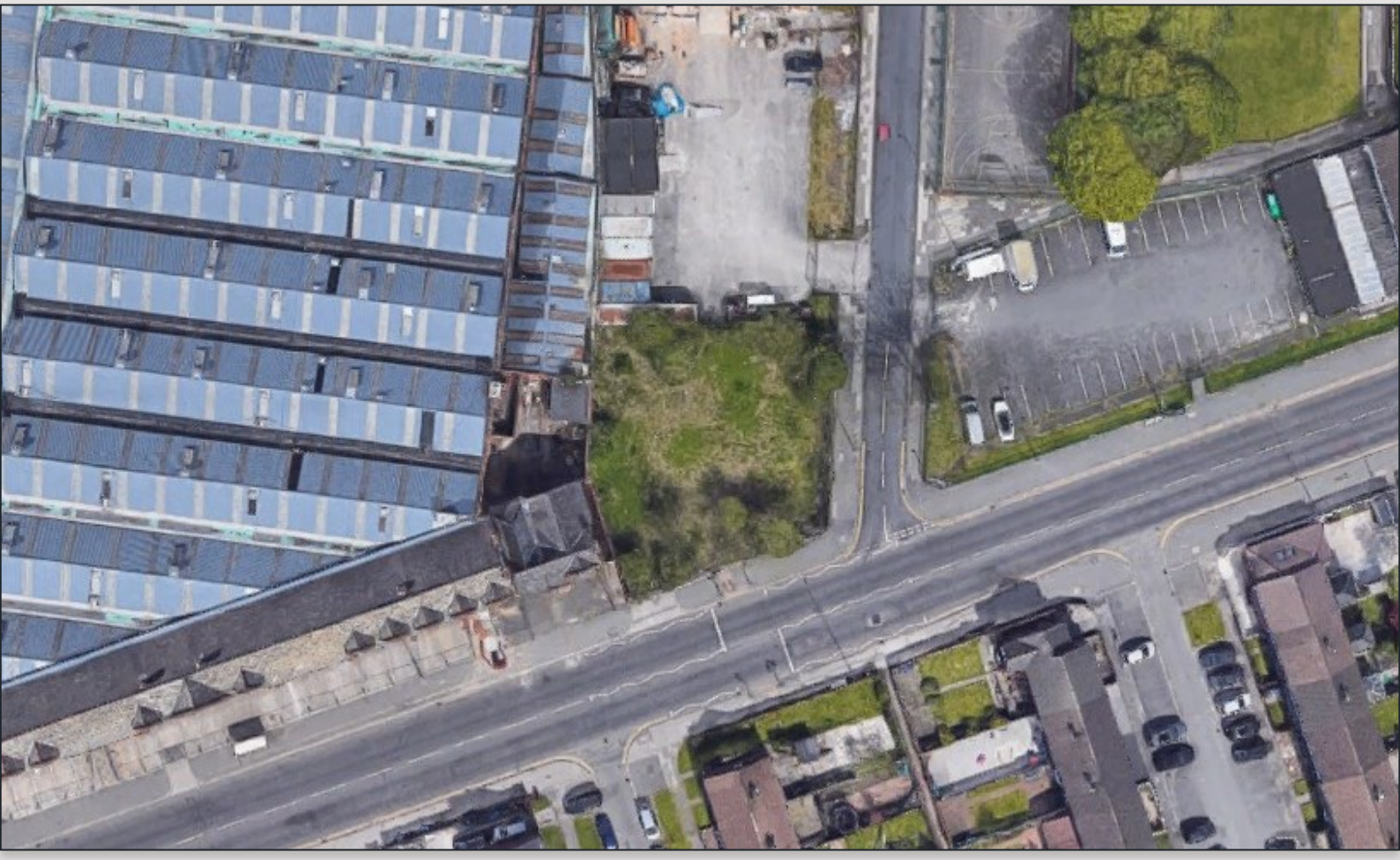
PENINSULAR
ACOUSTICS

Saghir Hussain

NOISE IMPACT ASSESSMENT

101 Queens Road, Cheetham Hill



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REPORT LIMITATIONS

1. INTRODUCTION

Peninsular Acoustics has been appointed by Createit Studios to undertake an assessment of the noise impact affecting 101 Queens Road, Manchester (“The Site”).

This report presents the results of an environmental noise survey, an evaluation of the noise risk in respect of exposure for the proposed residential use and summarises the potential measures that may be required to enable a good acoustic design.

For details of acoustic terminology used throughout this report, please refer to Appendix A.

1.1. SITE DESCRIPTION

The site is located at 101 Queens Road, Manchester, M8 8UT, at approximate National Grid Reference SD 84757 00540. Reference should be made to Figure 1 for a map of the site location. The site lies within the jurisdiction of Manchester City Council.



Figure 1 Site Location Plan

From an overview of satellite imagery, nearby noise sources with the potential to affect the proposed development site include Queens Rd (A6010).

The proposed site at Queens Rd comprises 13 new build residential apartments. The apartments are within a three-storey block and are to comprise a mixture of 1 bed and 2 bed units. The proposed site plans and elevations are in Appendix B.

1.2. SCOPE OF WORK

The following scope of work has been undertaken:

- Establish baseline environmental noise levels, comprising:
  - Undertaking of an environmental noise survey to ascertain existing prevailing ambient noise levels across the site; and
  - Modelling of existing prevailing noise sources affecting the site.
- Undertake a noise risk assessment of the site, the steps of which are to comprise:
  - **ProPG Stage 1**: Establish the site noise exposure from road and other noise sources and compare against the initial noise risk categories within the ANC / IOA / CIEH document Professional Practice Guidance: Planning & Noise (May 2017), and any other relevant guidance documents.
  - **ProPG Stage 2**: Complete and Acoustic Design Statement, comprising:
    - **Element #1**: A Good Acoustic Design Process
    - **Element #2**: Internal Noise Levels
    - **Element #3**: External Amenity Areas
    - **Element #4**: Other Relevant Issues

2. PLANNING POLICY AND GUIDANCE

2.1. NATIONAL POLICY AND GUIDANCE

Relevant national planning policy and guidance documents comprise:

- National Planning Policy Framework (2021)
- Noise Policy Statement for England (2010)
- Planning Practice Guidance
- ProPG: Planning & Noise (2017)
- British Standard 8233:2014

A summary of each of the above documents is provided in Appendix B.

2.2. LOCAL POLICY

Section 3.7 of the *Manchester City Council, Planning and Noise Technical Guidance, 2022* states that:

3.7 MCC assessment criteria

> *In the context of government policy, the Council require that developments aim for:*
>
> *1. A noise level between the No Observed Effect Level (this is the level of noise exposure below which no effect at all on health or quality of life can be detected) and the Lowest Observed Adverse Effect Level (this is the level of noise exposure above which adverse effects on health and quality of life can be detected). Conditions may be attached.*
>
> *If point 1 cannot be achieved, then:*
>
> *2. If the assessment results in a level between the Lowest Observed Adverse Effect Level and the Significant Observed Adverse Effect Level (this is the level of noise exposure above which significant adverse effects on health and quality of life occur), mitigation will be necessary to reduce the level and thus conditions will be attached.*
>
> *If points 1 & 2 cannot be achieved, then:*
>
> *3. If the assessment results in a Significant Observed Adverse Effect Level after mitigation, the application will be recommended for refusal.*

3.7.1 MCC guidance

> *The NPPF, NSPE and NPPG do not present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations in a planning context.*
>
> *One of the aims of this document, therefore, is to address this ambiguity and provide a suite of noise level design targets for typical developments (which are in accordance with current policies and standards).*
>
> *Where certain developments are not specifically covered, the applicant/consultant is encouraged to contact us with a view of discussing the best that can be achieved for the*

given situation (in the context of the scenarios listed in section 3.6).

