023	20:30:00	36.6	30.2	44.6	40.4	39.3	35.6	33.1
22/02/2023	20:45:00	37.1	30.8	48	41.2	40	35.6	32.9
22/02/2023	21:00:00	37.3	30.9	52.5	40.9	39.7	36.1	33.4
22/02/2023	21:15:00	38.4	32.3	52.6	41.7	40.5	37.5	34.9
22/02/2023	21:30:00	34	28.5	47.5	37.6	36.6	32.8	30.4
22/02/2023	21:45:00	39.1	29.5	55.8	45.7	41.8	34.2	31.6
22/02/2023	22:00:00	34.8	29.8	47.9	37.8	36.8	34	31.9
22/02/2023	22:15:00	37.5	31.9	48.8	41.1	39.9	36.4	34.2
22/02/2023	22:30:00	37.2	30.9	52.1	41.4	40.1	35.8	33.4
22/02/2023	22:45:00	34.4	28.3	44	37.4	36.4	33.7	31.4
22/02/2023	23:00:00	31	26	43.4	34.3	33.1	30.2	28.3
22/02/2023	23:15:00	31.8	26.1	43.8	35.2	33.9	30.9	28.5
22/02/2023	23:30:00	33.5	28.4	44.3	36.8	35.7	32.7	30.5
22/02/2023	23:45:00	33.5	27	50.1	36.7	35.4	32.1	29.4
23/02/2023	00:00:00	35.2	29.9	43.2	38.6	37.6	34.4	32
23/02/2023	00:15:00	36.8	30.3	45.9	40.9	39.3	35.6	33
23/02/2023	00:30:00	36.2	30	52.3	39.5	38.5	35.2	33
23/02/2023	00:45:00	34.1	26.6	42.7	38.1	36.9	33	29.6
23/02/2023	01:00:00	34.3	27.9	42.9	37.9	36.9	33.4	30.7
23/02/2023	01:15:00	34.2	28.3	42.8	37.4	36.4	33.4	31
23/02/2023	01:30:00	34.2	28	44.4	38.3	37	33	30.1
23/02/2023	01:45:00	34.7	27.3	44.2	38.7	37.6	33.5	30.2
23/02/2023	02:00:00	32.4	25.9	46.4	36.1	34.8	31	28.4
23/02/2023	02:15:00	30.3	23.9	43.9	34.5	33	28.7	26
23/02/2023	02:30:00	28.3	22.9	44.3	32.4	31.2	26.6	24.5
23/02/2023	02:45:00	27.7	22.9	35.9	30.9	29.9	26.9	24.8
23/02/2023	03:00:00	30.7	22.9	44	36	33.6	28	24.9
23/02/2023	03:15:00	27.3	22.4	39.1	30.8	29.6	26.4	24.4
23/02/2023	03:30:00	27.1	23.2	35	30.1	29	26.5	24.7
23/02/2023	03:45:00	27.7	22.5	39.8	31.5	29.9	26.4	24.6
23/02/2023	04:00:00	28.7	24.6	37.5	31.8	30.7	27.9	26.3
23/02/2023	04:15:00	29	24.2	37.3	31.7	30.8	28.3	26.3
23/02/2023	04:30:00	30.5	25.6	48.2	33.7	32.4	29.4	27.2
23/02/2023	04:45:00	34.5	26	52.4	39.5	37.3	31.6	28.6
23/02/2023	05:00:00	30.2	22.9	43.9	34.6	33	28.5	25
23/02/2023	05:15:00	31.6	22	48.3	38	35.6	25.6	23.6
23/02/2023	05:30:00	25.8	20.8	35.2	28.9	27.9	25.3	22.3



23/02/2023	05:45:00	28.1	21.2	42	33.1	31	25.8	22.6
23/02/2023	06:00:00	30.6	22.2	45.6	35.6	34	28.2	25
23/02/2023	06:15:00	34.5	23.2	51.2	41	37.9	29.8	25
23/02/2023	06:30:00	34.3	24.9	49.7	39.3	38.1	31.6	27.7
23/02/2023	06:45:00	40.2	28.6	61.1	44.2	42.7	38	33.6
23/02/2023	07:00:00	41.7	28.4	59.7	47.7	45.4	37.6	33.1
23/02/2023	07:15:00	45.8	29.8	68.9	50.8	47.5	39.4	33.4
23/02/2023	07:30:00	49.3	32	70.3	51.5	47.7	40.9	36.5
23/02/2023	07:45:00	41.7	33.4	56.9	46	44.2	39.9	36.8
23/02/2023	08:00:00	43.6	33.2	70.3	44.9	43.7	40.1	37.1
23/02/2023	08:15:00	47.5	32.4	73.9	50.8	49.2	41.8	37.6
23/02/2023	08:30:00	44.9	32.7	66.8	50	47.8	39.3	35.6
23/02/2023	08:45:00	42.9	32.4	63.8	49	46	37.5	35
23/02/2023	09:00:00	46.3	31.9	66.6	52.6	47.8	37.7	34.6
23/02/2023	09:15:00	48.7	31.3	66.2	56.5	50.3	39	34.6
23/02/2023	09:30:00	49.2	29.4	66	56	53.1	39.8	33.6
23/02/2023	09:45:00	41.3	30.3	66	44.8	42.4	35.9	32.8
23/02/2023	10:00:00	53.1	27.3	85.6	52.8	49.8	35.7	30.8
23/02/2023	10:15:00	53.8	28.9	68.3	61.5	58.1	41.3	32.6
23/02/2023	10:30:00	45.5	29.7	70.7	50	46.5	37.1	32.6
23/02/2023	10:45:00	52	30.8	74.6	58.5	52.2	37.5	33.3
23/02/2023	11:00:00	53.3	28.5	71.8	61.5	54.1	36.6	31.5
23/02/2023	11:15:00	52.9	29.2	74.4	59.3	58	41.6	33.7
23/02/2023	11:30:00	45.5	26.6	66.8	51.2	46.1	34.5	30
23/02/2023	11:45:00	56.3	29.1	75.5	63.9	59.7	40.3	33.7
23/02/2023	12:00:00	55.7	27.9	69	63.2	61.7	38.6	33.3
23/02/2023	12:15:00	50.8	25.3	73.2	57.2	55.2	34.2	30.4
23/02/2023	12:30:00	53.8	26.9	78.7	61.2	57.2	34.7	30.1
23/02/2023	12:45:00	53.6	25.6	72.4	61.6	55.7	34.3	29.5
23/02/2023	13:00:00	49.9	25.5	65.4	58.4	55	35	29.8
23/02/2023	13:15:00	49.3	25.6	68.9	57.5	54	33.2	29
23/02/2023	13:30:00	49	25.5	70.6	51.5	40.7	32.9	28.4
23/02/2023	13:45:00	38.6	29.5	56.3	43	41.6	36.7	33.6
23/02/2023	14:00:00	46.9	28.5	63.4	53.5	44.5	36.5	32.2
23/02/2023	14:15:00	49.1	27.9	61.2	54.9	53.8	38	32.6
23/02/2023	14:30:00	51.3	32.6	66.4	54	53.6	51.9	38
23/02/2023	14:45:00	48.3	29	66.3	53.4	51.1	37.2	33.1
23/02/2023	15:00:00	56	29	72.7	64	61.3	37.2	33.1
23/02/2023	15:15:00	52.9	31.3	76.7	60	57.5	39.6	34.9
23/02/2023	15:30:00	38.3	30.1	58.6	43.1	40.5	35.8	33.5
23/02/2023	15:45:00	41.6	29	71.3	43.3	40.6	35.6	32.4
23/02/2023	16:00:00	37.2	28.4	56.7	40.9	39.7	35.8	32.9
23/02/2023	16:15:00	36.1	29.6	49.8	39.3	38.2	35.3	32.8
23/02/2023	16:30:00	36.5	29.4	50.2	39.8	38.7	35.7	33
23/02/2023	16:45:00	37.7	31.1	54.8	41	39.8	36.5	33.8
23/02/2023	17:00:00	38.1	31	51	41.5	40.4	37.1	34.8
23/02/2023	17:15:00	41.6	32.2	61.8	45.8	43.4	37.7	35.1
23/02/2023	17:30:00	59.2	31.7	77.8	68.4	55	37.1	34.6
23/02/2023	17:45:00	37	30.4	48	41	40	35.6	32.7
23/02/2023	18:00:00	39.6	30.9	54.8	44.4	42.5	37.4	33.5

23/02/2023	18:15:00	38.5	31.3	52	42	40.9	37.5	34.9
23/02/2023	18:30:00	35.6	29.7	44.7	39	38	34.7	32.6
23/02/2023	18:45:00	36.5	30.4	48.8	40.4	39.2	35.3	32.8
23/02/2023	19:00:00	36.9	30.5	49.3	41.1	39.3	35.2	32.4
23/02/2023	19:15:00	38.9	29.1	62.7	40.2	38.5	34.5	31.7
23/02/2023	19:30:00	34.7	28.6	46.5	38.4	37.2	33.5	31.2
23/02/2023	19:45:00	36.2	29	48.9	39.8	38.6	35.3	32.2
23/02/2023	20:00:00	35.8	28.1	49.7	39.7	38.6	34.3	30.5
23/02/2023	20:15:00	34	28.9	44.9	37.7	36.5	33	30.7
23/02/2023	20:30:00	35.4	27.9	47	39.6	38.4	34.2	30.4
23/02/2023	20:45:00	34.6	28.2	46.1	38.8	37.3	33.3	30.3
23/02/2023	21:00:00	35.3	27	51	40.2	37.9	32.6	29.7
23/02/2023	21:15:00	36.5	26.3	64.8	37.3	35	30.6	27.8
23/02/2023	21:30:00	31.4	26.4	44	35.2	33.6	29.9	28
23/02/2023	21:45:00	32.1	25.9	45.3	37.3	35.7	29.4	27.5
23/02/2023	22:00:00	29.6	25.1	43.6	34	31.7	27.8	26.6
23/02/2023	22:15:00	32.1	26.4	44.7	36.1	34.7	30.5	28.2
23/02/2023	22:30:00	30.4	24.3	44.9	35.1	33.1	28.1	26.1
23/02/2023	22:45:00	30.4	24	41.1	34.6	33.3	28.8	26.1
23/02/2023	23:00:00	28.5	24.4	39.8	31.4	30.2	27.7	26.3
23/02/2023	23:15:00	27.1	23.6	39.8	29.6	28.6	26.6	25
23/02/2023	23:30:00	27.3	22.8	37.5	31.3	29.8	25.8	24.6
23/02/2023	23:45:00	27.2	22.4	40.2	30.9	28.8	26	24.2
24/02/2023	00:00:00	27.1	22.4	43.1	30.8	29	25.6	24.1
24/02/2023	00:15:00	24.1	20.8	33.9	26.6	25.8	23.6	22.4
24/02/2023	00:30:00	26.6	21.9	45	29.7	27.1	24.8	23.5
24/02/2023	00:45:00	24.2	21.4	29	25.9	25.5	23.9	22.7
24/02/2023	01:00:00	25.1	21.2	30.2	27	26.4	24.9	23.6
24/02/2023	01:15:00	26.8	20.8	48.7	31.2	28.4	24	22.9
24/02/2023	01:30:00	25.7	21	44.7	28.8	27	24.6	23.4
24/02/2023	01:45:00	30.2	21.1	47.1	36.7	33.5	25.1	23.1
24/02/2023	02:00:00	27.6	22.6	41.8	32.6	29.9	25.3	23.9
24/02/2023	02:15:00	26	20.7	41.8	30.5	27.8	23.7	22.3
24/02/2023	02:30:00	26.6	21.3	42.4	30.7	28.7	24.8	23.1
24/02/2023	02:45:00	27.8	21.5	49.2	30.3	27.1	24.4	23.1
24/02/2023	03:00:00	26.8	20.7	41.7	31.1	28.2	24.7	23.2
24/02/2023	03:15:00	25.3	21.8	33.7	27.9	27.1	24.8	23.3
24/02/2023	03:30:00	26.3	22.5	39.7	29.1	27.6	25.4	24.1
24/02/2023	03:45:00	27.9	22.9	43.9	31.5	30.1	26.1	24.3
24/02/2023	04:00:00	29	22.3	45.2	34.4	32.1	26.2	24.2
24/02/2023	04:15:00	31	24.4	44.7	36.3	33.6	28.9	26.7
24/02/2023	04:30:00	31.9	24.7	46.4	36.6	34.7	29.4	26.9
24/02/2023	04:45:00	31.4	26.5	40.3	35.5	33.8	30.2	28.3
24/02/2023	05:00:00	33.1	27.7	45.2	36.8	35.6	32	29.7
24/02/2023	05:15:00	34.5	27.6	48.2	40	37.6	31.5	29.4
24/02/2023	05:30:00	35.7	26.9	51.5	41.7	39	31.8	29.7
24/02/2023	05:45:00	32.5	27.5	44.6	35.9	34.7	31.3	29.3
24/02/2023	06:00:00	33.3	27.7	45.5	37.4	35.8	31.7	29.6
24/02/2023	06:15:00	34.5	28.2	49	39.7	37.2	32.1	30.2
24/02/2023	06:30:00	50.6	28.4	73.4	53.3	41.4	34	30.9

