

File With

## SECTION 131 FORM

Appeal No

ABP— 314485-22

Defer Re O/H

☐

To

SEO

Having considered the contents of the submission dated/received *3/10/22*from *Mary Grogan* I recommend that section 131 of the Planning and Development Act, 2000 be/not be invoked at this stage for the following reason(s):*No new issues raised*

Signed



EO

Date

14/10/22

To

EO

Section 131 not to be invoked at this stage.

☐

Section 131 to be invoked — allow 2/4 weeks for reply.

☐

Signed

SEO

Date

Signed

SAO

Date

M

Please prepare BP ..... — Section 131 notice enclosing a copy of the attached submission.

To

Task No

Allow 2/3/4 weeks

 BP

Signed

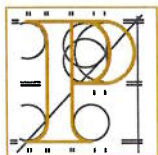
EO

Date

Signed

AA

Date



An  
Bord  
Pleanála

## Planning Appeal Online Observation

Online Reference  
NPA-OBS-001356

### Online Observation Details

Contact Name  
Mary Grogan

Lodgement Date  
03/10/2022 12:04:58

Case Number / Description  
314485

### Payment Details

Payment Method  
Online Payment

Cardholder Name  
Michael O'Rourke

Payment Amount  
€50.00

### Processing Section

S.131 Consideration Required

☒

Yes — P.T.O.

☐

N/A — Invalid

Signed

Mary Grogan,  
Broughan,  
The Ward,  
County Dublin D11 XY26

October 02, 2022

Observation in Case Reference: PL06F.314485 - F20A/0668

This observation to An Board Pleanála is in opposition to a decision by Fingal County Council to:

- Grant permission to the Dublin Airport Authority (DAA) to continue night flights.
- Redefine the definition of “night time” to exclude the period 2300-2330 and the period 0600-0700 for the purpose of the newly created Night Time Quota System.

I live directly under the Southern flight path of Dublin Airport.

This submission, includes a report from MLM (**Appendix B.**) regarding the severe noise intrusion into my home (Location 3 MLM Report) I also include additional points in **Appendix A**.

In the summer of 200 DAA completed the installation of replacement of windows and exterior doors in my home. It also installed what were termed to be “noise reducing” vents in some rooms.

However, the work has made little of no difference to the noise I am experiencing. Especially, from early morning take-offs where I am regularly awoken before 6:00am.

- I therefore wish to object to any night flights between the hours of 2300 and 0700.
- I oppose the decision by FCC/ANCA to redefine the definition of “night time” to exclude the period 2300-2330 and the period 0600-0700 for the purpose of the newly created Night Time Quota System.
- I also wish to be considered a party to, and have considered as part of my submission, the submissions made by the Saint Margaret’s, The Ward Residents Group and the SMTW Environmental DAC.
- I request an Oral Hearing on the decision by Fingal County Council

Regards

Mary Grogan

## Appendix A

- ANCA and the DAA have totally ignored the objective of Target 2 of the EU Action Plan “Towards a zero pollution for air, water and soil” adopted in May 2021 as the targets for 2030 are set at far higher noise levels in 2019 and 2018, which far exceed the baseline year of 2017 required under the EU Action Plan. The selection of 2019 as the baseline is contrary to ANCA’s own SEA document used to screen the project.
- Neither ANCA nor the DAA have evaluated the serious health effects, and costs associated with such health effects, of their proposed modification to the current restrictions in place at Dublin Airport. This has serious health implications for the inhabitants within the St Margaret’s The Ward area.
- ANCA and the DAA are proposing noise insulation as a mitigation measure to nighttime noise increases within the St Margaret’s The Ward communities. This is contrary to Fingal County Council’s advice within their own Development Plan, and testing carried out within the St Margaret’s The Ward area on housing that has already been insulated by the DAA recently indicates the guidance referred to by Fingal County Council and the WHO cannot be achieved and will cause serious health issues of those affected by the proposed increase in night time noise.
- From the DAA’s proposal, **79,405** people will be **Highly Annoyed** and **37,080** will be **Highly Sleep Disturbed** in 2025.
- Submission from HSE Environmental Health to Fingal County Council states that all efforts should be made to minimize the number of people subjected to the adverse health effects of aircraft noise by reducing aircraft noise levels to below the WHO safe limits of 45dB Lden and 40dB Lnight..
- The selection of 2019 or 2018 as the baseline for noise comparison does not meet the requirements of Directive 2002/49/EC as required by the Aircraft Noise (Dublin Airport) Regulation Act 2019. The escalating noise reported in noise action plans dating back to 2008 have been ignored with respect to reducing and prevention of noise at Dublin Airport.
- From 2016 to 2019 the size of the daytime noise 45dB Lden contour grew from 370km<sup>2</sup> to 745km<sup>2</sup>
- From 2016 to 2019 the size of the nighttime noise 40dB Lnight contour grew from 212km<sup>2</sup> to 328km<sup>2</sup>.

- The figures presented by the DAA for 2018 as a baseline are incorrect as during 2018 the crosswind runway was used extensively and therefore the figures are distorted and are not accurate with respect to reviewing the current application. The DAA and Fingal County Council in the Dublin Airport Noise Action Plan claim that aircraft types have changed in Dublin Airport between 2003 to 2017 resulting in quieter aircraft. However, noise exposure levels grew exponentially in line with movement increases.
- At the Oral Hearing in 2007 for the North Runway, figures were presented comparing 2007 levels to a 2025 forecast. The increase in population exposed with the 2025 forecast scenario was deemed unacceptable by An Bord Pleanála's consultant, Mr Rupert Thornely-Taylor. The figures in the DAA's current proposal are higher again. In 2007 the forecast noise exposure figures were deemed to be unacceptable from a health point of view. How can they be acceptable now?
- The health effects proposed to be inflicted on the St Margaret's The Ward community have not been evaluated by either the DAA or ANCA. The real cost due to health effects alone is calculated at more than €600 million per annum due to the proposal.
- Noise levels submitted by the DAA to the St Margaret's The Ward group for various noise emissions for specific aircraft types indicate that there is very little difference in the actual measured noise level between the older and newer aircraft. Therefore, the assertions claimed regarding fleet replacements is totally flawed
- Using DAA's own forecasts for arrivals and departures there appears to be no reason for proposing a change from the current flight restrictions as there is little or no difference in proposed movements
- The reports on cost effectiveness submitted by the DAA exclude quantification of costs associated with the adverse health effects inflicted on residents. This item was specifically requested by ANCA and was not provided by the DAA. We in St Margaret's The Ward as citizens were expecting this information to be presented to us as requested by ANCA. We refer to our submission on Public Health where we have evaluated the costs associated with the adverse health effects inflicted on us which indicated that the total yearly cost based on the 2019 figures is a staggering 610 million euro. How are we expected to suffer these costs to protect our health?
- The cost effectiveness analysis (CEA) submitted by Riondo does not meet the requirements of EU598/2014 as it does not take into account of the current flight restrictions in place at Dublin Airport. The report therefore is misleading and inaccurate.