3.7.1.1 Residential Developments

The Council has adopted the following noise limits for residential properties:

- *Bedrooms (nighttime - 23.00 - 07.00) 30 dB LAeq (individual noise events should not normally exceed 45 dB LAmax,F by more than 10 times)*
- *Living Rooms (daytime - 07.00 - 23.00) 35 dB LAeq*
- *Gardens and terraces (daytime) 55 dB LAeq*

These criteria have been adopted for the following reasons:

- *BS 8233: 2014 recognises these levels as a good standard for resting/sleeping conditions.*
- *The WHO document 'Guidelines for Community Noise' recommends an internal LAeq of 30dB for optimal sleep conditions (and no more than 35dB for internal rooms during daytime).*
- *The performance of acoustic insulation schemes can often be below that specified, according to the quality of installation, materials, noise spectrum and deterioration / wear and tear of building elements. A high design specification introduces a 'safety margin' should building elements not perform as well as expected ('on-site' performance).*
- *Performance specification for glazing does not usually take into account the detrimental effect of vents on the sound insulation. Even 'acoustic' vents will reduce the performance of the facade insulation, as they will inherently contain a free open area for air exchange.*
- *There is a general increase in urban noise levels, which can in the future be reasonably accommodated by these standards.*
- *The standards support the Local Authority corporate objective to prevent ill-health and improve local peoples' health and well being.*

3. NOISE SURVEY

3.1. METHODOLOGY

An unattended environmental noise survey of the current prevailing ambient noise levels was undertaken at one location on the Site between Friday 16 and Monday 19 June 2023 as shown in Figure 2.

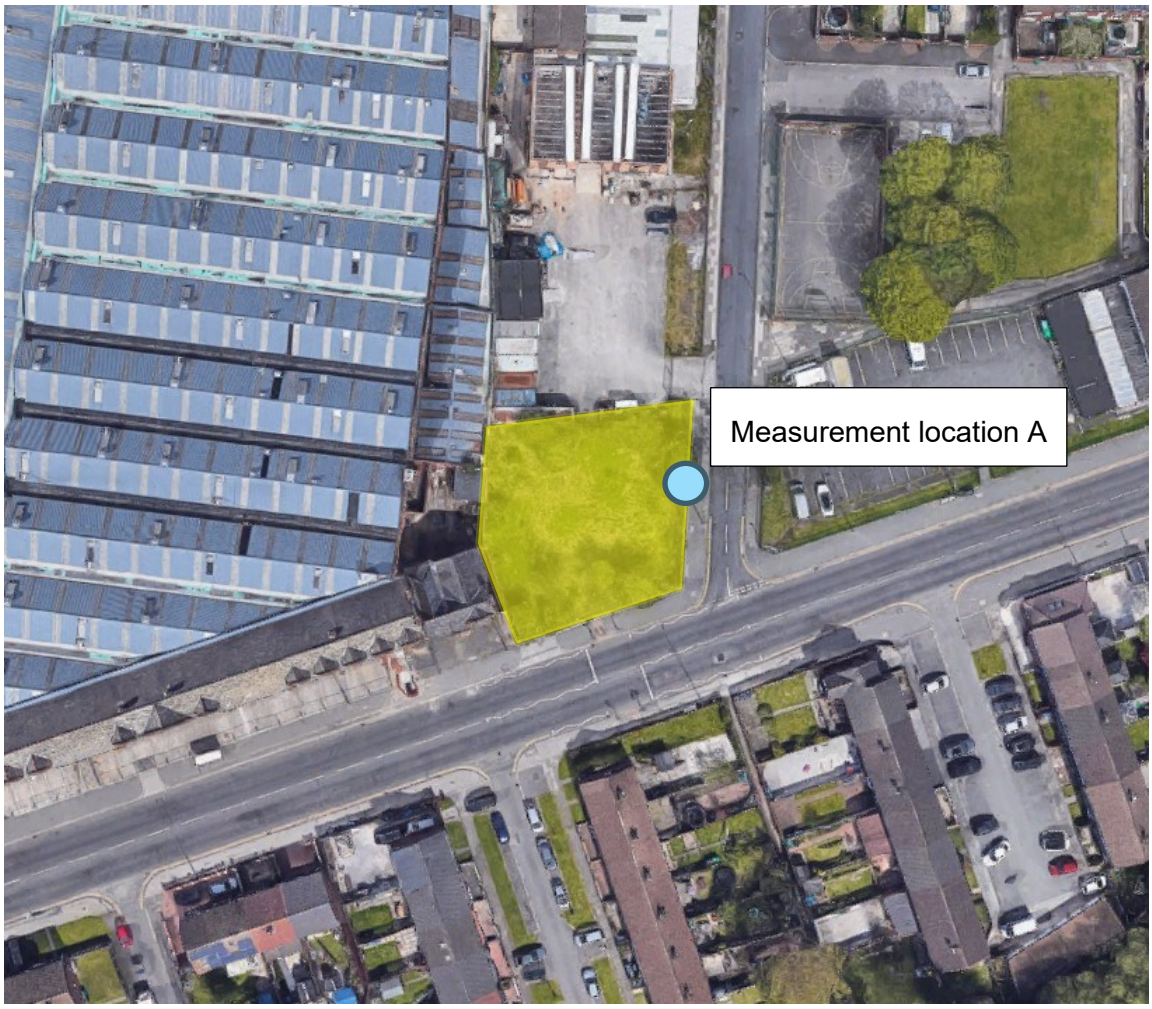


Figure 2 Site boundary and measurement location

To establish the prevailing daytime and night-time noise levels across the site, measurements of consecutive 2-minute L_{Aeq}, L_{A90} and L_{AFmax} sound pressure levels were taken at a height of 3m above local ground level, at location A shown in Figure 2.

3.2. EQUIPMENT

Noise levels were monitored using Class 1 integrating/averaging Sound Level Meters (SLMs), with the location A measurement equipment housed in environmental protection apparatus. The SLM was field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration levels recorded (> ± 0.5dB).

Full details of the noise measurement equipment used in the survey are provided in Table 1.

Position	Equipment Item	Make / Model	Serial Number
A	Sound Level Meter	Norsonic 118	31512
	Pre-amplifier	Norsonic 1201	15457
	Microphone	GRAS 40AF	51464
	Calibrator	Norsonic 1255	125525651

Table 1 Noise survey equipment

3.3. WEATHER CONDITIONS

Weather conditions during the survey were observed to be:

Day	Temperature range	Precipitation	Average wind speeds at 10m height
Friday 16 June 2023	18-25°C	0mm	4-7mph
Saturday 17 June 2023	15-19°C	0mm	4-9mph
Sunday 18 June 2023	13-22°C	**0-16.8mm**	4-11mph
Monday 19 June 2023	14-20°C	0-0.8mm	4-11mph
Source : BBC Weather			

Table 2: Weather During Survey

Weather conditions on Sunday 18 June 2023 were not suitable for the measurements of environmental noise and, therefore, data captured on this day has been excluded accordingly.

3.4. RESULTS

A summary of the full noise survey measurements taken at measurement position A on the side of Appleford drive is provided in Table 2. Due to poor weather conditions, the following times were taken to representative of the Daytime LAeq,16hr and Night-time LAeq,8hr:

Daytime: Friday (16/06/2023) 12:00pm-23:00pm, Monday (19/06/2023) 07:00am-12:00pm

Night-time: Friday (16/16/2023) 23:00pm-01:00am, Monday (19/06/2023) 01:00am-07:00am

Period	$L_{Aeq,T}$	2nd Highest $L_{AFmax,2m}$
Daytime, 07:00 to 23:00	66 dB	n/a
Night-time, 23:00 to 07:00	63 dB	82 dB

Table 3: Daytime and Night-time Sound pressure levels at measurement position A

To estimate the exposure on the Queen's Road façade and the façade to the rear of the development, the following $L_{Aeq,T}$ measurements were distance propagated assuming line source attenuation. No adjustment was made to the $L_{AFmax,2m}$ readings given the level was likely to be attributed to a passing vehicle, much like would occur on Queen's Road. It has been assumed that the sound pressure levels towards the rear of the building would be at least 10 dB lower accounting for screening by the building. A summary of the estimated prevailing noise levels on the Queen's Road façade and the rear façade of the building are provided in Table 4.

