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Land Investments Manchester Limited

Fenton House, 2 Higher Ardwick, Manchester, M12 6BZ

HA192 - Acoustic Assessment Report

November 2022

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Site	Fenton House 2 Higher Ardwick, Manchester, M12 6BZ.
Client	Land Investments Manchester Limited
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PREPARED BY:

J Howell, MIOA Director

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EXECUTIVE SUMMARY

Howell Acoustics Limited (HAL) have undertaken a noise impact assessment in accordance with a planning condition which relates to the proposed conversion of the existing listed building Fenton House, 2 Higher Ardwick, Manchester into seven apartments. The noise assessment considers the potential impact of existing sources of noise at the development site. The assessment has been undertaken in line with current planning and technical guidance.

The assessment of noise at the development site relies upon measured noise levels taken between the 24th and 26th October 2022. The noise assessment has found road traffic noise to be the dominant noise source from Higher Ardwick which has two lanes of traffic, linking the A6 and A665 South East of Manchester city centre. It is also noted that the development is in a mixed use area with both residential and commercial businesses located nearby. The connected building to the rear of the development site is a shell, with one external wall still standing.

The measured on-site noise levels have been assessed and calculated in accordance with BS8233:2014.

The assessment proposes mitigation measures in the form of replacement and enhancement of the existing glazing units, in combination with a mechanical ventilation system. An enhanced roof structure is also required. With the implementation of the proposed mitigation, internal noise guidelines will be met.

The assessment has found that if the specifications within this document are followed and implemented, the planning condition should be discharged following post-completion testing.

1 INTRODUCTION

1.1.1 Howell Acoustics Limited (HAL) has been commissioned by Land Investments Manchester Limited (LIML) to undertake a noise impact assessment for the proposed conversion of the existing building Fenton House, 2 Higher Ardwick, Manchester into 7 self-contained apartments.

1.1.2 The development was granted planning approval, with conditions, by Manchester City Council (MCC) on the 3rd July 2020 (Ref: 126094/FO2020). Condition 7 relates to noise, and states;

7) a) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Higher Ardwick shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary.

b) Upon completion of the development and before first occupation of the residential units, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultants report. The report shall also undertake post completion testing to confirm that the internal noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures
required to ensure compliance with the internal noise criteria.

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance, pursuant to policies SP1, H1 and DM1 of the Core Strategy and saved UDP policy DC26.

1.1.3 The existing building appears to be masonry built and set over four floors. (basement to 2nd floor / roof space. The building is currently being stripped out with brick and timber constructions exposed internally.

1.1.4 This report considers planning condition 7, in relation to the external noise from Higher Ardwick impacting the proposed residential.

1.1.5 The proposed development is located on Higher Ardwick, Manchester. To the front western façade of the building are existing residential houses. To the rear eastern façade of the building is large mainly demolished building with external walls still in

place facing onto Harkness Street. Beyond the demolished building structure there are commercial building to the east. The southern facade of the site has two mosque buildings to the other side of Dolphin Place.

1.1.6 The report considers the impact of existing sources of noise at proposed noise sensitive receptors, and in terms of the noise guidance stated in the planning condition, and more recent guidance. The report has been prepared to provide technical guidance and mitigation measures to support the discharge of planning condition 7.

2 ASSESSMENT METHODOLOGY

2.1 Scope of Works

2.1.1 The proposed assessment methodology is based upon good practice, our experience of similar projects, and relevant technical and planning guidance.

2.1.2 The assessment has been carried out to consider existing sources of noise at the proposed noise sensitive receptors associated with the proposed apartments.

2.2 Noise Survey

2.2.1 Noise measurements were undertaken by HAL in October 2022 at the front Western façade of the property. This noise data has been referenced in this report to determine the potential impact of the existing sources of noise and any mitigation measures which may be required.

2.3 Assessment Methodology

2.3.1 An assessment is required to consider the potential noise impact from the existing noise sources on the proposed sensitive development. The potential impacts have been assessed with reference to:

- National Planning Policy Framework, 2021 (NPPF).
- Noise Policy Statement for England, 2010 (NPSE).
- Planning Practice Guidance - Noise, 2019 (PPG-Noise)
- BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS8233).

National Planning Policy Framework

2.3.2 Paragraph 185 of the NPPF states.

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including

cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;…'

2.3.3 Paragraph 187 of the NPPF states.

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

2.3.4 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

- 'NOEL – No Observed Effect Level
  This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level
  This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
  This is the level above which significant adverse effects on health and quality of life occur'.

2.3.5 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are

taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

2.3.6 The Planning Practice Guidance - Noise (PPG-Noise) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 1 summarises the noise exposure hierarchy.

Table 1: Noise Exposure Hierarchy			
Response	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
Not Present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is	Significant Observed Adverse Effect	Avoid

	no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.		
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.3.7 The PPG summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

> "*It can, where justified, although it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern.*"

BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS8233)

2.3.8 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233) provides guidance on internal noise levels within dwellings allowing for sufficient resting and sleeping conditions, as shown in Table 2.

Table 2: BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS8233)			
Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35dB $L_{Aeq,16hour}$	N/A
Sleeping	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45dB $L_{Af,Max}$

2.3.9 The noise guideline levels have been used in this report to determine any potential noise impact and the mitigation measures as appropriate.

2.3.10 To ensure that the assessment is current and relevant, a baseline noise survey has been undertaken, with glazing and ventilation specifications calculated to achieve internal noise guideline levels stated in BS8233.

2.3.11 The development does not have any outside space. Therefore, noise in external amenity areas has not been considered in this assessment.

3 MEASURED SOUND LEVELS

3.1 Introduction

3.1.1 Noise measurements have been undertaken by HAL between the 24th and 25th October 2022. Noise measurements have been undertaken in one location to measure noise from road traffic from Higher Ardwick, which has been identified as the dominant source of noise at the development site.

3.1.2 The noise monitoring was unattended, however detailed observations were carried out during the installation and dismantling of the equipment.

3.1.3 The Class 1 sound level meter was calibrated to a reference level of 113.9dB at 1kHz both before, and on completion of, the noise survey. No drift in calibration was measured during the survey.

3.1.4 A-weighted L_{eqs} & $L_{A,max}$ were measured in accordance with the requirements of BS8233. The measured noise levels are set out in full in Appendix A in graphical format.

3.1.5 The monitoring locations are described as follows.

- **Monitoring Location 1 (ML1) –** Noise monitoring at ML1 was undertaken between 1600hrs on the 24th October and 1630hrs on the 26th October 2022. The microphone was located on a tripod fixed to the scaffolding at 1st floor level, approximately 2.5m from the façade / roof junction of the existing building. The microphone had a clear view of road traffic on Higher Ardwick, with the busy A6 in view in the distance.

3.1.6 For the purpose of this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

3.1.7 The weather conditions throughout the noise survey were as follows.

- Between 10 °C and 15°C.
- Between 0 and 5m/s light breeze of WSW to SSW.
- The survey period was mainly dry, with some light rain showers.

3.1.8 Full details of the noise measurements are shown in Appendix A in graphical format.

3.1.9 Our site observations identified the following sources of noise at the development site.

- Road traffic noise from passing cars, trucks and buses on Higher Ardwick and the distant A6, were the dominant source of noise at the development site.

3.2 Existing Measured Nosie Levels

3.2.1 As described above, noise measurements were undertaken between Monday 24th and Wednesday 26th October 2022, which captured typical weekday noise levels.

3.2.2 The measured ambient façade sound levels used in this assessment are described below in Table 3. All measurements have been treated as "free-field".

Table 3: Measured Ambient Façade Sound Levels (Figures in dB)

Monitoring Location	Date	Daytime dB(A) $L_{eq, 16hour}$	Night-time dB(A) $L_{eq,8hour}$	Night-time dB(A) L_{max} (10th highest)*
ML1	Monday 24th October 2022		62	79
	Tuesday 25th October 2022	70**	62	78
	Wednesday 26th October 2022	68***		

*10th Highest in accordance with ProPG
** The client informed us work was carried out on the roof of the building during the daytime hours, likely to be raising measured noise levels, by the use of circular saws cutting tiles etc.
***The 16hours of data is made up from data majority from Wednesday 26th with some data from the evening from Monday 24th.