24/02/2023	06:45:00	39.9	30.9	53.5	45	42.7	37.6	34.1
24/02/2023	07:00:00	49.9	30.5	76.3	55.4	51.3	39.2	33.7
24/02/2023	07:15:00	49	33.1	65.5	56.2	53.6	41.2	37
24/02/2023	07:30:00	59.7	31.9	79.5	67.1	61.2	42.4	37.3
24/02/2023	07:45:00	48.6	31.8	69	54.1	49.2	40.6	36.2
24/02/2023	08:00:00	46.4	32.9	72.2	47.2	43.6	39.5	37.5
24/02/2023	08:15:00	55.9	33.9	75.3	62.3	55.2	41.4	37.8
24/02/2023	08:30:00	49	34.2	67.2	55.8	51.4	41.5	38.3
24/02/2023	08:45:00	41	33.7	54.6	44.6	42.9	39.7	37.1
24/02/2023	09:00:00	40.7	34	61.2	44	42.3	39	36.6
24/02/2023	09:15:00	46	33.2	65	51.2	48	38.4	35.7
24/02/2023	09:30:00	41.8	31.7	70.7	44.3	42	36.7	34.1
24/02/2023	09:45:00	54	32.9	73.4	62	56.6	39	35.4
24/02/2023	10:00:00	52.6	31.8	72.1	60	49.7	36.9	34.5
24/02/2023	10:15:00	40.8	31.8	57.8	45.9	42.8	38.2	35.2
24/02/2023	10:30:00	46.3	32.9	67.7	47.9	44	38.3	35.5
24/02/2023	10:45:00	42.6	32.2	60.3	46.7	44	39.7	36.5
24/02/2023	11:00:00	52.7	31.8	84.7	47.4	44.9	37.4	34.6
24/02/2023	11:15:00	46.6	31.5	70.7	51.4	48.3	38.2	34.5
24/02/2023	11:30:00	46.3	29.5	67	53.4	46.9	36.4	32.9
24/02/2023	11:45:00	41.1	30.9	64.2	45.5	42.3	37.1	33.8
24/02/2023	12:00:00	46.2	31.9	66.3	53.2	49.2	38.5	35.4
24/02/2023	12:15:00	50.8	33.4	72.2	58.1	54.4	39.6	35.7
24/02/2023	12:30:00	49.2	30.8	72.3	54.2	49.1	38	34.3
24/02/2023	12:45:00	46.7	34.7	74.7	48.3	46.3	40.8	37.9
24/02/2023	13:00:00	42.1	31	63.3	46.1	44.6	38.4	34.3
24/02/2023	13:15:00	43	32.2	67.1	47	43.8	38.9	35.6
24/02/2023	13:30:00	39.8	31.7	59.8	43.4	42	37.9	34.9
24/02/2023	13:45:00	39	31.1	59	43.4	41.3	36.3	33.6
24/02/2023	14:00:00	52.9	31.6	71	58.1	47.8	38.4	35.2
24/02/2023	14:15:00	41.1	30.4	54.5	45.9	44	38.9	34.1
24/02/2023	14:30:00	38.5	30.3	60.9	42	40	36	33.7
24/02/2023	14:45:00	50.7	31	68.3	57.8	55	40.8	34.7
24/02/2023	15:00:00	37.6	29.5	51.1	41.3	40.2	36.6	33.2
24/02/2023	15:15:00	39.2	30.2	58	43.8	41.9	37.1	33.8
24/02/2023	15:30:00	38.4	29.3	61.7	40.8	39.4	36.1	33.3
24/02/2023	15:45:00	40.1	28.3	72.3	41.1	39.9	36.1	32.2
24/02/2023	16:00:00	38.4	31.5	56.2	42	40.8	37.3	34.4
24/02/2023	16:15:00	37.7	31.5	54.1	41.6	40.3	36.2	33.9
24/02/2023	16:30:00	36.9	30.7	50.3	40.1	39.1	36.1	33.1
24/02/2023	16:45:00	40	29.9	59.5	45.2	42.2	36.7	33
24/02/2023	17:00:00	40.8	32.3	63.9	42.6	40.2	36.5	34.6
24/02/2023	17:15:00	37.9	31.7	59.8	40.4	39.3	36.2	33.8
24/02/2023	17:30:00	38.2	32.2	53.2	42.9	40.9	36	34
24/02/2023	17:45:00	40.4	31.4	66.4	40.6	39.4	36.3	33.7
24/02/2023	18:00:00	36.9	31.4	50.8	39.5	38.7	36.3	34
24/02/2023	18:15:00	45.8	31.5	73.8	42.4	40.6	36.9	34.5
24/02/2023	18:30:00	37.9	30.7	54.6	41.3	39.8	36.5	34.1
24/02/2023	18:45:00	35.8	30.8	47	39.2	38.1	34.9	32.8
24/02/2023	19:00:00	39.5	32.7	47.8	43.8	42.6	38.1	35.4

24/02/2023	19:15:00	38.5	28.4	63.8	39.1	36.8	33.5	31.4
24/02/2023	19:30:00	32.6	28	44	35.6	34.7	31.9	29.8
24/02/2023	19:45:00	32.8	28.1	42.6	36.2	35.1	31.8	30
24/02/2023	20:00:00	34.8	28.1	48.7	38.6	37.6	33.5	31.2
24/02/2023	20:15:00	34	26.3	47.4	37.9	36.1	32.7	29.5
24/02/2023	20:30:00	31.6	25.9	42.6	35.1	33.7	30.8	28.4
24/02/2023	20:45:00	38	27.7	56.8	43.8	41.3	35	31.6
24/02/2023	21:00:00	31.9	26.1	40.9	35.2	34.2	31.2	28.4
24/02/2023	21:15:00	31.1	25.3	42.8	34.7	33.6	30.2	27.3
24/02/2023	21:30:00	35.1	24.4	52.8	42.1	35.5	29	27
24/02/2023	21:45:00	28.9	23.3	39.7	31.9	30.9	28.2	25.6
24/02/2023	22:00:00	28	22.6	41	30.9	29.9	27.3	24.8
24/02/2023	22:15:00	28.5	23.2	40.2	32.4	30.9	27.2	25
24/02/2023	22:30:00	27.4	23.1	36.9	30.2	29.3	26.8	25
24/02/2023	22:45:00	25.9	21.9	37.9	29.2	27.9	24.9	23.5
24/02/2023	23:00:00	28.2	22.2	49	31.7	30	25.9	24.1
24/02/2023	23:15:00	25.2	21.4	34	27.6	26.8	24.8	23.4
24/02/2023	23:30:00	26.8	21.2	38.7	31	29.4	25.1	23.2
24/02/2023	23:45:00	26.7	21.2	41	30.9	29.3	25.2	23
25/02/2023	00:00:00	27.3	21.1	39.4	31.2	29.8	26.2	23.2
25/02/2023	00:15:00	27.5	20	36.7	31.6	30.4	26.5	22.1
25/02/2023	00:30:00	24.8	20	38	27.7	26.2	23.5	21.9
25/02/2023	00:45:00	24.5	19.8	37.5	28	26.7	23.4	21.5
25/02/2023	01:00:00	25.6	19	41.4	29.8	28.1	23.4	20.7
25/02/2023	01:15:00	23.2	18.9	32.7	26.4	25.3	22.3	20.8
25/02/2023	01:30:00	25.5	19.8	39.9	28.8	27.5	24	21.9
25/02/2023	01:45:00	24.1	18.4	38.5	28.1	26.3	22.6	19.7
25/02/2023	02:00:00	24	18.2	37.3	28.5	26.5	21.7	19.6
25/02/2023	02:15:00	20.8	18	30	23.5	22.3	20	19
25/02/2023	02:30:00	20.1	17.5	48.5	21.3	20.5	18.9	18.2
25/02/2023	02:45:00	22.7	18	47.3	25	22.9	20.4	19.1
25/02/2023	03:00:00	20.1	17.7	32.8	22.9	21.6	19.3	18.4
25/02/2023	03:15:00	22.3	17.6	39.4	25.6	24	20.5	18.8
25/02/2023	03:30:00	20.6	17.9	44.3	23.1	22	19.5	18.6
25/02/2023	03:45:00	26.4	19	40.4	34	29.5	21.9	20.3
25/02/2023	04:00:00	25.6	18.3	44.5	30.1	27.7	22.8	20.6
25/02/2023	04:15:00	23.6	18	44.3	28.5	26.2	21.1	19.1
25/02/2023	04:30:00	21.5	18.2	36.8	23.8	22.9	20.8	19.3
25/02/2023	04:45:00	24.9	17.9	51.2	26.9	25.4	21.5	19.3
25/02/2023	05:00:00	25.4	17.5	39.8	30.4	27.9	23.3	19.7
25/02/2023	05:15:00	20.5	17.8	32.5	22.2	21.7	20.1	18.7
25/02/2023	05:30:00	21.2	17.8	33.7	24.1	22.9	20.3	18.9
25/02/2023	05:45:00	19.8	17.4	35.2	21.8	20.6	19.1	18.1
25/02/2023	06:00:00	32.1	17.8	47.5	39.7	37.3	21.8	19
25/02/2023	06:15:00	23.7	17.8	38.9	27.9	25.2	20.9	19.2
25/02/2023	06:30:00	37.8	18.5	70.7	35.9	33.4	24.2	20.1
25/02/2023	06:45:00	41.3	20.6	71.2	39.8	38.2	32.2	27
25/02/2023	07:00:00	47.1	20.7	64.5	55.5	48.1	30.4	24.5
25/02/2023	07:15:00	36.2	21.5	54.2	42.6	38.1	31.2	24.7
25/02/2023	07:30:00	52.2	25.6	74.1	56.4	49.6	36.9	30.4

25/02/2023	07:45:00	40.9	24.9	58.9	47.9	44	34.6	29.3
25/02/2023	08:00:00	49.2	24.9	76.3	55	50.1	31.7	27.5
25/02/2023	08:15:00	55.3	25.4	79.2	55.6	49	32.8	28.4
25/02/2023	08:30:00	42.9	25.3	65.3	49	45.9	35.2	29.2
25/02/2023	08:45:00	48.4	26.9	80.2	46.9	43.3	33.9	30
25/02/2023	09:00:00	37.8	26.5	52.9	43.7	41.4	34	29.6
25/02/2023	09:15:00	46.9	27.6	67.9	54	50.9	36.4	30.4
25/02/2023	09:30:00	47.4	37.3	66.2	54	49.9	41.1	38.7
25/02/2023	09:45:00	56.4	37.7	67.8	58.3	58.2	57.5	39.8
25/02/2023	10:00:00	59.8	30.6	77.9	59	58.2	57.5	53
25/02/2023	10:15:00	50.8	27.7	70	56.2	50.9	37.1	31.3
25/02/2023	10:30:00	42	28.3	65.2	46.9	41.6	34	30.6
25/02/2023	10:45:00	41.9	27.1	62.7	48.5	41.8	32.8	29.6
25/02/2023	11:00:00	45.9	28.2	63.9	52.7	49.4	38	32.5
25/02/2023	11:15:00	46.1	27.6	67.6	51.8	45.7	34.5	30.8
25/02/2023	11:30:00	45.1	26.7	65.1	51.3	47	34.6	30.2
25/02/2023	11:45:00	47.8	27.2	70.3	53.9	49	36.6	31.9
25/02/2023	12:00:00	40.1	28.7	68.4	44.5	42	36	32
25/02/2023	12:15:00	37.4	26.3	58.8	42.1	39.8	34.5	30
25/02/2023	12:30:00	41	26.2	69.7	44.1	41.2	34.7	30.7
25/02/2023	12:45:00	36.2	29	58	39.8	38.2	33.7	31.3
25/02/2023	13:00:00	39.9	27.3	64.3	44	41.4	35.5	30.5
25/02/2023	13:15:00	39.8	28.8	58.2	43.9	42.2	37.2	32.8
25/02/2023	13:30:00	41.2	26	63.9	46.7	44.1	35.7	29.8
25/02/2023	13:45:00	41.5	27.8	63.8	45.8	43.7	35.8	30.7
25/02/2023	14:00:00	42	30.2	64.3	46.5	43.7	37.5	33.3
25/02/2023	14:15:00	40.2	28.5	62.5	43.7	41	36.2	31.9
25/02/2023	14:30:00	46.2	29.3	71.1	49.5	46.2	39.4	33.8
25/02/2023	14:45:00	42.7	29.2	66	47.7	44	38	33.8
25/02/2023	15:00:00	40.4	27.3	73.1	42	39	33.3	30.1
25/02/2023	15:15:00	39.7	28.5	64.2	43.6	41.4	36.4	31.9
25/02/2023	15:30:00	38.3	28.8	61.9	42.3	40.4	35.3	31.3
25/02/2023	15:45:00	39.6	28.3	64.1	44.1	42.2	35.8	30.9
25/02/2023	16:00:00	41	26.5	64.8	44	42.1	35	30
25/02/2023	16:15:00	41.3	30.2	67	44.5	40.8	35.9	32.4
25/02/2023	16:30:00	39.8	29.3	61.7	44.5	41.8	35.4	32.2
25/02/2023	16:45:00	38	26.8	66.8	38.8	36.1	31.7	29.4
25/02/2023	17:00:00	38.7	25.3	64.7	39.9	36.3	30.7	28.1
25/02/2023	17:15:00	34.8	26.2	60.9	37.5	35	30.1	28.1
25/02/2023	17:30:00	38.4	25.9	58.8	44.3	41.1	31.6	27.7
25/02/2023	17:45:00	33.2	25.9	51.8	38.1	34.9	30	28
25/02/2023	18:00:00	37.3	26.2	67.5	33.8	32.4	29.9	28.4
25/02/2023	18:15:00	49.9	26.3	77	49.6	44.6	31.2	28.3
25/02/2023	18:30:00	30.8	25	54	32.5	31.3	28.4	26.9
25/02/2023	18:45:00	27.1	23.3	38.4	29.5	28.8	26.5	24.9
25/02/2023	19:00:00	26.8	22.9	45.9	28.9	28.2	26	24.5
25/02/2023	19:15:00	26.2	21.8	38.2	28.7	27.9	25.7	24.1
25/02/2023	19:30:00	26.3	21.7	40.3	29.3	28.2	25.3	23.8
25/02/2023	19:45:00	26	21.5	45	29.3	27.6	24.7	23
25/02/2023	20:00:00	28	20.1	46.6	32.9	30	24.8	22.6

25/02/2023	20:15:00	26.5	21.3	43.3	29.5	28.4	25.6	23.7
25/02/2023	20:30:00	24.4	20.7	35.6	27.2	26.3	23.7	22.2
25/02/2023	20:45:00	25.7	20.7	38.5	29.6	27.8	24.3	22.8
25/02/2023	21:00:00	23.6	20.2	40.3	25.8	24.9	23	21.7
25/02/2023	21:15:00	23.7	20.1	46.2	25.7	24.9	22.9	21.6
25/02/2023	21:30:00	24.9	20.3	43.7	27.3	25.8	23.4	21.8
25/02/2023	21:45:00	25.5	20.7	43.7	29	26.4	23.2	22
25/02/2023	22:00:00	27	20.4	46	31.2	29.3	24.9	22.9
25/02/2023	22:15:00	24.2	19.9	36.6	27.6	26.2	23.3	21.7
25/02/2023	22:30:00	22.3	18.8	34.7	24.5	23.7	21.9	20.5
25/02/2023	22:45:00	21.7	18.3	34.7	24.6	23.3	21	19.6
25/02/2023	23:00:00	21.2	17.5	37	23.6	22.7	20.6	18.9
25/02/2023	23:15:00	27.1	17.9	47.9	33.5	26.9	20.6	19
25/02/2023	23:30:00	23.8	18.5	45.5	26.2	24.9	22.1	20
25/02/2023	23:45:00	29	21.1	47.8	32.9	30.9	27.2	23.1

Appendices

**Appendix 4 – Calibration Certificate**

# Calibration Certificate

Certificate Number 2021003965

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** LxT SE  
**Serial Number** 0006435  
**Test Results** **Pass**

**Procedure Number** D0001.8384  
**Technician** Kyle Holm  
**Calibration Date** 7 Apr 2021

**Initial Condition** As Manufactured

**Calibration Due Temperature** 23.9 °C ± 0.25 °C

**Description** Sound Expert LxT  
Class 1 Sound Level Meter  
Firmware Revision: 2.404

**Humidity** 51.1 %RH ± 2.0 %RH  
**Static Pressure** 86.26 kPa ± 0.13 kPa

**Evaluation Method** **Tested with:** **Data reported in dB re 20 µPa.**  
Larson Davis PRMLxT1L, S/N 070056  
PCB 377B02, S/N 329147  
Larson Davis CAL200, S/N 9079  
Larson Davis CAL291, S/N 0108

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

- |                        |                            |
|------------------------|----------------------------|
| IEC 60651:2001 Type 1  | ANSI S1.4-2014 Class 1     |
| IEC 60804:2000 Type 1  | ANSI S1.4 (R2006) Type 1   |
| IEC 61252:2002         | ANSI S1.11 (R2009) Class 1 |
| IEC 61260:2001 Class 1 | ANSI S1.25 (R2007)         |
| IEC 61672:2013 Class 1 | ANSI S1.43 (R2007) Type 1  |

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

**Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt. I770.01 Rev J Supporting Firmware Version

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2.301, 2015-04-30

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**Certificate Number 2021003965**

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to 1/2" adaptor is used with the preamplifier.

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

No Pattern approval for IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 available.

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3 cover only a limited subset of the specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1.