Period	Front facade		Rear facade	
	$L_{Aeq,T}$	2nd Highest $L_{AFmax,2m}$	$L_{Aeq,T}$	2nd Highest $L_{AFmax,2m}$
Daytime, 07:00 to 23:00	69 dB	n/a	59 dB	n/a
Night-time, 23:00 to 07:00	66 dB	82 dB	56 dB	71 dB

Table 4: Daytime and Night-time Sound pressure levels at the front façade and rear façade

The octave band measurement data has also been adjusted to represent conditions at the front façade and this is given in Table 5.

Parameter	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	dBA
$L_{eq,16h}$	65	64	61	65	64	60	69
$L_{eq,8h}$	59	58	57	61	60	57	66
2nd Highest $L_{AFmax,2m}$	74	75	71	74	77	76	82

Table 5: Octave band noise levels on Queen's Road facade

4. PROPG STAGE 1: INITIAL SITE NOISE RISK ASSESSMENT

4.1. SITE CLASSIFICATION

The highest noise levels from Table 3 and Table 4 have been used as the basis of the noise levels to be used in the noise assessment. Table 6 also shows the corresponding level of noise risk from the ProPG and its relationship to LOAEL and SOAEL.

For the purposes of the assessment, the LOAEL and SOAEL is based on the defined standard by Highways England for road traffic noise exposure.

	Daytime $L_{Aeq,16h}$	Night-time $L_{Aeq,8h}$
Result	69 dB	66 dB
ProPG Noise Risk	High	High
Effect Level	SOAEL	SOAEL
Action	*High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.*	

Table 6: Initial Site Noise Risk Assessment

5. PROPG STAGE 2: ACOUSTIC DESIGN STATEMENT

The Stage 1 Initial Site Risk Assessment has identified that the noise risk is “High”.

5.1. ELEMENT #1: GOOD ACOUSTIC DESIGN PROCESS

Following a good acoustic design process is an implicit part of Government planning and noise policy and it is imperative that acoustic design is considered at an early stage of the development control process.

The ProPG requires the consideration of acoustic design and requires considerations such as checking the feasibility of relocating, or reducing noise levels from, relevant sources; considering options for planning the site or building layout; considering the options for screening buildings or sources; and considering the orientation of proposed buildings. These considerations will then inform how best to deal with excessive noise by either:

- Quietening or removing the source of noise;
- Attenuating the sound on its path to the receiver;
- Obstructing the sound path between the source and receiver; or
- Improving the sound insulation of the building envelope.

The orientation and layout of the proposed development has been deliberately set back from Queens Road which will reduce direct noise exposure. 60% of the Upper floor apartments have at least one room on a quieter façade i.e, towards the north, north-east and north-west facades. Moreover, most apartments have a predominantly north or east facing façade aspect which reduces the risk of overheating hence minimising the need for extensive mechanical systems, which otherwise have the potential to cause internal noise issues.

5.2. ELEMENT #2: INTERNAL NOISE LEVELS

5.2.1. INTRODUCTION

The Initial Site Risk Assessment and acoustic design process indicates that the sound insulation of the building envelope requires improvement and noise would need to be taken into account in the design of the building in order to meet the internal noise criteria contained within BS 8233 and the ProPG, and to comply with the guidance contained within the NPPF.

The appropriate design noise levels at this site are those identified in BS 8233:2014 and Figure 2 of ProPG. Using the equation in Annex G of BS 8233, it is possible to calculate the internal noise levels based on typical construction details and proposed room dimensions.

5.2.2. VENTILATION STRATEGY

Based on the measured free field external noise levels and as indicated in Table B-3 of the *Acoustics, Ventilation and Overheating: Residential Design Guide*, the only practical ventilation strategy is one delivered by a Mechanical Ventilation Heat Recovery System with high performance acoustic glazing.

With appropriate acoustic specifications, it should be possible to achieve the desired internal noise levels using this ventilation strategy based on the measured external noise levels.

5.2.3. OPEN WINDOWS

Where an occupant chooses to open a window for the purposes of greater connection with the external environment, typically windows are only partially opened (e.g. ajar). Under this situation, the outside to inside level difference may be limited to circa. 10 to 15 dB.

Where the external noise level is greater than $L_{Aeq,16h}$ 45 to 50 dB during the daytime or $L_{Aeq,8h}$ 40 to 45 dB / 10th highest L_{AFmax} 55 dB during the night-time (all façades), occupants may choose to close windows to achieve acceptable internal conditions any time of the year.

This will be the case for all the facades of the proposed building.

The desire to open or close a window has no bearing on the ventilation strategy, which is to be defined based on the standard systems set out in Approved Document F. The internal noise levels of BS 8233:2014 and ProPG are to be determined during the provision of year-round ventilation according to Building Regulations.

5.2.4. FAÇADE SOUND INSULATION

The level of façade sound insulation is to be deigned to uphold adequate ventilation as required by Approved Document F. The octave band noise levels measured and then distance propagated from Measurement position A have been used as the basis of the noise break-in calculations. A standard façade construction throughout the development is to comprise the following elements:

- a traditional cavity masonry external wall of R_w 51 dB
- a concrete tiled pitched roof with 9 mm plasterboard coil and 2no.50mm fiberglass of R_w 42 dB
- thermally specified double glazing of configuration 4mm glass / 12mm air space / 4mm glass of R_w 30 dB

Table 7 sets out the sound insulation provision and upper noise limit when using this standard construction, and the details of increased sound insulation performance using where required.

Ref.	Upgrade on Standard Construction	Outside to Inside Level Difference	External Upper Noise Limit
Type A	None	30 dB ($L_{Aeq,T}$ and L_{AFmax})	Daytime $L_{Aeq,16h}$: 65 dB Night-time $L_{Aeq,8h}$: 60 dB Night-time L_{AFmax}: 75 dB
Type B	Improved double glazing of 6mm glass / 27mm air space / 10mm glass of Rw 41 dB	36 dB ($L_{Aeq,T}$) 37 dB (L_{AFmax})	Daytime $L_{Aeq,16h}$: 71 dB Night-time $L_{Aeq,8h}$: 66 dB Night-time L_{AFmax}: 82 dB

Table 7: Façade Acoustic Performance Summary

Example calculations are provided in Appendix E.

The location where these performance requirements apply is shown in Appendix F.

5.3. ELEMENT #3: EXTERNAL AMENITY AREAS

There are no communal areas on site surrounding the building to provide common external amenity. However there are the following public parks nearby at a walking distance from the site which noise levels not exceeding the 50-55 dB $L_{Aeq16hr}$ limit as shown in Figure 3:

- Smedley Lane Playing Fields- 9 minutes walking distance
- Bignor Street Park- 10 minutes walking distance
- Queens Park-12 minutes walking distance



Figure 3 External amenity areas

5.4. ELEMENT #4: OTHER RELEVANT ISSUES

ProPG suggests other relevant issues could comprise:

Compliance with relevant national and local policy

Magnitude and extent of compliance with ProPG

Likely occupants of the development

Acoustic design vs. unintended adverse consequences

Acoustic design vs. wider planning objectives

Good acoustic design principles which have been followed mean that proposed development complies with ProPG.

The proposed façade sound insulation performances mean that internal noise levels when windows are closed will be in line with ProPG internal noise criteria.

The development design also satisfies national and local policy, including policy 3.7.1.1.

There are no unintended adverse consequences nor is there a need to consider wider planning objectives.

6. CONCLUSIONS

Createit Studios are proposing a site at 101 Queens Road, Manchester, M8 8UT, comprising 13 no. apartments. The apartments are within a three-storey block and are to comprise a mixture of 1 bed and 2 bed units.