- The cost effectiveness analysis as submitted by Ricondo does not take into account the costs associated with Carbon Emissions nor does it indicate the costs in meeting Ireland's requirements under the Climate Action and Low Carbon (Amendment) Act 2021 for the proposed revision to the current restrictions.
- The EIAR submitted does not meet the requirements set out in the EPA guidance as it does not take into account the foreseeable and planned increase in passenger numbers above 32 million passengers and is considered 'project splitting'.

St Margaret's The Ward Residents

Newtown Cottages – Aircraft Noise Survey

# Aircraft Environmental Noise Survey Report



**MLM.**

Group

Part of Sweco

## Notice

This document and its contents have been prepared and intended solely for St Margaret's The Ward Residents information and use in relation to Newtown Cottages, Aircraft Noise Survey.

MLM Ireland assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

## Certifying Body

MLM are full members of the ANC:



## Document History

**Client:** St Margaret's The Ward Residents  
**Project:** Newtown Cottages – Aircraft Noise Survey  
**Document Title:** Aircraft Environmental Noise Survey  
**Document Reference:** 525093-MLM-ZZ-XX-RP-YA-0001  
**MLM Reference:** DP/525093/MS

Revision	Status	Description	Author	Checked/Approved	Date
C01	1	Aircraft Environmental Noise Survey	Dominic Parkinson	Mark Scaife	29/01/2021



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Appendix A - Glossary of Acoustic Terminology

Appendix B - Time History Graphs

# 1 Introduction

MLM Ireland has been commissioned by St Margaret's The Ward Residents to undertake a series of noise surveys at three selected properties located in the vicinity of Dublin Airport. Noise monitoring of up to 24hrs was undertaken at each property both internally and externally. It is understood that the sound insulation of the rooms assessed had been upgraded.

The purpose of the survey was to identify the noise levels within selected bedrooms of each property during aircraft movements. Of particular interest was the  $L_{A_{fmax}}$  noise levels within each surveyed bedroom during night-time hours due aircraft movements. To enable identification of aircraft movements the internal noise level meter was set to trigger audio recordings for events over  $L_{A_{fmax}}$  45 dB and the external noise level meter was set to  $L_{A_{fmax}}$  70 dB in line with local planning guidelines for internal noise.

This report presents the results of the noise survey for each locations detailing the following levels:

- $L_{Aeq}$
- $L_{A_{fmax}}$
- $L_{A1}$
- $L_{A10}$
- $L_{A90}$

The measurements were carried out by a Consultant certified as competent in environmental noise measurement, using instrumentation conforming to Type 1 Specification, as set out in BS EN 61672: 2013: Electroacoustics. Sound Level Meters. Part 1 Specifications and in accordance with the principles of BS 7445: 2003: Description and Measurement of Environmental Noise.

Whilst every effort has been made to ensure that this report is easily understood, it is technical in nature; a glossary of terms is included in Appendix A to assist the reader.

Appendix B details the ( $L_{Aeq}$ ,  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{A_{fmax}}$ ) measured noise levels at the boundary of site as Time History Graphs.

## 2 Policy, Standards and Guidance Documents

A summary of the relevant policy, standards and guidance documents used to inform this survey and assessment is provided below.

- ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures.
- BS 7445: 2003: Description and Measurement of Environmental Noise.
- BS EN 61672: 2013: Electroacoustics. Sound Level Meters
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings
- ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise
- WHO Guidelines for Community Noise

## 3 Bedroom Internal Noise Criteria

The internal noise levels have been compared against noise criteria typically applied to residential developments in Ireland at this time. Current planning applications for residential buildings apply guidance taken from ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise.

As advised on ProPG: Planning and Noise, the following noise level criteria would be expected to result in no adverse impact:

Table 1: Noise Level Criteria For This Assessment

Location	07:00 to 23:00	23:00 to 07:00
Bedroom	35 dB $L_{Aeq}$	30 dB $L_{Aeq}$ and;  $\leq 10$ events $> 45$ dB $L_{Amax}$

The aforementioned criteria is derived from internal levels detailed in BS 8233:2014 Guidance on sound insulation and noise reduction for buildings and WHO Guidelines for Community Noise 2000.

## 4 Site Description

Three residential properties were selected for assessment their locations with respect to Dublin Airport are provided in Figure 1 below:

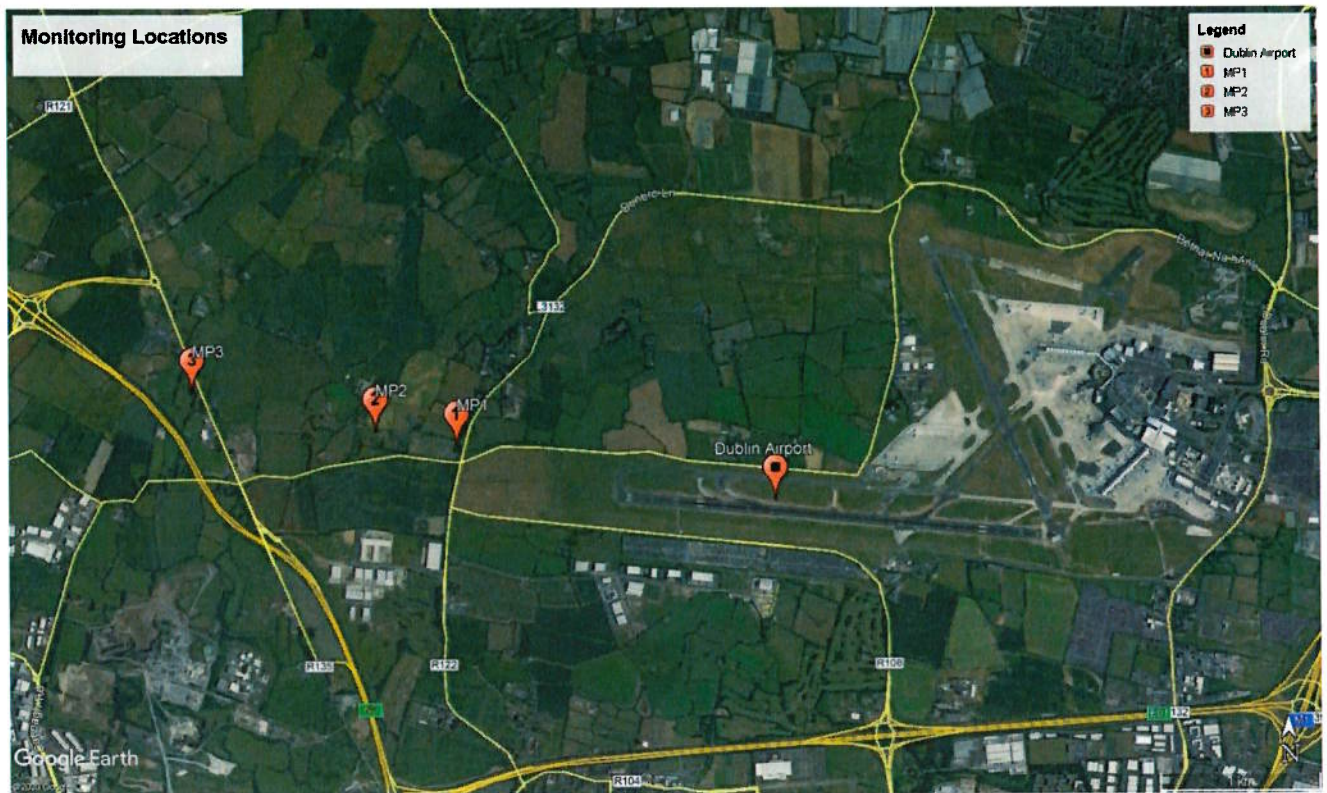


Figure 1: Site Location

Typically aircraft take off from the main runway 10/28 heading west directly over the surveyed properties. The measurements locations are described in detail in the following section.

## 5 Noise Survey Methodology

In order to quantify the noise levels at each location, unattended noise level measurements were undertaken within a selected bedroom of each property and also externally within the vicinity of the bedroom under assessment.

Measurements were undertaken at three properties for the following periods:

Location 1 – 15:30 Wednesday 9<sup>th</sup> September to 16:00 Thursday 10<sup>th</sup> September

Location 2 – 16:30 Thursday 10<sup>th</sup> September to 16:30 Friday 11<sup>th</sup> September

Location 3 – 17:00 Friday 11<sup>th</sup> September to 17:20 Saturday 12<sup>th</sup> September

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445<sup>1</sup>. All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672<sup>2</sup>.

Both internal and external meters were set to continuously log 1 second samples over the measurements periods. In order to identify aircraft movements the meters were set to trigger audio recordings when internal levels exceeded  $L_{A_{fmax}}$  45 dB internally and  $L_{A_{fmax}}$  70 dB externally.

### 5.1 Equipment

A full inventory of this equipment is shown below.

Table 2: Inventory of Sound Measurement Equipment

Item	Make & Model	Serial Number	Date of Expiration of Calibration
Sound Level Meter (Internal)	Brüel & Kjær 2270	3001952	27/01/22
Preamplifier	Brüel & Kjær 4189	2819925	
Microphone	Brüel & Kjær ZC-0032	8014	
Sound Level Meter (External)	Brüel & Kjær 2250	2580156	24/02/22
Preamplifier	Brüel & Kjær 4189	17445	
Microphone	Brüel & Kjær ZC-0032	03875	
Calibrator	Brüel & Kjær 4231	3005620	10/03/20

The sound measurement equipment used during the survey was checked calibrated at the start and end of the measurement period. No significant drift in calibration was found to have occurred.

<sup>1</sup> British Standard 7445: 2003: Description and measurement of environmental noise. BSI.

<sup>2</sup> British Standard 61672: 2013: Electroacoustics, Sound level meters. Part 1 Specifications. BSI



The calibrator used has been calibrated by an accredited calibration laboratory within the twelve months preceding the measurements. Calibration certificates are available upon request.

## 5.2 Weather Conditions

During the survey periods the weather was typically dry with wind speeds in the order of 5 m/s and below. .

All microphones were fitted with a protective windshield.

## 5.3 Measurement Locations

Internal measurements the microphone was locate on a tripod at approximately 1.2 m from floor level and a minimum of 1.5 m from surrounding walls. During the survey all windows were closed, in wall vents open for background ventilation and rooms unoccupied.

External measurements the microphone was located on a tripod at approximately 2 m form ground level. The microphone was located more than 3.5 m from reflective surfaces.

### 5.3.1 Location 1

The internal and external monitoring locations are presented below:



Table 3: Location 1		
Location Address	Internal Measurement Location	External Measurement Location
Location 1 Newtown Cottages St Margaret's Co Dublin K67 YV02		



Figure 2: Location 1 Monitoring Locations

5.3.2 Location 2

The internal and external monitoring locations are presented below:

Table 4: Location 2		
Location Address	Internal Measurement Location	External Measurement Location
Location 2 12 Newtown Cottages St Margaret’s Co Dublin		