**Standards Used**

Description	Cal Date	Cal Due	Cal Standard
Larson Davis CAL291 Residual Intensity Calibrator	2020-09-18	2021-09-18	001250
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943
Larson Davis CAL200 Acoustic Calibrator	2020-07-21	2021-07-21	007027
Larson Davis Model 831	2021-03-02	2022-03-02	007182
PCB 377A13 1/2 inch Prepolarized Pressure Microphone	2021-03-03	2022-03-03	007185
SRS DS360 Ultra Low Distortion Generator	2020-04-14	2021-04-14	007635
Larson Davis 1/2" Preamplifier for Model 831 Type 1	2020-10-06	2021-10-06	PCB0004783

**Acoustic Calibration**

Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
1000 Hz	114.00	113.80	114.20	0.14	Pass

**Loaded Circuit Sensitivity**

Measurement	Test Result [dB re 1 V / Pa]	Lower Limit [dB re 1 V / Pa]	Upper Limit [dB re 1 V / Pa]	Expanded Uncertainty [dB]	Result
1000 Hz	-27.92	-29.61	-26.24	0.14	Pass

-- End of measurement results--



### Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using slow time-weighted sound level for compliance to IEC 61672-1:2013 5.5; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.20	-0.20	-1.20	0.80	0.23	Pass
1000	0.13	0.00	-0.70	0.70	0.23	Pass
8000	-3.22	-3.00	-5.50	-1.50	0.32	Pass

-- End of measurement results--

### Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
A-weighted	40.29

-- End of measurement results--

-- End of Report--

Signatory: Kyle Holm



# Calibration Certificate

Certificate Number 2021003955

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** LxT SE

**Procedure Number** D0001.8378

**Serial Number** 0006435

**Technician** Kyle Holm

**Test Results** Pass

**Calibration Date** 7 Apr 2021

**Initial Condition** As Manufactured

**Calibration Due Temperature** 23.61 °C ± 0.25 °C

**Description** Sound Expert LxT  
Class 1 Sound Level Meter  
Firmware Revision: 2.404

**Humidity** 50.9 %RH ± 2.0 %RH

**Static Pressure** 86.35 kPa ± 0.13 kPa

**Evaluation Method** Tested electrically using Larson Davis PRMLxT1L S/N 070056 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23.6 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1  
IEC 60804:2000 Type 1  
IEC 61252:2002  
IEC 61672:2013 Class 1  
IEC 61260:2001 Class 1

ANSI S1.4-2014 Class 1  
ANSI S1.4 (R2006) Type 1  
ANSI S1.25 (R2007)  
ANSI S1.43 (R2007) Type 1  
ANSI S1.11 (R2009) Class 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

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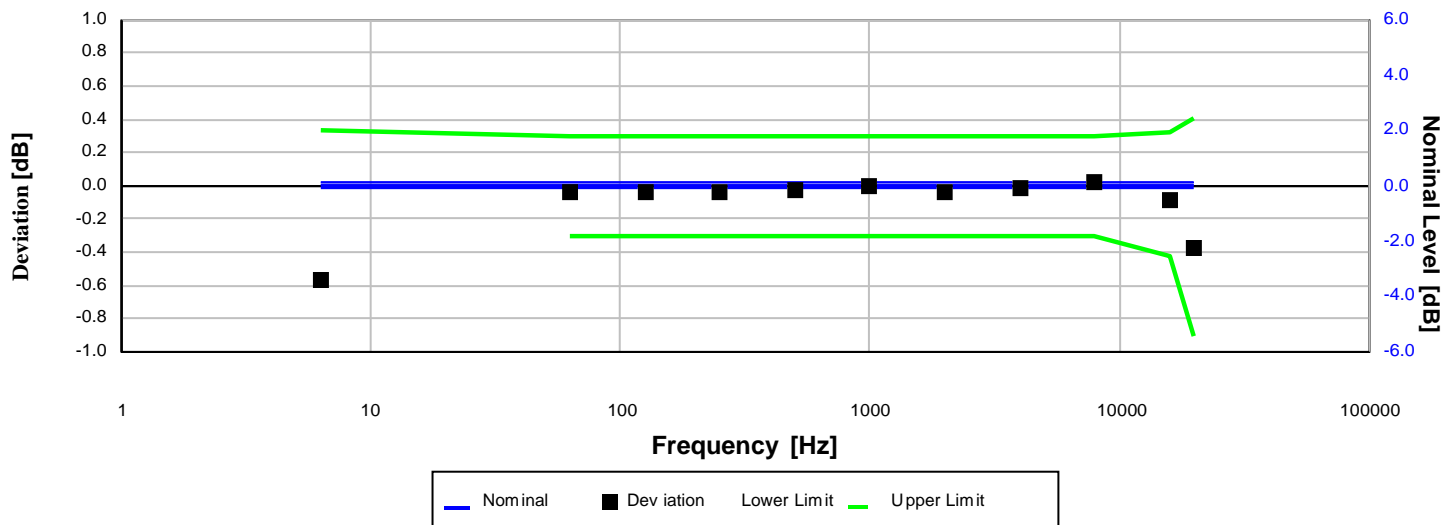
Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20  $\mu$ Pa



Description	Standards Used		
	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943
SRS DS360 Ultra Low Distortion Generator	2020-04-14	2021-04-14	007635



### Z-weight Filter Response



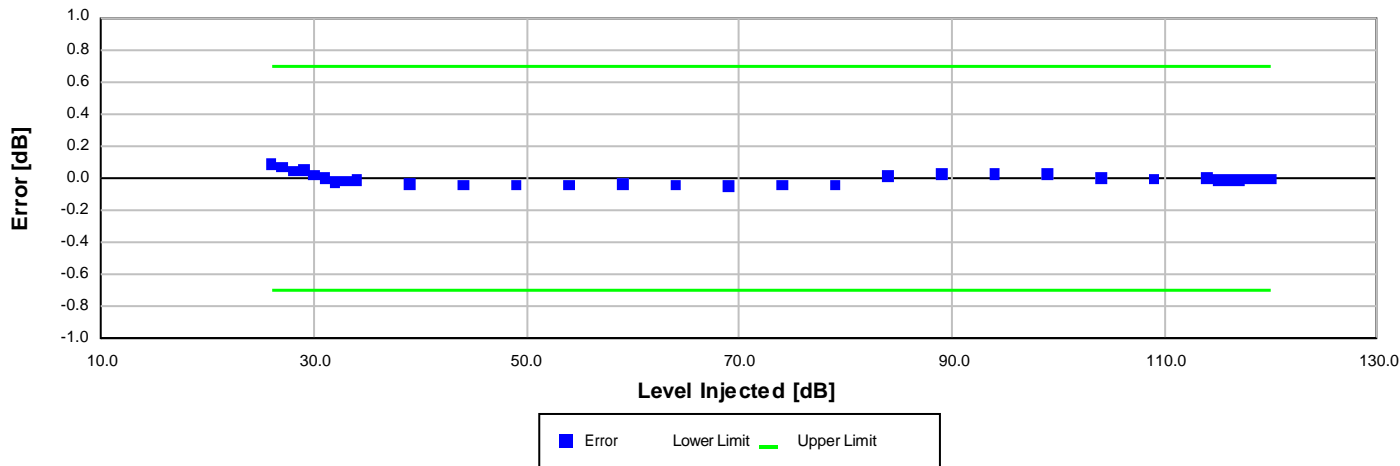
Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.57	-0.57	-1.11	0.33	0.15	Pass
63.10	-0.04	-0.04	-0.30	0.30	0.15	Pass
125.89	-0.04	-0.04	-0.30	0.30	0.15	Pass
251.19	-0.04	-0.04	-0.30	0.30	0.15	Pass
501.19	-0.02	-0.02	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.03	-0.03	-0.30	0.30	0.15	Pass
3,981.07	-0.02	-0.02	-0.30	0.30	0.15	Pass
7,943.28	0.02	0.02	-0.30	0.30	0.15	Pass
15,848.93	-0.09	-0.09	-0.42	0.32	0.15	Pass
19,952.62	-0.37	-0.37	-0.91	0.41	0.15	Pass

-- End of measurement results--



### A-weighted Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
26.00	0.09	-0.70	0.70	0.16	Pass
27.00	0.07	-0.70	0.70	0.16	Pass
28.00	0.04	-0.70	0.70	0.17	Pass
29.00	0.05	-0.70	0.70	0.16	Pass
30.00	0.02	-0.70	0.70	0.35	Pass
31.00	0.00	-0.70	0.70	0.16	Pass
32.00	-0.02	-0.70	0.70	0.16	Pass
33.00	-0.02	-0.70	0.70	0.16	Pass
34.00	-0.02	-0.70	0.70	0.16	Pass
39.00	-0.04	-0.70	0.70	0.16	Pass
44.00	-0.04	-0.70	0.70	0.16	Pass
49.00	-0.04	-0.70	0.70	0.16	Pass
54.00	-0.04	-0.70	0.70	0.16	Pass
59.00	-0.04	-0.70	0.70	0.16	Pass
64.00	-0.05	-0.70	0.70	0.16	Pass
69.00	-0.05	-0.70	0.70	0.16	Pass
74.00	-0.04	-0.70	0.70	0.16	Pass
79.00	-0.04	-0.70	0.70	0.16	Pass
84.00	0.01	-0.70	0.70	0.16	Pass
89.00	0.02	-0.70	0.70	0.16	Pass
94.00	0.03	-0.70	0.70	0.16	Pass
99.00	0.02	-0.70	0.70	0.16	Pass
104.00	0.00	-0.70	0.70	0.15	Pass
109.00	-0.01	-0.70	0.70	0.15	Pass
114.00	0.00	-0.70	0.70	0.15	Pass
115.00	-0.02	-0.70	0.70	0.15	Pass
116.00	-0.01	-0.70	0.70	0.15	Pass
117.00	-0.01	-0.70	0.70	0.15	Pass
118.00	-0.01	-0.70	0.70	0.15	Pass
119.00	-0.01	-0.70	0.70	0.15	Pass
120.00	-0.01	-0.70	0.70	0.15	Pass

-- End of measurement results--





### Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [μs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
116.15	40	Negative Pulse	117.54	116.10	118.10	0.15	Pass
		Positive Pulse	117.45	116.01	118.01	0.15	Pass
	30	Negative Pulse	116.57	116.10	118.10	0.15	Pass
		Positive Pulse	116.48	116.01	118.01	0.15	Pass
-- End of measurement results--							

### Positive Pulse Crest Factor

#### 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVL	± 0.50	0.15 ‡	Pass
	5	OVL	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
104.15	3	-0.14	± 0.50	0.15 ‡	Pass
	5	-0.18	± 1.00	0.16 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
94.15	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.14	± 1.00	0.15 ‡	Pass
	10	-0.17	± 1.50	0.15 ‡	Pass
84.15	3	-0.13	± 0.50	0.15 ‡	Pass
	5	-0.13	± 1.00	0.15 ‡	Pass
	10	-0.26	± 1.50	0.15 ‡	Pass
-- End of measurement results--					

### Negative Pulse Crest Factor

#### 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVL	± 0.50	0.15 ‡	Pass
	5	OVL	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
104.15	3	-0.09	± 0.50	0.15 ‡	Pass
	5	-0.06	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
94.15	3	-0.09	± 0.50	0.15 ‡	Pass
	5	-0.09	± 1.00	0.15 ‡	Pass
	10	-0.03	± 1.50	0.15 ‡	Pass
84.15	3	-0.10	± 0.50	0.15 ‡	Pass
	5	-0.11	± 1.00	0.15 ‡	Pass
	10	-0.23	± 1.50	0.15 ‡	Pass
-- End of measurement results--					



### Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	84.01	83.89	84.09	0.15	Pass
0 dB Gain, Linearity	21.15	20.29	21.69	0.16	Pass
OBA Low Range	83.99	83.89	84.09	0.15	Pass
OBA Normal Range	83.99	83.20	84.80	0.15	Pass

-- End of measurement results--

### Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	7.21	16.00	Pass
C-weight Noise Floor	11.80	18.00	Pass
Z-weight Noise Floor	20.19	25.00	Pass

-- End of measurement results--

### Total Harmonic Distortion

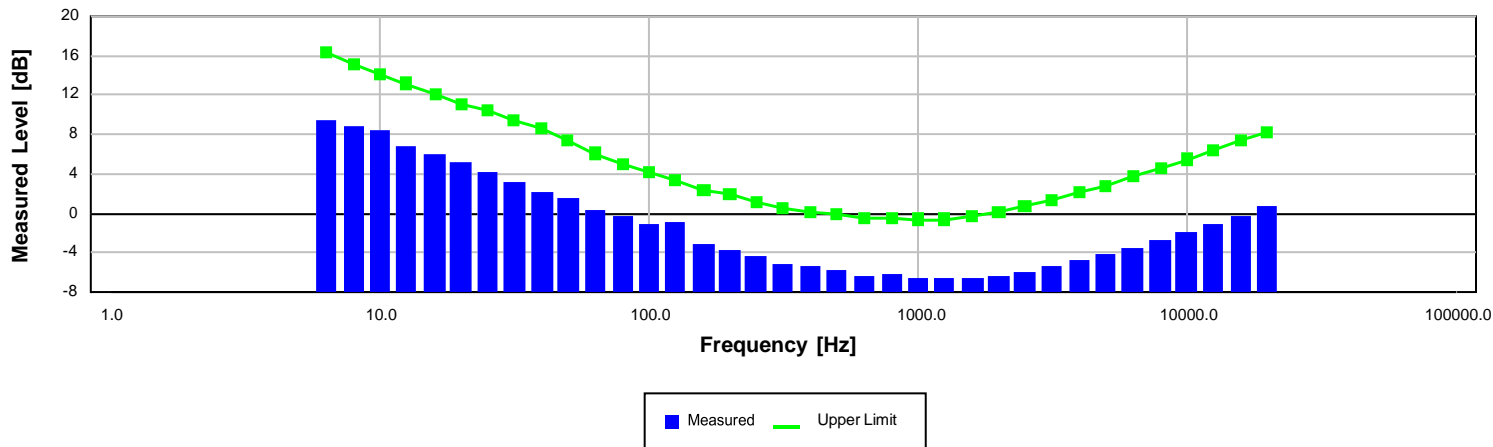
Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	113.43	112.35	113.95	0.15	Pass
THD	-55.56		-50.00	0.00 ‡	Pass
THD+N	-54.15		-50.00	0.00 ‡	Pass

-- End of measurement results--



### 1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	9.45	16.30	Pass
8.00	8.88	15.20	Pass
10.00	8.49	14.20	Pass
12.50	6.91	13.20	Pass
16.00	5.98	12.10	Pass
20.00	5.16	11.10	Pass
25.00	4.23	10.40	Pass
31.50	3.24	9.40	Pass
40.00	2.24	8.60	Pass
50.00	1.58	7.40	Pass
63.00	0.34	6.10	Pass
80.00	-0.28	5.00	Pass
100.00	-1.11	4.20	Pass
125.00	-0.97	3.30	Pass
160.00	-3.04	2.40	Pass
200.00	-3.72	1.90	Pass
250.00	-4.27	1.20	Pass
315.00	-5.06	0.60	Pass
400.00	-5.34	0.20	Pass
500.00	-5.84	-0.10	Pass
630.00	-6.29	-0.50	Pass
800.00	-6.18	-0.50	Pass
1,000.00	-6.56	-0.60	Pass
1,250.00	-6.59	-0.60	Pass
1,600.00	-6.53	-0.20	Pass
2,000.00	-6.28	0.20	Pass
2,500.00	-5.88	0.70	Pass
3,150.00	-5.41	1.40	Pass
4,000.00	-4.83	2.10	Pass
5,000.00	-4.18	2.80	Pass
6,300.00	-3.53	3.70	Pass
8,000.00	-2.71	4.60	Pass
10,000.00	-1.89	5.50	Pass
12,500.00	-1.08	6.40	Pass
16,000.00	-0.19	7.40	Pass
20,000.00	0.70	8.30	Pass