Peninsular Acoustics has undertaken a noise assessment for the proposed development based on national and local policy and the requirements set out in ProPG. A long-term unattended noise survey was undertaken at the site. The results have demonstrated via the Initial Noise Risk Assessment that the site is *High* risk to noise, suggesting adverse impacts are required to be reduced via an Acoustic Design Statement.

An Acoustic Design Statement in accordance with ProPG has been provided, with the following key considerations:

Acoustic Design Statement	
Element #1: Good Acoustic Design Process	The orientation and layout of the proposed development has been designed with noise and overheating in mind, in combination with several other considerations as required by planning.
Element #2: Internal Noise Levels	The proposed standard façade construction (Type A) should provide acceptable internal noise levels. An MVHR system would be required to provide adequate ventilation for all dwellings. For façades exposed to a greater level of noise, enhanced façade sound insulation is to be provided via the use of improved glazing. Provided suitable products are procured, the internal noise levels recommended in BS 8233:2014 , ProPG and the MCC guidance should be achieved.
Element #3: External Amenity	There are external communal parks at walking distance to the the building to provide common external amenity. Data show that these external areas will offer good amenity in relation to external noise.
Element #4: Other Relevant Issues	Beyond standard statutory compliance, there are no other relevant issues requiring specific attention.

The results of this study demonstrate that with the suggested mitigation, the site and development proposals are suitable for the intended use.

Limitations applicable to this report are contained in Appendix G

Appendix A

TECHNICAL TERMINOLOGY

Descriptor	Description
Absorption Class	A classification system applied to materials to describe the level of sound absorption they provide. Determined by comparing the practical sound absorption coefficient of the material with the values given in BS EN ISO 11654:1997.
Acoustic Louvre	Angled louvre screens that incorporate absorption material within the depth of each louvre blade to attenuate sound as air passes through it.
Acoustic Open Area	The measurable, cross-sectional, geometric area of an opening. For a partially open window, this is considered to be the lesser of either the size of the hole in the window frame that is left by the opening light, or the combined cross-sectional area around the opening light through which air must pass to move from outside to inside. The area around a hinged opening light includes the triangular areas on the sides adjacent to the hinge, and the rectangular area on the side opposite the hinge. This should not be used for comparing the air-flow performance of elements because this will also be dependent on factors such as depth (length of air-path), surface roughness and tortuosity.
C_{tr}	The spectrum adaptation term, calculated with the A-weighted urban traffic spectrum as defined in BS EN ISO 717-1:2013. Often added to other terms such as $D_{nT,w}$ and R_w to correct for weaknesses in low-frequency sound insulation performance.
$D_{n,c,w}$	A single-number rating of the laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it. A specific type of the $D_{n,f,w}$ defined below.
$D_{n,e,w}$	Sound insulation of small building elements, normalised to an equivalent absorption area of $10m^2$.
$D_{n,f,w}$	The weighted normalised flanking level difference. A single-number rating of the room-to-room airborne sound insulation of a flanking construction, such as curtain walling. The rating is determined in accordance with EN ISO 717-1 from measurements made in accordance with BS EN 10848-2:2006 over the third-octave band frequency range 100-3150 Hz.
$D_{nT,w}$	The weighted normalised sound level difference. A single-number rating of the room-to-room sound insulation of a separating construction as installed on site.
Façade Level	The sound pressure level measured close to a building façade that includes contribution from both the incident sound and the sound reflected from the façade. Normally taken to be 3dB higher than the equivalent free-field level, when located at 1 metre from a façade.
Free-Field Level	A measured sound pressure level that is independent of any contributions due to reflections from nearby surfaces and is therefore representative of the direct path only.
$L_{n,f,w}$	The weighted normalised flanking impact sound pressure level. A single-number rating of the room-to-room impact sound insulation of a flanking construction, such as curtain walling.
$L_{nT,w}$	The weighted normalised impact sound pressure level. A single number rating of the room-to-room impact sound insulation of a separating construction. As this is a sound pressure level, measured with a calibrated impact source, the lower then number the better the result.
Practical Sound Absorption Coefficient	Frequency dependent value of the sound absorption, based calculated in octave bands.
Resilient Layer	Mat laid under a floating floor construction to acoustically isolate the floating element from the structure below. This reduces the level of impact noise (e.g. footsteps or movement of furniture) being transmitted into the floor and to rooms below.

Robust Details	A set of standardised wall and floor types and junction details used in residential developments. The use of Robust Details avoids the need for pre-completion testing at handover.
R_w (Weighted Sound Reduction Index)	A single-figure quantity which characterises the airborne sound insulating properties of a material or element over a range of frequencies. Used to quantify the maximum sound insulation performance of a construction element when tested under laboratory conditions.
Sound Insulation	The capacity of a structure to prevent sound from reaching a receiving location. Sound energy is not necessarily absorbed; impedance mismatch, or reflection back toward the source, is often the principal mechanism.
Structure-Borne Noise	Vibration in the audible frequency range that is transmitted in a building's structure and has the potential to be re-radiated as airborne sound.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{AFmax,T}$	A noise level index defined as the maximum noise level during the period T. LMax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
$L_{Aeq,Tr}$	Specific noise level. The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level. The specific noise level plus any adjustments for characteristic features of the noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.

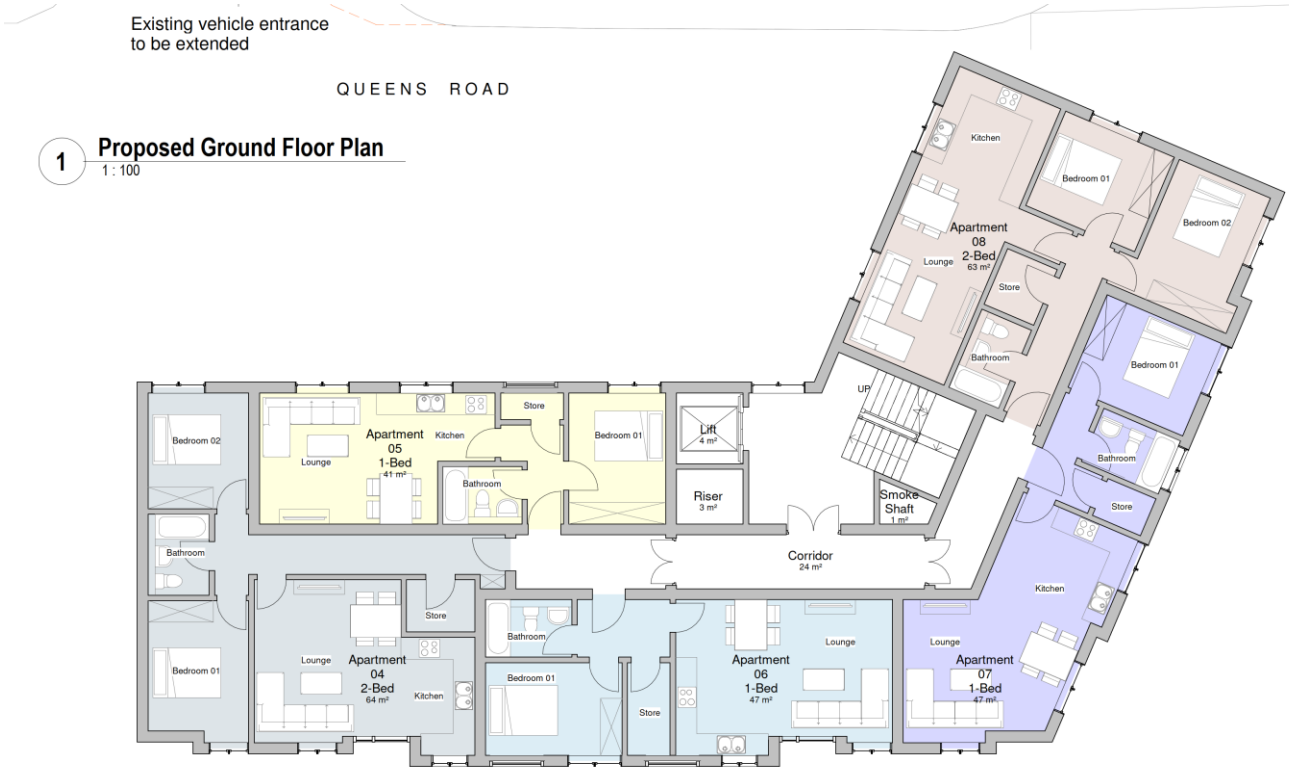
Facade	At a distance of 1m in front of a large sound reflecting object such as a building facade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit

Appendix B

SITE DRAWINGS



1 **Proposed Ground Floor Plan**
1 : 100



1 **Proposed Ground Floor Plan**
1 : 100

2 **Proposed First Floor Plan**
1 : 100



3 **Proposed Second Floor Plan**
1 : 100

All dimensions should be checked on site. Do not scale from this drawing

To be read in conjunction with all other Consultant's drawings.

