

Upper Brook Street PBSA, Manchester

Noise Impact Assessment – Planning Conditions 22(a) and 23 (a) McLaren Construction

Job No: 1036881
Doc ref: 1036881-CDL-XX-XX-RP-AS-45091
Revision: P01
Revision date: 17 September 2025

Project title	Upper Brook Street PBSA, Manchester	Job number
Report title	Noise Impact Assessment – Planning Conditions 22(a) and 23 (a)	1036881
Classification	Client Confidential	

Document revision history

Revision ref	Issue date	Purpose of issue / description of revision
P01	17 September 2025	First Issue

Document validation (latest issue)

		17/09/2025

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1.0

Introduction

1.0 Introduction

Cundall has been commissioned by McLaren Property to prepare a Noise Impact Assessment report with a view to addressing Conditions 22(a) and 23(a) attached to the proposed Purpose-Built Student Accommodation (PBSA) development at Upper Brook Street, Manchester (application ref: 137399/FO/2023).

1.1 Objectives of report

The principle aims of the acoustic design are summarised below:

Condition 22(a)

- Provide details of the scheme of acoustic insulation for the non-residential areas (gym, commercial uses, community spaces) within the PBSA
- Provide confirmation that there are no significant sources of entertainment or amplified sound proposed as part of the current scheme.

Condition 23(a)

- Provide details of acoustically insulating the proposed student accommodation (Plot C) against noise, including:
 - Assess the proposed façade design to ensure that internal ambient noise levels, resulting from external environmental sources, are appropriate for the intended use of the internal spaces.
 - Evaluate the potential for overheating within the development and consider the implications this may have on the effectiveness of the noise insulation strategy.
- Provide confirmation that there are no nearby existing entertainment noise sources which contribute to the prevailing noise climate.

1.2 Application site and surroundings

The site is located off Upper Brook Street (UBS) in Manchester and comprises 1.084 hectares (ha) of land controlled by McLaren Property and Manchester City Council (MCC). The red-line application boundary is shared with the proposed Kadans Life Sciences building located to the southern portion of the site.

The adjacent land uses surrounding the site include:

- To the north of the Site is a vacant single-storey commercial building and the Grade II listed 'Former Unitarian Chapel' which now functions as student accommodation.
- To the east of the Site is Kincardine Road; beyond which is a four to six-storey student accommodation building known as Kincardine Court, and two-storey terraced dwellings off Whitekirk Close, Arkley Street and associated side streets.
- To the south of the Site is Cottenham Street beyond which is W.H. Lung Chinese & Asian Supermarket and Wholesaler.
- To the west of the Site is Upper Brook Street and University of Manchester teaching buildings.

Figure 1-1 identifies the red line boundary, PBSA blue line ownership boundary, building footprint of the PBSA Development (cyan), building footprint of the adjacent Life Science building (purple) and nearest off-site residential noise- sensitive receptors (yellow)

