



Residential Noise Assessment

Site Address: 550-552 Stockport Road Longsight, Manchester, M12 4JJ

Client Name: Primal Properties Limited

Project Reference No: NP-013206



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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for a residential development ('the proposed development') at 550-552 Stockport Road Longsight, Manchester, M12 4JJ ('the site'). The proposed development is for the change of use of the first floor from retail to residential apartments with the ground floor split into 2 retail units.

The applicant has received conditional approval for planning application No. 141378/FO/2024 ('the Application') from Manchester City Council. This report has been prepared to discharge condition 5a imposed by the local planning authority ('LPA')

A noise survey has been undertaken to establish the prevailing sound levels at the proposed development. The findings have been subsequently used to assess the suitability of the site for residential use. Measures required to mitigate noise impacts for the proposed development have been assessed in accordance with the relevant performance standards, legislation, policy and guidance.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

The following performance standards, legislation, policy and guidance have been considered to ensure good acoustic design in the assessment:

- The LPA's conditional approval; specifically, Condition 5a.
- National Planning Policy Framework (2024)
- Noise Policy Statement for England (2010)
- British Standard BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'
- British Standard BS8233:2014 – 'Guidance on sound insulation and noise reduction for buildings'
- ProPG: 'Planning and Noise 2017' (including supplementary documents 1 & 2)
- Approved Document F: Volume 1 Dwellings (2021)
- Acoustics Ventilation Overheating: Residential Design Guide 2020' (AVO Guide)

Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

The proposal is for the change of use of the first-floor retail occupied space to 3 no. residential. The existing retail usage of the ground floor is to be retained, but split into two smaller units. It is understood at this stage that no fixed external plant is currently proposed for the commercial aspect of the development.

Due to the layout of the building, the only shared partition between the existing retail space and new residential shall be the party floor, which has been included within the assessment to ensure that noise breakthrough from within the structure does not result in unsuitable noise levels within the residential areas.

The floor plans for the proposed development are presented in Appendix F.

1.3 Local Planning Authority & Background

The following condition of the approved planning application No. 141378/FO/2024 requires discharging:

"5) a) Before the occupation of the development, a scheme shall be submitted to and approved in writing by the City Council as local planning authority relating to the acoustic insulation of the two authorised flats against noise from Stockport Road and any other identified noise source, including the retained ground floor Class E use. The scheme should also consider and attenuated against potential for overheating. The approved noise insulation and ventilation scheme shall be implemented before the occupation of the authorised flats."

2. Environmental Noise Survey

2.1 Measurement Methodology

The following table outlines the measurement dates and particulars. In all instances a 130mm diameter windshield was fitted to the microphones along with a suitable outdoor environmental kit. Details of the equipment used, and the meteorological conditions are available in Appendix D.

Note that a -3dB façade correction has been applied to all measured levels at MP1 and MP2 to account for increased façade reflections.

Location	Survey Dates	Measurement Particulars
MP1	05/09/25 – 09/09/25	Equipment protruding 1m from the first-floor front façade overlooking Stockport Road.
MP2	05/09/25 – 09/09/25	Equipment protruding 1m from the first-floor rear façade overlooking Dencombe Street. This location was chosen to obtain noise measurements to the rear of the property. Although there is a window further west, the location was not considered secure by the client to protrude the meter from this window for the duration of the survey.

Table 1 – Measurement Methodology

The figure below outlines the site surroundings and measurement locations:

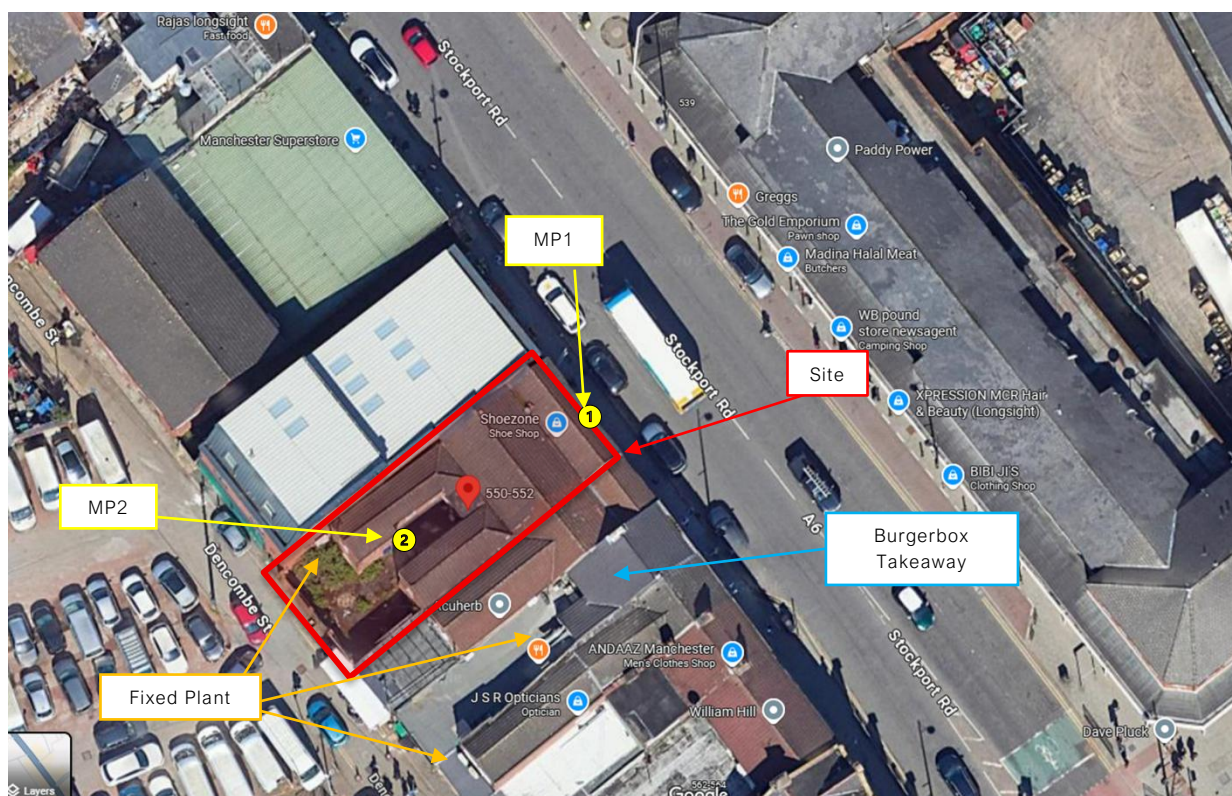


Figure 1 – Measurement Locations and Site Surroundings

2.2 Context & Subjective Impression

The site is situated in Longsight, Manchester and fronts onto the busy Stockport Road (A6) that leads out of Manchester City centre. The surrounding properties are predominantly commercial in nature with some units featuring residential spaces on the upper floors. The commercial units are predominately retail with various takeaway restaurants also in the nearby vicinity. To the rear of the site is Longsight market, where it was observed during the set up and collection of monitoring equipment that frequent loading and unloading occurs.

The noise environment in the area was deemed as moderate to high, with heavy traffic on the A6 to the front of the development being the dominant noise source in the area. Additionally, pedestrian activity and footfall provided a secondary source, particularly at MP1 which fronted on to the main high street.

To the rear of the development there is also a considerable amount of footfall and pedestrian noise from the market as well as high levels of vehicle activity from the associated car park and deliveries to commercial units via Dencombe Lane.