3.2.3 The noise measurements show broadly consistent noise levels throughout the survey period.

3.2.4 The noise levels captured on the night-time of Monday 24th October are marginally higher than Tuesday 25th October.

3.2.5 Therefore, the higher measured night time noise levels captured on Monday 24th October, along with the daytime noise measures captured on Wednesday 26th October have been used in this report to assess the potential impact of existing sources of noise at the proposed noise sensitive receptors.

4 NOISE IMPACT ASSESSMENT

4.1 Introduction

4.1.1 The calculated sound levels at the facades of the property have been considered against the internal noise guideline levels stated in BS8233 which is the appropriate standard when assessing the potential impact of existing sources of noise at proposed noise sensitive receptors.

4.2 Noise in Living Rooms and Bedrooms During the Daytime

4.2.1 The development includes living rooms and bedrooms which have windows to the front and side of the property, including in the roof space. The daytime façade noise level at the façades of the building is 68dB $L_{Aeq,16hr}$. The internal noise guideline level for living rooms and bedrooms during the daytime is 35dB $L_{Aeq,16hr}$.

4.2.2 The windows of the building are considered to be the weakest part of the façade, and a standard double-glazed window can provide between 30dB and 40dB attenuation when closed. However, adequate ventilation must be provided to habitable rooms which could be provided by an open window where an alternative is not provided.

4.2.3 An open window typically provides 13dB attenuation. Therefore, with an open window, the highest internal noise level in rooms could be up to 55dB(A) which would exceed the internal noise guideline level.

4.2.4 Therefore, mitigation measures to provide adequate glazing, and an alternative to an open window which provides up to 33dB attenuation is required. This will ensure that habitable rooms within the proposed development achieve internal noise guideline levels.

4.2.5 Furthermore, the roof structure could cause a weakness to the sound insulation of the building envelope and should also be considered.

4.2.6 Full details are discussed in Section 5 of this report.

4.3 Noise in Bedrooms During the Night-time

4.3.1 The development includes bedrooms which have windows at the front and side of the property, as well as in the roof space. The night-time façade noise level at the façades of the building are 62dB $L_{Aeq,8hr}$, and 79dB $L_{Af,Max}$. The internal noise guideline level for bedrooms during the daytime is 30dB L_{Aeq}, and 45dB $L_{Af,Max}$.

4.3.2 The windows of the building are considered to be the weakest part of the façade, and a standard double-glazed window can provide between 30 and 40dB attenuation

when closed. However, adequate ventilation must be provided to habitable rooms which could be provided by an open window where an alternative is not provided.

4.3.3 An open window typically provides 13dB attenuation. Therefore, with an open window, the highest internal noise level in bedrooms could be up to 49dB(A) L_{Aeq}, and 66dB $L_{Af,Max}$ which would exceed the internal noise guideline level.

4.3.4 Therefore, mitigation measures to provide adequate glazing, and an alternative to an open window which provides up to 34dB attenuation is required. This will ensure that habitable rooms within the proposed development achieve internal noise guideline levels.

4.3.5 Furthermore, the roof structure could cause a weakness to the sound insulation of the building envelope and should also be considered.

4.3.6 Full details are discussed in Section 5 of this report.

4.4 Noise Impact Assessment Summary

4.4.1 The noise level incident at the façade have been considered in octave band levels. Example assessments of the noise level which are incident on the façade of selected rooms are shown in Appendix B.

4.4.2 The noise break-in calculations are based upon free-field levels, with adjustments made for the distance of the differing floor levels to Higher Ardwick, in relation to the measurement locations ML1.

5 NOISE MITIGATION MEASURES

5.1 Introduction

5.1.1 The following mitigation measures have been prepared in order to achieve the noise guideline levels in proposed apartments.

5.2 Proposed Mitigation

5.2.1 The proposed development comprises of seven apartments. The calculated façade noise level for a selection of windows on the Higher Ardwick façade of the development are described in Appendix B.

5.2.2 The noise mitigation measures are based upon commonly used products and materials and are shown in this report as examples. Alternatives to the recommended products may be used, however, any alternatives must meet with, or exceed the sound attenuation requirements of those used in the assessment. The minimum product performance is given below in Table 5.

Table 5 – Noise Mitigation Requirements (Figures in dB)

Mitigation	Sound Reduction Indices						
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
4/150/6	14	25	37	45	50	51	50
4 / 20argon / 4	21	22	20	32	42	46	39
Roof Structure (see 5.4)	21	41	52	59	64	64	67
350mm approx. Brick wall	44	44	52	59	64	69	74

5.3 Glazing

Table 5 provides two glazing specifications;

4/150/6 This system requires the installation of a secondary 6mm glazing with a minimum 150mm cavity to the existing single glazed window.
This glazing is to be used across the development.
Please ensure the existing glazing is refurbished as required and well sealed air tight, as the acoustic data the report is based on could be compromised if poorly sealed.

4/20 argon /4 A double glazed unit with 4mm glass /20mm argon cavity /4mm glass.
This glazing is used on all 2nd floor roof lights.

5.4 Ventilation

5.4.1 The proposed apartments will require the introduction of mechanical ventilation system to remove the need of the occupants to open the windows for background ventilation. The outlets and inlets to the ventilation system should be away from the Higher Ardwick façade, as noise ingress should be designed against by the ventilation specialist.

Acoustic hole in the wall vents and trickle vents have not been considered as options due to the listed status of the building and the proposed implementation of secondary glazing.

We are acoustic consultants not ventilation specialists and the mechanical system should be specified by an appropriate specialist to ensure compliance with Building Regulations Document F.

5.5 Roof Structure

5.5.1 As described in this report, the 2nd floor rooms need to consider the acoustic performance of the roof structure. Typically roof structures provide less sound attenuation than traditional masonry walls. Therefore, enhancements to the sound attenuation of the roof structure are required due to the high external ambient sound levels.

5.5.2 Therefore, the roof structure, should be enhanced as follows.

- Existing roof tiles, and structural timber to be retained and made good as appropriate, and extended to minimum 150mm deep. 100mm Rockwool 33Kg/m3 mineral wool insulation between timbers. A double layer of 15mm Soundbloc plasterboard on resilient bars which are fixed to the roof timbers.
- Please note the ceiling system described should be installed on the dwarf walls around the perimeter of the roof to maintain the acoustic performance.

5.6 Uncertainty

5.6.1 The process to specify mitigation measures involves a number of factors.

- The measured external noise levels being typical (external noise environment can change day to day).

- The onsite installation of the proposed specifications.
- The specifications expected performance based on Lab / computer generated test data.
- The noise break-in calculations are theoretical calculations. However, it is noted that in real world situations these are a guide to expected acoustic performance, with many variables.

5.7 Thermal Performance of External Elements.

5.7.1 The specifications within this report are acoustic specifications. The thermal performance of external elements, will require consideration for Building Regulations Part L. Some specification may require adjusting to increase thermal performance, however, the acoustic performance should not be compromised.

6 CONSERVATION UPDATE JANUARY 2023

6.1 The proposed mitigation measures detailed within this report rely on the use of mechanical ventilation to remove the need to open windows. Following the initial version of this report issued in November 2022, this update has been provided as the building is Grade II listed and the conservation officer has informed the client, that installing mechanical ventilation will not be possible. It is understood, this is due to the mechanical ventilation having a detrimental impact on the character of the historic building, as it will require the routing of ventilation ducting along the ceiling and penetrating through walls, floors and external walls introducing grills on the building elevations and requiring the installation of a suspended ceiling to hide the ductwork.

6.2 To provide ventilation the client wishes to rely on passive ventilation, opening windows.

6.3 When windows are closed the sound insulation of the external façade of the building will as detailed in this report, achieve the required internal noise levels with the required ventilation performance compromised. However, if the windows are opened for ventilation the acoustic system will be compromised.

6.4 Building Regulation Part F, states in relation to Historic and traditional buildings, point 0.6 “should comply with the ventilation standards in the approved document were reasonably practicable”.