-- End of measurement results--



-- End of Report--

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Signatory: **Kyle Holm**

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Provo, UT 84601, United States  
716-684-0001



# Calibration Certificate

**Certificate Number** 2021003853

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** PRMLxT1L  
**Serial Number** 070056  
**Test Results** **Pass**  
**Initial Condition** As Manufactured

**Procedure Number** D0001.8383  
**Technician** Ashley Anderson  
**Calibration Date** 6 Apr 2021  
**Calibration Due**

**Description** Larson Davis 1/2" Preamplifier for LxT Class 1  
-1 dB

**Temperature** 23.48 °C ± 0.01 °C  
**Humidity** 52.4 %RH ± 0.5 %RH  
**Static Pressure** 85.86 kPa ± 0.03 kPa

**Evaluation Method** Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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## Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/05/2021	03/05/2022	003003
Hart Scientific 2626-S Humidity/Temperature Sensor	05/12/2020	05/12/2021	006943
Agilent 34401A DMM	07/07/2020	07/07/2021	007165
SRS DS360 Ultra Low Distortion Generator	08/19/2020	08/19/2021	007167

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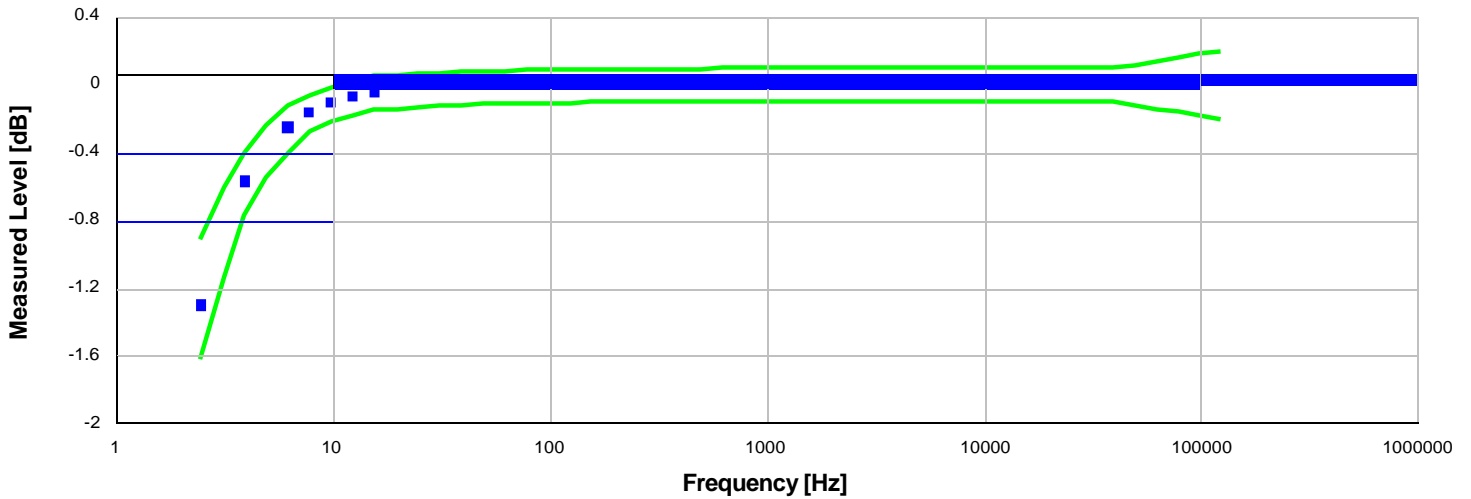


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716-684-0001



### Frequency Response



Frequency response electrically tested at 120.0 dB re 1  $\mu$ V

Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
2.50	-1.30	-1.62	-0.91	0.12	Pass
3.20	-0.85	-1.14	-0.60	0.12	Pass
4.00	-0.57	-0.77	-0.40	0.12	Pass
5.00	-0.38	-0.54	-0.24	0.12	Pass
6.30	-0.25	-0.40	-0.12	0.12	Pass
7.90	-0.16	-0.28	-0.06	0.12	Pass
10.00	-0.10	-0.22	-0.01	0.12	Pass
12.60	-0.07	-0.18	0.02	0.12	Pass
15.80	-0.04	-0.15	0.05	0.12	Pass
20.00	-0.02	-0.14	0.06	0.12	Pass
25.10	-0.01	-0.13	0.07	0.12	Pass
31.60	-0.01	-0.12	0.07	0.12	Pass
39.80	0.00	-0.12	0.08	0.12	Pass
50.10	0.00	-0.11	0.08	0.12	Pass
63.10	0.00	-0.11	0.08	0.12	Pass
79.40	0.00	-0.11	0.09	0.12	Pass
100.00	0.00	-0.11	0.09	0.12	Pass
125.90	0.01	-0.11	0.09	0.12	Pass
158.50	0.02	-0.10	0.09	0.12	Pass
199.50	0.01	-0.10	0.09	0.12	Pass
251.20	0.01	-0.10	0.09	0.12	Pass
316.20	0.01	-0.10	0.09	0.12	Pass
398.10	0.02	-0.10	0.09	0.12	Pass
501.20	0.02	-0.10	0.09	0.12	Pass
631.00	0.02	-0.10	0.10	0.12	Pass
794.30	0.02	-0.10	0.10	0.12	Pass
1,000.00	0.02	-0.10	0.10	0.12	Pass
1,258.90	0.01	-0.10	0.10	0.12	Pass
1,584.90	0.01	-0.10	0.10	0.12	Pass
1,995.30	0.01	-0.10	0.10	0.12	Pass
2,511.90	0.01	-0.10	0.10	0.12	Pass
3,162.30	0.01	-0.10	0.10	0.12	Pass

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Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
3,981.10	0.01	-0.10	0.10	0.12	Pass
5,011.90	0.02	-0.10	0.10	0.12	Pass
6,309.60	0.02	-0.10	0.10	0.12	Pass
7,943.30	0.01	-0.10	0.10	0.12	Pass
10,000.00	0.01	-0.10	0.10	0.12	Pass
12,589.30	0.01	-0.10	0.10	0.12	Pass
15,848.90	0.01	-0.10	0.10	0.12	Pass
19,952.60	0.01	-0.10	0.10	0.12	Pass
25,118.90	0.01	-0.10	0.10	0.12	Pass
31,622.80	0.01	-0.10	0.10	0.12	Pass
39,810.70	0.02	-0.10	0.10	0.12	Pass
50,118.70	0.01	-0.12	0.12	0.12	Pass
63,095.70	0.01	-0.14	0.14	0.12	Pass
79,432.80	0.02	-0.16	0.16	0.12	Pass
100,000.00	0.02	-0.18	0.18	0.12	Pass
125,892.50	0.04	-0.20	0.20	0.24	Pass

**Gain Measurement**

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
Output Gain @ 1 kHz	-1.52	-2.60	-1.00	0.12	Pass

-- End of measurement results--

**DC Bias Measurement**

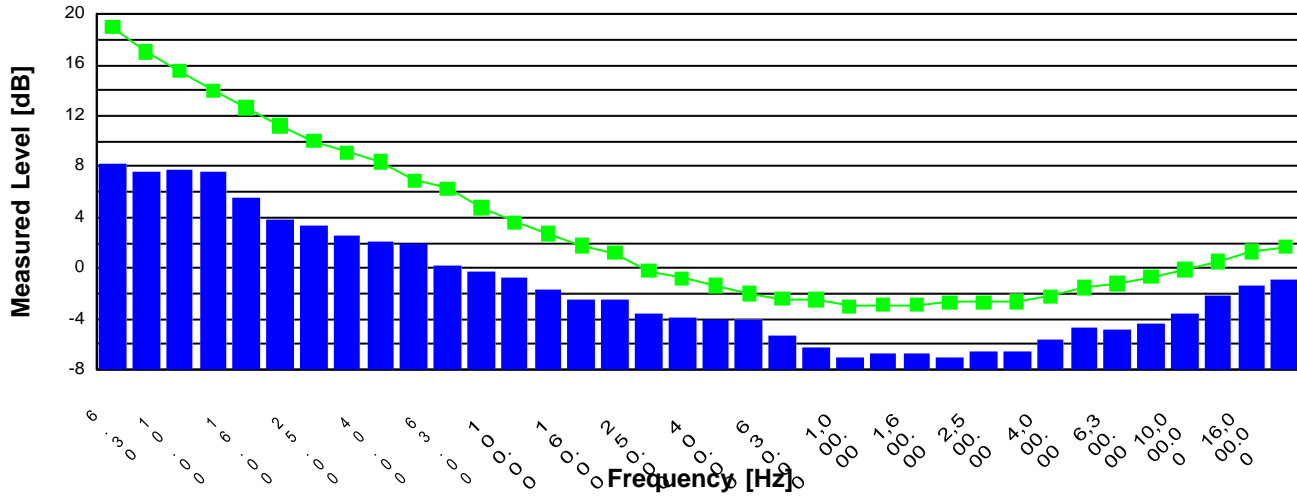
Measurement	Test Result [V]	Lower limit [V]	Upper limit [V]	Expanded Uncertainty [V]	Result
DC Voltage	3.78	2.90	3.80	0.01	Pass

-- End of measurement results--





### 1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [dB re 1 µV]	Upper limit [dB re 1 µV]	Result
6.30	8.20	19.00	Pass
8.00	7.60	17.00	Pass
10.00	7.70	15.50	Pass
12.50	7.60	14.00	Pass
16.00	5.60	12.60	Pass
20.00	3.90	11.20	Pass
25.00	3.30	10.00	Pass
31.50	2.50	9.10	Pass
40.00	2.10	8.40	Pass
50.00	1.90	6.90	Pass
63.00	0.20	6.30	Pass
80.00	-0.20	4.80	Pass
100.00	-0.70	3.60	Pass
125.00	-1.70	2.70	Pass
160.00	-2.40	1.80	Pass
200.00	-2.50	1.20	Pass
250.00	-3.50	-0.20	Pass
315.00	-3.90	-0.80	Pass
400.00	-4.10	-1.40	Pass
500.00	-4.00	-2.00	Pass
630.00	-5.30	-2.40	Pass
800.00	-6.30	-2.50	Pass
1,000.00	-7.10	-3.00	Pass
1,250.00	-6.70	-2.90	Pass
1,600.00	-6.70	-2.90	Pass
2,000.00	-7.00	-2.70	Pass
2,500.00	-6.60	-2.70	Pass
3,150.00	-6.60	-2.60	Pass
4,000.00	-5.60	-2.20	Pass
5,000.00	-4.60	-1.50	Pass
6,300.00	-4.90	-1.20	Pass
8,000.00	-4.40	-0.70	Pass
10,000.00	-3.60	-0.10	Pass
12,500.00	-2.20	0.50	Pass
16,000.00	-1.30	1.30	Pass
20,000.00	-0.90	1.70	Pass

-- End of measurement results--



### Self-generated Noise

Bandwidth	Test Result [ $\mu\text{V}$ ]	Test Result [dB re 1 $\mu\text{V}$ ]	Upper limit [dB re 1 $\mu\text{V}$ ]	Result
A-weighted (1 Hz - 20 kHz)	2.14	6.60	8.00	Pass
Broadband (1 Hz - 20 kHz)	4.37	12.80	14.00	Pass

-- End of measurement results--

---

Signatory: Ashley Anderson

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Provo, UT 84601, United States  
716-684-0001



# ~ Certificate of Calibration and Compliance ~

Microphone Model: 377B02

Serial Number: 329147

Manufacturer: PCB

## Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

## Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
National Instruments	PC1e-6351	1896F08	CA1918	10/19/20	10/19/21
Larson Davis	PRM915	146	CA2115	4/1/20	4/1/21
Larson Davis	PRM902	4394	CA1244	6/30/20	6/30/21
Larson Davis	PRM916	128	CA1553	10/14/20	10/14/21
Larson Davis	CAL250	5026	CA1278	1/26/21	1/26/22
Larson Davis	2201	151	CA2073	11/24/20	11/24/21
Bruel & Kjaer	4192	3259547	CA3214	1/21/21	1/21/22
Larson Davis	GPRM902	5283	CA2152	3/31/20	3/31/21
Newport	iTHX-SD/N	1080002	CA1511	2/4/21	2/4/22
Larson Davis	PRA951-4	234	CA1154	11/11/20	11/11/21
Larson Davis	PRM915	136	CA1434	10/14/20	10/14/21
0	0	0	0	not required	not required
0	0	0	0	not required	not required
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

## Condition of Unit

As Found: n/a

As Left: New Unit, In Tolerance

## Notes

1. Calibration of reference equipment is traceable to one or more of the following National Labs; NIST, PTB or DFM.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open Circuit Sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Leonard Lukasik

Date: March 6, 2021



3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID: CAL112-3687872355.079+0

# ~ Calibration Report ~

Microphone Model: 377B02

Serial Number: 329147

Description: 1/2" Free-Field Microphone

## Calibration Data

Open Circuit Sensitivity @ 251.2 Hz: 47.37 mV/Pa  
-26.49 dB re 1V/Pa

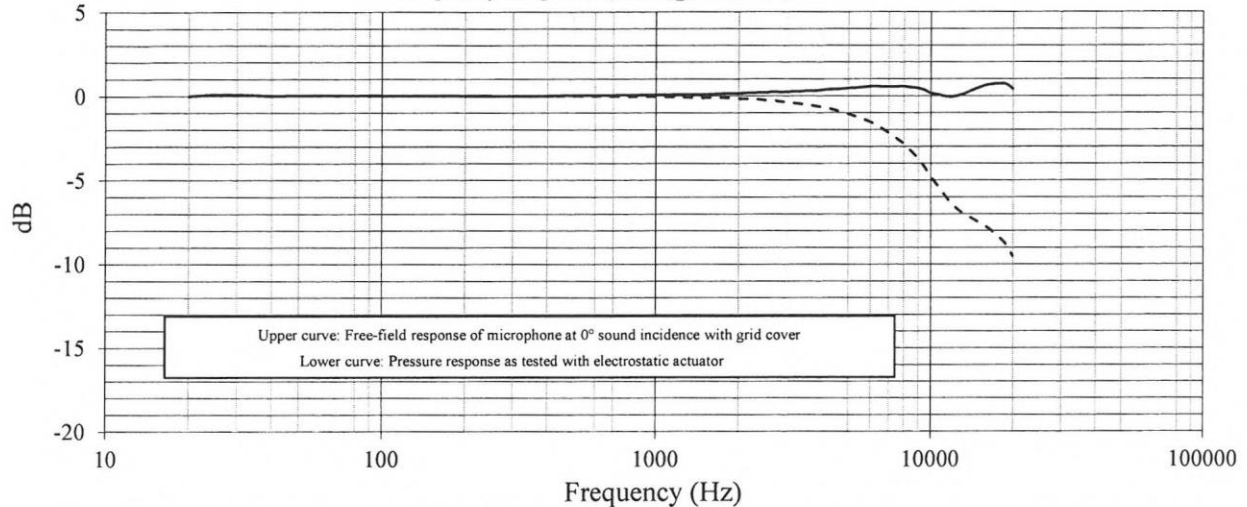
Polarization Voltage, External: 0 V  
Capacitance: 12.4 pF

Temperature: 67 °F (20°C)

Ambient Pressure: 993 mbar

Relative Humidity: 23 %

Frequency Response (0 dB @ 251.2 Hz)



Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	-0.01	-0.01	1679	-0.11	0.13	7499	-2.53	0.54	-	-	-
25.1	0.09	0.09	1778	-0.11	0.14	7943	-2.82	0.57	-	-	-
31.6	0.07	0.07	1884	-0.13	0.15	8414	-3.23	0.50	-	-	-
39.8	0.01	0.01	1995	-0.17	0.14	8913	-3.65	0.46	-	-	-
50.1	0.04	0.04	2114	-0.17	0.17	9441	-4.17	0.35	-	-	-
63.1	0.04	0.04	2239	-0.19	0.18	10000	-4.80	0.16	-	-	-
79.4	0.03	0.03	2371	-0.21	0.20	10593	-5.32	0.08	-	-	-
100.0	0.02	0.02	2512	-0.26	0.20	11220	-5.88	-0.02	-	-	-
125.9	0.02	0.02	2661	-0.27	0.25	11885	-6.37	-0.05	-	-	-
158.5	0.01	0.01	2818	-0.34	0.22	12589	-6.75	0.02	-	-	-
199.5	0.00	0.00	2985	-0.38	0.24	13335	-7.04	0.15	-	-	-
251.2	0.00	0.00	3162	-0.43	0.25	14125	-7.26	0.33	-	-	-
316.2	-0.01	0.00	3350	-0.47	0.27	14962	-7.49	0.48	-	-	-
398.1	0.00	0.00	3548	-0.52	0.31	15849	-7.73	0.62	-	-	-
501.2	-0.01	0.04	3758	-0.60	0.30	16788	-8.03	0.69	-	-	-
631.0	-0.02	0.03	3981	-0.66	0.34	17783	-8.39	0.72	-	-	-
794.3	-0.04	0.05	4217	-0.73	0.38	18837	-8.82	0.70	-	-	-
1000.0	-0.05	0.07	4467	-0.84	0.39	19953	-9.52	0.41	-	-	-
1059.3	-0.06	0.08	4732	-0.95	0.42	-	-	-	-	-	-
1122.0	-0.07	0.07	5012	-1.08	0.45	-	-	-	-	-	-
1188.5	-0.06	0.09	5309	-1.22	0.48	-	-	-	-	-	-
1258.9	-0.08	0.08	5623	-1.37	0.51	-	-	-	-	-	-
1333.5	-0.09	0.09	5957	-1.52	0.55	-	-	-	-	-	-
1412.5	-0.11	0.08	6310	-1.73	0.56	-	-	-	-	-	-
1496.2	-0.11	0.09	6683	-1.98	0.54	-	-	-	-	-	-
1584.9	-0.11	0.10	7080	-2.24	0.54	-	-	-	-	-	-

Technician: Leonard Lukasik

Date: March 6, 2021



3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID: CAL112-3697872355.079-0

# Calibration Certificate

Certificate Number 2021003950

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** LxT SE  
**Serial Number** 0006433  
**Test Results** Pass

**Procedure Number** D0001.8384  
**Technician** Kyle Holm  
**Calibration Date** 7 Apr 2021

**Initial Condition** As Manufactured

**Calibration Due Temperature** 23.5 °C ± 0.25 °C

**Description** Sound Expert LxT  
Class 1 Sound Level Meter  
Firmware Revision: 2.404

**Humidity** 51.8 %RH ± 2.0 %RH  
**Static Pressure** 86.39 kPa ± 0.13 kPa

**Evaluation Method**      **Tested with:**      **Data reported in dB re 20 µPa.**  
Larson Davis PRMLxT1L, S/N 070022  
PCB 377B02, S/N 328839  
Larson Davis CAL200, S/N 9079  
Larson Davis CAL291, S/N 0108

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

- |                        |                            |
|------------------------|----------------------------|
| IEC 60651:2001 Type 1  | ANSI S1.4-2014 Class 1     |
| IEC 60804:2000 Type 1  | ANSI S1.4 (R2006) Type 1   |
| IEC 61252:2002         | ANSI S1.11 (R2009) Class 1 |
| IEC 61260:2001 Class 1 | ANSI S1.25 (R2007)         |
| IEC 61672:2013 Class 1 | ANSI S1.43 (R2007) Type 1  |

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

**Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev J Supporting Firmware Version

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2.301, 2015-04-30

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**Certificate Number 2021003950**

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to 1/2" adaptor is used with the preamplifier.

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

No Pattern approval for IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 available.

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3 cover only a limited subset of the specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1.

**Standards Used**

Description	Cal Date	Cal Due	Cal Standard
Larson Davis CAL291 Residual Intensity Calibrator	2020-09-18	2021-09-18	001250
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943
Larson Davis CAL200 Acoustic Calibrator	2020-07-21	2021-07-21	007027
Larson Davis Model 831	2021-03-02	2022-03-02	007182
PCB 377A13 1/2 inch Prepolarized Pressure Microphone	2021-03-03	2022-03-03	007185
SRS DS360 Ultra Low Distortion Generator	2020-04-14	2021-04-14	007635
Larson Davis 1/2" Preamplifier for Model 831 Type 1	2020-10-06	2021-10-06	PCB0004783

**Acoustic Calibration**

Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
1000 Hz	114.00	113.80	114.20	0.14	Pass

**Loaded Circuit Sensitivity**

Measurement	Test Result [dB re 1 V / Pa]	Lower Limit [dB re 1 V / Pa]	Upper Limit [dB re 1 V / Pa]	Expanded Uncertainty [dB]	Result
1000 Hz	-28.26	-29.61	-26.24	0.14	Pass

-- End of measurement results--



### Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using slow time-weighted sound level for compliance to IEC 61672-1:2013 5.5; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.20	-0.20	-1.20	0.80	0.23	Pass
1000	0.12	0.00	-0.70	0.70	0.23	Pass
8000	-2.56	-3.00	-5.50	-1.50	0.32	Pass

-- End of measurement results--

### Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
A-weighted	40.43

-- End of measurement results--

-- End of Report--

Signatory: Kyle Holm





# Calibration Certificate

Certificate Number 2021003944

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** LxT SE

**Procedure Number** D0001.8378

**Serial Number** 0006433

**Technician** Kyle Holm

**Test Results** Pass

**Calibration Date** 7 Apr 2021

**Initial Condition** As Manufactured

**Calibration Due Temperature**

23.41 °C ± 0.25 °C

**Description** Sound Expert LxT  
Class 1 Sound Level Meter  
Firmware Revision: 2.404

**Humidity** 50.8 %RH ± 2.0 %RH

**Static Pressure** 86.45 kPa ± 0.13 kPa

**Evaluation Method** Tested electrically using Larson Davis PRMLxT1L S/N 070022 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23.6 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1  
IEC 60804:2000 Type 1  
IEC 61252:2002  
IEC 61672:2013 Class 1  
IEC 61260:2001 Class 1

ANSI S1.4-2014 Class 1  
ANSI S1.4 (R2006) Type 1  
ANSI S1.25 (R2007)  
ANSI S1.43 (R2007) Type 1  
ANSI S1.11 (R2009) Class 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

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Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

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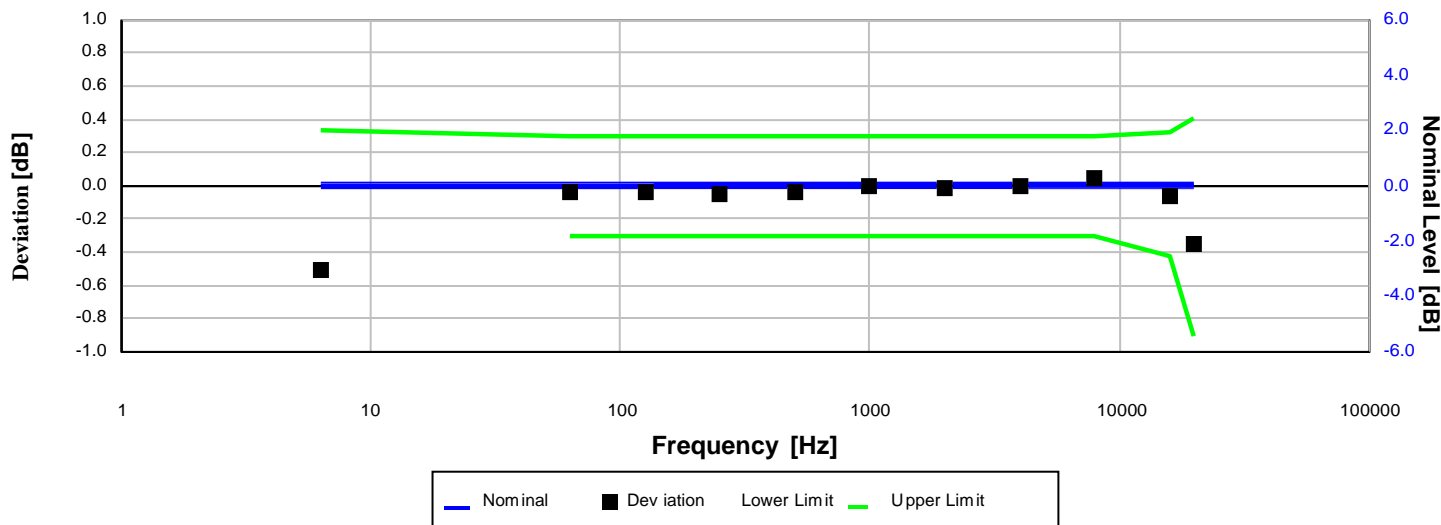
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1681 West 820 North  
Provo, UT 84601, United States  
716-684-0001



Description	Standards Used		
	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	2021-03-09	2022-03-09	006311
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943



### Z-weight Filter Response



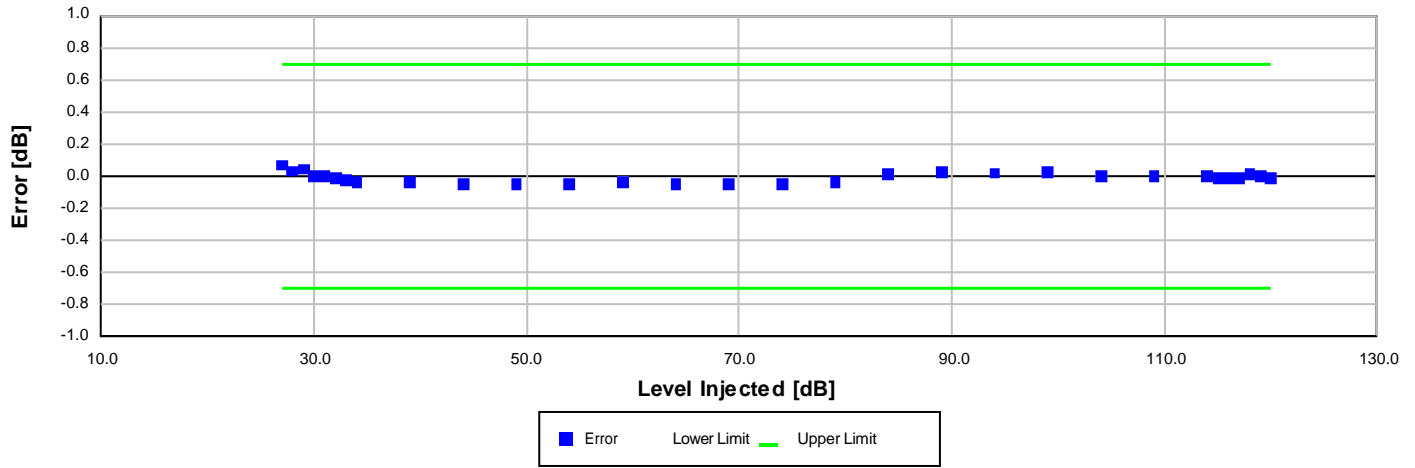
Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.51	-0.51	-1.11	0.33	0.15	Pass
63.10	-0.04	-0.04	-0.30	0.30	0.15	Pass
125.89	-0.04	-0.04	-0.30	0.30	0.15	Pass
251.19	-0.05	-0.05	-0.30	0.30	0.15	Pass
501.19	-0.03	-0.03	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.01	-0.01	-0.30	0.30	0.15	Pass
3,981.07	0.00	0.00	-0.30	0.30	0.15	Pass
7,943.28	0.04	0.04	-0.30	0.30	0.15	Pass
15,848.93	-0.07	-0.07	-0.42	0.32	0.15	Pass
19,952.62	-0.35	-0.35	-0.91	0.41	0.15	Pass

-- End of measurement results--



### A-weighted Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
27.00	0.07	-0.70	0.70	0.16	Pass
28.00	0.03	-0.70	0.70	0.17	Pass
29.00	0.04	-0.70	0.70	0.16	Pass
30.00	0.00	-0.70	0.70	0.35	Pass
31.00	-0.01	-0.70	0.70	0.16	Pass
32.00	-0.02	-0.70	0.70	0.16	Pass
33.00	-0.03	-0.70	0.70	0.16	Pass
34.00	-0.04	-0.70	0.70	0.16	Pass
39.00	-0.04	-0.70	0.70	0.16	Pass
44.00	-0.05	-0.70	0.70	0.16	Pass
49.00	-0.05	-0.70	0.70	0.16	Pass
54.00	-0.05	-0.70	0.70	0.16	Pass
59.00	-0.04	-0.70	0.70	0.16	Pass
64.00	-0.05	-0.70	0.70	0.16	Pass
69.00	-0.05	-0.70	0.70	0.16	Pass
74.00	-0.05	-0.70	0.70	0.16	Pass
79.00	-0.04	-0.70	0.70	0.16	Pass
84.00	0.01	-0.70	0.70	0.16	Pass
89.00	0.02	-0.70	0.70	0.16	Pass
94.00	0.02	-0.70	0.70	0.16	Pass
99.00	0.02	-0.70	0.70	0.16	Pass
104.00	-0.01	-0.70	0.70	0.15	Pass
109.00	0.00	-0.70	0.70	0.15	Pass
114.00	-0.01	-0.70	0.70	0.15	Pass
115.00	-0.01	-0.70	0.70	0.15	Pass
116.00	-0.01	-0.70	0.70	0.15	Pass
117.00	-0.02	-0.70	0.70	0.15	Pass
118.00	0.01	-0.70	0.70	0.15	Pass
119.00	0.00	-0.70	0.70	0.15	Pass
120.00	-0.01	-0.70	0.70	0.15	Pass

-- End of measurement results--



### Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [µs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
116.15	40	Negative Pulse	117.53	116.06	118.06	0.15	Pass
		Positive Pulse	117.47	116.01	118.01	0.15	Pass
	30	Negative Pulse	116.59	116.06	118.06	0.15	Pass
		Positive Pulse	116.52	116.01	118.01	0.15	Pass
-- End of measurement results--							

### Positive Pulse Crest Factor

#### 200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVL	± 0.50	0.15 ‡	Pass
	5	OVL	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
104.15	3	-0.15	± 0.50	0.15 ‡	Pass
	5	-0.13	± 1.00	0.16 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
94.15	3	-0.13	± 0.50	0.15 ‡	Pass
	5	-0.13	± 1.00	0.15 ‡	Pass
	10	-0.18	± 1.50	0.15 ‡	Pass
84.15	3	-0.13	± 0.50	0.15 ‡	Pass
	5	-0.12	± 1.00	0.15 ‡	Pass
	10	-0.08	± 1.50	0.15 ‡	Pass
-- End of measurement results--					