Numerous items of fixed plant were identified to service commercial units within the local area, which were predominately located towards the rear of the proposed development.

The table below contains the details of commercial premises within proximity to the proposed development, including the known operating times of each business. All premises not listed are either regarded as being low noise generation, such as a hairdresser, or limited to daytime use only.

Name	Description	Opening Hours
Burgerbox - Longsight	Takeaway burger restaurant located to the southeast of the proposed development further down the high street.	11:00 – 03:00 hours Tuesday to Saturday, 11:00 – 01:00 hours Sunday & Monday
Rajas Longsight	Takeaway restaurant located to the north of the proposed development further down the high street.	12:00 – 23:30 hours Sunday to Friday, 13:00 – 23:30 hours Saturday
Cha Cha Chai	Takeaway and dine in coffee shop located to the north of the proposed development further down the high street.	08:00 – 02:00 hours Monday - Saturday 09:00 – 02:00 hours Sunday
My Karak Chai	Takeaway and dine in coffee shop located to the south of the proposed development further down the high street.	09:00 – 01:00 hours Sunday - Thursday 09:00 – 02:00 hours Friday & Saturday
WokChef Manchester	Takeaway Chinese restaurant located to the south of the proposed development further down the high street.	12:00 – 00:00 hours Saturday - Thursday 15:00 – 00:00 hours Friday

Table 2 – Business Identification

2.3 Environmental Noise Survey Results

The following section outlines the measured sound levels during the unattended survey. A period between 12:30 and 15:00 on 07/09/2025 has been excluded due to the influence of rainfall during the measurement period. This period is highlighted on the time history results which can be found in Appendix D.

Location	Measurement Period ('T')	Octave Frequency Band (Hz, L _{eq,T} dB)							Overall (dBA)
		63	125	250	500	1k	2k	4k	
MP1	L _{eq,16hr} (Day)	70	63	62	62	64	60	53	67
	L _{eq,8hr} (Night)	66	59	59	60	63	58	50	66
	L _{Fmax,1min} (Night)*	81	79	76	77	82	76	66	84
MP2	L _{eq,16hr} (Day)	58	52	52	49	48	45	37	52
	L _{eq,8hr} (Night)	55	48	50	47	46	43	36	50
	L _{Fmax,1min} (Night)*	71	68	70	72	68	61	53	72
*Exceeded 10 times or fewer per night.									

Table 3 – Sound Level Results Summary

3. BS4142 Noise Impact Assessment

3.1 BS4142 Noise Impact Assessment

Noise Sources & Subjective Impression

To the rear of the proposed development are multiple items of external fixed plant that service the neighbouring commercial units. The noise emissions from said plant have been assessed in accordance with BS4142:2014+A1:2019. The figure below shows the location of the plant equipment under assessment.

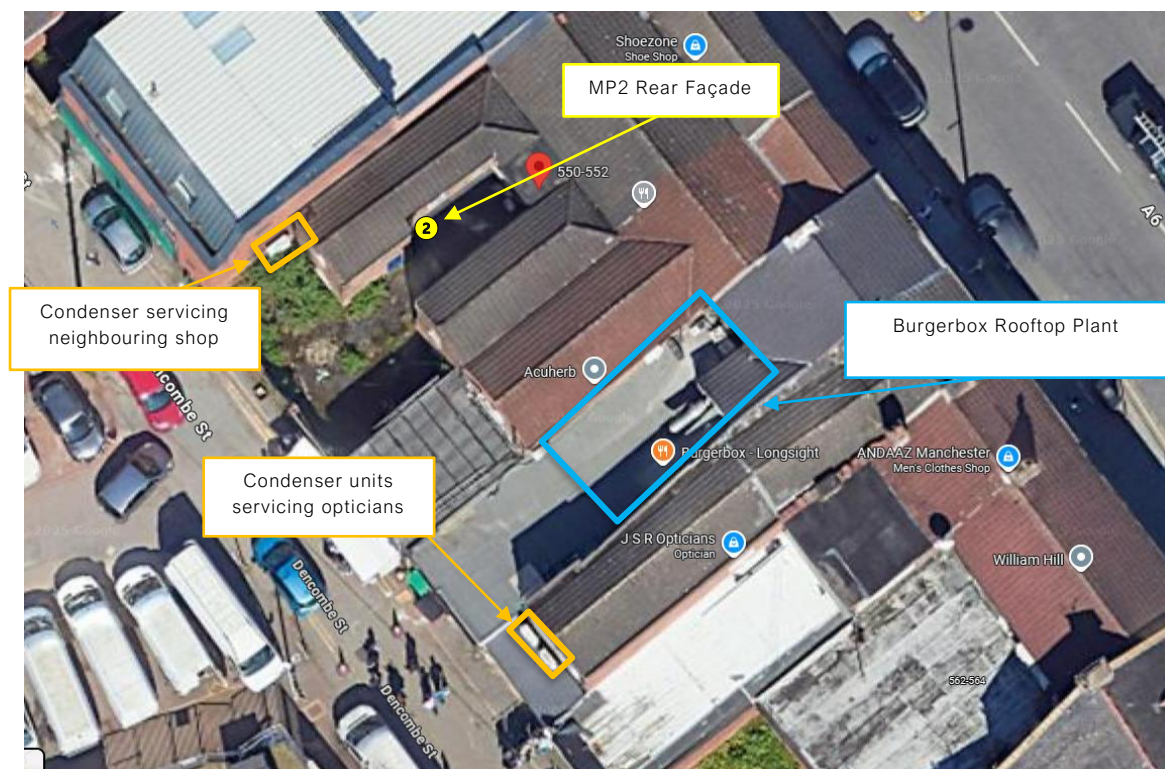


Figure 2 – Location of Nearby External Fixed Plant

When analysing the time history graph at MP2, there is a noticeable cut off in the background noise level (L_{A90}). At 03:00 hours on the Friday and Saturday nights and at 01:00 hours on the Sunday and Monday nights as is highlighted in red on Figure 3 below. This coincides with the operational hours of the nearby Burgerbox hot food takeaway as presented in Table 2 and therefore is likely to be due to the switching off their kitchen extract plant.