The Architect to be immediately notified of any discrepancies.

Copyright on this drawing retained by the Architect.



2 **Proposed Front 3D View**



3 **Proposed Rear 3D View**

P2 21/04/23 AK

Appendix C

RELEVANT NATIONAL POLICY AND GUIDANCE

NATIONAL PLANNING POLICY FRAMEWORK (2021)

The original NPPF was published by central government in 2012 with revised versions published in July 2018 and again in July 2021. It replaces previous noise policy contained in Planning Policy Guidance Note 24. It does not replace the Noise Policy Statement for England 2010 to which it refers.

The NPPF is a concise document that provides its position on noise primarily in paragraphs 185 and 187 which are reproduced below:

185. 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[65];

    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.

Footnote 65: See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)'

187. 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.

NOISE POLICY STATEMENT FOR ENGLAND (2010)

This provides more detail than the NPPF setting out the long-term vision of the Government noise policy and applying to all forms of noise excluding occupational noise. The NPSE repeatedly refers to the management and control of noise within the context of Government Policy on sustainable development. The NPSE also stresses that noise impact should not be treated in isolation from other related factors. At paragraph 2.7 for example it states:

'…the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications.'

The NPSE introduces and describes three categories, or levels, describing the presence or absence of noise effects but does not quantify those categories, stating that the corresponding objective levels are likely to be different for different noise sources, receptors and times of the day or night. These categories are:

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.

The NPSE recognised that, at the time of publication, further research was needed into how these categories might be quantified for different scenarios. There is still no robust, universally accepted method of deriving suitable values and a variety of approaches are adopted in different circumstances. The subjective guidance provided in the Planning Practice Guidance (PPG) for noise can be of assistance in deriving suitable values and this guidance is described below.

The three aims of the NPSE are in alignment with the categories described above. These aims are:

1. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

3. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Although no absolute noise levels have been aligned with LOAEL and SOAEL, Highways England (in document LA 111) have adopted the following equivalent free-field values for road traffic noise:

LOAEL – Daytime $L_{Aeq,16h}$ 50 dB Night-time $L_{Aeq,8h}$ 40 dB

SOAEL – Daytime $L_{Aeq,16h}$ 63 dB Night-time $L_{Aeq,8h}$ 55 dB

PLANNING PRACTICE GUIDANCE

In March 2014 the Government launched the Planning Practice Guidance (PPG) web-based resource. The section on noise provides tabulated descriptions of example outcomes of the categories introduced in the NPSE based on the likely average response. It also adds a fourth category termed Unacceptable Adverse Effect (UAE). The tabulated descriptions are summarised in the below table.

Table 8: PPG Noise Guidance

Category	Example Outcome Description	Action
NOE – No Observed Effect		
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No specific measures required
LOAEL – Lowest Observed Adverse Effect Level		
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Mitigate and reduce to a minimum
SOAEL – Significant Observed Adverse Effect Level		
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is 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.	Avoid
UAE – Unacceptable Adverse Effect		
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological or physiological effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Prevent

The PPG recognises that there is not a simple relationship between measured or predicted noise levels and the resultant impact and that this will depend on how various factors combine. The factors thought to be most relevant in this assessment are:

- The source and absolute level of the noise together with the time of day it occurs.
- For non-continuous sources of noise, the number of noise events and the frequency and pattern of occurrence of the noise.
- The spectral content and general character of the noise i.e. tonal or with other particular features.
- The local topology and topography.
- The existing or, where appropriate, planned character of the area.

PROPG: PLANNING & NOISE (2017)

The ProPG was published by the Chartered Institute of Environmental Health (CIEH), the Institute of Acoustics (IoA) and the Association of Noise Consultants (ANC) in June 2017. This guidance is primarily aimed at the assessment of proposed residential development 'exposed predominantly to noise from existing transport sources'.

A two-stage approach is advocated:

- Stage 1: an initial noise risk assessment of the proposed development site
- Stage 2: Complete and Acoustic Design Statement, comprising:
  - Element #1: A Good Acoustic Design Process
  - Element #2: Internal Noise Levels
  - Element #3: External Amenity Areas
  - Element #4: Other Relevant Issues

This approach is underpinned by an Acoustic Design Statement (ADS), the level of detail of which should be commensurate with the risk assessment for the development site.

With reference to the night-time period, the ProPG suggests that sites where there are more than ten incidents of L_{Amax} levels greater than 60 dB should not be risk assessed as negligible.

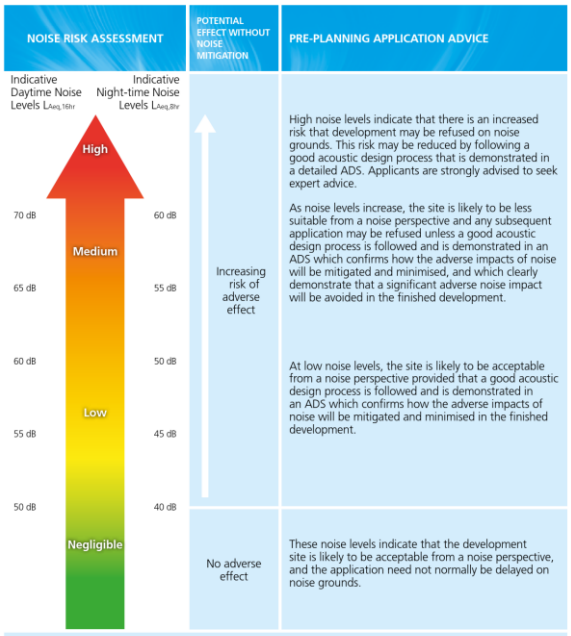


Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\,hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\,hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\,hr}$	30 dB $L_{Aeq,8\,hr}$ **45 dB $L_{Amax,F}$** (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table 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 internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. 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 (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form **(see Section 3.D)**.

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue)

BRITISH STANDARD 8233

BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings provides guidance for the control of noise in and around buildings’. The guidance provided within the document is applicable to the design of new buildings.

The guidance provided includes appropriate internal and external noise level criteria, which are applicable to dwellings exposed to steady external noise sources. It is stated that it is desirable for internal ambient noise levels not to exceed the criteria set out in Table 4 of the Standard, which are reproduced in the below table, although Note 7 to the table states that reasonable internal conditions can still be achieved with the tabulated values relaxed by up to 5 dB.