6.5 If the building is constructed relying on opening windows for ventilation due to the restrictions of the Grade II listed status of the building, it is clear that satisfying planning condition 7a & 7b will not be achievable, and condition 7b could only be a “test and declare” methodology as compliance with the criteria detailed within this report would not be possible.

7 CONCLUSIONS

7.1 Howell Acoustics Limited (HAL) was commissioned to carry out a noise impact assessment in relation to a planning condition which is associated with the conversion of the existing building at Fenton House, 2 Higher Ardwick, Manchester into seven apartments.

7.2 Therefore, Howell Acoustics Limited (HAL) has carried out a noise assessment to consider the potential impact of existing sources of noise at the development site.

7.3 This assessment considers noise from road traffic, and any other sources of noise impacting from the Higher Adwick Façade. The assessment has been undertaken in line with current planning and technical guidance in relation to the planning condition which relates to noise.

7.4 The assessment of noise at the development site relies upon measured noise levels taken between the 24th and 26th October 2022. The noise assessment has found road traffic noise to be the main source of noise at the site.

7.5 The measured on-site noise levels have been assessed and calculated in accordance with BS8233.

7.6 The assessment proposes mitigation measures in the form of replacement and upgrading of the existing glazing, in combination with a mechanical ventilation system to remove the need to open windows, and an enhanced roof structure. With the implementation of the proposed mitigation measures, internal noise guidelines will be met.

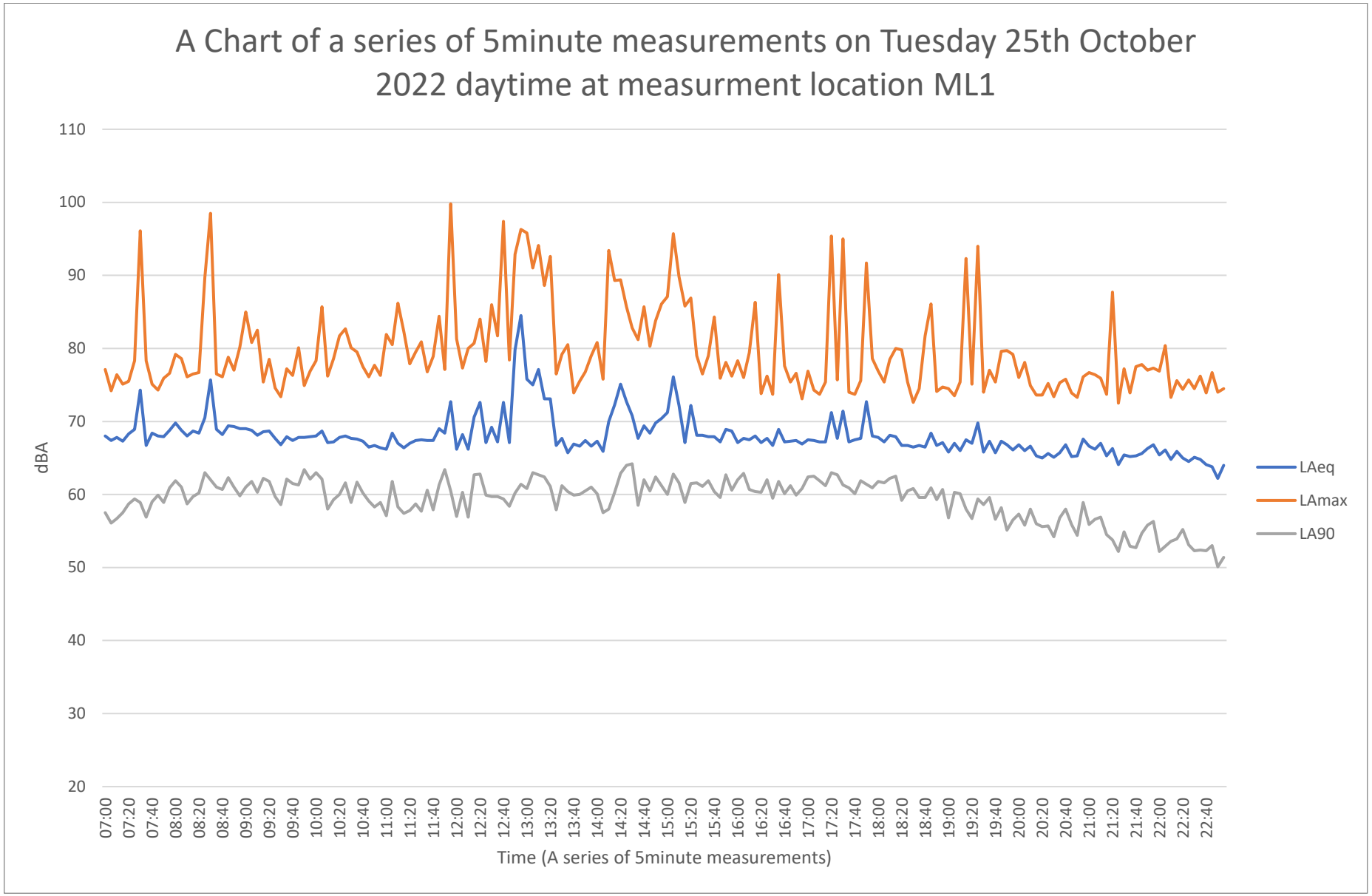
7.7 Glazing and ventilation specifications have been provided for different rooms.

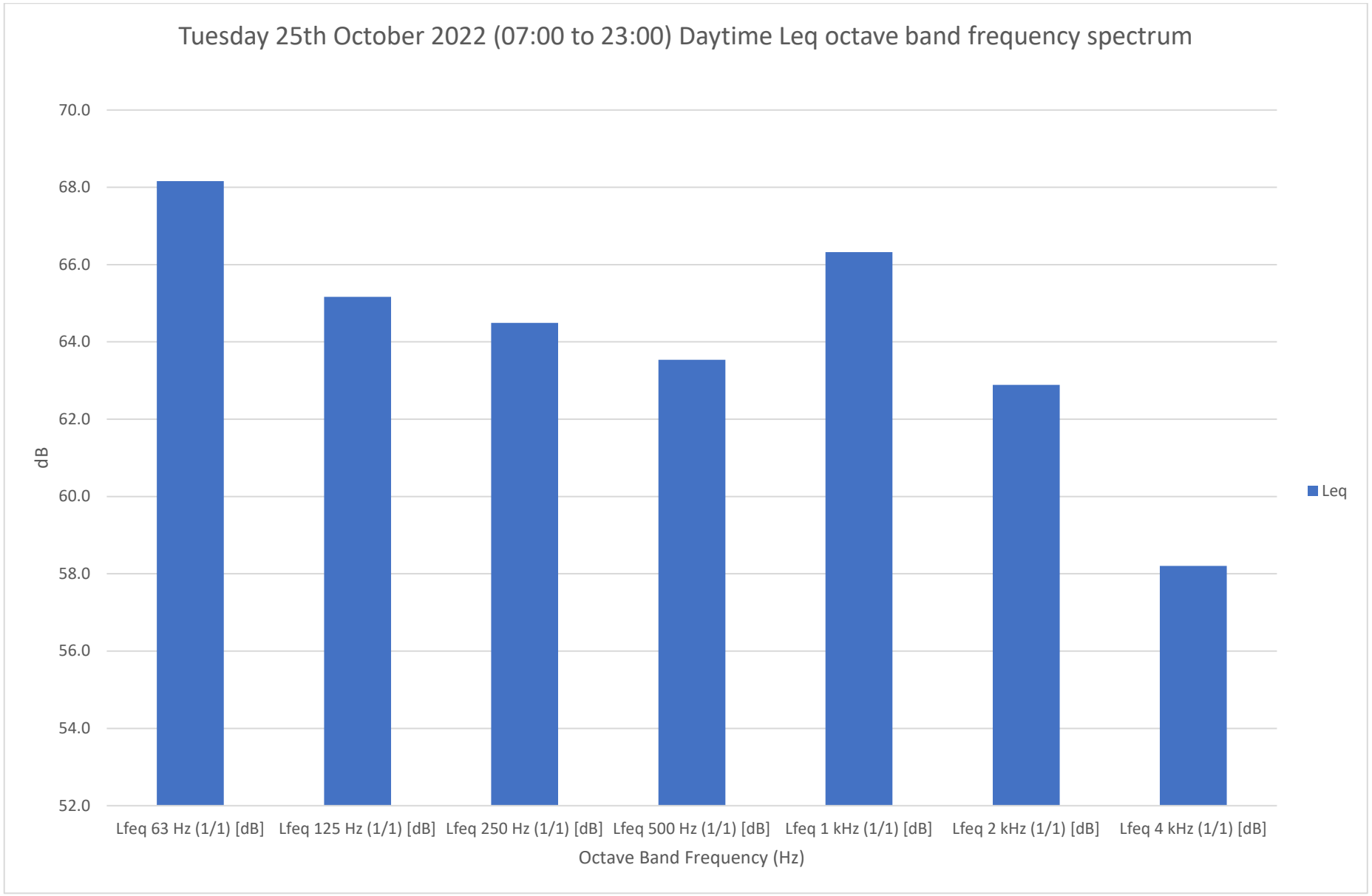
7.8 The assessment has found that the initial part of the planning condition can be discharged with the implementation of the proposed mitigation measures, to adequately reduce the impact of the external noise sources.