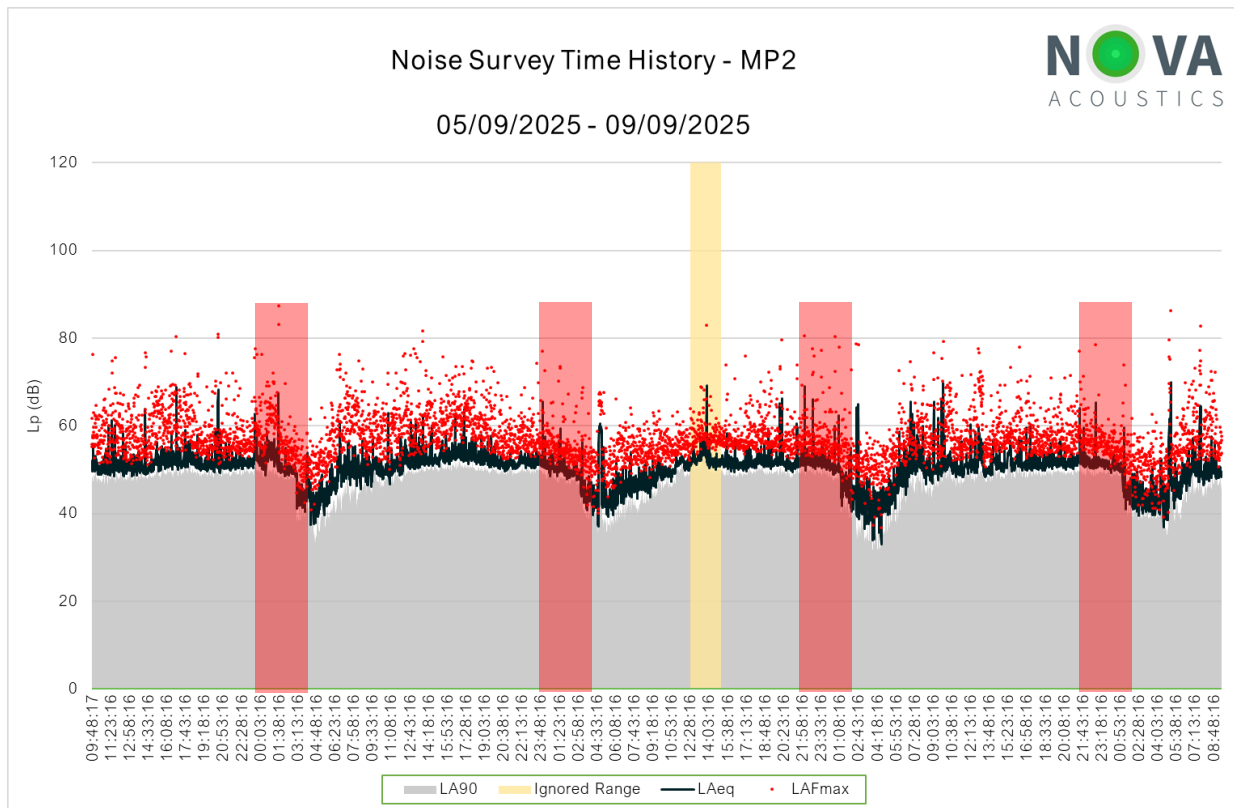


Figure 3 – Fixed Plant Cut -Off Periods (MP2)

Background Sound Level Analysis

The following section outlines the measured background sound levels that have been used as the baseline for the subsequent BS4142 noise assessment. The figure below shows a histogram graph of the background sound levels measured during the most sensitive period of Burgerbox's operational period, 23:0 – 03:00 hours. This is likely to determine the underlying noise level produced by any extraction plant from the site.

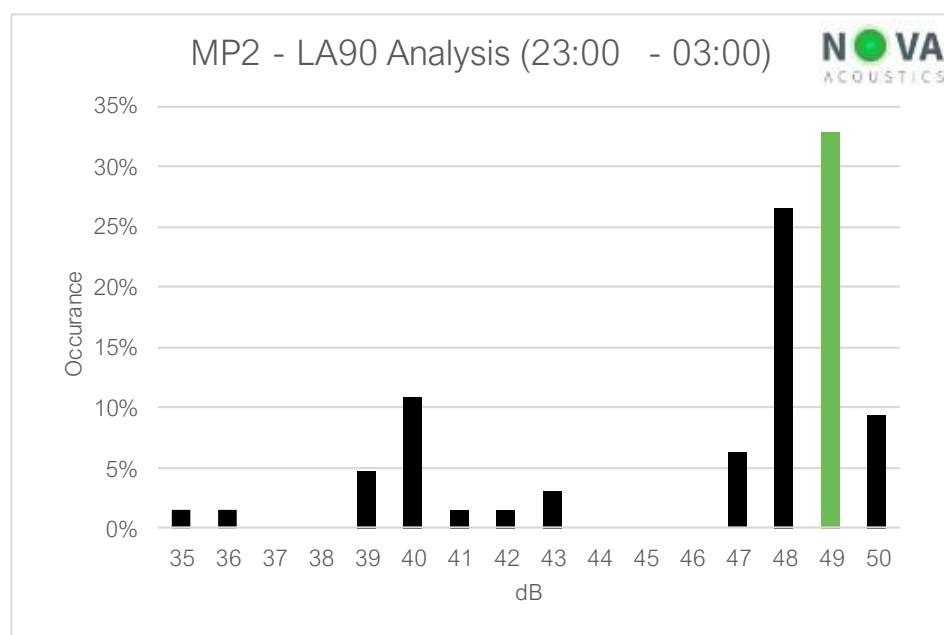


Figure 4 – MP2 Background Sound Level Analysis – Burgerbox Plant

Given the distribution of the measured $L_{A90,15min}$ values, it has been determined that the specific sound level associated with the Burgerbox fixed plant is approximately 49dB L_{Aeq} at the proposed residential development. All windows associated with the development site are fully shielded from Burgerbox's rooftop plant.

There is a noticeable drop in the external background sound level once Burgerbox closes. Therefore, it is anticipated that this would result in an adverse impact on the proposed development. Assuming a partially open window provides 13dB of attenuation, the resulting internal sound level from the nearby fixed plant would be approximately 36dB. This is 6dB above the internal ambient noise level typically recommended in BS8233 for resting areas and would likely be an indication of adverse impact.

Analysis of the night-time levels between 03:00 and 07:00 hours throughout the measurement period determine that the background noise level in absence of the plant is determined to be 39dB $L_{A90,15min}$. This is highlighted in the histogram below.

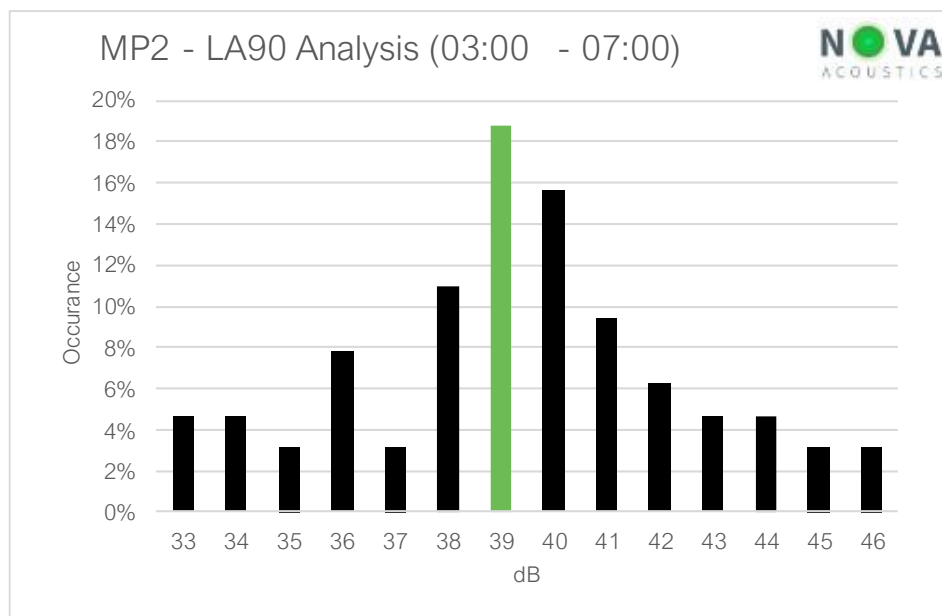


Figure 5 – MP2 Background Sound Level Analysis – No Plant Influence

Additionally, a small wall mounted condenser unit that services the adjoining commercial unit to the north of the development is located approximately 1.5m from the window of the proposed Apartment 03 bedroom. Operational hours are not known for the commercial property the unit services. Spot measurements were undertaken of the unit during the set-up of the noise monitoring equipment at approximately 3m from the unit. It was observed that the unit appears to run intermittently.