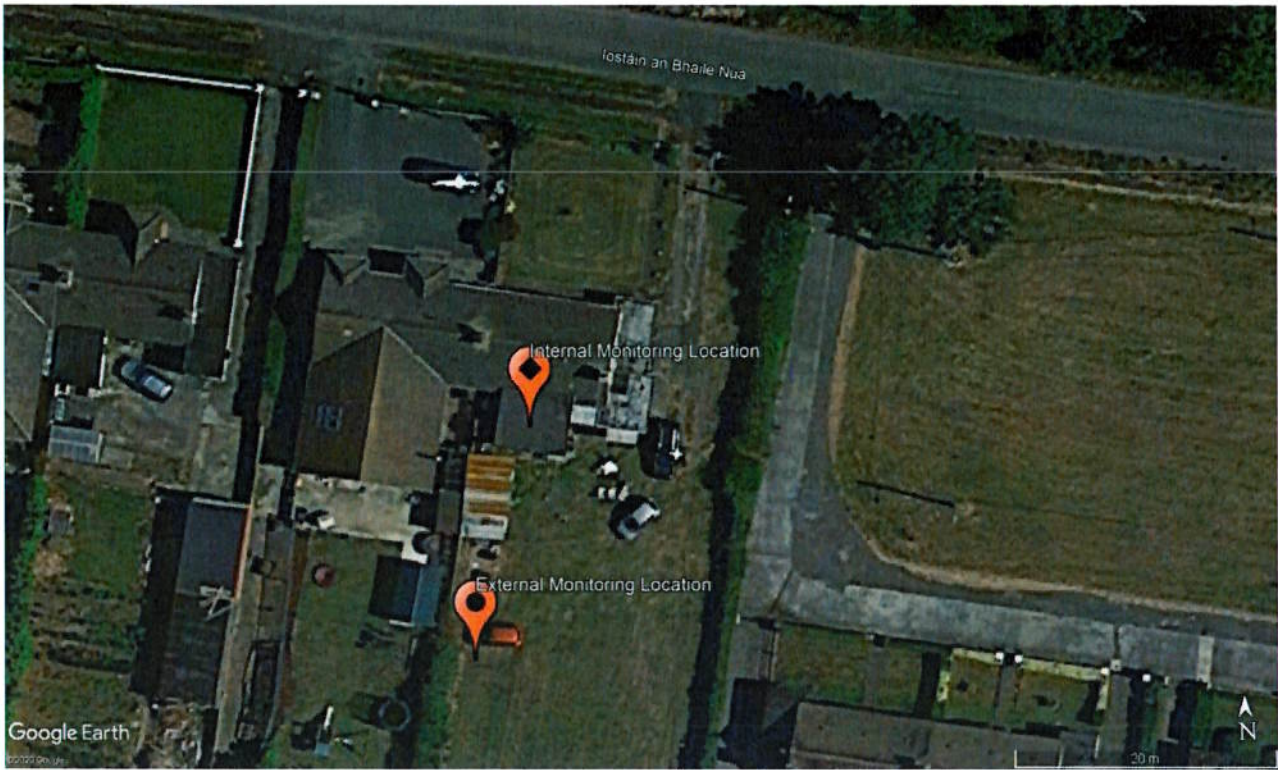


Figure 3: Location 2 Monitoring Locations

5.3.3 Location 3

The internal and external monitoring locations are presented below:



Table 5: Location 3		
Location Address	Internal Measurement Location	External Measurement Location
Location 3 Broughan The Ward Co Dublin D11 XY26		





Figure 4: Location 3 Monitoring Locations

## 6 Noise Survey Results

### 6.1 Night-time $L_{A_{fmax}}$ Events

The tables below presents the measured  $L_{A_{fmax}}$  events over 45dB measured within each property. Only exceedances over 45dB are shown which are directly attributed to aircraft movements. In addition the external  $L_{A_{fmax}}$  events have also been presented.

It should be noted that Dublin Airport is currently operating at reduced capacity due to COVID-19 as such the events are likely to increase once restrictions to travel have been reduced.

#### 6.1.1 Location 1

Table 6:  $L_{A_{fmax}}$  Exceedances over 45 dB – Location 1

Number of Events	Date and Time of Event	External Measured $L_{A_{fmax}}$ dB	Internal Measured $L_{A_{fmax}}$ dB
1	10/09/20 04:08:52	72	48
2	10/09/20 05:37:54	79	49
3	10/09/20 05:50:57	86	52
4	10/09/20 05:53:25	81	48
5	10/09/20 05:57:37	88	55
6	10/09/20 05:59:37	83	54
7	10/09/20 06:14:18	82	52
8	10/09/20 06:19:23	86	56
9	10/09/20 06:22:24	81	48
10	10/09/20 06:25:47	81	50
11	10/09/20 06:28:34	82	51
12	10/09/20 06:32:55	83	53
13	10/09/20 06:34:29	82	53
14	10/09/20 06:36:12	82	52
15	10/09/20 06:37:38	83	53
16	10/09/20 06:49:00	77	46
17	10/09/20 06:50:36	85	53
18	10/09/20 06:52:08	81	54
19	10/09/20 06:54:42	86	57
20	10/09/20 06:58:19	83	53
<b>Total Number of Events</b>			<b>20</b>

It can be seen from the table above that 20 events exceed the guidance of  $\leq 10$  events  $> 45$  dB  $L_{A_{\text{fmax}}}$ . The exceedances above the 45 dB range from 1 to 11 dB.

Whilst on site it was noted that the subjectively dominant noise transmission path was via the roof.

### 6.1.2 Location 2

Table 7:  $L_{A_{\text{fmax}}}$  Exceedances over 45 dB – Location 2

Number of Events	Date and Time of Event	Internal Measured $L_{A_{\text{fmax}}}$ dB
1	11/09/20 01:22:41	51
2	11/09/20 05:52:35	48
3	11/09/20 06:09:43	46
4	11/09/20 06:17:09	48
5	11/09/20 06:21:03	50
6	11/09/20 06:27:56	46
7	11/09/20 06:29:19	48
8	11/09/20 06:32:22	47
9	11/09/20 06:34:00	47
10	11/09/20 06:36:29	47
11	11/09/20 06:38:00	49
12	11/09/20 06:39:34	48
13	11/09/20 06:42:32	48
14	11/09/20 06:44:01	47
15	11/09/20 06:45:26	50
16	11/09/20 06:52:02	48
17	11/09/20 06:55:17	50
<b>Total Number of Events</b>		<b>17</b>

It can be seen from the table above that the 17 events exceed the guidance of  $\leq 10$  events  $> 45$  dB  $L_{A_{\text{fmax}}}$ . The exceedances above the 45 dB range from 1 to 6 dB.

Whilst on site it was noted that the subjectively dominant noise transmission path was via the roof. Please note due to an issue with the external meter at Location 2 measurements were only logged from 16:30 to 00:00.

### 6.1.3 Location 3

Table 8: L<sub>Afmax</sub> Exceedances over 45 dB – Location 1

Number of Events	Date and Time of Event	External Measured L <sub>Afmax</sub> dB	Internal Measured L <sub>Afmax</sub> dB
1	12/09/20 05:52:29	82	46
<b>Total Number of Events</b>			<b>1</b>

It can be seen from the table above that the 1 events exceed the guidance of  $\leq 10$  events  $> 45$  dB L<sub>Afmax</sub>. The event exceeded the 45dB by 1 dB. Another exceedance was noted at 06:03 hrs however the event was short in duration (1 sec) and did not trigger an audio recording, due to the short duration it is assumed this can be attributed to an isolated event as aircraft movements typically lasted over 20 seconds.

The table below presents the noted aircraft events measured and recorded on external noise meter with corresponding internal noise levels.