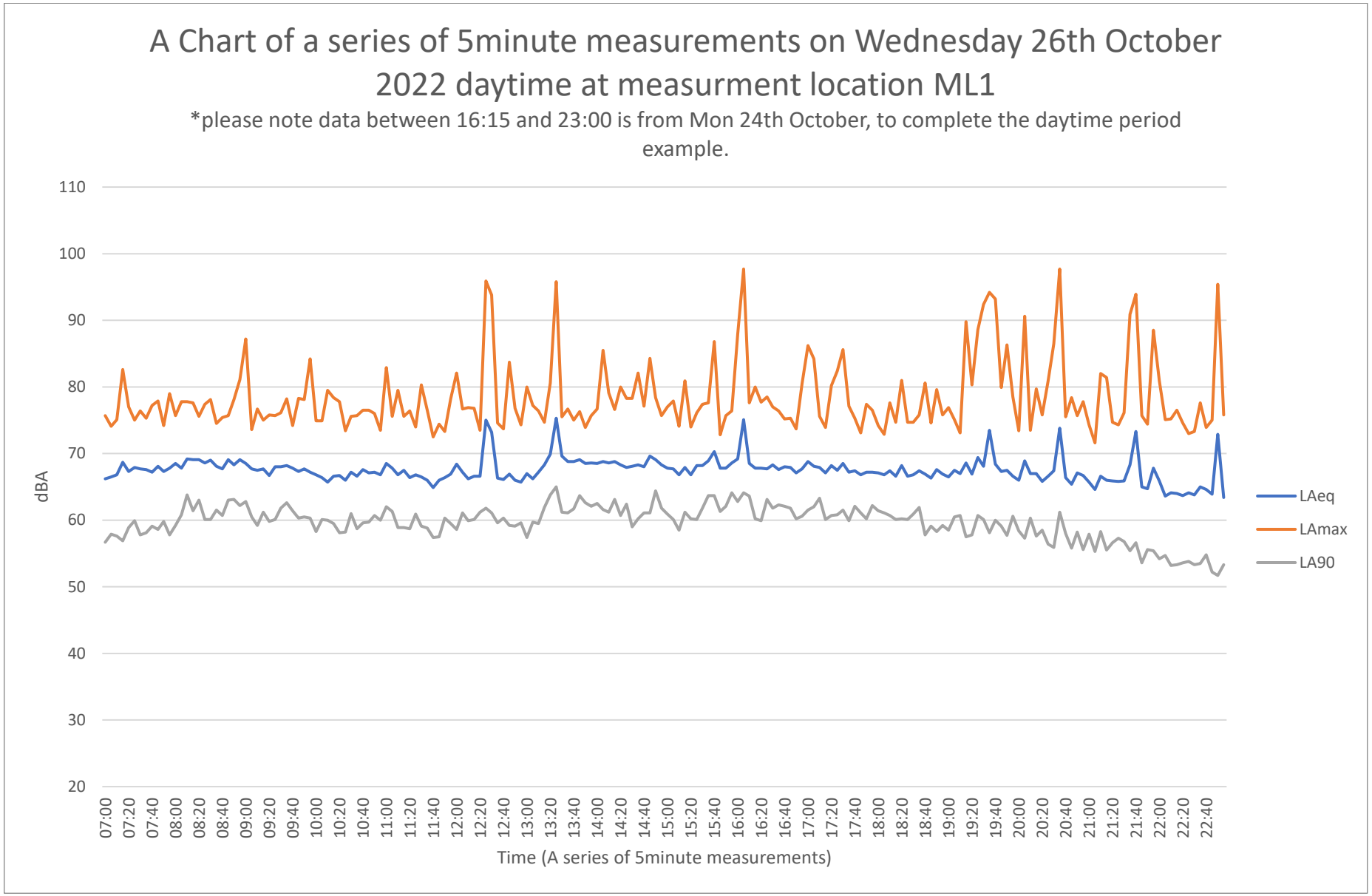
7.9 The conversation update in section 6 is an addition to the report, demonstrating the challenges within this development and a conflict between satisfying conservation and the implementation of the mitigation measures proposed in this report.