The measurements were conducted in 1/3 octave bands; however, a summary of the 1/1 octave frequency band specific sound levels has been provided. All results have been façade corrected during the analysis.

The table below outlines the sound levels measured during an attended survey. Shorter measurements were conducted, however, the plant under assessment operates in a steady-state continuous manner, and as such, the measurements are deemed representative.

Description	1/1 Octave Frequency Band (Hz, $L_{eq,T}$ dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Condenser Unit Ambient Sound Level (15:19 – 15:25)	61	59	55	54	51	49	42	39	57
Condenser Unit Residual Sound Level (15:29 – 15:35)	59	52	48	49	44	40	33	25	50
Condenser Unit Specific Sound Level (Daytime $L_{eq,1hr}$)	57	58	54	53	51	48	42	39	56

Table 4 – Specific Sound Level of Condenser Unit (Fixed Plant Correctly Operating)

BS4142 Noise Impact Assessment

The BS4142 noise impact assessment is presented in the table below.

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at Most Exposed Window of Site (Apartment 03 Bedroom)	54	55	51	49	47	45	38	35	52
Acoustic Feature Correction	A +3 dB penalty has been applied for intermittency as the switching on and off of the fixed plant is clearly distinguishable.								+3
Rating Sound Level (L _{Ar,Tr})									55
Background Sound Level	MP2 L _{A90,15min} in Figure 5.								39
Exceedance									+16
BS4142 Assessment Outcome	Significant adverse impact, dependent on context.								
NPPF & NPSE Outcome	Above the Significant Observed Adverse Effect Level ('SOAEL').								
Mitigation measures are required to reduce noise impact.									

Table 5 – BS4142 Noise Impact Assessment

Assuming a partially open window provides 13dB of attenuation, the resulting internal sound level in the bedroom of the proposed Apartment 03 from the nearby condenser unit would be approximately 42dB which is 12dB above the internal ambient sound level typically recommended in BS8233 for resting areas and would likely be an indication of significant adverse impact.

Therefore, it is recommended that the applicant seeks agreement with the owner/ operator of the adjacent commercial unit who own the condenser unit to seek to relocate the unit and/or enclose the unit to reduce the impact on the proposed residential development. Ideally the measured should reduce noise emissions by a minimum of 17dB, resulting in internal levels at the site to not exceed 25dBA from mechanical plant

noise from the condenser unit with a partially open window to bedrooms. This is considered to result in a low likelihood of adverse impact. Additionally, the applicant should seek agreement with Burgerbox to install silencers on their kitchen extract plant to minimise the risk of adverse impact at the proposed residential development. Ideally, these measures should seek to reduce noise emissions by a minimum of 11 dB, resulting in internal levels at the site to not exceed 25dBA from mechanical plant noise with a partially open window to bedrooms. This is considered to result in a low likelihood of adverse impact.

However, if this approach cannot be agreed or is not possible, an enhanced glazing and ventilation specification will be required. This approach is discussed further in Section 4.

4. Noise Break-in Assessment and Sound Insulation Scheme

4.1 Internal Noise Level Criteria

The following table outlines the typically adopted internal noise criteria, as provided in BS8233.

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$ / NR30	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$ / NR35	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$ / NR30	30 dB $L_{Aeq,8hr}$ / NR25 45 dB L_{AFmax} *

*NOTE 1: The maximum criteria have been taken from the World Health Organisation (WHO) Guidelines for Community Noise.

*NOTE 2: ProPG:2017 which is relevant to 'New Residential' states; "In most circumstances in noise sensitive rooms at night (e.g., bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax, F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability, and regularity of noise events".

Note 3: BS8233:2014 states: "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved".

Note 4: BS8233:2014 states: "The levels shown in Table 4 (criteria shown above) are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g., 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in Table 4.

Note 5: BS8233:2014 states: "If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

Table 6 – Acoustic Design Criteria (BS8233)

The above criteria are appropriate when external noise conditions are dominated by anonymous noise sources (i.e. that associated with transportation).

As the site is heavily influenced by industrial/commercial noise towards the rear of the development, the following criteria are adopted for the assessment at the rear facades of the property:

- NR25 $L_{Aeq,T}$ during the daytime within bedrooms and living rooms
- NR20 $L_{Aeq,T}$ during the night-time in bedrooms

Adopting the above NR criteria in place of the standard BS8233 guidance provides improved control over spectral content within the proposed flats and achieves an overall reduction of up to 5dBA, thereby further minimising the potential for adverse impact on future residents

It should be recognised that the subsequent sound insulation scheme should be considered indicative, as it is based on a pre-mitigation scenario. Should it be possible to mitigate noise emissions associated with the nearby condenser unit and Burgerbox's extraction plant, a less onerous façade insulation scheme could be suitable.

4.2 Glazing and Whole Dwelling (Background) Ventilation Specification

The following section provides a glazing and background ventilation specification that achieves the relevant internal noise criteria. The calculations considering the following sound insulation scheme can be found in Appendix E.

Description	Octave Frequency Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Front Facade: Living Rooms & Bedrooms								
10mm Glass / 16mm Air Cavity / 8.8mm Optiphon Glass	25	28	31	42	45	50	58	44 R _w (-6 C _{tr})
Greenwood 2500EA.AC1 (Through Frame)	31	41	40	37	47	43	46	42 D _{ne,w} (-2 C _{tr})
Rear Facades: Living Rooms & Bedrooms								
10mm Glass / 16mm Air Cavity / 8.8mm Optiphon Glass	25	28	31	42	45	50	58	44 R _w (-6 C _{tr})
Greenwood MA3051 (Through Wall)	30	46	45	50	55	65	67	55 D _{ne,w} (-3 C _{tr})

Table 7 – Sound Insulation Scheme – Glazing & Ventilation Specification

Any other window specification capable of providing this attenuation will be suitable provided the glazing suppliers can provide an acoustic test report in accordance with BS EN ISO 10140-2:2010 or an evidence-based calculation.

4.3 Ventilation Considerations

Due to the presence of fixed plant noise emissions, it is recommended that open windows are not used to provide cooling, unless plant noise can be treated at source.

Instead, it is recommended that a secondary ventilation strategy is adopted. Alternative forms of ventilation include an MVHR or MEV system. The system should be capable of providing whole dwelling ventilation and higher rates of ventilation/cooling to mitigate potential overheating effects.

Due to the ducted nature of an MVHR system (should one be installed), the resulting break in from external noise sources is considered negligible.

5. Noise Breakthrough Assessment and Sound Insulation Scheme

5.1 Noise Breakthrough Criteria

The proposed development structurally adjoins commercial properties via separating walls and floors. BS8233:2014 states that the internal noise criteria include 'overall noise' which is the sum of structure borne and airborne noise sources. Noise breaking through from structurally adjoining commercial property will be considered to ensure the total noise from both structurally adjoining commercial properties and external noise ingress, does not exceed the proposed acoustic design criteria. Guidance on sound insulation between adjoining domestic and non-domestic dwellings is discussed in Approved Document E (ADE) of the Building Regulations, it is stated in section 0.8 of Part E that:

"The performance standards set out in Tables 1a and 1b are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations, the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level."

5.2 Noise Breakthrough Assessment and Specification

Retail – Separating Floor

The following table outlines the expected risk associated with the 'Class Use' of the structure adjoining commercial businesses proposed on the ground floor of the development and provides a required sound insulation standard including a discussion to justify the standard.