### Negative Pulse Crest Factor

#### 200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVL	± 0.50	0.15 ‡	Pass
	5	OVL	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
104.15	3	-0.11	± 0.50	0.15 ‡	Pass
	5	-0.09	± 1.00	0.15 ‡	Pass
	10	OVL	± 1.50	0.15 ‡	Pass
94.15	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.10	± 1.00	0.15 ‡	Pass
	10	-0.15	± 1.50	0.15 ‡	Pass
84.15	3	-0.09	± 0.50	0.15 ‡	Pass
	5	-0.12	± 1.00	0.15 ‡	Pass
	10	-0.06	± 1.50	0.15 ‡	Pass
-- End of measurement results--					



### Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	84.02	83.90	84.10	0.15	Pass
0 dB Gain, Linearity	21.20	20.30	21.70	0.16	Pass
OBA Low Range	84.00	83.90	84.10	0.15	Pass
OBA Normal Range	84.00	83.20	84.80	0.15	Pass

-- End of measurement results--

### Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	7.47	16.00	Pass
C-weight Noise Floor	12.16	18.00	Pass
Z-weight Noise Floor	20.00	25.00	Pass

-- End of measurement results--

### Total Harmonic Distortion

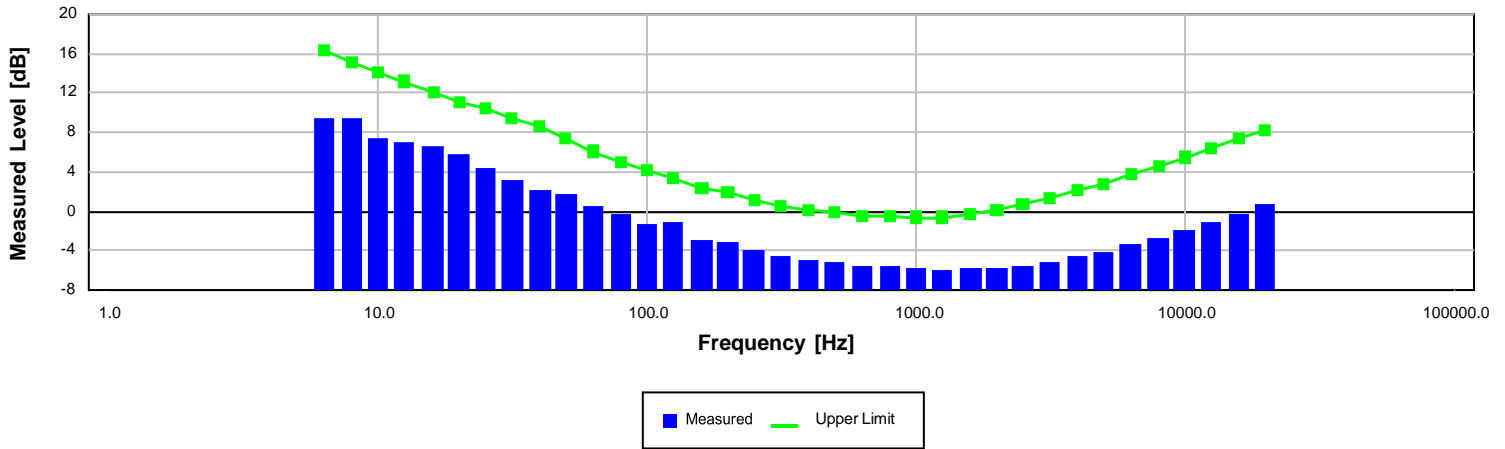
Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	113.43	112.35	113.95	0.15	Pass
THD	-55.87		-50.00	0.01 ‡	Pass
THD+N	-54.47		-50.00	0.01 ‡	Pass

-- End of measurement results--



### 1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	9.51	16.30	Pass
8.00	9.46	15.20	Pass
10.00	7.48	14.20	Pass
12.50	7.08	13.20	Pass
16.00	6.59	12.10	Pass
20.00	5.77	11.10	Pass
25.00	4.40	10.40	Pass
31.50	3.15	9.40	Pass
40.00	2.23	8.60	Pass
50.00	1.68	7.40	Pass
63.00	0.60	6.10	Pass
80.00	-0.22	5.00	Pass
100.00	-1.20	4.20	Pass
125.00	-1.01	3.30	Pass
160.00	-2.82	2.40	Pass
200.00	-3.07	1.90	Pass
250.00	-3.99	1.20	Pass
315.00	-4.56	0.60	Pass
400.00	-4.86	0.20	Pass
500.00	-5.21	-0.10	Pass
630.00	-5.51	-0.50	Pass
800.00	-5.65	-0.50	Pass
1,000.00	-5.84	-0.60	Pass
1,250.00	-5.88	-0.60	Pass
1,600.00	-5.84	-0.20	Pass
2,000.00	-5.76	0.20	Pass
2,500.00	-5.49	0.70	Pass
3,150.00	-5.09	1.40	Pass
4,000.00	-4.62	2.10	Pass
5,000.00	-4.08	2.80	Pass
6,300.00	-3.37	3.70	Pass
8,000.00	-2.68	4.60	Pass
10,000.00	-1.86	5.50	Pass
12,500.00	-1.04	6.40	Pass
16,000.00	-0.18	7.40	Pass
20,000.00	0.71	8.30	Pass

-- End of measurement results--





-- End of Report--

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Signatory: Kyle Holm

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Provo, UT 84601, United States  
716-684-0001



# Calibration Certificate

**Certificate Number** 2021003846

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24, Ireland

**Model Number** PRMLxT1L  
**Serial Number** 070022  
**Test Results** **Pass**  
**Initial Condition** As Manufactured

**Procedure Number** D0001.8383  
**Technician** Ashley Anderson  
**Calibration Date** 6 Apr 2021  
**Calibration Due**

**Description** Larson Davis 1/2" Preamplifier for LxT Class 1  
-1 dB

**Temperature** 23.4 °C ± 0.01 °C  
**Humidity** 51.1 %RH ± 0.5 %RH  
**Static Pressure** 85.75 kPa ± 0.03 kPa

**Evaluation Method** Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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## Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/05/2021	03/05/2022	003003
Hart Scientific 2626-S Humidity/Temperature Sensor	05/12/2020	05/12/2021	006943
Agilent 34401A DMM	07/07/2020	07/07/2021	007165
SRS DS360 Ultra Low Distortion Generator	08/19/2020	08/19/2021	007167

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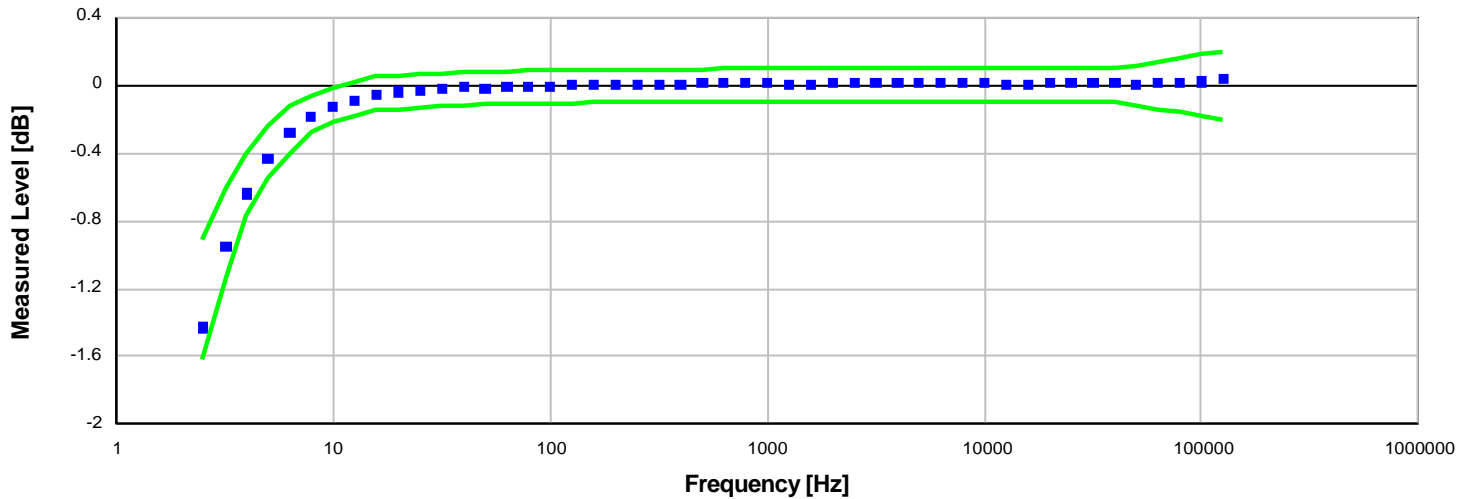


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### Frequency Response



Frequency response electrically tested at 120.0 dB re 1  $\mu$ V

Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
2.50	-1.43	-1.62	-0.91	0.12	Pass
3.20	-0.95	-1.14	-0.60	0.12	Pass
4.00	-0.64	-0.77	-0.40	0.12	Pass
5.00	-0.43	-0.54	-0.24	0.12	Pass
6.30	-0.28	-0.40	-0.12	0.12	Pass
7.90	-0.19	-0.28	-0.06	0.12	Pass
10.00	-0.13	-0.22	-0.01	0.12	Pass
12.60	-0.09	-0.18	0.02	0.12	Pass
15.80	-0.06	-0.15	0.05	0.12	Pass
20.00	-0.04	-0.14	0.06	0.12	Pass
25.10	-0.03	-0.13	0.07	0.12	Pass
31.60	-0.02	-0.12	0.07	0.12	Pass
39.80	-0.01	-0.12	0.08	0.12	Pass
50.10	-0.02	-0.11	0.08	0.12	Pass
63.10	-0.01	-0.11	0.08	0.12	Pass
79.40	-0.01	-0.11	0.09	0.12	Pass
100.00	-0.01	-0.11	0.09	0.12	Pass
125.90	0.00	-0.11	0.09	0.12	Pass
158.50	0.00	-0.10	0.09	0.12	Pass
199.50	0.00	-0.10	0.09	0.12	Pass
251.20	0.00	-0.10	0.09	0.12	Pass
316.20	0.00	-0.10	0.09	0.12	Pass
398.10	0.00	-0.10	0.09	0.12	Pass
501.20	0.01	-0.10	0.09	0.12	Pass
631.00	0.01	-0.10	0.10	0.12	Pass
794.30	0.01	-0.10	0.10	0.12	Pass
1,000.00	0.01	-0.10	0.10	0.12	Pass
1,258.90	0.00	-0.10	0.10	0.12	Pass
1,584.90	0.00	-0.10	0.10	0.12	Pass
1,995.30	0.01	-0.10	0.10	0.12	Pass
2,511.90	0.01	-0.10	0.10	0.12	Pass
3,162.30	0.01	-0.10	0.10	0.12	Pass



Frequency [Hz]	Test Result [dB re 1 kHz]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
3,981.10	0.01	-0.10	0.10	0.12	Pass
5,011.90	0.01	-0.10	0.10	0.12	Pass
6,309.60	0.01	-0.10	0.10	0.12	Pass
7,943.30	0.01	-0.10	0.10	0.12	Pass
10,000.00	0.01	-0.10	0.10	0.12	Pass
12,589.30	0.00	-0.10	0.10	0.12	Pass
15,848.90	0.00	-0.10	0.10	0.12	Pass
19,952.60	0.01	-0.10	0.10	0.12	Pass
25,118.90	0.01	-0.10	0.10	0.12	Pass
31,622.80	0.01	-0.10	0.10	0.12	Pass
39,810.70	0.01	-0.10	0.10	0.12	Pass
50,118.70	0.00	-0.12	0.12	0.12	Pass
63,095.70	0.01	-0.14	0.14	0.12	Pass
79,432.80	0.01	-0.16	0.16	0.12	Pass
100,000.00	0.02	-0.18	0.18	0.12	Pass
125,892.50	0.04	-0.20	0.20	0.24	Pass

**Gain Measurement**

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
Output Gain @ 1 kHz	-1.48	-2.60	-1.00	0.12	Pass

-- End of measurement results--

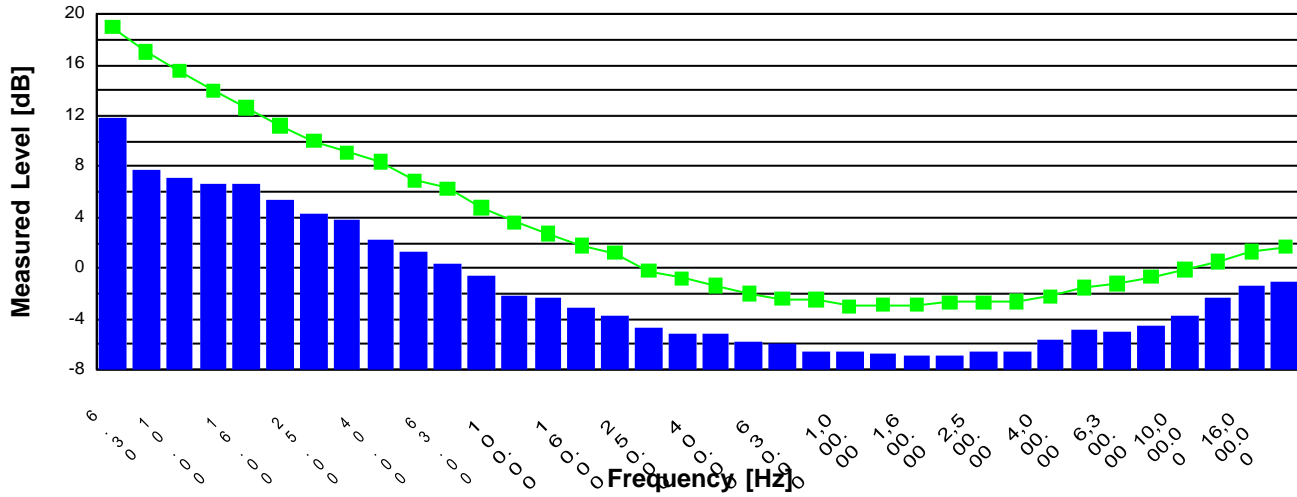
**DC Bias Measurement**

Measurement	Test Result [V]	Lower limit [V]	Upper limit [V]	Expanded Uncertainty [V]	Result
DC Voltage	3.70	2.90	3.80	0.01	Pass

-- End of measurement results--



### 1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [dB re 1 µV]	Upper limit [dB re 1 µV]	Result
6.30	11.80	19.00	Pass
8.00	7.80	17.00	Pass
10.00	7.20	15.50	Pass
12.50	6.60	14.00	Pass
16.00	6.70	12.60	Pass
20.00	5.40	11.20	Pass
25.00	4.30	10.00	Pass
31.50	3.90	9.10	Pass
40.00	2.20	8.40	Pass
50.00	1.30	6.90	Pass
63.00	0.40	6.30	Pass
80.00	-0.60	4.80	Pass
100.00	-2.10	3.60	Pass
125.00	-2.30	2.70	Pass
160.00	-3.10	1.80	Pass
200.00	-3.70	1.20	Pass
250.00	-4.60	-0.20	Pass
315.00	-5.20	-0.80	Pass
400.00	-5.20	-1.40	Pass
500.00	-5.80	-2.00	Pass
630.00	-6.00	-2.40	Pass
800.00	-6.60	-2.50	Pass
1,000.00	-6.60	-3.00	Pass
1,250.00	-6.70	-2.90	Pass
1,600.00	-6.90	-2.90	Pass
2,000.00	-6.80	-2.70	Pass
2,500.00	-6.50	-2.70	Pass
3,150.00	-6.50	-2.60	Pass
4,000.00	-5.60	-2.20	Pass
5,000.00	-4.90	-1.50	Pass
6,300.00	-5.00	-1.20	Pass
8,000.00	-4.50	-0.70	Pass
10,000.00	-3.70	-0.10	Pass
12,500.00	-2.30	0.50	Pass
16,000.00	-1.40	1.30	Pass
20,000.00	-1.10	1.70	Pass