Table 9: BS 8233:2014 Internal Noise Level Guidelines

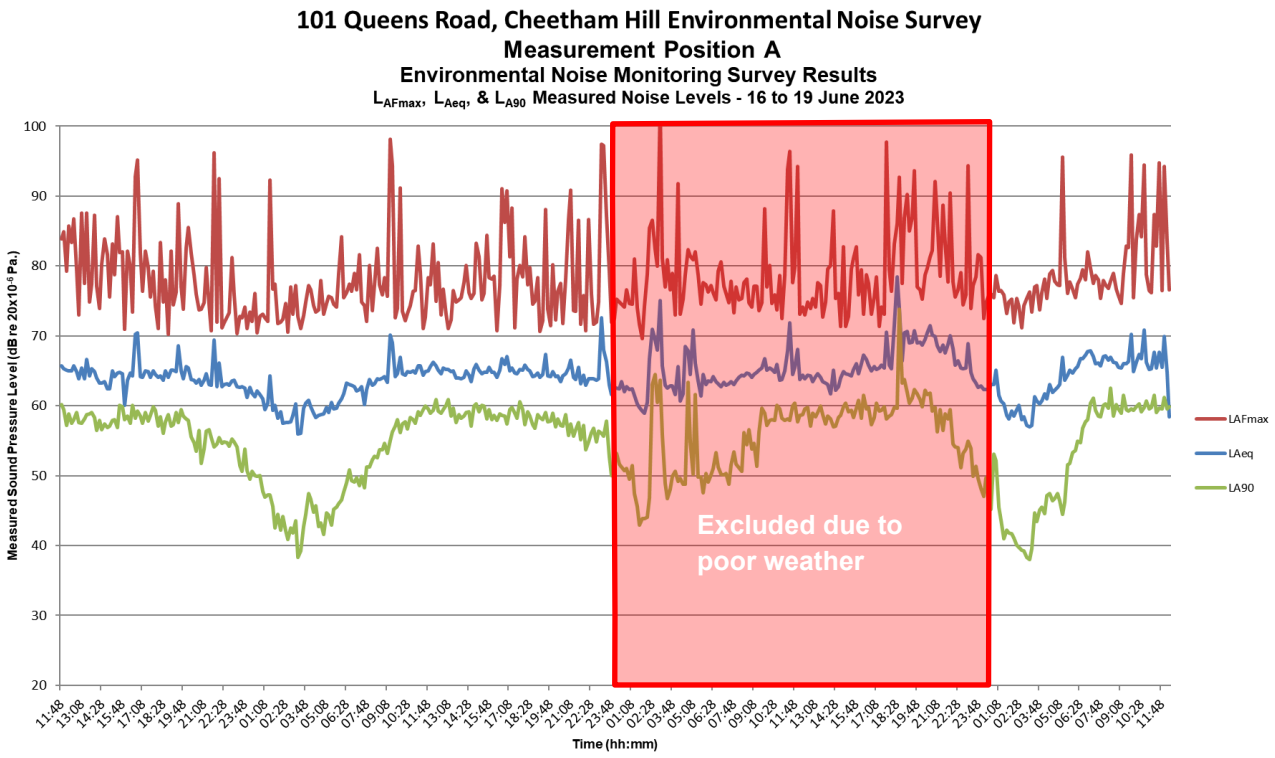
Activity	Location	Period	
		07:00 to 23:00	**23:00 to 07:00**
Resting	Living Room	$L_{Aeq,16h}$ 35 dB	-
Dining	Dining Room/area	$L_{Aeq,16h}$ 40 dB	-
Sleeping (daytime resting)	Bedroom	$L_{Aeq,16h}$ 35 dB	$L_{Aeq,8h}$ 30 dB

Note 4 to the table advises that regular noise events (for example, scheduled aircraft) can cause sleep disturbance and that a ‘guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night’.

With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed $L_{Aeq,16h}$ 50 dB, with an upper guideline value of $L_{Aeq,16h}$ 55 dB, being acceptable in noisier environments.

Appendix D

NOISE SURVEY TIME HISTORY


101 Queens Road, Cheetham Hill Environmental Noise Survey
Measurement Position A
Environmental Noise Monitoring Survey Results
L_{AFmax}, L_{Aeq}, & L_{A90} Measured Noise Levels - 16 to 19 June 2023
Measured Sound Pressure Level (dB re 20x10⁻⁶ Pa.)
Time (hh:mm)
Excluded due to poor weather
LAFmax
LAeq
LA90

Appendix E

EXAMPLE FACADE SOUND INSULATION CALCULATIONS

Living Room - Daytime $L_{Aeq,16h}$ – Type B glazing

BS8233 Calculations (pg 15, 16)													
Calculation Set Up Using BS8233 Values													
Frequency Independent Terms													
Ao =	10	m2		Reference absorbtion area									
H =	3	m2		Height of the room									
W =	8	m2		Width of the room									
Sf =	24	m2		Total façade area of the room									
Swi =	12.22	m2		Window area of room									
Sew =	11.78	m2		External wall area									
Srr =		m2		Ceiling area									
S =	24	m2		Total surface are of elements through which sound enters the room (= Sf + Srr)									
d =	6.4	m2		Depth of the room									
V =	153.6	m3		Room volume									
Frequency Dependent Terms													
					Octave Band Centre Frequency								
					63	125	250	500	1k	2k	4k	8k	Single
SRIs													
Dn,e =	Insulation of trickle vent												
Rwi =	SRI of window (6/27/10)					28	34	39	44	38	52		41
Rew =	SRI of external wall					40	44	45	51	56	56		51
Rrr =	SRI of roof / ceiling												
Absorption Coefficients													
carpet on underlay						0.08	0.24	0.57	0.69	0.71	0.73		
walls, painted and plastered						0.02	0.02	0.03	0.03	0.04	0.05		
double glazing						0.18	0.06	0.04	0.03	0.02	0.02		
ceiling	Armstrong Dune Supreme					0.4	0.45	0.55	0.6	0.5	0.45		
Total Absorption				area									
carpet on underlay				60.48	0	4.8384	14.5152	34.4736	41.7312	42.9408	44.1504	0	
walls, painted and plastered				74.18	0	1.4836	1.4836	2.2254	2.2254	2.9672	3.709	0	
double glazing				12.22	0	2.1996	0.7332	0.4888	0.3666	0.2444	0.2444	0	
ceiling				60.48	0	24.192	27.216	33.264	36.288	30.24	27.216	0	
A from rev time (RT) or abs coeff (AC)?				RT									
A =	Equiv abs area of rec room (AC				0.00	32.71	43.95	70.45	80.61	76.39	75.32	0.00	
RT						0.5	0.5	0.5	0.5	0.5	0.5		
A =	Equiv abs area of rec room (RT)				0.00	49.15	49.15	49.15	49.15	49.15	49.15	0.00	
A =	Equiv abs area of rec room				0.00	49.15	49.15	49.15	49.15	49.15	49.15	0.00	
TERM A	Leq,ff =	Leq ext ff	69.1	dB(A)		65	64	61	65	64	60		
TERM B	(Ao/S) * 10^(-Dn,e / 10)				0	0	0	0	0	0	0	0	
TERM C	(Swi/S) * 10^(-Rwi / 10)				0	0.000807	0.000203	6.41E-05	2.03E-05	8.07E-05	3.21E-06	0	
TERM D	(Sew/S) * 10^(-Rew / 10)				0	4.91E-05	1.95E-05	1.55E-05	3.9E-06	1.23E-06	1.23E-06	0	
TERM E	(Srr/S) * 10^(-Rrr / 10)				0	0	0	0	0	0	0	0	
TERM F	10 Log (B+C+D+E)				0	-30.675	-36.5317	-40.9897	-46.1674	-40.8655	-53.5208	0	
TERM G	10 Log (S/A)				0	-3.1133	-3.1133	-3.1133	-3.1133	-3.1133	-3.1133	0	
TERM K	+3				3	3	3	3	3	3	3	3	
Leq,2	SPL in room		dB		0.0	34.0	27.0	20.2	18.2	22.6	6.4	0.0	
A-weighting					-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
LAeq,2			dB(A)		0.0	17.9	18.4	17.0	18.2	23.8	7.4	0.0	
10^(LAeq,2 / 10)					0	62.03431	68.70011	50.25285	66.58701	241.8654	5.470833	0	
LAeq noise level in room =			26.9	dB(A)									
dB(A) reduction =			42.2	dB(A)									