Table 9: L<sub>Afmax</sub> Aircraft Movements at Location 3

Number of Events	Date and Time of Event	External Measured L <sub>Afmax</sub> dB	Internal Measured L <sub>Afmax</sub> dB
1	11/09/20 23:52:46	75	42
2	12/09/20 00:10:18	74	40
3	12/09/20 05:52:29	82	46
4	12/09/20 06:03:46	71	40
5	12/09/20 06:11:20	74	39
6	12/09/20 06:20:20	76	44
7	12/09/20 06:22:35	78	42
8	12/09/20 06:24:06	72	42
9	12/09/20 06:32:25	77	42
10	12/09/20 06:34:02	76	44
11	12/09/20 06:36:50	77.	44.9
12	12/09/20 06:38:24	77	44
13	12/09/20 06:39:45	76	41
14	12/09/20 06:39:46	76	41
15	12/09/20 06:41:10	75	43
16	12/09/20 06:42:42	78	44
17	12/09/20 06:44:16	78	43

Table 9:  $L_{A_{fmax}}$  Aircraft Movements at Location 3

Number of Events	Date and Time of Event	External Measured $L_{A_{fmax}}$ dB	Internal Measured $L_{A_{fmax}}$ dB
18	12/09/20 06:49:03	74	43
19	12/09/20 06:53:27	76	43
20	12/09/20 06:57:15	73	43
21	12/09/20 06:59:41	74	39
<b>Total Number of Events</b>			<b>21</b>

#### 6.1.4 Summary of Exceedances

From the results of the survey it can be seen there are significant amount of  $\leq 10$  events over the guideline  $L_{A_{fmax}}$  of 45dB at Locations 1 and 2, (20 and 17 respectively). For Location 3, one event was recorded. It should be noted that these events are likely to increase considerably once Dublin airport returns to normal operations and flight numbers increase.

#### 6.2 Summary of Broadband Noise Levels

The tables below presents a summary of the noise levels at each location. Time history graphs at each location presenting the measured  $L_{Aeq}$ ,  $L_{A_{fmax}}$ ,  $L_{A10}$  and  $L_{A90}$  noise levels are presented at the rear of this report.

##### 6.2.1 Internal Noise Levels

The table below presents the logarithmic average noise levels ( $L_{Aeq,T}$ ,  $L_{A90}$ ,  $L_{A10}$ ) and maximum  $L_{A_{fmax}}$  noise levels during both day-time and night-time periods.

It should be noted that these levels include all events from aircraft and domestic activities (dogs barking, door slams etc.).

Table 10: Measured Internal Broadband Sound Pressure Levels (dB)

Measurement Position	Period	$L_{Aeq,T}$ (dB)	$L_{A_{fmax}}$ (dB)	$L_{A1T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Location 1	Daytime - (07:00 – 23:00)	34	65	37	36	31
	Night-time (23:00-07:00)	30	63	32	31	29
Location 2	Daytime - (07:00 – 23:00)	39	82	42	41	35
	Night-time (23:00-07:00)	26	66	30	29	24
Location 3	Daytime - (07:00 – 23:00)	46	88	51	50	37
	Night-time (23:00-07:00)	23	63	27	26.5	21

The noise levels are typically below the guideline values given Table 1



## 6.2.2 External Noise Levels

The table below presents the logarithmic average noise levels ( $L_{Aeq,T}$ ,  $L_{A90}$ ,  $L_{A10}$ ) and maximum  $L_{A_{fmax}}$  noise levels during both day-time and night-time periods.

Table 11: Measured External Broadband Sound Pressure Levels (dB)

Measurement Position	Period	$L_{Aeq,T}$ (dB)	$L_{A_{fmax}}$ (dB)	$L_{A1T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Location 1	Daytime - (07:00 – 23:00)	65	99	66	66	64
	Night-time (23:00-07:00)	60	88	61	61	59
Location 2	Daytime - (16:30 – 23:00)	47	86	49	48	45
	Night-time (23:00-00:00)	48	62	49	49	47
Location 3	Daytime - (07:00 – 23:00)	63	88	65	65	62
	Night-time (23:00-07:00)	57	83	59	59	56

Please note due to an issue with meter at Locations 2 measurements were only logged from 16:30 to 00:00.

## 7 Conclusions

MLM Ireland has been commissioned by St Margaret's The Ward Residents to undertake a series of noise surveys at three residential locations following acoustic mitigation works to the facades of the buildings.

Noise levels measurements of up 24hrs were undertaken within a bedroom of each property and also externally. The results of noise surveys have been compared against typical internal noise criteria for residential buildings used in Ireland. It was found that two of the three locations have a number of exceedances over the guideline  $\leq 10$  events  $> 45$  dB  $L_{A_{fmax}}$ . It should be noted that these events are likely to increase once restrictions ease following the COVID-19 pandemic and Dublin Airport returns to operating at normal capacity.