Planning Class	Level of Risk from Noise	Required Sound Insulation Standard (dB)
E(a) Display or retail sale of goods, other than hot food	Low	$\geq 53 D_{nT,w} + C_{tr}$
Discussion: The noise emissions produced by shops may include both amplified music, general equipment noise and noise from staff/patrons. It is understood that no additional plant is proposed for the development at this stage. Amplified music and noise from general equipment associated with these facilities is normally of a background level to facilitate conversation and as such is not a primary concern. The noise from staff/patrons can vary significantly and is highly dependent on the nature of the establishment. The required level of sound insulation should consider raised and elevated vocal efforts occurring regularly. The units proposed are of retail and care use and are therefore not expected to have operating hours that extend into the night-time period (23:00 – 07:00) as such the sensitivity of the adjoining residential will consider only the daytime period.		

Table 8 – Noise Breakthrough Criteria of Separating floor

The floor construction between the ground floor commercial units and the proposed residential units is unknown, However, based on site observations it is assumed that the separating floor is constructed from 200mm timber joists with floorboards and a lath and plaster ceiling below..

To ensure that the noise breaking through the adjoining floor is sufficiently attenuated, the following sound insulation upgrades should be implemented at the site.

Existing:

- Existing floorboard (assumed min. 18mm)
- Existing 200mm timber joists
- Existing lath and plaster (assumed min. 20mm)

Proposed Upgrade:

- **12mm overlay plywood**
- **4mm Mutebarrier® mass loaded vinyl (min surface mass 10kg/m²)**
- Existing 18mm floorboard
- 200mm timber joists **with 150mm acoustic mineral wool insulation (min. density 45kg/m³) tightly and evenly fitted.**
- **Isolation clips (iKoustic Muteclip® or equivalent) and furring channel system affixed to the underside of the joist. (in accordance with the manufactures guidelines)**
- **2no. 15mm Gyproc SoundBloc plasterboard (min. surface mass 12.6kg/m² per board) with overlapping joints and sealed with flexible mastic at the perimeter.**

This upgraded floor construction has been modelled using INSUL 10.0.6 prediction software and the proposed construction is shown to be capable of meeting the required sound insulation standard.

Should the proposed sound insulation upgrades be adhered to, the adopted criteria can be achieved and thus the residential amenity of future occupants can be protected. It should be noted that this report provides an indicative specification that can achieve the required acoustic performance and considers that all flanking routes for sound have been appropriately suppressed. As with any construction project, the ability to meet the specification will rely upon the quality of the built structure. As such the works should be carried out to a high standard of workmanship to ensure that any sound insulation measures are not breached, for example by installing a rigid connection across an isolated connection. The development cannot achieve compliance until sound insulation testing is carried out by a UKAS accredited sound insulation testing company upon completion and assessed against the required sound insulation standard.

6. Conclusion and Action Plan

The proposed development has been assessed against the acoustic design criteria, and sound insulation and alternative ventilation schemes have been provided to ensure the criteria has been achieved.

The survey indicates that the rear of the site is influenced by noise from existing mechanical plant, and a review of the time history alongside the operational hours of neighbouring commercial properties indicate that this is from Burgerbox. This is likely to result in adverse impact at the residential development is windows were to be opened.

Therefore, it is recommended that the applicant seeks agreement with the owner/operator of Burgerbox to install a silencer on the extraction plant, and additionally with the neighbouring retail space to relocate the condenser currently situated outside the proposed Apartment 03 bedroom window.

However, if this approach cannot be agreed or is not possible, an enhanced glazing and ventilation specification will be required. This approach is discussed further in Section 4. It is recommended that an alternative ventilation strategy is installed should it not be possible to reduce noise emissions associated with nearby plant sources to avoid open windows being required at the site to combat potential overheating effects, unless noise from these units can be treated at source.

Finally, the separating walls and floors between the structurally adjoining commercial properties and the proposed development should be designed to achieve the required sound insulation. Indicative specifications have been provided in Section 5. Further design assistance can be provided by NOVA Acoustics if required.

The findings of this report will require written approval from the Local Authority prior to work commencing.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Background Sound	Underlying level of sound over a period, T , which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for $N\%$ of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10 \log_{10} (p/p_0)^2$. Where: p is the root-mean-square sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy, and guidance.

B.1 – National Planning Policy Framework (2024)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2024. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 187e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

Paragraph 198 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 impact 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; and*
- c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes, and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 198 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

To achieve this vision the Statement identifies the following three aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life:
- Mitigate and minimise adverse impacts on health and quality of life:
- Where possible, contribute to the improvement of health and quality of life.

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that “significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development”.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: “all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.”

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. This can be related to the third aim above, which seeks: “where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

This is further expanded using the updated “Noise Exposure Hierarchy Table” which includes an additional level of impact referred to as the ‘No Observed Adverse Effect Level’ (‘NOAEL’). It is stated that at this level: *“noise can be heard, but does not cause any change in behaviour, attitude or other physiological response”*. In addition, noise at this level *“can slightly affect the acoustic character of the area but not such that there is a change in the quality of life”*.

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – British Standard BS4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{A,r}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;*
- b) objective method for tonality;*
- c) reference method."*

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) *Intermittency*

BS4142:2014 states that when the “specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time ... if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.”

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a ‘typical’ background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- “Typically, the greater this difference, the greater the magnitude of the impact.”
- “A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”
- “A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”
- “The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;

- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating sound level does not exceed the background sound level, this is an indication of the specific sound source having a low impact and would therefore be classified as a No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

B.4 – BS8233:2014 ‘Guidance on Sound insulation and noise reduction for buildings’

BS8233 provides guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, ‘WHO Guidelines on Community Noise, 1999’. The Guidelines on Community Noise (1999) document defines community noise to include noise from “industries” and “construction”. The desirable criteria levels of steady state, “anonymous” noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below.

BS8233:2014 Internal Ambient Noise Level Criteria			
Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	--
Sleeping (Daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{AFmax} *

Table 9 – BS8233:2014 Internal Ambient Noise Level Criteria

**ProPG:2017 states that's good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 times a night within noise sensitive rooms such as bedrooms. However, where it is not reasonably practicable to achieve the guideline then the judgment of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number distribution, predictability, and regularity of noise events.*

It is noted, however, that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

For this assessment, the above criteria are considered to be the ‘LOAEL’ as defined in the NPSE in Appendix B.

B.5 – ProPG: Planning and Noise (2017)

ProPG Planning and Noise published May 2017 by the Association of Noise Consultants (ANC) was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. ProPG aims to encourage better acoustic design of new residential developments promoting good health and wellbeing through the effective management of noise. It therefore outlines four key elements which should be considered in the assessment of noise:

- Element 1 – demonstrating a “Good Acoustic Design Process”.
- Element 2 – observing internal “Noise Level Guidelines”.
- Element 3 – undertaking an “External Amenity Area Noise Assessment”.
- Element 4 – consideration of “Other Relevant Issues”.

The ProPG supplementary document 2 provides the following ‘Good Acoustic Design’ hierarchy of noise management measures which LPAs should encourage. These are shown below, In descending order of preference:

Order of Preference	Noise Management Measure
1	Reduction of the noise generated at source by redesign, relocation or containment. *
2	Maximising the spatial separation of noise source(s) and receptor(s).
3	Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.
4	Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.
5	Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.
6	Using the layout of the scheme to reduce noise propagation across the site.
7	Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms.
8	Using the building envelope to mitigate noise to acceptable levels.