Bedroom – Night-time $L_{Aeq,8h}$ – Type B glazing

BS8233 Calculations (pg 15, 16)													
Calculation Set Up Using BS8233 Values													
Frequency Independent Terms													
Ao =	10	m2		Reference absorbtion area									
H =	3	m2		Height of the room									
W =	2.9	m2		Width of the room									
Sf =	8.7	m2		Total façade area of the room									
Swi =	3.3	m2		Window area of room									
Sew =	5.4	m2		External wall area									
Srr =	10.063	m2		Ceiling area									
S =	18.763	m2		Total surface are of elements through which sound enters the room (= Sf + Srr)									
d =	3.47	m2		Depth of the room									
V =	30.189	m3		Room volume									
Frequency Dependent Terms													
					Octave Band Centre Frequency								
					63	125	250	500	1k	2k	4k	8k	Single
SRIs													
Dn,e =	Insulation of trickle vent												
Rwi =	SRI of window (6/27/10)					28	34	39	44	38	52		41
Rew =	SRI of external wall					40	44	45	51	56	56		51
Rrr =	SRI of roof / ceiling					24	32	40	44	48	50		42
Absorption Coefficients													
carpet on underlay						0.08	0.24	0.57	0.69	0.71	0.73		
walls, painted and plastered						0.02	0.02	0.03	0.03	0.04	0.05		
double glazing						0.18	0.06	0.04	0.03	0.02	0.02		
ceiling	Armstrong Dune Supreme					0.4	0.45	0.55	0.6	0.5	0.45		
Total Absorption				area									
carpet on underlay				60.48	0	4.8384	14.5152	34.4736	41.7312	42.9408	44.1504	0	
walls, painted and plastered				34.92	0	0.6984	0.6984	1.0476	1.0476	1.3968	1.746	0	
double glazing				3.3	0	0.594	0.198	0.132	0.099	0.066	0.066	0	
ceiling				60.48	0	24.192	27.216	33.264	36.288	30.24	27.216	0	
A from rev time (RT) or abs coeff (AC)?				RT									
A =	Equiv abs area of rec room (AC				0.00	30.32	42.63	68.92	79.17	74.64	73.18	0.00	
RT						0.5	0.5	0.5	0.5	0.5	0.5		
A =	Equiv abs area of rec room (RT)				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
A =	Equiv abs area of rec room				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
TERM A	Leq,ff =	Leq ext ff	65.9	dB(A)		59	58	57	61	60	57		
TERM B	(Ao/S) * 10^(-Dn,e / 10)				0	0	0	0	0	0	0	0	
TERM C	(Swi/S) * 10^(-Rwi / 10)				0	0.000279	7E-05	2.21E-05	7E-06	2.79E-05	1.11E-06	0	
TERM D	(Sew/S) * 10^(-Rew / 10)				0	2.88E-05	1.15E-05	9.1E-06	2.29E-06	7.23E-07	7.23E-07	0	
TERM E	(Srr/S) * 10^(-Rrr / 10)				0	0.002135	0.000338	5.36E-05	2.14E-05	8.5E-06	5.36E-06	0	
TERM F	10 Log (B+C+D+E)				0	-26.1214	-33.7688	-40.7122	-45.1372	-44.3065	-51.4292	0	
TERM G	10 Log (S/A)				0	2.883036	2.883036	2.883036	2.883036	2.883036	2.883036	0	
TERM K	+3				3	3	3	3	3	3	3	3	
Leq,2	SPL in room		dB		0.0	39.2	30.5	22.6	22.2	22.0	11.9	0.0	
A-weighting					-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
LAeq,2			dB(A)		0.0	23.1	21.9	19.4	22.2	23.2	12.9	0.0	
10^(LAeq,2 / 10)					0	203.0606	155.9118	86.80439	164.4525	208.5023	19.35729	0	
LAeq noise level in room =			29.2	dB(A)									
dB(A) reduction =			36.7	dB(A)									

Bedroom – Night-time L_{AFmax} – Type B glazing

BS8233 Calculations (pg 15, 16)													
Calculation Set Up Using BS8233 Values													
Frequency Independent Terms													
Ao =	10	m2	Reference absorbtion area										
H =	3	m2	Height of the room										
W =	2.9	m2	Width of the room										
Sf =	8.7	m2	Total façade area of the room										
Swi =	3.3	m2	Window area of room										
Sew =	5.4	m2	External wall area										
Srr =	10.063	m2	Ceiling area										
S =	18.763	m2	Total surface are of elements through which sound enters the room (= Sf + Srr)										
d =	3.47	m2	Depth of the room										
V =	30.189	m3	Room volume										
Frequency Dependent Terms													
					Octave Band Centre Frequency								
					63	125	250	500	1k	2k	4k	8k	Single
SRIs													
Dn,e =	Insulation of trickle vent												
Rwi =	SRI of window (6/27/10)					28	34	39	44	38	52		41
Rew =	SRI of external wall					40	44	45	51	56	56		51
Rrr =	SRI of roof / ceiling					24	32	40	44	48	50		42
Absorption Coefficients													
carpet on underlay						0.08	0.24	0.57	0.69	0.71	0.73		
walls, painted and plastered						0.02	0.02	0.03	0.03	0.04	0.05		
double glazing						0.18	0.06	0.04	0.03	0.02	0.02		
ceiling	Armstrong Dune Supreme					0.4	0.45	0.55	0.6	0.5	0.45		
Total Absorption				area									
carpet on underlay				60.48	0	4.8384	14.5152	34.4736	41.7312	42.9408	44.1504	0	
walls, painted and plastered				34.92	0	0.6984	0.6984	1.0476	1.0476	1.3968	1.746	0	
double glazing				3.3	0	0.594	0.198	0.132	0.099	0.066	0.066	0	
ceiling				60.48	0	24.192	27.216	33.264	36.288	30.24	27.216	0	
A from rev time (RT) or abs coeff (AC)?				RT									
A =	Equiv abs area of rec room (AC				0.00	30.32	42.63	68.92	79.17	74.64	73.18	0.00	
RT						0.5	0.5	0.5	0.5	0.5	0.5		
A =	Equiv abs area of rec room (RT)				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
A =	Equiv abs area of rec room				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
TERM A	Leq,ff =	Leq ext ff	81.6	dB(A)		74.4	75.3	70.7	73.9	76.5	76		
TERM B	(Ao/S) * 10^(-Dn,e / 10)				0	0	0	0	0	0	0	0	
TERM C	(Swi/S) * 10^(-Rwi / 10)				0	0.000279	7E-05	2.21E-05	7E-06	2.79E-05	1.11E-06	0	
TERM D	(Sew/S) * 10^(-Rew / 10)				0	2.88E-05	1.15E-05	9.1E-06	2.29E-06	7.23E-07	7.23E-07	0	
TERM E	(Srr/S) * 10^(-Rrr / 10)				0	0.002135	0.000338	5.36E-05	2.14E-05	8.5E-06	5.36E-06	0	
TERM F	10 Log (B+C+D+E)				0	-26.1214	-33.7688	-40.7122	-45.1372	-44.3065	-51.4292	0	
TERM G	10 Log (S/A)				0	2.883036	2.883036	2.883036	2.883036	2.883036	2.883036	0	
TERM K	+3				3	3	3	3	3	3	3	3	
Leq,2	SPL in room		dB		0.0	54.2	47.4	35.9	34.6	38.1	30.5	0.0	
A-weighting					-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
LAeq,2			dB(A)		0.0	38.1	38.8	32.7	34.6	39.3	31.5	0.0	
10^(LAeq,2 / 10)					0	6399.809	7610.625	1849.622	2914.619	8465.492	1397.609	0	
LAeq noise level in room =			44.6	dB(A)									
dB(A) reduction =			37.0	dB(A)									