Appendix A

Measurement Data at ML1

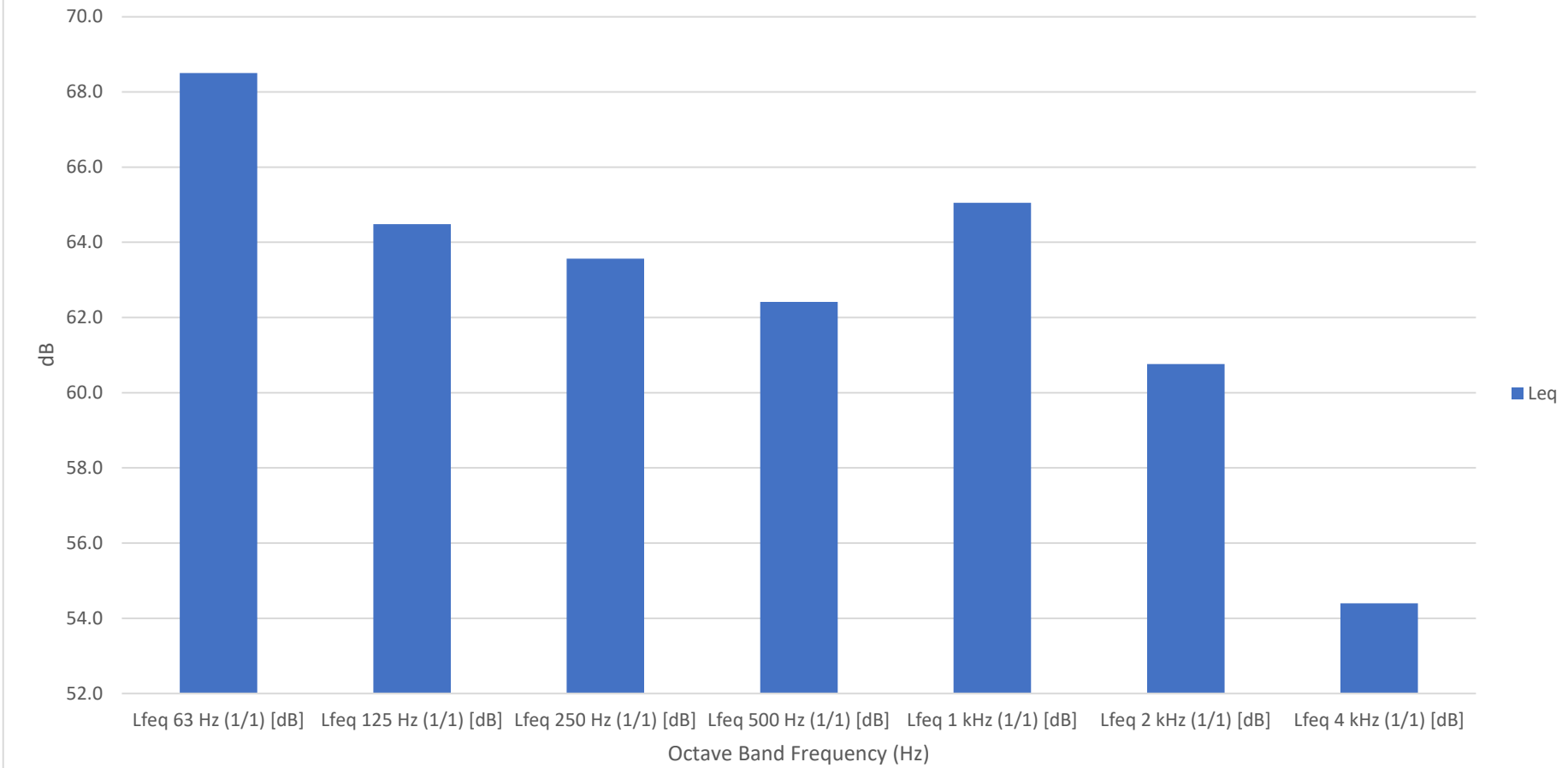

A Chart of a series of 5minute measurements on Tuesday 25th October 2022 daytime at measurment location ML1
110
100
90
80
70
60
50
40
30
20
dBA
07:00
07:20
07:40
08:00
08:20
08:40
09:00
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22:40
Time (A series of 5minute measurements)
LAeq
LAmax
LA90

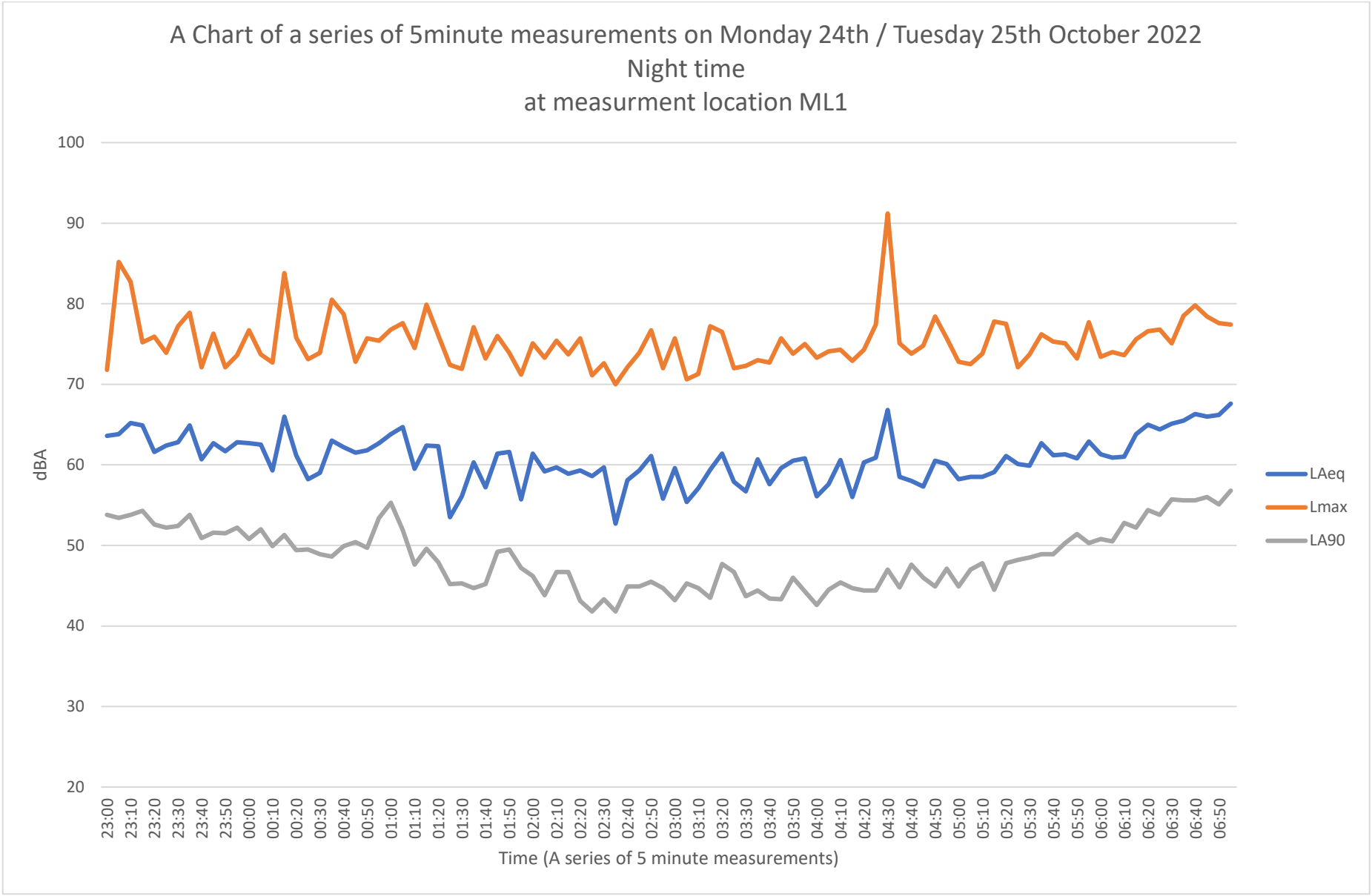

Tuesday 25th October 2022 (07:00 to 23:00) Daytime Leq octave band frequency spectrum
70.0
68.0
66.0
64.0
62.0
60.0
58.0
56.0
54.0
52.0
dB
Lfeq 63 Hz (1/1) [dB]
Lfeq 125 Hz (1/1) [dB]
Lfeq 250 Hz (1/1) [dB]
Lfeq 500 Hz (1/1) [dB]
Lfeq 1 kHz (1/1) [dB]
Lfeq 2 kHz (1/1) [dB]
Lfeq 4 kHz (1/1) [dB]
Octave Band Frequency (Hz)
Leq


A Chart of a series of 5minute measurements on Wednesday 26th October 2022 daytime at measurment location ML1
*please note data between 16:15 and 23:00 is from Mon 24th October, to complete the daytime period example.
dBA
110
100
90
80
70
60
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40
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08:40
09:00
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21:40
22:00
22:20
22:40
Time (A series of 5minute measurements)
LAeq
LAmax
LA90

Wednesday 26th October 2022 (07:00 to 23:00) Daytime Leq octave band frequency spectrum