-- End of measurement results--



### Self-generated Noise

Bandwidth	Test Result [ $\mu\text{V}$ ]	Test Result [dB re 1 $\mu\text{V}$ ]	Upper limit [dB re 1 $\mu\text{V}$ ]	Result
A-weighted (1 Hz - 20 kHz)	2.09	6.40	8.00	Pass
Broadband (1 Hz - 20 kHz)	4.37	12.80	14.00	Pass

-- End of measurement results--

Signatory: Ashley Anderson

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716-684-0001



# ~ Certificate of Calibration and Compliance ~

Microphone Model: 377B02

Serial Number: 328839

Manufacturer: PCB

## Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

## Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
National Instruments	PC1e-6351	1896F08	CA1918	10/19/20	10/19/21
Larson Davis	PRM915	146	CA2115	4/1/20	4/1/21
Larson Davis	PRM902	4394	CA1244	6/30/20	6/30/21
Larson Davis	PRM916	128	CA1553	10/14/20	10/14/21
Larson Davis	CAL250	5026	CA1278	1/26/21	1/26/22
Larson Davis	2201	151	CA2073	11/24/20	11/24/21
Bruel & Kjaer	4192	3259547	CA3214	1/21/21	1/21/22
Larson Davis	GPRM902	5283	CA2152	3/31/20	3/31/21
Newport	iTHX-SD/N	1080002	CA1511	2/4/21	2/4/22
Larson Davis	PRA951-4	234	CA1154	11/11/20	11/11/21
Larson Davis	PRM915	136	CA1434	10/14/20	10/14/21
0	0	0	0	not required	not required
0	0	0	0	not required	not required
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

## Condition of Unit

As Found: n/a

As Left: New Unit, In Tolerance

## Notes

1. Calibration of reference equipment is traceable to one or more of the following National Labs; NIST, PTB or DFM.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 10012-1, ANSI/NC SL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open Circuit Sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Leonard Lukasik

Date: March 6, 2021



CALIBRATION CERT #1862.01



3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL112-3697871235.285+0



# ~ Calibration Report ~

Microphone Model: 377B02

Serial Number: 328839

Description: 1/2" Free-Field Microphone

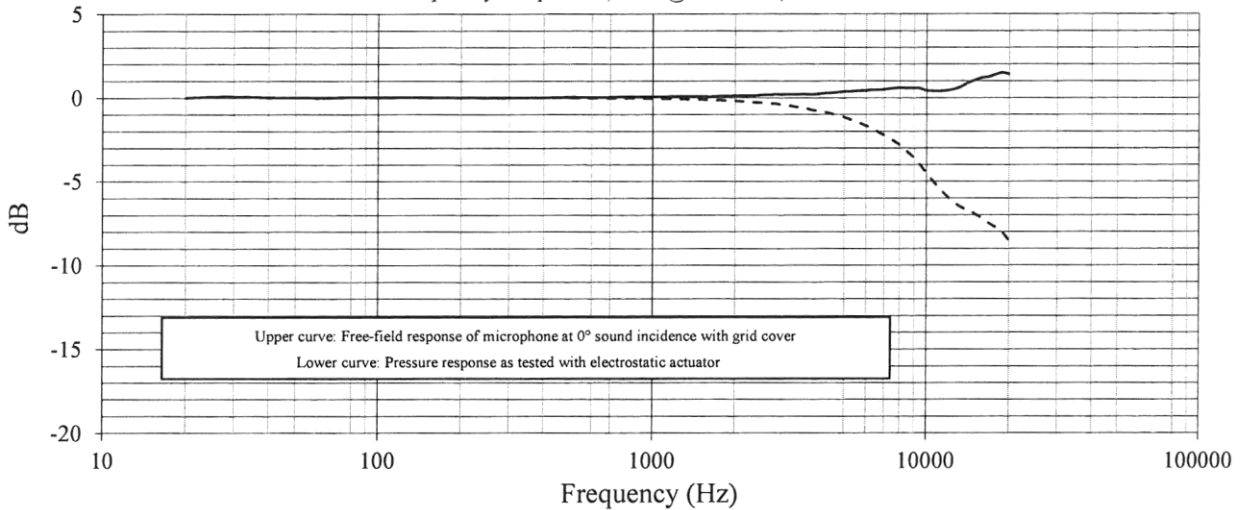
## Calibration Data

Open Circuit Sensitivity @ 251.2 Hz: 45.69 mV/Pa  
-26.8 dB re 1V/Pa

Polarization Voltage, External: 0 V  
Capacitance: 13.1 pF

Temperature: 69 °F (20°C)      Ambient Pressure: 993 mbar      Relative Humidity: 23 %

Frequency Response (0 dB @ 251.2 Hz)



Upper curve: Free-field response of microphone at 0° sound incidence with grid cover  
 Lower curve: Pressure response as tested with electrostatic actuator

Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	0.00	0.00	1679	-0.15	0.08	7499	-2.51	0.56	-	-	-
25.1	0.07	0.07	1778	-0.15	0.10	7943	-2.79	0.60	-	-	-
31.6	0.07	0.07	1884	-0.18	0.10	8414	-3.16	0.58	-	-	-
39.8	0.02	0.02	1995	-0.19	0.13	8913	-3.53	0.58	-	-	-
50.1	0.02	0.02	2114	-0.22	0.12	9441	-3.96	0.56	-	-	-
63.1	0.00	0.00	2239	-0.25	0.12	10000	-4.51	0.44	-	-	-
79.4	0.03	0.03	2371	-0.28	0.13	10593	-5.00	0.40	-	-	-
100.0	0.02	0.02	2512	-0.29	0.17	11220	-5.47	0.39	-	-	-
125.9	0.03	0.03	2661	-0.33	0.18	11885	-5.89	0.43	-	-	-
158.5	0.02	0.02	2818	-0.36	0.20	12589	-6.25	0.52	-	-	-
199.5	0.01	0.01	2985	-0.42	0.20	13335	-6.53	0.66	-	-	-
251.2	0.00	0.00	3162	-0.48	0.20	14125	-6.71	0.88	-	-	-
316.2	0.01	0.02	3350	-0.54	0.20	14962	-6.93	1.04	-	-	-
398.1	0.01	0.01	3548	-0.60	0.22	15849	-7.16	1.19	-	-	-
501.2	0.00	0.04	3758	-0.70	0.21	16788	-7.47	1.25	-	-	-
631.0	-0.02	0.02	3981	-0.78	0.22	17783	-7.73	1.39	-	-	-
794.3	-0.02	0.07	4217	-0.85	0.27	18837	-8.02	1.49	-	-	-
1000.0	-0.06	0.07	4467	-0.94	0.29	19953	-8.52	1.41	-	-	-
1059.3	-0.07	0.06	4732	-1.05	0.33	-	-	-	-	-	-
1122.0	-0.07	0.07	5012	-1.17	0.36	-	-	-	-	-	-
1188.5	-0.06	0.09	5309	-1.33	0.38	-	-	-	-	-	-
1258.9	-0.08	0.08	5623	-1.47	0.41	-	-	-	-	-	-
1333.5	-0.09	0.09	5957	-1.64	0.43	-	-	-	-	-	-
1412.5	-0.11	0.08	6310	-1.82	0.47	-	-	-	-	-	-
1496.2	-0.10	0.10	6683	-2.05	0.47	-	-	-	-	-	-
1584.9	-0.13	0.08	7080	-2.27	0.51	-	-	-	-	-	-

Technician: Leonard Lukasik      Date: March 6, 2021



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ID: CAL 112-3697871235 285+0

**Baseline Dust Monitoring Report  
for  
KILWEX LTD.  
at  
Coolnabacky, Timahoe, Co. Laois**

Prepared By:



1st & 2nd Floor Kilmurry House  
Main Street,  
Castlerea,  
Co. Roscommon,  
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Visit us at [www.coyleenv.ie](http://www.coyleenv.ie)

ENVIRONMENTAL • MONITORING • CONSULTING

**Document Control**

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Project Reference No: 22-224

Project Description: Baseline Dust Sampling for the Coolnabacky Project

Status: FINAL

Client Details: Kilwex Ltd.

Issued By: Coyle Environmental Ltd., 1<sup>st</sup> & 2<sup>nd</sup> Floor Kilmurry House,  
Castlerea, Co. Roscommon

Document Production and Approval			
	Name	Date	Position
Prepared by	Clodagh Kissane	05/05/2023	Environmental Technician
Approved by	Daniella O'Neill	05/05/2023	Environmental Consultant

Revision History		
Rev	Status	Date
0	Final	05/05/2023
1		

Coyle Environmental Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. The report has been prepared with reasonable skill, care, and diligence within the terms of the Contract with the Client. The report is confidential to the Client and Coyle Environmental Limited accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

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## **1 INTRODUCTION**

Coyle Environmental Ltd were commissioned by Kilwex to undertake baseline dust monitoring at the nearest sensitive receptors. The following report outlines the methodologies, results, and interpretation of one dust monitoring location (Figure 1) carried out from the 2<sup>nd</sup> of March to 3<sup>rd</sup> April 2023.

### **1.1 Sources of dust deposition**

Within the site and due to the ground conditions and exposed surfaces, dust can result from sources such as vehicle movements and wind-blown dust from both outside and within.

## **2 METEOROLOGICAL CONDITIONS**

Meteorological conditions significantly affect the level of dust emissions and the deposition downwind of the source. The most significant meteorological elements affecting dust deposition are rainfall and wind-speed. Rain helps suppress the generation of dust due to the cohesive nature of water between dust particles. Wind lifts up particles into the air and transports them downwind. The worst-case dust deposition conditions typically occur during dry conditions with strong winds.

## **3 SITE LOCATION AND SAMPLING POINTS**

The Kilwex site is located in a rural area within the townland of Timahoe. Access to the site is just off the primary road, R426. It is approximately 2.5 km north of the village of Timahoe. A map of the sampling point is presented in Figure 1. The dust gauge was set up at the location selected at positions D01 (52.979443; -7.208092).



*Figure 1 Sample Location Points*

#### **4 METHODOLOGY**

Total dust deposition was measured at the site using the Bergerhoff gauges specified in the German Engineering Institute VDI2119 document entitled “Measurement of Dustfall using the Bergerhoff Instrument (Standard Method)”. The containers were analysed by IAS Laboratories Muine Bheag, Co. Carlow, for total dust. The liquid was evaporated in a drying chamber and the dust fall residue weighed using a calibrated balance. The daily dust deposition rate was then calculated using information on the dust fall mass, the sampling period, and the area of the collecting surface.

## 5 RESULTS

*Table 1 Dust results for D01 March to April 2023*

Location	Dust Level mg/m <sup>2</sup> /day	Emission Limit Value mg/m <sup>2</sup> /day
D01 (52.979443 -7.208092)	151.5	350

## 6 INTERPRETATION OF RESULTS & RECOMMENDATIONS

This report presents the results for dust monitoring for Kilwex Ltd. At Coolnabacky Ltd, carried out for the period 2<sup>nd</sup> March to 3<sup>rd</sup> April 2023. The values presented in Table 1 show that total depositional dust levels measured at D01 monitoring location was not in exceedance of the 350 mg/m<sup>2</sup>/day limit value. This indicates that nuisance levels of dust did not occur during that period.

# Appendix I

## IAS Lab results

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# Baseline Groundwater and Surface water Report for Kilwex Ltd at Coolnabacky Timahoe, Co. Laois

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Prepared By:



1<sup>st</sup> & 2<sup>nd</sup> Floor Kilmurry House

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Project Title: Baseline Groundwater and surface water report

Project Reference No.: 22-224

Project Description: Baseline Groundwater and surface water compliance report

Status: Final

Client Details: Kilwex Ltd, ESB reinforcement project Coolnabacky , Co. Laois.

Issued By: Coyle Environmental Ltd. 1<sup>st</sup> & 2<sup>nd</sup> Floor Kilmurry House, Main Street, Castlerea, Co. Roscommon

Document Production Approval			
	Name	Date	Position
Prepared by	Clodagh Kissane	20/04/23	Environmental Technician
Approved by	Daniella O' Neil	20/04/23	Environmental Consultant
Revision no		Status and date	

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## 1.0 INTRODUCTION

Coyle Environmental Ltd were commissioned by Kilwex Ltd to undertake Baseline compliance monitoring according to the conditions stated in Planning Permission reference VA0015. The following report presents the results from a groundwater and surface water monitoring event consisting of four groundwater samples and three surface water samples taken at the Kilwex Coolnabacky, Co. Laois site.

Monitoring was undertaken on the 20<sup>th</sup> February 2023 and Laboratory analysis of the samples was undertaken on the 21<sup>st</sup> of February 2023.

## 2.0 SITE LOCATION AND SAMPLING POINTS

The Kilwex site is located in a rural area within the townland of Timahoe. Access to the site is just off the primary road, R426. It is approximately 2.5 km north of the village of Timahoe. A map of the sampling points is presented in Figure 1.

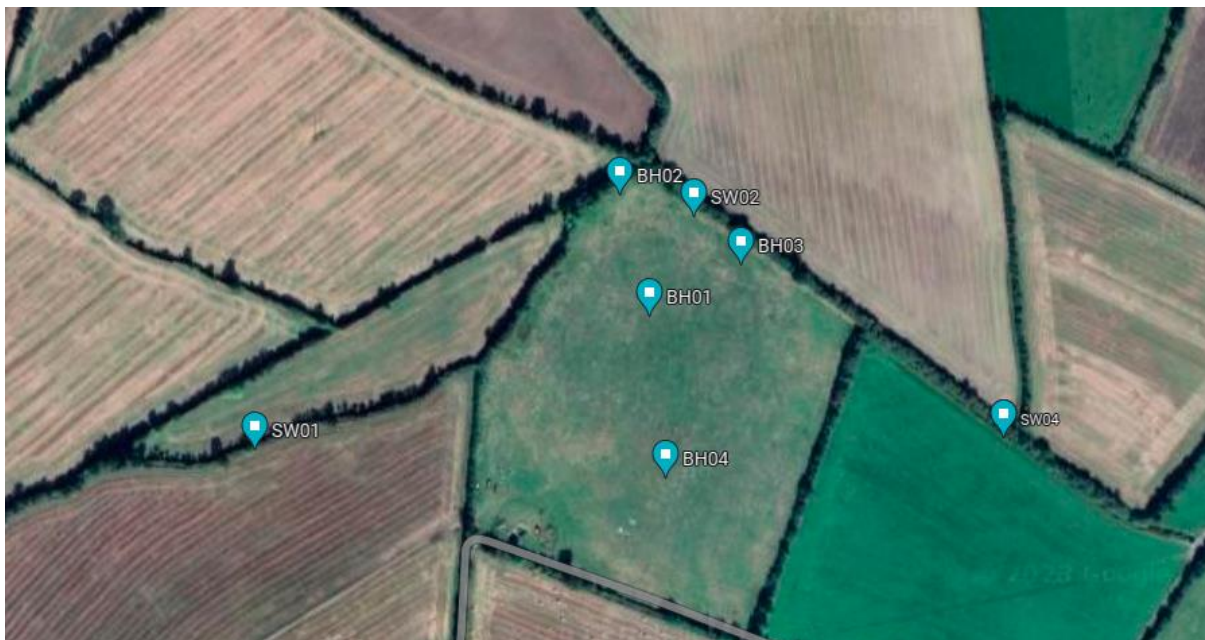


Figure 1: Sample Location Points

### 3.0 METHODOLOGY

The monitoring involved taking four groundwater samples and three surface water samples as shown in Figure 1, Sampling location points. Samples were stored in polyethylene and glass storage containers and preserved at below 6°C for laboratory analysis. Laboratory analysis of the samples was carried out by IAS INDEPENDENT ANALYTICAL SUPPLIES Ltd. Unit 4, Bagenalstown, Co. Carlow.