Bedroom – Night-time $L_{Aeq,8h}$ – Type A glazing

BS8233 Calculations (pg 15, 16)													
Calculation Set Up Using BS8233 Values													
Frequency Independent Terms													
Ao =	10	m2		Reference absorbtion area									
H =	3	m2		Height of the room									
W =	2.9	m2		Width of the room									
Sf =	8.7	m2		Total façade area of the room									
Swi =	3.3	m2		Window area of room									
Sew =	5.4	m2		External wall area									
Srr =	10.063	m2		Ceiling area									
S =	18.763	m2		Total surface are of elements through which sound enters the room (= Sf + Srr)									
d =	3.47	m2		Depth of the room									
V =	30.189	m3		Room volume									
Frequency Dependent Terms													
					Octave Band Centre Frequency								
					63	125	250	500	1k	2k	4k	8k	Single
SRIs													
Dn,e =	Insulation of trickle vent												
Rwi =	SRI of window (4/12/4)					23	18	26	38	44	38		30
Rew =	SRI of external wall					40	44	45	51	56	56		51
Rrr =	SRI of roof / ceiling					24	32	40	44	48	50		42
Absorption Coefficients													
carpet on underlay						0.08	0.24	0.57	0.69	0.71	0.73		
walls, painted and plastered						0.02	0.02	0.03	0.03	0.04	0.05		
double glazing						0.18	0.06	0.04	0.03	0.02	0.02		
ceiling	Armstrong Dune Supreme					0.4	0.45	0.55	0.6	0.5	0.45		
Total Absorption				area									
carpet on underlay				60.48	0	4.8384	14.5152	34.4736	41.7312	42.9408	44.1504	0	
walls, painted and plastered				34.92	0	0.6984	0.6984	1.0476	1.0476	1.3968	1.746	0	
double glazing				3.3	0	0.594	0.198	0.132	0.099	0.066	0.066	0	
ceiling				60.48	0	24.192	27.216	33.264	36.288	30.24	27.216	0	
A from rev time (RT) or abs coeff (AC)?				RT									
A =	Equiv abs area of rec room (AC				0.00	30.32	42.63	68.92	79.17	74.64	73.18	0.00	
RT						0.5	0.5	0.5	0.5	0.5	0.5		
A =	Equiv abs area of rec room (RT)				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
A =	Equiv abs area of rec room				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
TERM A	Leq,ff =	Leq ext ff	55.9	dB(A)		49	48	47	51	50	47		
TERM B	(Ao/S) * 10^(-Dn,e / 10)				0	0	0	0	0	0	0	0	
TERM C	(Swi/S) * 10^(-Rwi / 10)				0	0.000881	0.002787	0.000442	2.79E-05	7E-06	2.79E-05	0	
TERM D	(Sew/S) * 10^(-Rew / 10)				0	2.88E-05	1.15E-05	9.1E-06	2.29E-06	7.23E-07	7.23E-07	0	
TERM E	(Srr/S) * 10^(-Rrr / 10)				0	0.002135	0.000338	5.36E-05	2.14E-05	8.5E-06	5.36E-06	0	
TERM F	10 Log (B+C+D+E)				0	-25.1636	-25.0344	-32.9712	-42.8809	-47.8982	-44.6902	0	
TERM G	10 Log (S/A)				0	2.883036	2.883036	2.883036	2.883036	2.883036	2.883036	0	
TERM K	+3				3	3	3	3	3	3	3	3	
Leq,2	SPL in room		dB		0.0	30.1	29.3	20.3	14.4	8.4	8.6	0.0	
A-weighting					-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
LAeq,2			dB(A)		0.0	14.0	20.7	17.1	14.4	9.6	9.6	0.0	
10^(LAeq,2 / 10)					0	25.31661	116.4992	51.59881	27.64856	9.118925	9.1357	0	
LAeq noise level in room =			23.8	dB(A)									
dB(A) reduction =			32.1	dB(A)									

Bedroom – Night-time L_{AFmax} – Type A glazing

BS8233 Calculations (pg 15, 16)												
Calculation Set Up Using BS8233 Values												
Frequency Independent Terms												
Ao =	10	m2	Reference absorbtion area									
H =	3	m2	Height of the room									
W =	2.9	m2	Width of the room									
Sf =	8.7	m2	Total façade area of the room									
Swi =	3.3	m2	Window area of room									
Sew =	5.4	m2	External wall area									
Srr =	10.063	m2	Ceiling area									
S =	18.763	m2	Total surface are of elements through which sound enters the room (= Sf + Srr)									
d =	3.47	m2	Depth of the room									
V =	30.189	m3	Room volume									
Frequency Dependent Terms												
					Octave Band Centre Frequency							
					63	125	250	500	1k	2k	4k	8k	Single
SRIs													
Dn,e =	Insulation of trickle vent												
Rwi =	SRI of window (4/12/4)					23	18	26	38	44	38		30
Rew =	SRI of external wall					40	44	45	51	56	56		51
Rrr =	SRI of roof / ceiling					24	32	40	44	48	50		42
Absorption Coefficients													
carpet on underlay						0.08	0.24	0.57	0.69	0.71	0.73		
walls, painted and plastered						0.02	0.02	0.03	0.03	0.04	0.05		
double glazing						0.18	0.06	0.04	0.03	0.02	0.02		
ceiling	Armstrong Dune Supreme					0.4	0.45	0.55	0.6	0.5	0.45		
Total Absorption				area									
carpet on underlay				60.48	0	4.8384	14.5152	34.4736	41.7312	42.9408	44.1504	0	
walls, painted and plastered				34.92	0	0.6984	0.6984	1.0476	1.0476	1.3968	1.746	0	
double glazing				3.3	0	0.594	0.198	0.132	0.099	0.066	0.066	0	
ceiling				60.48	0	24.192	27.216	33.264	36.288	30.24	27.216	0	
A from rev time (RT) or abs coeff (AC)?				RT									
A =	Equiv abs area of rec room (AC				0.00	30.32	42.63	68.92	79.17	74.64	73.18	0.00	
RT						0.5	0.5	0.5	0.5	0.5	0.5		
A =	Equiv abs area of rec room (RT)				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
A =	Equiv abs area of rec room				0.00	9.66	9.66	9.66	9.66	9.66	9.66	0.00	
TERM A	Leq,ff =	Leq ext ff	71.6	dB(A)		64.4	65.3	60.7	63.9	66.5	66		
TERM B	(Ao/S) * 10^(-Dn,e / 10)				0	0	0	0	0	0	0	0	
TERM C	(Swi/S) * 10^(-Rwi / 10)				0	0.000881	0.002787	0.000442	2.79E-05	7E-06	2.79E-05	0	
TERM D	(Sew/S) * 10^(-Rew / 10)				0	2.88E-05	1.15E-05	9.1E-06	2.29E-06	7.23E-07	7.23E-07	0	
TERM E	(Srr/S) * 10^(-Rrr / 10)				0	0.002135	0.000338	5.36E-05	2.14E-05	8.5E-06	5.36E-06	0	
TERM F	10 Log (B+C+D+E)				0	-25.1636	-25.0344	-32.9712	-42.8809	-47.8982	-44.6902	0	
TERM G	10 Log (S/A)				0	2.883036	2.883036	2.883036	2.883036	2.883036	2.883036	0	
TERM K	+3				3	3	3	3	3	3	3	3	
Leq,2	SPL in room		dB		0.0	45.1	46.1	33.6	26.9	24.5	27.2	0.0	
A-weighting					-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
LAeq,2			dB(A)		0.0	29.0	37.5	30.4	26.9	25.7	28.2	0.0	
10^(LAeq,2 / 10)					0	797.8971	5686.751	1099.464	490.02	370.2414	659.6038	0	
LAeq noise level in room =			39.6	dB(A)									
dB(A) reduction =			32.0	dB(A)									

Appendix F

FAÇADE SOUND INSULATION SPECIFICATION



AIRBORNE SOUND INSULATION OF FACADE

Glazing

26 dB $R_w + C_{tr}$

37 dB $R_w + C_{tr}$

DATE	REV	DESCRIPTION	BY
07/07/23	P01	PLANNING	JH

PROJECT
FACADE SOUND INSULATION
REF:

PENINSULAR ACOUSTICS

Notes

Appendix G

REPORT LIMITATIONS

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