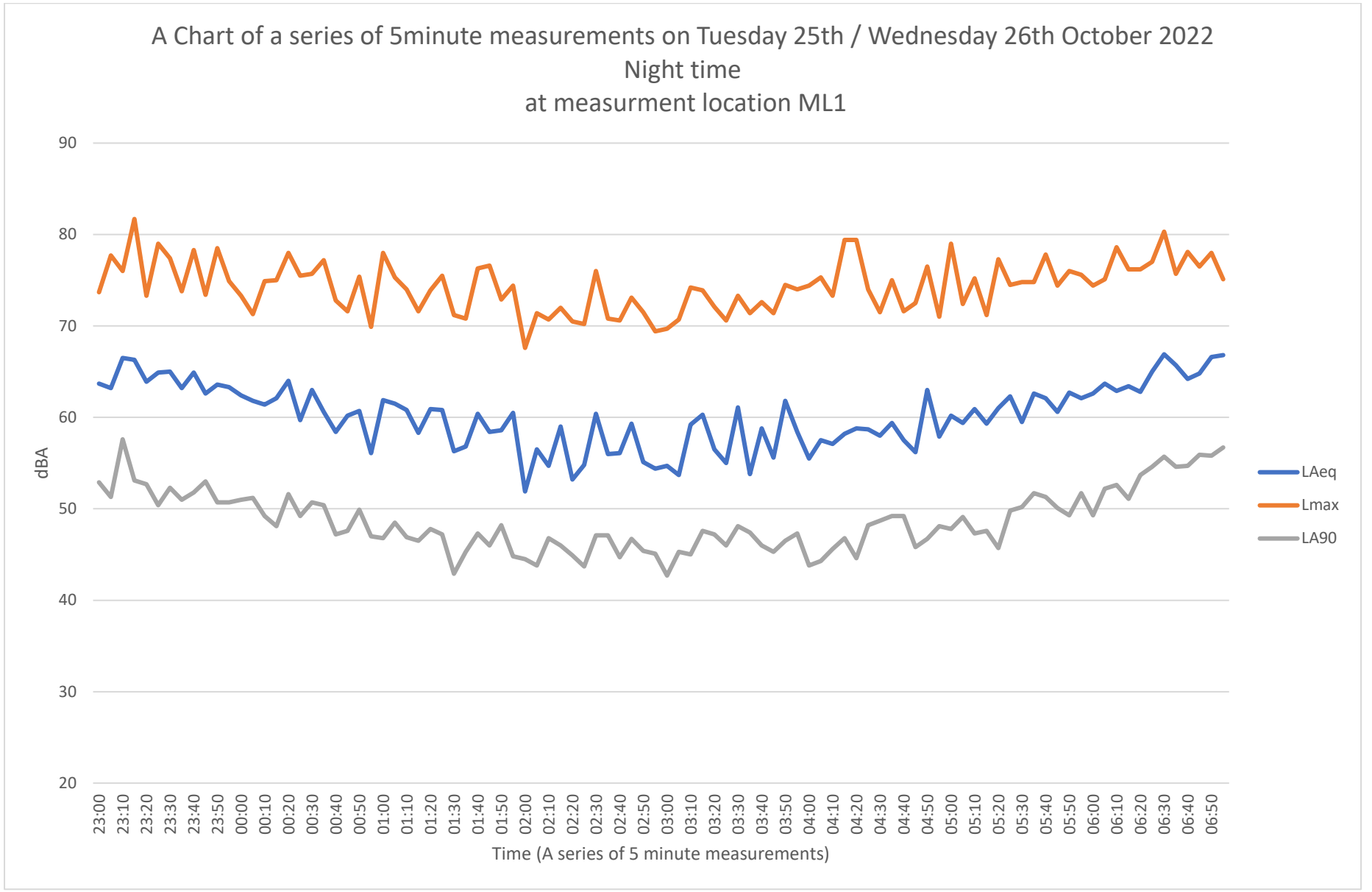
*please note data between 16:15 and 23:00 is from Mon 24th October, to complete the daytime period example.




A Chart of a series of 5minute measurements on Monday 24th / Tuesday 25th October 2022
Night time
at measurment location ML1
dBA
100
90
80
70
60
50
40
30
20
23:00
23:10
23:20
23:30
23:40
23:50
00:00
00:10
00:20
00:30
00:40
00:50
01:00
01:10
01:20
01:30
01:40
01:50
02:00
02:10
02:20
02:30
02:40
02:50
03:00
03:10
03:20
03:30
03:40
03:50
04:00
04:10
04:20
04:30
04:40
04:50
05:00
05:10
05:20
05:30
05:40
05:50
06:00
06:10
06:20
06:30
06:40
06:50
Time (A series of 5 minute measurements)
LAeq
Lmax
LA90

Monday Night LAmax Noise Events

HIGHEST	LAmax	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz
1	91.2	78.6	73.2	72.1	72.8	81.3	87.9	87.3
2	85.2	77.8	74.1	76.8	82.2	81.9	77.9	71.9
3	83.8	76.4	84.2	79.5	79.4	82.2	73.2	76.8
4	82.7	78.2	75.8	77.1	79.1	81	74.2	63.1
5	80.5	79.4	77.7	77.4	75.5	78.8	72.9	67.4
6	79.9	73.5	67.6	68.4	67.4	77.9	77.7	63.4
7	79.8	76.5	76.9	78.7	76.8	75.3	73.8	67.4
8	78.9	80.5	73.3	75.3	74.1	77.6	68.7	56.8
9	78.7	75.1	74.9	76.8	73.6	75.8	71.4	62.9
10	78.5	84.3	77.6	77.3	75.8	74.6	70.3	64.3
11	78.4	69.4	68.6	71.9	73	76.6	70.7	62.8
12	78.4	69.4	68.6	71.9	73	76.6	70.7	62.8
13	77.8	80.5	78.3	76.3	75.2	74.1	70.3	63.7
14	77.7	78.3	71.2	73.8	72.9	75.8	68.5	62.3
15	77.6	72.5	69.6	70.9	72.5	75.1	70.5	66
16	77.6	72.5	69.6	70.9	72.5	75.1	70.5	66


A Chart of a series of 5minute measurements on Tuesday 25th / Wednesday 26th October 2022
Night time
at measurment location ML1
90
80
70
60
50
40
30
20
dBA
23:00
23:10
23:20
23:30
23:40
23:50
00:00
00:10
00:20
00:30
00:40
00:50
01:00
01:10
01:20
01:30
01:40
01:50
02:00
02:10
02:20
02:30
02:40
02:50
03:00
03:10
03:20
03:30
03:40
03:50
04:00
04:10
04:20
04:30
04:40
04:50
05:00
05:10
05:20
05:30
05:40
05:50
06:00
06:10
06:20
06:30
06:40
06:50
Time (A series of 5 minute measurements)
LAeq
Lmax
LA90

HOWELL ACOUSTICS
SPECIALIST ACOUSTIC CONSULTANCY

Tuesday Night LAmax Noise Events

HIGHEST	LAmax	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz
1	81.7	89.8	84.5	76.9	76.2	80.1	72.4	58.6
2	80.3	85.6	81.7	78.4	78.7	76.6	73.3	66.4
3	79.4	81.7	72.2	72.6	73.5	77.7	70.6	63.1
4	79.4	81.7	72.2	72.6	73.5	77.7	70.6	63.1
5	79	82.3	82.1	77.7	75.9	76.3	71.8	65.7
6	79	82.3	82.1	77.7	75.9	76.3	71.8	65.7
7	78.6	76.6	74.3	74.4	75	74.6	72.1	65.6
8	78.5	73.6	73	73.8	74.4	77.1	67.5	60.9
9	78.3	76.9	75.6	74.6	73.7	76.1	71.3	62.8
10	78.1	79.4	81.8	74.7	74.9	74.4	70.5	65.6
11	78	77.3	76.4	73.4	73.3	75.5	70.8	60.9
12	78	77.3	76.4	73.4	73.3	75.5	70.8	60.9
13	78	77.3	76.4	73.4	73.3	75.5	70.8	60.9
14	77.8	68.9	66.9	70.8	73	76.5	68.9	61.1
15	77.7	77.5	78	73.6	79.7	73.4	66.8	59
16	77.4	79.2	79.5	73.7	74.2	75.5	67.8	59.1

Appendix B

Summary of Noise Break-in Calculations

Ground Floor Apartment Flat 4 Bedroom 2 Night-time Noise Break-in calculations

BS EN 12354-Calcs	Use	Volume		Volume	30.5		LAeq Ext		64.9	
	length						LAeq Int		18.1	
Apartment 4 Bedroom 2	width			RT	0.5		dBA Diff		47	
	height		Octave Band Centre Frequency [Hz]						dBA	
			125	250	500	1k	2k	4k		
External Spectrum Leq (Free Field & Linear)			57.5	56.9	55.9	59.0	54.3	47.3		
Adjustment to Given Level if required									-3.2	
External Spectrum Adjusted for Level			60.7	60.1	59.1	62.2	57.5	50.5	64.9	
		Area m2	Element Sound Reduction Index [SRI]						Contrib	NR
Wall	350mm Brick Wall	7.8	44	52	59	64	69	74	6.3	6
Window	4/150/6_double_window	2.0	25	37	45	50	51	51	18.0	11
Window	None	0.0	0	0	0	0	0	0	0.0	6
Door	None	0.0	0	0	0	0	0	0	0.0	6
Roof	None	0.0	0	0	0	0	0	0	0.0	6
		# Vents								
Vent Dn,e	None	0.0	0	0	0	0	0	0	0.0	6
									dBA	NR
	Internal SPL/dBLin		31.8	19.2	10.2	8.3	2.6	0.0	18.1	11