Table 10 – Hierarchy of Noise Management Measures

**Not from ProPG*

B.6 – Approved Document F Volume 1: Dwellings (2021)

Approved Document F states the following in relation to noise:

- Mechanical ventilation systems, including both continuous and intermittent mechanical ventilation, should be designed and installed to minimise noise. This includes doing all of the following.

- Correctly sizing and jointing ducts.
- Ensuring that equipment is appropriately and securely fixed, such as using resilient mountings where noise carried by the structure of the building could be a problem.
- Selecting appropriate equipment, including following paragraph
- For mechanical ventilation systems, fan units should be appropriately sized so that fans operating in normal background ventilation mode are not overly noisy. This might require fans to be sized so that they do not operate near maximum capacity when in normal background ventilation mode.
- Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation.
- If an exposed façade is close to an area of sustained and loud noise (e.g. a main road), then a noise attenuating background ventilator should be fitted.

B.7 - Acoustics Ventilation and Overheating – Residential Design Guide 2020

It is suggested that the desirable internal noise criteria within BS8233:2014 should be achieved considering adequate ventilation as defined by Building Regulations 'Approved Document F' ('ADF') whole dwelling ventilation. However, for a whole dwelling ventilation system such as MVHR it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.

The 'Institute of Acoustics' ('IOA') and the 'Association of Noise Consultant's' ('ANC') have published 'The AVO Guide: 2020' document 2020. It provides guidance for those acousticians involved in the design of buildings to prevent noise ingress to and achieve reasonable internal levels. This provides valuable guidance on ventilation and overheating in support of the "Good Acoustic Design" principle advocated by ProPG. Along with guidance showing an acoustic assessment during the overheating condition, the AVO Guide (2020) provides a framework that has a two-level assessment procedure to estimate the potential impact on occupants:

Level 1 Risk Assessment

AVO 'Level 1' risk assessment criteria guide based on external free field ambient noise levels for dwellings relying on purge ventilation (e.g., opening windows) to prevent summertime overheating. AVO Guide Table 3-2 detailed in the figure below. To assess the possibility of overheating it is reasonable to relax the BS 8233:2014 internal ambient noise levels from opening a window by 5 decibels (5 dB). Also, it is assumed that a partially open window will provide a sound reduction of 13 dB. Therefore, to achieve internal noise levels in line with BS 8233:2014 the façade external noise levels should fall inside the levels shown in Table 3-2.

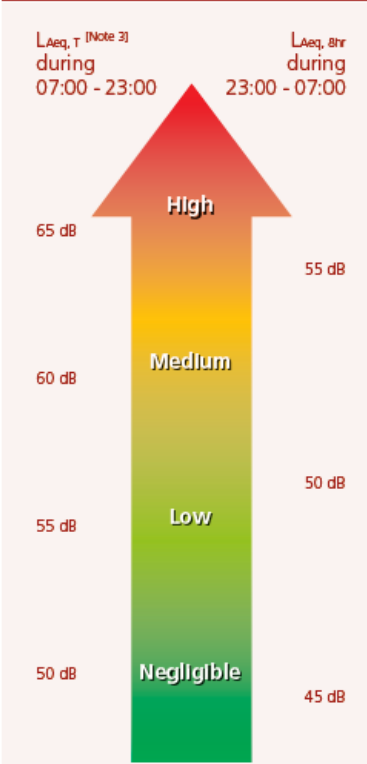
Risk category for Level 1 assessment ^[Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Table 3-2 of AVO Guide (2020)

Figure 6 – AVO Guide Level 1 Risk Category

The AVO Guide (2020) seeks to determine the level of risk associated with overheating in a new residential development based on the existing noise climate. The AVO risk categories are detailed in the table below with clearer categorisation.

AVO Guide (2020) Level 1 Risk Assessment			
Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)	Risk Category	Mitigation
≥ 63 dB $L_{Aeq,16hour}$	≥ 55 dB $L_{Aeq,8hour}$	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy.
57 – 62 dB $L_{Aeq,16hour}$	52 – 54 dB $L_{Aeq,8hour}$	Medium Risk	Level 2 assessment optional to give more confidence regarding the suitability of internal noise conditions.
54 – 56 dB $L_{Aeq,16hour}$	49 – 51 dB $L_{Aeq,8hour}$	Low Risk	
≤ 53 dB $L_{Aeq,16hour}$	≤ 48 dB $L_{Aeq,8hour}$	Negligible Risk	None required – openable windows suitable for ventilation

Table 11 – AVO Guide (2020) Level 1 Risk Assessment

Level 2 Risk Assessment:

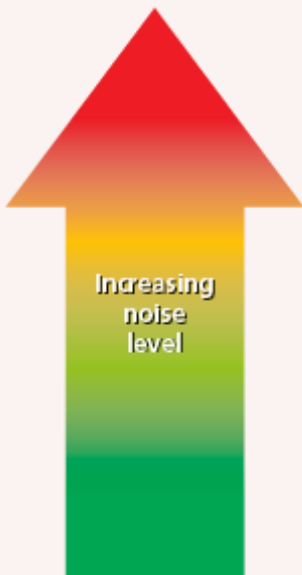
A 'Level 2' assessment of noise is recommended where a dwelling using purge ventilation (e.g., open windows) reaches Level 1 'High Risk' or 'Medium Risk'. The Level 2 assessment guidance comments that where internal ambient noise levels are >50 dB $L_{Aeq,16hr}$ (day) or >42 dB $L_{Aeq,8hr}$ (night) then the outcome might be that the noise causes a material change in behaviour, e.g., having to keep windows closed for the majority of the time, or there is the potential for sleep disturbance.

To conduct a Level 2 assessment, the following minimum information is required:

- Statement of the overheating criteria being applied.
- Description of the provisions for meeting the stated overheating criteria. This should include, where relevant, the area of façade opening.
- Details of the likely internal ambient noise levels whilst using provisions for mitigating overheating, and the method used to predict these.
- Estimation of how frequently and for what duration such provisions are required to mitigate overheating.
- Consideration of the effect of individual noise events.

- Assessment of the adverse effect on occupants.

The figure below outlines the AVO Guide (2020) guidance for a Level 2 assessment of noise from transport sources relating to the Overheating Condition.

Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A,Fmax}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 5]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A,Fmax}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 5] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

Table 3-3 of AVO Guide (2020)