Groundwater was purged at each borehole using a WASP submersible pump. A representative groundwater sample by the well screen is then recovered, bottled, and taken for analysis.

Surface water samples were obtained by lifting a sample mid-flow using a grab sampler instrument. Samples were bottled and taken for analysis.

The following supplementary readings were recorded in the field at each sample site for groundwater and surface water using a calibrated HANNA HI98196 Multiparameter probe and a Turbimeter plus:

- pH
- Temperature (°C)
- Conductivity ( $\mu\text{s}/\text{cm}$ )
- DO (ppm)
- Turbidity

## 4.0 RESULTS

## 4.1 Groundwater

Table 1: Groundwater results for BH01 BH02, BH03 & BH04 20<sup>th</sup> February 2023

	BH01	BH02	BH03	BH04	Unit
pH	7.2	7.3	7.1	7.2	pH units
Conductivity	501	468	580	494	µs/cm 20 °C
Temperature	8.34	8.22	9.05	9.38	°C
Turbidity	2.84	33.3	18.7	225	NTU
DO	0.007	0.07	0.07	0.08	ppm
Nitrate	<0.03	<2.2	<2.2	<2.2	mg/l NO <sub>3</sub>
Chloride	9.32	6.40	8.74	9.41	mg/l
Sodium	6.4	4.7	4.4	5.0	mg/l
Sulphate	11.89	2.96	6.75	10.97	mg/l
Calcium	120	120	130	120	mg/l
Magnesium	5.9	3.8	11	8.9	mg/l
Potassium	0.49	1.3	0.60	1.1	mg/l
Ammoniacal N	0.04	0.08	0.06	0.01	mg/l NH <sub>4</sub>
Alkalinity	293.58	298.27	364.35	296.03	mg/l CaCO <sub>3</sub>
Phosphorus	<0.013	0.016	<0.013	0.044	mg/l P
Total TPH	<10	<10	<10	<10	ug/l

## 4.2 Surface water

Table 2 Surface water results for SW01, SW02 & SW04 20<sup>th</sup> February 2023

	SW01	SW02	SW04	Unit
pH	8.2	8.1	8.3	pH units
Conductivity	573	579	586	µs/cm 20 °C
Temperature	12.66	9.89	10.79	°C
Turbidity	6.99	8.30	1.97	NTU
DO	0.08	0.09	0.08	ppm
Nitrate	33.26	40.26	35.16	mg/l NO <sub>3</sub>
Chloride	19.55	18.15	25.17	mg/l
Sodium	7.8	7.5	11	mg/l
Sulphate	25.69	21.86	18.05	mg/l
Calcium	120	130	130	mg/l
Magnesium	6.1	5.7	7.4	mg/l
Potassium	3.8	3.9	3.2	mg/l
Ammoniacal N	0.06	0.04	0.06	mg/l NH <sub>4</sub>
Alkalinity	276.89	280.14	276.77	mg/l CaCO <sub>3</sub>
Phosphorus	0.031	0.021	0.029	mg/l P
Total TPH	<10	22	<10	ug/l

This report presents the results for groundwater and surface water monitoring at Kilwex Ltd, carried out on the 20<sup>th</sup> February 2023. See appendix I for IAS Laboratories certificates of analysis.



## Appendix I

---



IAS Certificates of Analysis



## Independent Analytical Supplies

## Test Report

Lab Report Number: 17639S001

Customer ID:	COYL.FJ	Analysis Type:	99A (99A)
Contact Name:	CLODAGH KISSANE	Delivery By:	CUSTOMER
Company Name:	COYLE ENVIRONMENTAL LTD	Sample Card Number:	64297
Address:	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	Condition on Receipt:	Acceptable
Sample Type:	GROUND WATER	Date Sample Received:	21/02/2023
Sample Reference:	KILWEX GROUND/SURFACE	Date Analysis Commenced:	21/02/2023
Sample Description:	BH01	Date Certificate Issued:	27/03/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	293.58	mg/l CaCO <sub>3</sub>
Calcium <sup>*</sup>	Subcontracted	120	mg/l
Chloride	SOP 2065	9.32	mg/l
Conductivity <sup>*</sup>	SOP 2076	501	µS/cm 20°C
Potassium <sup>*</sup>	Subcontracted	0.49	mg/l
Magnesium <sup>*</sup>	Subcontracted	5.9	mg/l
Sodium <sup>*</sup>	Subcontracted	6.4	mg/l
Ammonium	SOP 2057	0.04	mg/l NH <sub>4</sub>
Nitrite	SOP 2059	<0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	<2.2	mg/l NO <sub>3</sub>
Total Phosphorus <sup>*</sup>	Subcontracted	<0.013	mg/l P
pH	SOP 2004	7.2	pH units
Sulphate	SOP 2062	11.89	mg/l
Total Oxidised Nitrogen	SOP 2058	<0.50	mg/l N
Total Petroleum Hydrocarbons <sup>**</sup>	Subcontracted	<10	µg/l

Signed: Laura Kavanagh  
**Laura Kavanagh - Laboratory Manager**

Date: 27/03/2023

\* = not INAB Accredited    ^ = Subcontracted

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IAS Laboratories, Unit 4 Bagenalstown Bus. Park, Bagenalstown, Co Carlow, R21 YX99

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Phone: 059 9721022    Email: reception@iaslabs.ie    Web: www.iaslabs.ie

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## Independent Analytical Supplies

## Test Report

Lab Report Number: 17639S002

<b>Customer ID:</b>	COYL.FJ	<b>Analysis Type:</b>	99A (99A)
<b>Contact Name:</b>	CLODAGH KISSANE	<b>Delivery By:</b>	CUSTOMER
<b>Company Name:</b>	COYLE ENVIRONMENTAL LTD	<b>Sample Card Number:</b>	64297
<b>Address:</b>	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	<b>Condition on Receipt:</b>	Acceptable
<b>Sample Type:</b>	GROUND WATER	<b>Date Sample Received:</b>	21/02/2023
<b>Sample Reference:</b>	KILWEX GROUND/SURFACE	<b>Date Analysis Commenced:</b>	21/02/2023
<b>Sample Description:</b>	BH02	<b>Date Certificate Issued:</b>	27/03/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	298.27	mg/l CaCO <sub>3</sub>
Calcium <sup>*</sup>	Subcontracted	120	mg/l
Chloride	SOP 2065	6.40	mg/l
Conductivity <sup>*</sup>	SOP 2076	468	µS/cm 20°C
Potassium <sup>*</sup>	Subcontracted	1.3	mg/l
Magnesium <sup>*</sup>	Subcontracted	3.8	mg/l
Sodium <sup>*</sup>	Subcontracted	4.7	mg/l
Ammonium	SOP 2057	0.08	mg/l NH <sub>4</sub>
Nitrite	SOP 2059	<0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	<2.2	mg/l NO <sub>3</sub>
Total Phosphorus <sup>*</sup>	Subcontracted	0.016	mg/l P
pH	SOP 2004	7.3	pH units
Sulphate	SOP 2062	2.96	mg/l
Total Oxidised Nitrogen	SOP 2058	<0.50	mg/l N
Total Petroleum Hydrocarbons <sup>**</sup>	Subcontracted	<10	µg/l

Signed: Laura Kavanagh  
**Laura Kavanagh - Laboratory Manager**

Date: 27/03/2023

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## Independent Analytical Supplies

## Test Report

Lab Report Number: 17639S003

<b>Customer ID:</b>	COYL.FJ	<b>Analysis Type:</b>	99A (99A)
<b>Contact Name:</b>	CLODAGH KISSANE	<b>Delivery By:</b>	CUSTOMER
<b>Company Name:</b>	COYLE ENVIRONMENTAL LTD	<b>Sample Card Number:</b>	64297
<b>Address:</b>	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	<b>Condition on Receipt:</b>	Acceptable
<b>Sample Type:</b>	GROUND WATER	<b>Date Sample Received:</b>	21/02/2023
<b>Sample Reference:</b>	KILWEX GROUND/SURFACE	<b>Date Analysis Commenced:</b>	21/02/2023
<b>Sample Description:</b>	BH03	<b>Date Certificate Issued:</b>	27/03/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	364.35	mg/l CaCO <sub>3</sub>
Calcium <sup>*</sup>	Subcontracted	130	mg/l
Chloride	SOP 2065	8.74	mg/l
Conductivity <sup>*</sup>	SOP 2076	580	µS/cm 20°C
Potassium <sup>*</sup>	Subcontracted	0.60	mg/l
Magnesium <sup>*</sup>	Subcontracted	11	mg/l
Sodium <sup>*</sup>	Subcontracted	4.4	mg/l
Ammonium	SOP 2057	0.06	mg/l NH <sub>4</sub>
Nitrite	SOP 2059	<0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	<2.2	mg/l NO <sub>3</sub>
Total Phosphorus <sup>*</sup>	Subcontracted	<0.013	mg/l P
pH	SOP 2004	7.1	pH units
Sulphate	SOP 2062	6.75	mg/l
Total Oxidised Nitrogen	SOP 2058	<0.50	mg/l N
Total Petroleum Hydrocarbons <sup>**</sup>	Subcontracted	<10	µg/l

Signed: Laura Kavanagh  
**Laura Kavanagh - Laboratory Manager**

Date: 27/03/2023

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## Independent Analytical Supplies

## Test Report

Lab Report Number: 17639S004

<b>Customer ID:</b>	COYL.FJ	<b>Analysis Type:</b>	99A (99A)
<b>Contact Name:</b>	CLODAGH KISSANE	<b>Delivery By:</b>	CUSTOMER
<b>Company Name:</b>	COYLE ENVIRONMENTAL LTD	<b>Sample Card Number:</b>	64297
<b>Address:</b>	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	<b>Condition on Receipt:</b>	Acceptable
<b>Sample Type:</b>	GROUND WATER	<b>Date Sample Received:</b>	21/02/2023
<b>Sample Reference:</b>	KILWEX GROUND/SURFACE	<b>Date Analysis Commenced:</b>	21/02/2023
<b>Sample Description:</b>	BH04	<b>Date Certificate Issued:</b>	27/03/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	296.03	mg/l CaCO <sub>3</sub>
Calcium*	Subcontracted	120	mg/l
Chloride	SOP 2065	9.41	mg/l
Conductivity*	SOP 2076	494	µS/cm 20°C
Potassium*	Subcontracted	1.1	mg/l
Magnesium*	Subcontracted	8.9	mg/l
Sodium*	Subcontracted	5.0	mg/l
Ammonium	SOP 2057	0.01	mg/l NH <sub>4</sub>
Nitrite	SOP 2059	<0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	<2.2	mg/l NO <sub>3</sub>
Total Phosphorus*	Subcontracted	0.044	mg/l P
pH	SOP 2004	7.2	pH units
Sulphate	SOP 2062	10.97	mg/l
Total Oxidised Nitrogen	SOP 2058	<0.50	mg/l N
Total Petroleum Hydrocarbons**	Subcontracted	<10	µg/l

Signed: Laura Kavanagh  
**Laura Kavanagh - Laboratory Manager**

Date: 27/03/2023

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## Independent Analytical Supplies

## Test Report

Lab Report Number: 17792S001

<b>Customer ID:</b>	COYL.FJ	<b>Analysis Type:</b>	99A (99A)
<b>Contact Name:</b>	CLODAGH KISSANE	<b>Delivery By:</b>	COURIER
<b>Company Name:</b>	COYLE ENVIRONMENTAL LTD	<b>Sample Card Number:</b>	64296
<b>Address:</b>	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	<b>Condition on Receipt:</b>	Acceptable
<b>Sample Type:</b>	SURFACE WATER	<b>Date Sample Received:</b>	23/02/2023
<b>Sample Reference:</b>	KILMEX SURFACE WATER	<b>Date Analysis Commenced:</b>	23/02/2023
<b>Sample Description:</b>	KILMEX SW1	<b>Date Certificate Issued:</b>	12/04/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	276.89	mg/l CaCO <sub>3</sub>
Calcium <sup>*</sup>	Subcontracted	120	mg/l
Chloride	SOP 2065	19.55	mg/l
Conductivity	SOP 2076	573	µS/cm 20°C
Potassium <sup>*</sup>	Subcontracted	3.8	mg/l
Magnesium <sup>*</sup>	Subcontracted	6.1	mg/l
Sodium <sup>*</sup>	Subcontracted	7.8	mg/l
Ammonium Nitrogen	SOP 2057	0.06	mg/l NH <sub>4</sub> -N
Nitrite	SOP 2059	<0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	33.26	mg/l NO <sub>3</sub>
Total Phosphorus <sup>*</sup>	Subcontracted	0.031	mg/l P
pH	SOP 2004	8.2	pH units
Sulphate	SOP 2062	25.69	mg/l
Total Oxidised Nitrogen	SOP 2058	7.56	mg/l N
Total Petroleum Hydrocarbons <sup>**</sup>	Subcontracted	<10	µg/l

Signed: Laura KavanaghDate: 12/04/2023

Laura Kavanagh - Laboratory Manager

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## Independent Analytical Supplies

## Test Report

Lab Report Number: 17639S005

<b>Customer ID:</b>	COYL.FJ	<b>Analysis Type:</b>	99A (99A)
<b>Contact Name:</b>	CLODAGH KISSANE	<b>Delivery By:</b>	CUSTOMER
<b>Company Name:</b>	COYLE ENVIRONMENTAL LTD	<b>Sample Card Number:</b>	64297
<b>Address:</b>	1ST/2ND FLR, KILMURRY HSE MAIN STREET CASTLEREA CO ROSCOMMON	<b>Condition on Receipt:</b>	Acceptable
<b>Sample Type:</b>	SURFACE WATER	<b>Date Sample Received:</b>	21/02/2023
<b>Sample Reference:</b>	KILWEX GROUND/SURFACE	<b>Date Analysis Commenced:</b>	21/02/2023
<b>Sample Description:</b>	SW02	<b>Date Certificate Issued:</b>	27/03/2023

Parameter	Method	Result	Unit
Alkalinity	SOP 2064	280.14	mg/l CaCO <sub>3</sub>
Calcium <sup>*</sup>	Subcontracted	130	mg/l
Chloride	SOP 2065	18.15	mg/l
Conductivity	SOP 2076	579	µS/cm 20°C
Potassium <sup>*</sup>	Subcontracted	3.9	mg/l
Magnesium <sup>*</sup>	Subcontracted	5.7	mg/l
Sodium <sup>*</sup>	Subcontracted	7.5	mg/l
Ammonium	SOP 2057	0.04	mg/l NH <sub>4</sub>
Nitrite	SOP 2059	0.03	mg/l NO <sub>2</sub>
Nitrate	SOP 2060	40.26	mg/l NO <sub>3</sub>
Total Phosphorus <sup>*</sup>	Subcontracted	0.021	mg/l P
pH	SOP 2004	8.1	pH units
Sulphate	SOP 2062	21.86	mg/l
Total Oxidised Nitrogen	SOP 2058	9.16	mg/l N
Total Petroleum Hydrocarbons <sup>**</sup>	Subcontracted	22	µg/l

Signed: Laura Kavanagh  
**Laura Kavanagh - Laboratory Manager**

Date: 27/03/2023

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