BS EN 12354-Calcs	Use	Volume		Volume	30.5		LAmax Ext		81.9	
	length						LAmax Int		37.7	
Apartment 4 Bedroom 2	width			RT	0.5		dBA Diff		44	
	height		Octave Band Centre Frequency [Hz]						dBA	
			125	250	500	1k	2k	4k		
External Spectrum Leq (Free Field & Linear)			77.6	77.3	75.8	74.6	70.3	64.3		
Adjustment to Given Level if required									-3.2	
External Spectrum Adjusted for Level			80.8	80.5	79.0	77.8	73.5	67.5	81.9	
		Area m2	Element Sound Reduction Index [SRI]						Contrib	NR
Wall	350mm Brick Wall	7.8	44	52	59	64	69	74	6.3	6
Window	4/150/6_double_window	2.0	25	37	45	50	51	51	37.7	34
Window	None	0.0	0	0	0	0	0	0	0.0	6
Door	None	0.0	0	0	0	0	0	0	0.0	6
Roof	None	0.0	0	0	0	0	0	0	0.0	6
		# Vents								
Vent Dn,e	None	0.0	0	0	0	0	0	0	0.0	6
									dBA	NR
	Internal SPL/dBLin		51.9	39.6	30.1	23.9	18.6	12.6	37.7	34

Ground Floor Apartment 3 Living room / Kitchen Daytime Noise Break-in calculations

BS EN 12354-Calcs	Use	Volume		Volume	54.2		LAeq Ext		71.2	
	length						LAeq Int		27.1	
Apartment 3 Living Room / Kitchen	width			RT	0.5		dBA Diff		44	
	height		Octave Band Centre Frequency [Hz]						dBA	
			125	250	500	1k	2k	4k		
External Spectrum Leq (Free Field & Linear)			64.5	63.6	62.4	65.1	60.8	54.4		
Adjustment to Given Level if required									-3.2	
External Spectrum Adjusted for Level			67.7	66.8	65.6	68.3	64.0	57.6	71.2	
		Area m2	Element Sound Reduction Index [SRI]						Contrib	NR
Wall	350mm Brick Wall	22.6	44	52	59	64	69	74	6.3	6
Window	4/150/6_double_window	6.0	25	37	45	50	51	51	27.1	22
Window	None	0.0	0	0	0	0	0	0	0.0	6
Door	None	0.0	0	0	0	0	0	0	0.0	6
Roof	None	0.0	0	0	0	0	0	0	0.0	6
		# Vents								
Vent Dn,e	None	0.0	0	0	0	0	0	0	0.0	6
									dBA	NR
	Internal SPL/dBLin		41.0	28.1	19.0	16.6	11.3	5.0	27.1	22

Second Floor Apartment Flat 7 Bedroom 3 Night-time Noise Break-in calculations

BS EN 12354-Calcs	Use	Volume		Volume	15.5		LAeq Ext		61.5	
	length						LAeq Int		23.7	
Apartment 7 Bedroom 3	width			RT	0.5		dBA Diff		38	
	height		Octave Band Centre Frequency [Hz]						dBA	
			125	250	500	1k	2k	4k		
External Spectrum Leq (Free Field & Linear)			57.5	56.9	55.9	59.0	54.3	47.3		
Adjustment to Given Level if required									0.2	
External Spectrum Adjusted for Level			57.3	56.7	55.7	58.8	54.1	47.1	61.5	
		Area m2	Element Sound Reduction Index [SRI]						Contrib	NR
Wall	350mm Brick Wall	3.8	44	52	59	64	69	74	6.3	6
Window	4/20/4_double_glazing Argon	0.6	22	20	32	42	46	46	23.6	20
Window	None	0.0	0	0	0	0	0	0	0.0	6
Door	None	0.0	0	0	0	0	0	0	0.0	6
Roof	Roofing tiles, Timber joists (150mm) with 100mm Rockw	9.3	41	52	59	64	64	67	9.0	1
		# Vents								
Vent Dn,e	None	0.0	0	0	0	0	0	0	0.0	6
									dBA	NR
	Internal SPL/dBLin		30.0	30.8	17.9	11.2	3.1	0.0	23.7	20

BS EN 12354-Calcs	Use	Volume		Volume	15.5		LAmax Ext		78.5	
	length						LAmax Int		43.6	
Apartment 7 Bedroom 3	width			RT	0.5		dBA Diff		35	
	height		Octave Band Centre Frequency [Hz]						dBA	
			125	250	500	1k	2k	4k		
External Spectrum Leq (Free Field & Linear)			77.6	77.3	75.8	74.6	70.3	64.3		
Adjustment to Given Level if required									0.2	
External Spectrum Adjusted for Level			77.4	77.1	75.6	74.4	70.1	64.1	78.5	
		Area m2	Element Sound Reduction Index [SRI]						Contrib	NR
Wall	350mm Brick Wall	3.8	44	52	59	64	69	74	6.3	6
Window	4/20/4_double_glazing Argon	0.6	22	20	32	42	46	46	43.5	42
Window	None	0.0	0	0	0	0	0	0	0.0	6
Door	None	0.0	0	0	0	0	0	0	0.0	6
Roof	Roofing tiles, Timber joists (150mm) with 100mm Rockw	9.3	41	52	59	64	64	67	28.5	23
		# Vents								
Vent Dn,e	None	0.0	0	0	0	0	0	0	0.0	6
									dBA	NR
	Internal SPL/dBLin		50.0	50.9	37.5	26.6	18.9	12.4	43.6	42

Appendix C

Measurement locations and photographs

Development Site Location



Fenton House, 2 Higher Ardwick, Manchester, M12 6BZ.

Measurment Location 1



Photographs of Measurement Location 1





Fenton House, 2 Higher Ardwick, Manchester, M12 6BZ.

Appendix D

Sound Reduction of elements

Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 6541
Job Name:
Job No.: HA162 Initials:Jonathan
Date:14/06/2022
File Name:Insul.ixl

Notes:



Rw 47 dB
C -2 dB
Ctr -8 dB

Mass-air-mass resonant frequency = =62 Hz

Panel Size = 2.0 m x 1.5 m

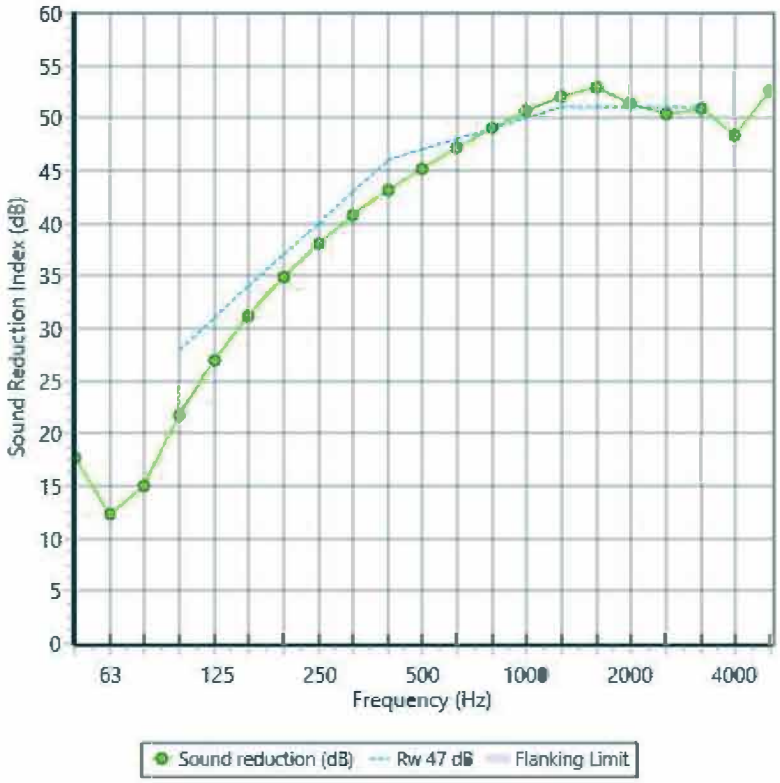
Partition surface mass = 24.9 kg/m²

System description

Pane 1 : 1 x 4 mm Glass

air: 150 mm
Pane 2 : 1 x 6 mm Glass

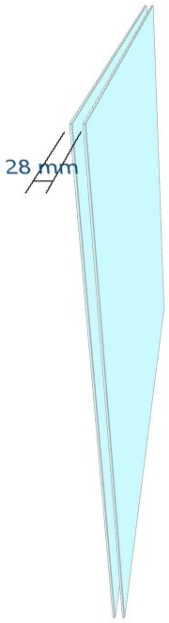
freq.(Hz)	R(dB)	R(dB)
50	18	
63	12	14
80	15	
100	22	
125	27	25
160	31	
200	35	
250	38	37
315	41	
400	43	
500	45	45
630	47	
800	49	
1000	51	50
1250	52	
1600	53	
2000	51	51
2500	50	
3150	51	
4000	48	50
5000	53	



Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 6541
Job Name:
Job No.: Initials:Jonathan
Date:12/10/2022
File Name:

Notes:



Rw 35 dB
C -2 dB
Ctr -6 dB

Mass-air-mass resonant frequency = =212 Hz

Panel Size = 2.0 m x 1.5 m

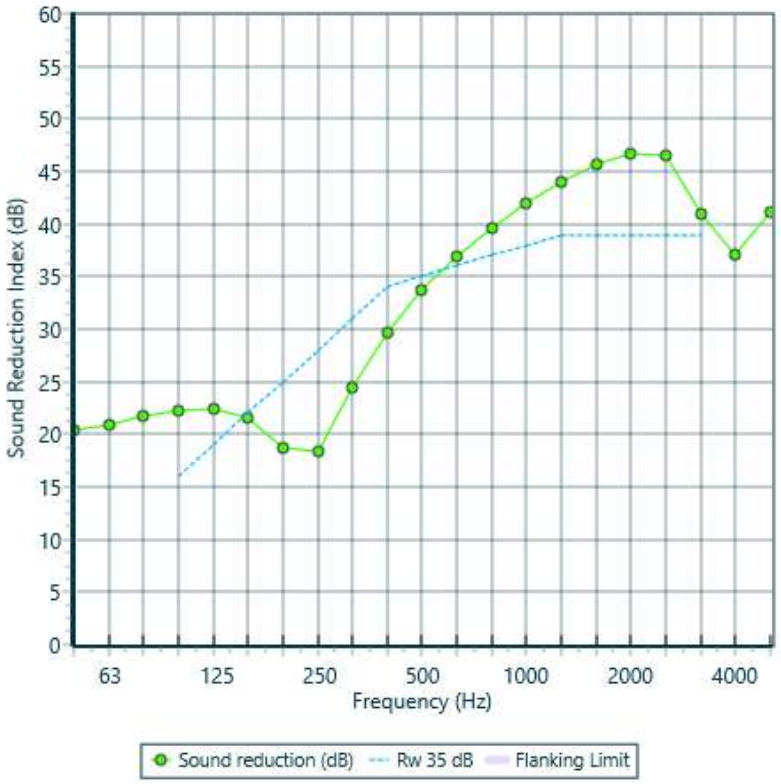
Partition surface mass = 20 kg/m²

System description

Pane 1 : 1 x 4 mm Glass

argon: 20 mm
Pane 2 : 1 x 4 mm Glass

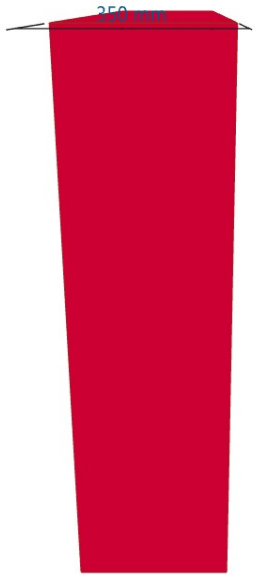
freq.(Hz)	R(dB)	R(dB)
50	20	
63	21	21
80	22	
100	22	
125	22	22
160	22	
200	19	
250	18	20
315	24	
400	30	
500	34	32
630	37	
800	40	
1000	42	42
1250	44	
1600	46	
2000	47	46
2500	47	
3150	41	
4000	37	39
5000	41	



Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 6541
Job Name:
Job No.: Initials:Jonathan
Date:26/11/2022
File Name:

Notes:



Rw 62 dB
C -1 dB
Ctr -6 dB

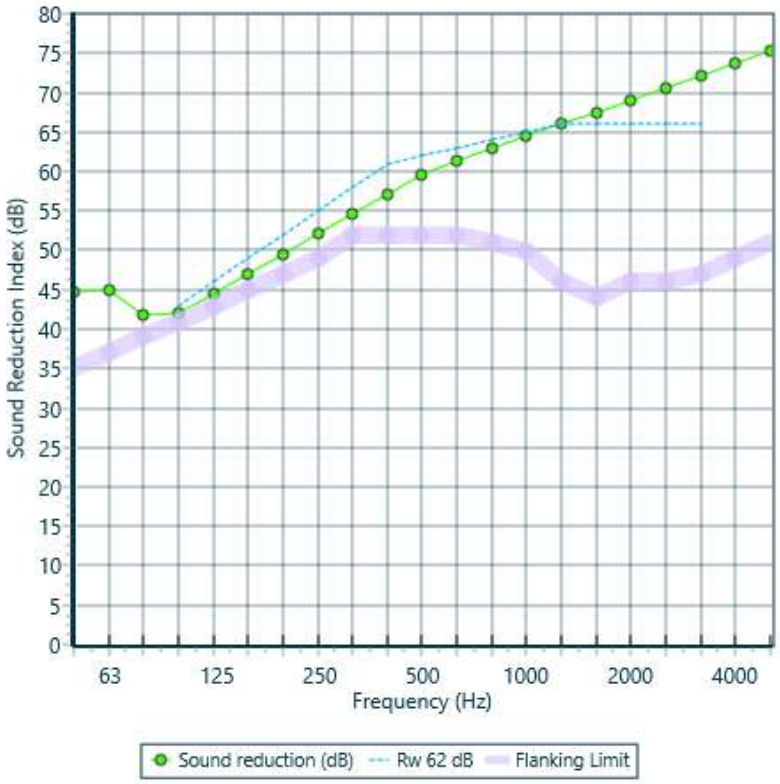
Panel Size = 2.7 m x 4.0 m

Partition surface mass = 560 kg/m²

System description

Panel 1 : 1 x 350 mm Brick

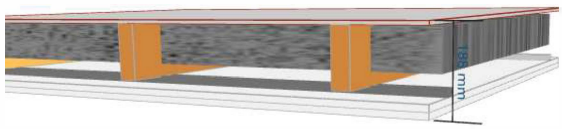
freq.(Hz)	R(dB)	R(dB)
50	45	
63	45	44
80	42	
100	42	
125	44	44
160	47	
200	50	
250	52	52
315	55	
400	57	
500	60	59
630	61	
800	63	
1000	64	64
1250	66	
1600	68	
2000	69	69
2500	71	
3150	72	
4000	74	74
5000	75	



Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 6541
Job Name:
Job No.: HA162 Initials:Jonathan
Date:14/06/2022
File Name:

Notes:



Rw 61 dB
C -2 dB
Ctr -7 dB

Mass-air-mass resonant frequency = =40 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 47.6 kg/m²

System description

Panel 1 : 1 x 8 mm Roofing tiles

Frame: Solid Joist with resilient rail (1.3E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 150 mm , 1 x Rockwool (33kg/m3) Thickness 100 mm
Panel 2 : 2 x 15 mm Gyproc SoundBloc 15mm

freq.(Hz)	R(dB)	R(dB)
50	17	
63	25	21
80	32	
100	38	
125	42	41
160	46	
200	50	
250	52	52
315	55	
400	57	
500	59	59
630	61	
800	63	
1000	64	64
1250	66	
1600	66	
2000	64	64
2500	64	
3150	70	
4000	65	67
5000	67	