Figure 7 – AVO Guide Level 2 Internal Ambient Noise Levels

Appendix C – Location Plans



Appendix D – Environmental Survey

D.1 – Time History Noise Data

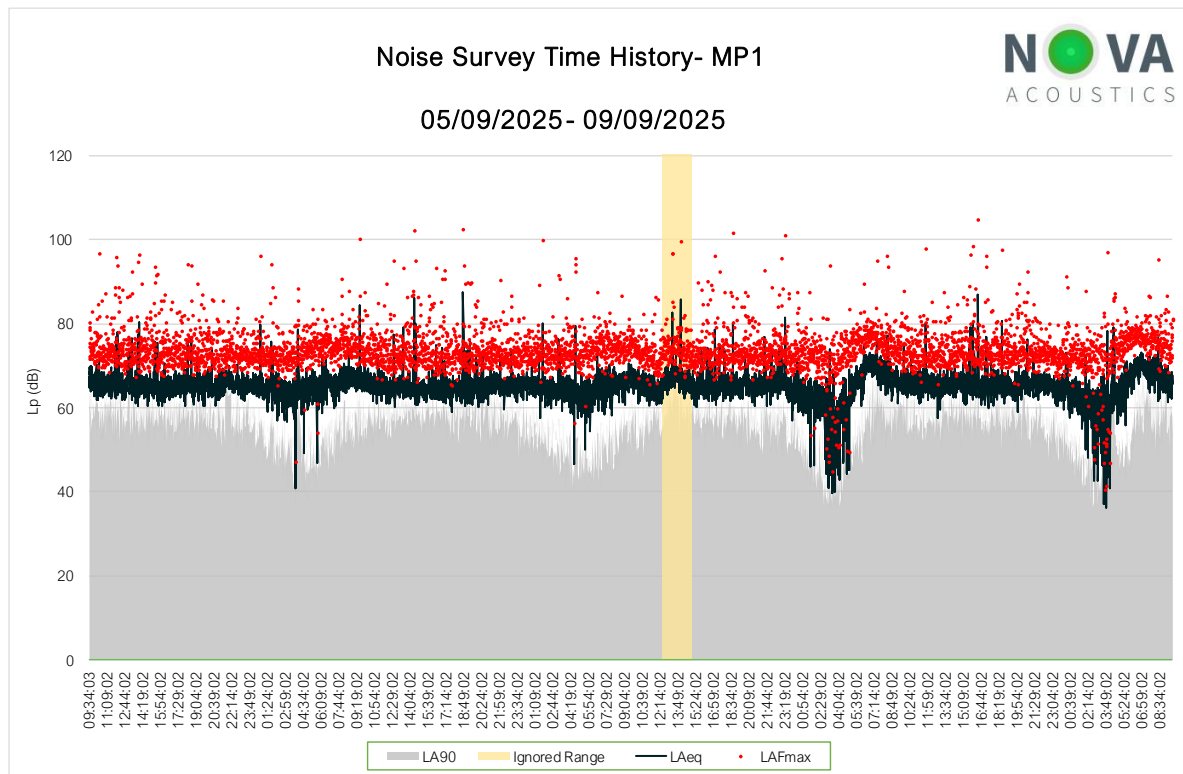


Figure 8 – MP1 Noise Survey Time History

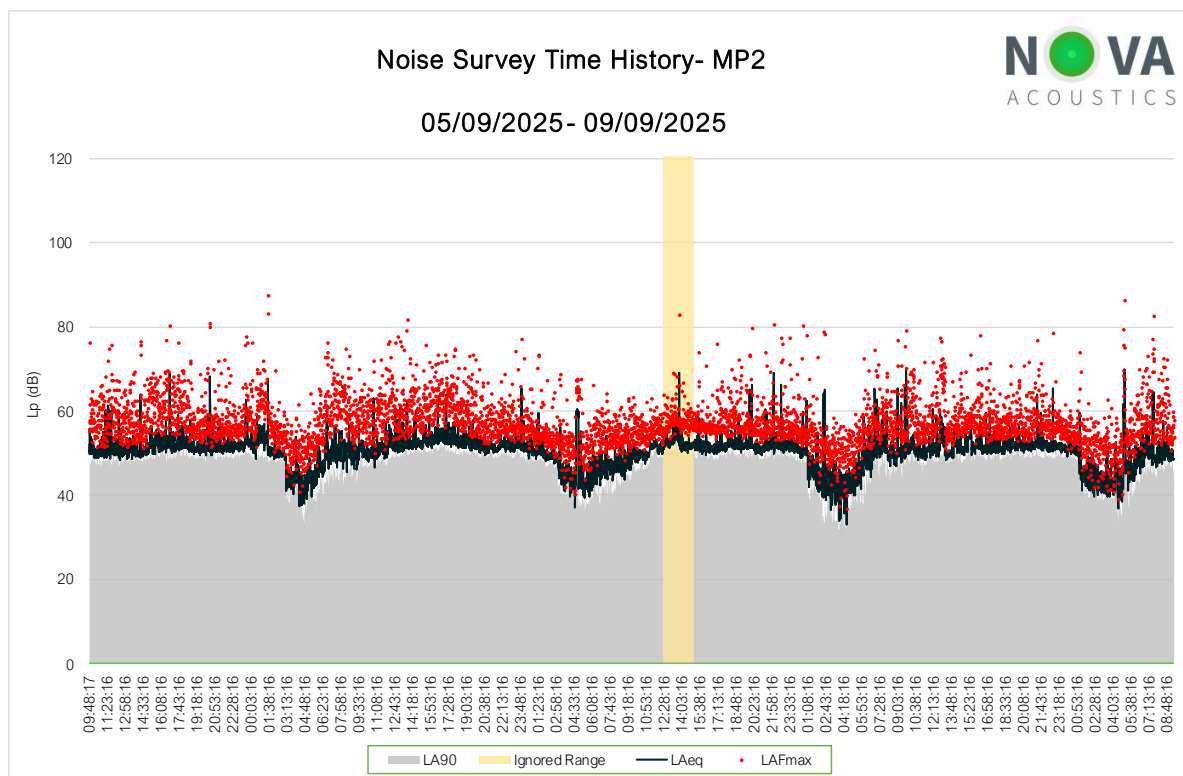


Figure 9 – MP2 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV971A Class 1 Sound Level Meter	141414	≤0.1
Cesva CB006 Class 1 Calibrator	901927	
Svantek SV971A Class 1 Sound Level Meter	143583	≤0.1
Cesva CB006 Class 1 Calibrator	901927	
Svantek 977C Class 1 Sound Level Meter	97493	≤0.1
Cesva CB006 Class 1 Calibrator	901927	

Table 12 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.1 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Highfield Park, Heaton Mersey (Approx. 5.2km SE of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
05/09/25: 00:00 – 23:59	10.8 – 20.7	0.0 – 0.3	SW	0.0 – 2.6
06/09/25: 00:00 – 23:59	12.4 – 21.8	0.0	SW	0.0 – 2.6
07/09/25: 00:00 – 23:59	14.0 – 20.8	0.0 – 3.1	SW	0.0 – 2.8
08/09/25: 00:00 – 23:59	10.9 – 20.0	0.0	SW	0.0 – 3.3
09/09/25: 00:00 – 23:59	9.8 – 22.1	0.0 – 0.5	SW	0.0 – 2.8

Table 13 – Weather Conditions

Appendix E – Noise Break-in Calculations

The façade sound reduction and predicted internal noise levels are calculated assuming the following:

- The calculation method for façade sound reduction is in accordance with BS8233:2014 and BS EN 12354-3.
- The reverberation time is typically 0.5 seconds across the relevant frequency range for a furnished living room in the UK. This value is used for both living rooms and bedrooms.
- Based on the technical drawings provided to NOVA Acoustics, Window areas of and room volumes for bedrooms and for living rooms used within the calculations have been taken from the technical drawings provided to Nova Acoustics.
- The acoustic performance of the façade elements are taken from the relevant manufacturers technical information or the sound reduction has been predicted using INSUL 9.0.
- For background trickle ventilation a total Equivalent Area of 5000mm² per habitable room has been used in the calculations, which equates to 2no. trickle vents (2500mm² each).