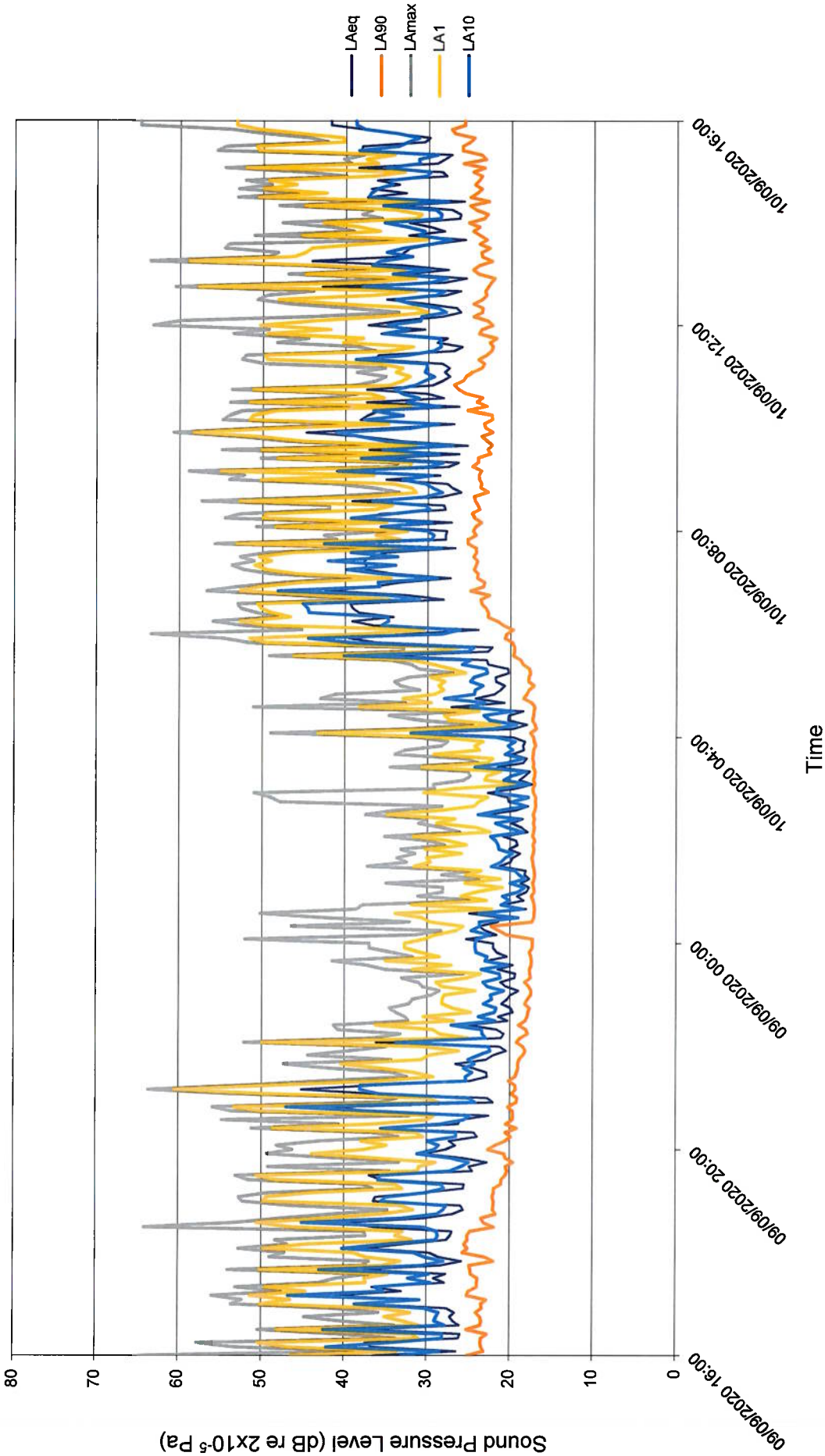
## Appendix A - Glossary of Acoustic Terminology



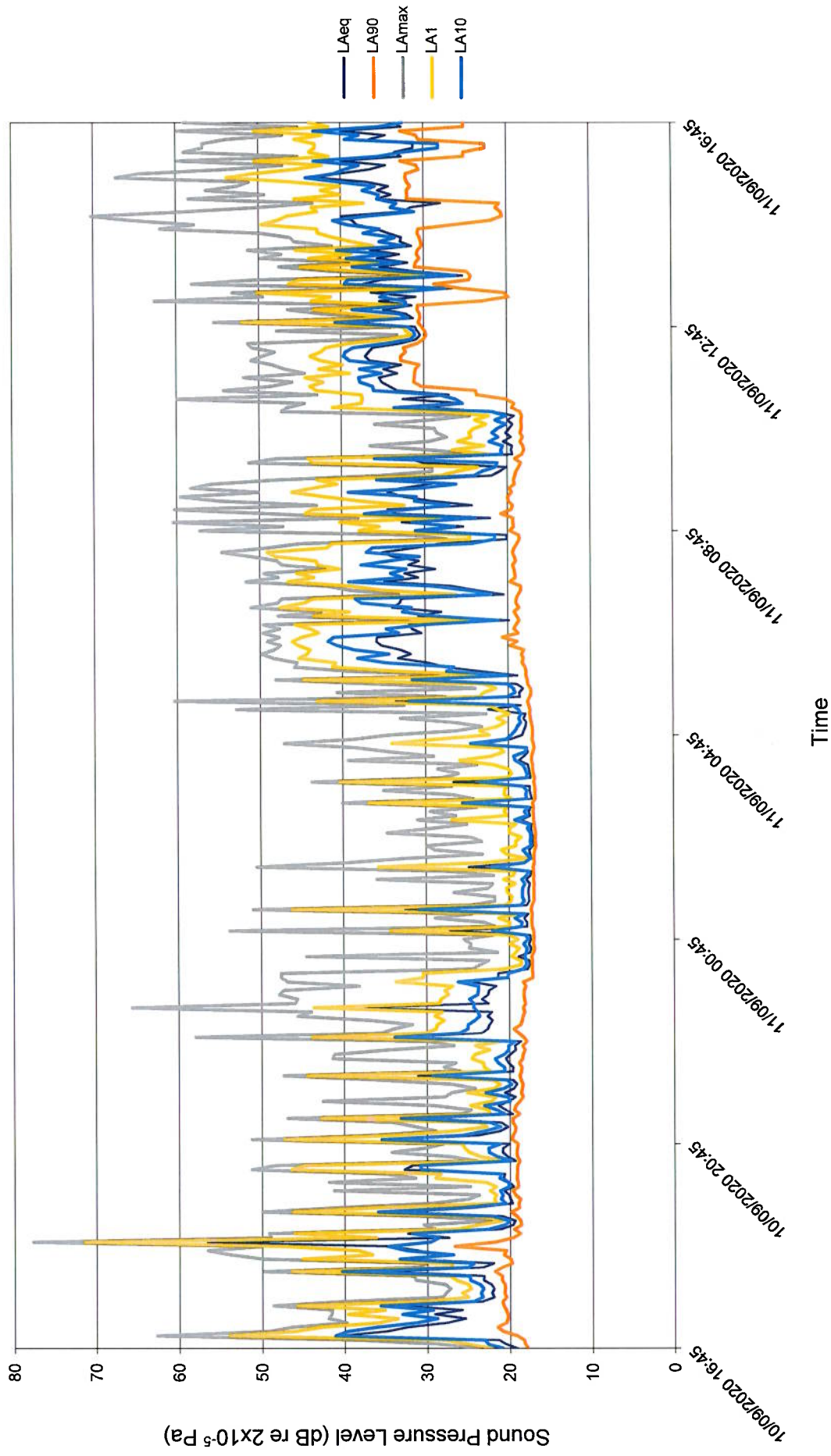
Wording	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 <sup>-6</sup> Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log <sub>10</sub> ( s1 / s2 ). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L <sub>eq,T</sub>	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L <sub>max,T</sub>	A noise level index defined as the maximum noise level during the period T. L <sub>max</sub> is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L <sub>eq</sub> noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L <sub>90,T</sub>	A noise level index. The noise level exceeded for 90% of the time over the period T. L <sub>90</sub> can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L <sub>10,T</sub>	A noise level index. The noise level exceeded for 10% of the time over the period T. L <sub>10</sub> can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1 m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

## Appendix B - Time History Graphs

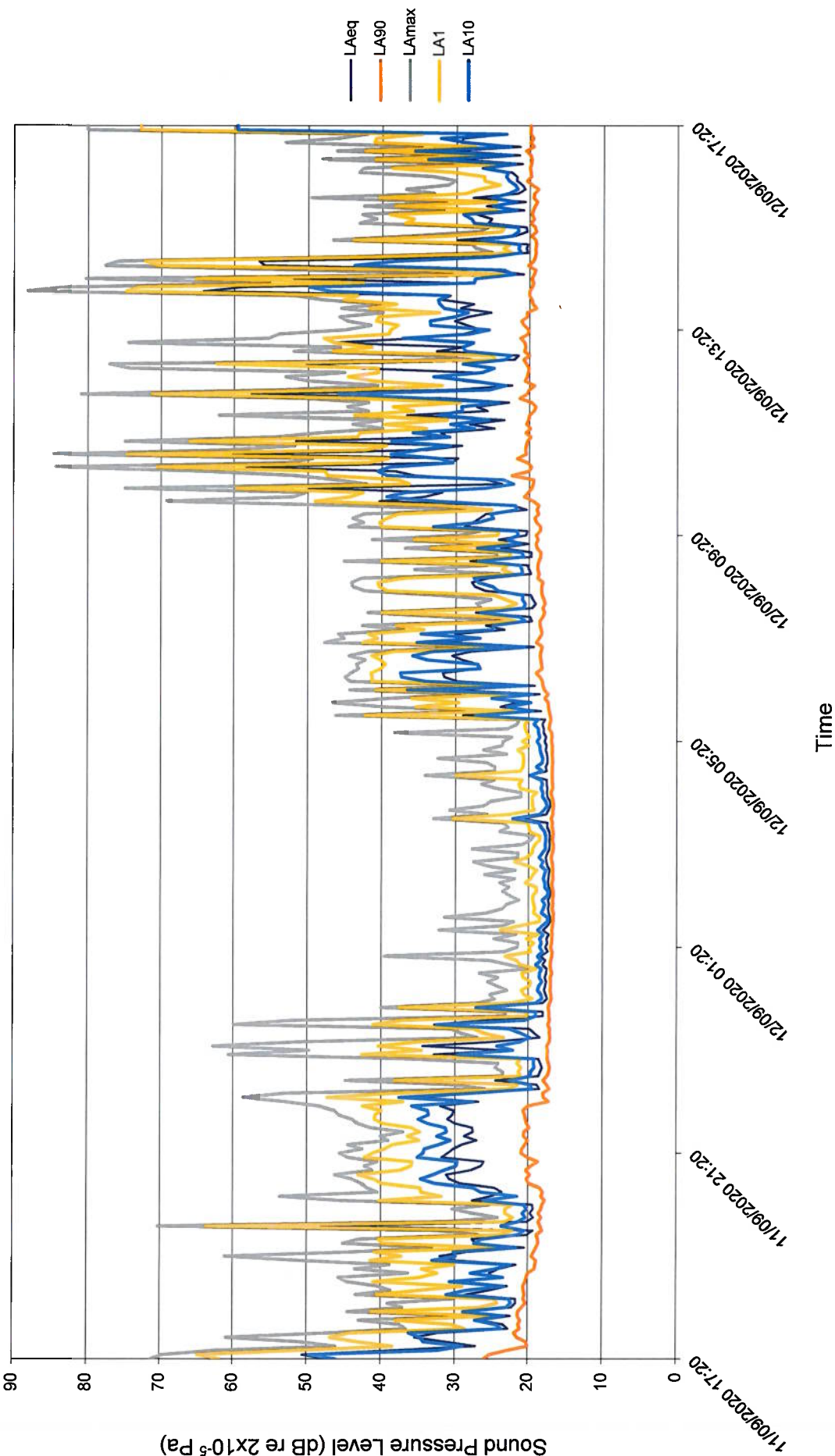
Monitoring Location 1 Internal  
Measured  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{AFmax}$ ,  $L_{A1}$ ,  $L_{A10}$  Time History



Monitoring Location 2 Internal  
Measured  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{AFmax}$ ,  $L_{A1}$ ,  $L_{A10}$  Time History