Front Façade

Living Room Front Façade Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	67	70	63	62	62	64	60	53	0
Glazing Noise Ingress	22	40	30	26	15	14	5	-10	-63
Ventilation Noise Ingress	27	41	24	24	27	19	19	9	-44
Wall Noise Ingress	8	26	14	11	1	2	-2	-9	-62
Roof Noise Ingress									
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4	-6
Total Noise Ingress	29	45	33	29	28	21	19	8	-46
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-6	-14	-15	-10	-5	-9	-7	-16	-68

Bedroom Front Façade Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	67	70	63	62	62	64	60	53	0
Glazing Noise Ingress	23	41	31	27	16	15	6	-9	-62
Ventilation Noise Ingress	28	42	25	25	28	20	20	10	-43
Wall Noise Ingress	8	26	14	11	1	2	-2	-9	-62
Roof Noise Ingress									
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4	-6
Total Noise Ingress	29	46	33	30	28	21	20	9	-46
NR30	35	59	48	39	33	30	26	24	22
Exceedance of Criteria	-6	-13	-15	-9	-5	-9	-6	-15	-68

Bedroom Front Façade Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	66	66	59	59	60	63	58	50	0
Glazing Noise Ingress	20	37	27	24	14	14	4	-12	-62
Ventilation Noise Ingress	26	38	21	22	26	19	18	7	-43
Wall Noise Ingress	5	22	10	8	-1	1	-4	-12	-62
Roof Noise Ingress									
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4	-6
Total Noise Ingress	27	42	29	27	26	20	18	6	-46
NR25	30	55	43	35	28	25	21	19	17
Exceedance of Criteria	-3	-13	-14	-8	-2	-5	-3	-13	-63

Bedroom Front Façade Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Lmax	84	81	79	76	77	82	76	66	60
Glazing Noise Ingress	38	52	47	41	31	33	22	4	-2
Ventilation Noise Ingress	43	53	41	39	43	38	36	23	17
Wall Noise Ingress	23	37	30	25	16	20	14	4	-2
Roof Noise Ingress									
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4	-6
Total Noise Ingress	45	57	49	44	43	39	36	22	14
NR40	45	67	56	49	43	40	37	34	33
Exceedance of Criteria	0	-10	-7	-5	0	-1	-1	-12	-19

Rear Facade

Bedroom Apartment 03 Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	67	58	70	66	63	61	61	43	41
Glazing Noise Ingress	23	26	35	28	14	9	4	-22	-24
Ventilation Noise Ingress	16	28	24	21	13	6	-4	-24	-26
Wall Noise Ingress	11	15	22	16	3	0	0	-18	-20
Roof Noise Ingress									
Room Absorption Correction		3	3	3	2	2	2	1	-1
Total Noise Ingress	30	37	42	35	22	17	11	-12	-16
NR25	30	55	43	35	28	25	21	19	17
Exceedance of Criteria	0	-18	-1	0	-6	-8	-10	-31	-33

Bedroom Apartment 02 Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	67	58	70	66	63	61	61	43	41
Glazing Noise Ingress	23	26	35	28	14	9	4	-22	-24
Ventilation Noise Ingress	19	31	27	24	16	9	-1	-21	-23
Wall Noise Ingress	11	15	22	16	3	0	0	-18	-20
Roof Noise Ingress									
Room Absorption Correction		1	0	0	0	0	-1	-2	-4
Total Noise Ingress	27	36	39	32	21	15	8	-14	-18
NR25	30	55	43	35	28	25	21	19	17
Exceedance of Criteria	-3	-19	-4	-3	-7	-10	-13	-33	-35

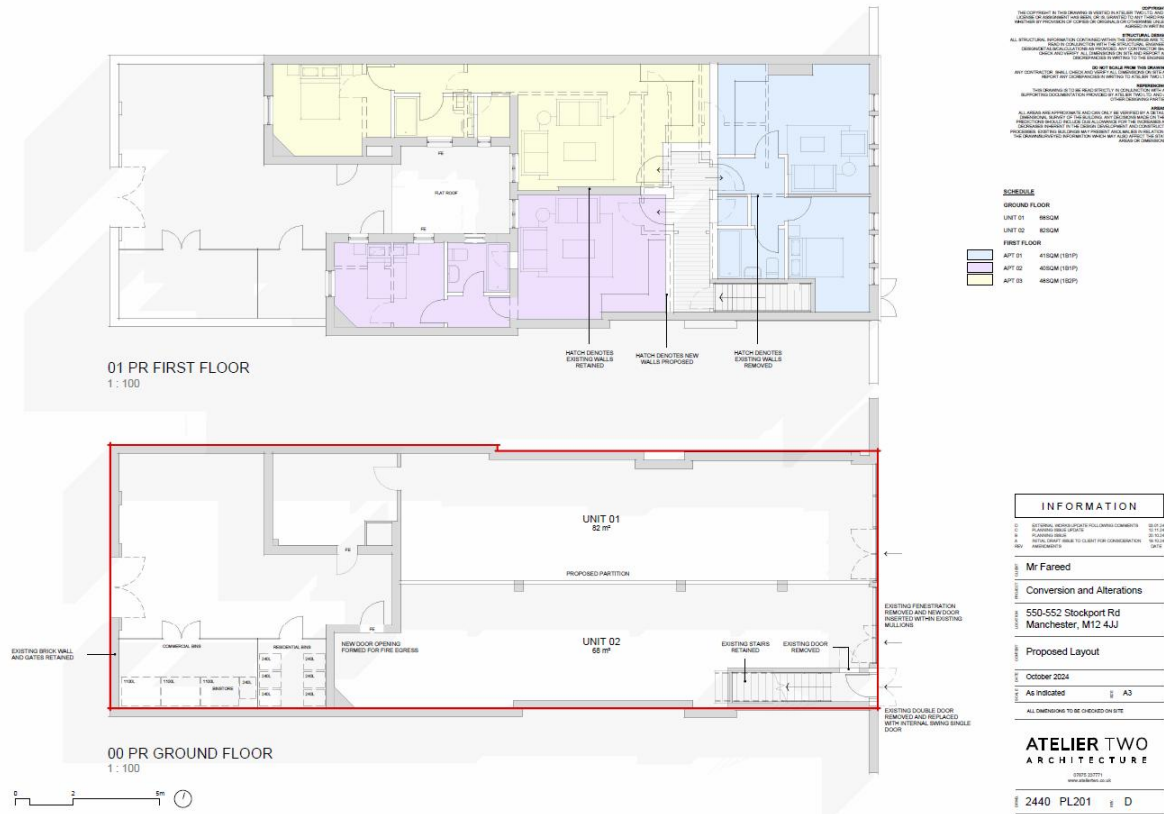
Bedroom Apartment 02 Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Leq,T	51	55	46	43	45	44	42	45	42
Glazing Noise Ingress	2	23	11	5	-4	-8	-15	-20	-23
Ventilation Noise Ingress	4	28	3	1	-2	-8	-20	-19	-22
Wall Noise Ingress	-8	12	-2	-7	-15	-17	-19	-16	-19
Roof Noise Ingress									
Room Absorption Correction		1	0	0	0	0	-1	-2	-4
Total Noise Ingress	9	33	15	9	3	-2	-11	-12	-17
NR20	25	51	39	30	23	20	16	14	12
Exceedance of Criteria	-16	-18	-24	-21	-20	-22	-27	-26	-29

Bedroom Apartment 02 Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Measured Lmax	72	71	68	70	72	68	61	53	46
Glazing Noise Ingress	26	39	33	32	23	16	4	-12	-19
Ventilation Noise Ingress	26	44	25	28	25	16	-1	-11	-18
Wall Noise Ingress	15	28	20	20	12	7	0	-8	-15
Roof Noise Ingress									
Room Absorption Correction		1	0	0	0	0	-1	-2	-4
Total Noise Ingress	32	49	37	36	30	22	8	-4	-13
NR40	45	67	56	49	43	40	37	34	33
Exceedance of Criteria	-13	-18	-19	-13	-13	-18	-29	-38	-46

Appendix F – Proposed Floor Plans





NOVA
ACOUSTICS