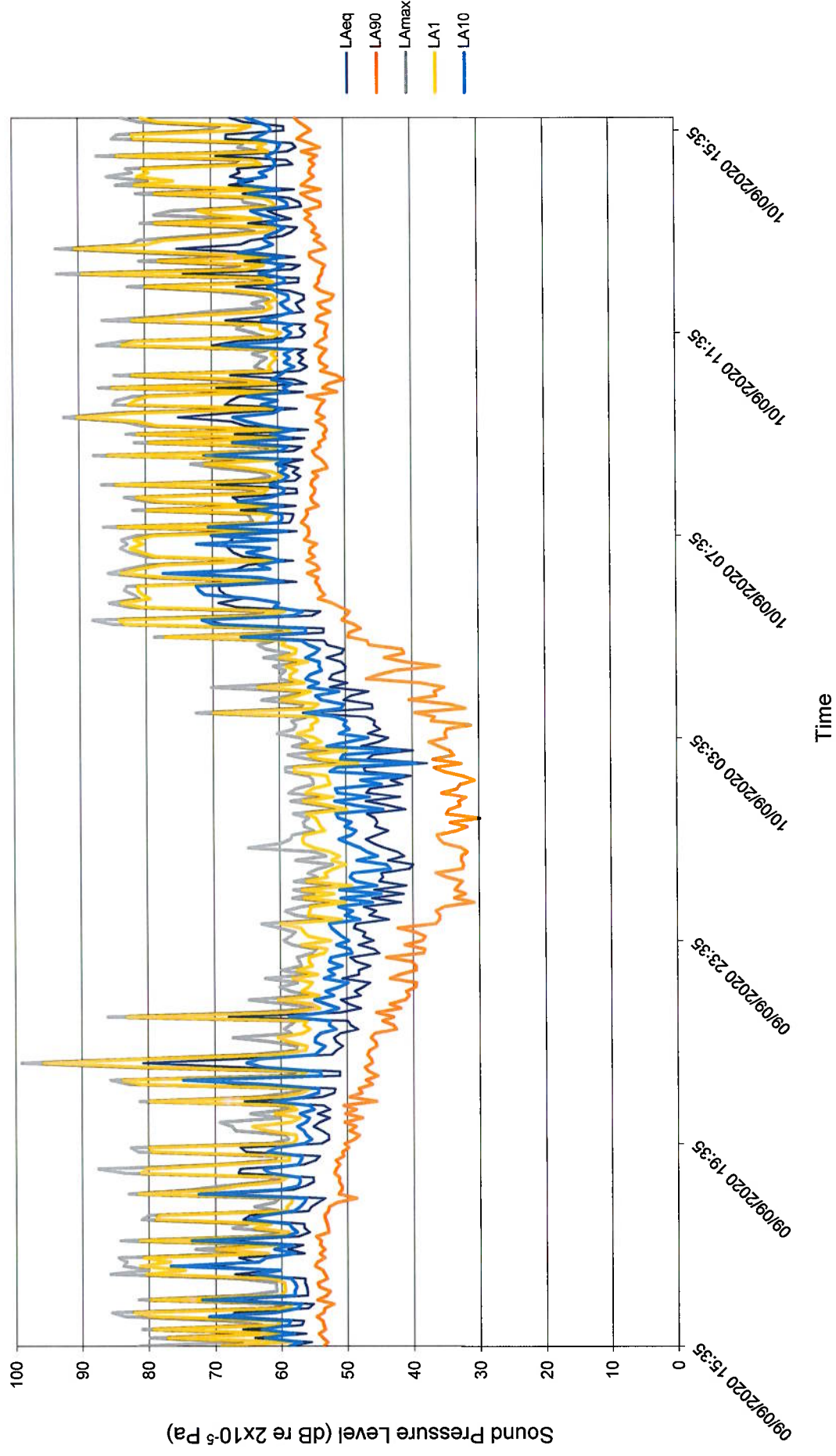


Monitoring Location 3 Internal  
Measured  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{AFmax}$ ,  $L_{A1}$ ,  $L_{A10}$  Time History

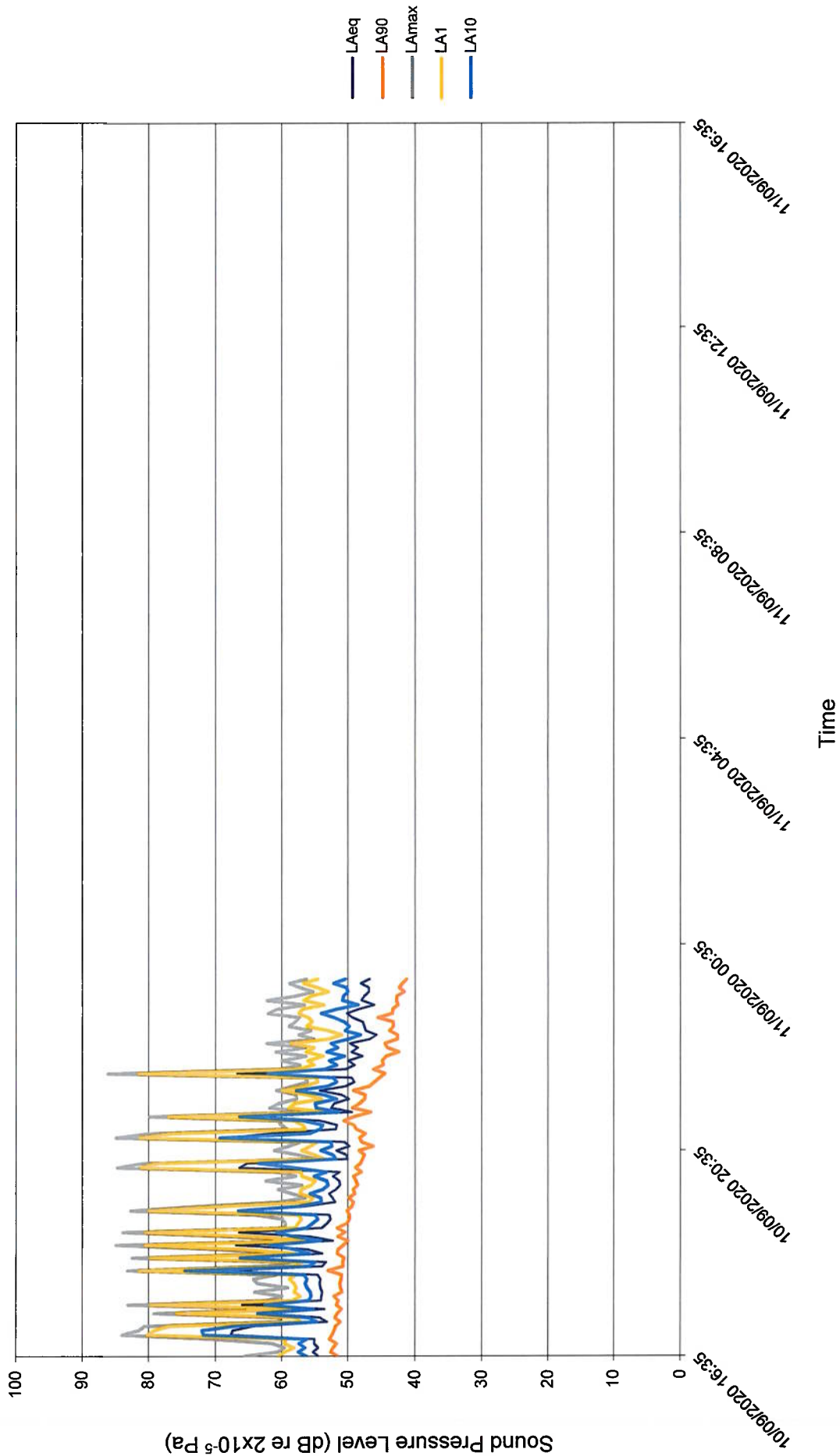




### Monitoring Location 1 External Measured $L_{Aeq}$ , $L_{A90}$ , $L_{AFmax}$ , $L_{A1}$ , $L_{A10}$ Time History



Monitoring Location 2 External  
Measured  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{AFmax}$ ,  $L_{A1}$ ,  $L_{A10}$  Time History



Monitoring Location 3 External  
Measured  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{AFmax}$ ,  $L_{A1}$ ,  $L_{A10}$  Time History