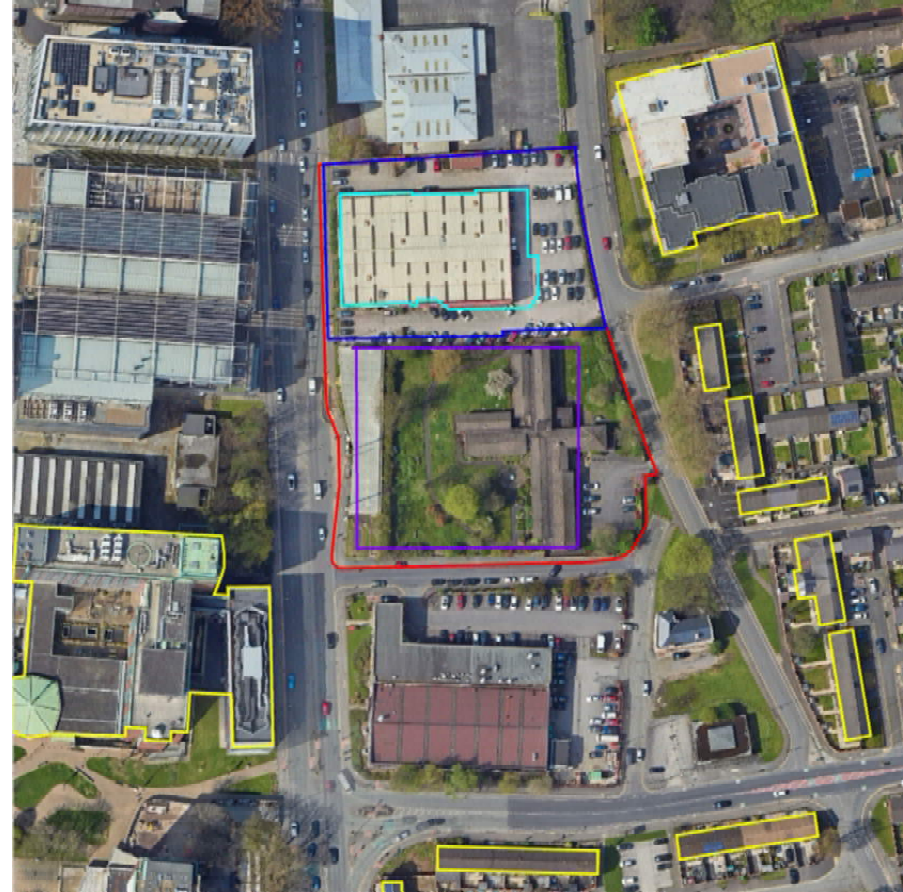


Figure 1-1: Development site and nearest residential noise-sensitive receptors

2.0

Planning conditions

2.0 Planning conditions

Conditions 22(a) and 23(a) of the approved decision notice for the Development (137399/FO/2023) are reproduced in full in Table 2-1, below:

Condition	Wording
22(a)	Prior to any above ground works, a scheme of acoustic insulation for the non-residential areas (gym, commercial uses, community spaces) within the PBSA plot of the development shall be submitted for approval in writing by the City Council, as Local Planning Authority. Where entertainment noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 5 dB below the L_{A90} (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63 Hz and 125 Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41 dB ($L_{eq,5min}$), respectively
23(a)	Prior to any above ground works, a scheme for acoustically insulating the proposed student accommodation (Plot C) against noise shall be submitted for approval in writing by the City Council as Local Planning Authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The potential for overheating shall also be assessed and the noise insulation scheme shall take this into account. Noise survey data shall include measurements taken during a rush-hour period and night-time to determine the appropriate sound insulation measures necessary. The following noise criteria shall be required to be achieved when providing adequate ventilation as defined by Approved Document F of the Building Regulations (whole dwelling ventilation): ▪ Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not exceed 45 dB $L_{Amax,F}$ by more than 15 times) ▪ Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq} ▪ Gardens and terraces (daytime) 55 dB L_{Aeq} Higher internal noise levels than those specified above may be allowed when higher rates of ventilation are required in relation to the overheating condition. Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125 Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB ($L_{eq,5min}$), respectively. The approved noise insulation and ventilation scheme shall be completed before the first occupation of the student accommodation plot C of the development.

Table 2-1: Manchester city council planning conditions

3.0

Environmental noise survey

3.0 Environmental noise survey

3.1 Objective

The objective was to capture representative background sound levels at the nearest NSRs, and prevailing ambient noise levels at the facades of the proposed development.

3.1 Date and time

Competently trained staff from Cundall conducted noise surveys on weekdays over the following periods:

- 17:00 on Monday, 5 December to 07:00 on Tuesday, 6 December 2022
- 12:00 on Wednesday, 18 January to 15:15 on Tuesday, 19 January 2023

3.2 Measurement locations

Two measurement locations were chosen at representative positions as described in Table 3-1: and marked in Figure 3-1

No.	Description	Observations
NMP1	10 m from edge of Upper Brook Street, and 2 m above local ground level in free field condition.	Road traffic along Upper Brook Street (A34) was the dominant noise source
NMP2	2 m from edge of Kincardine Road, and 2 m above local ground level in free field condition.	Road traffic along Upper Brook Street (A34) was the dominant noise source

Table 3-1: Measurement locations and observations



Figure 3-1: Approximate measurement locations

With reference to entertainment noise in Conditions 22(a) and 23(a), Cundall can confirm that there are no nearby existing entertainment noise sources which contribute to the prevailing noise climate.

3.3 Utilised equipment

The equipment listed below were used for the noise survey. Calibration certificates for all equipment are available upon request.

Equipment	Type	Serial No.	Last calibration date (prior to survey)
Casella Sound Level Meter	633	1211405	22/07/2021
Casella Pre-amp	495	001211	
Casella Microphone	251	2626	
Casella Calibrator	120/1	4921893	05/07/2022
NTi Sound Level Meter	NTi XL2	A2A-16315-E0	15/07/2021
NTi Pre-amp	MA220	8550	
NTi Microphone Capsule	MC230A	A17555	
Larson Davis Calibrator	CAL200	16781	30/06/2022

Table 3-2: Utilised equipment

3.4 Measurement procedure

The weather during the surveys was cold, dry, and overcast with minimal wind throughout.

Noise measurements were made in accordance with BS EN 60651:1994 and BS 7445:1993. The sound level meters were calibrated prior and post to site measurements using the appropriate calibrators to a reference tone of 114 dB at 1 kHz. Pre- and post-calibrations indicated a shift of no more than 0.2 dB.

The measurements were carried out unattended. Audio triggers were set as 65 dB(A) to identify unusual noise events with a level higher than this during the unattended periods.

3.5 Measurement results

A summary of the average ambient noise levels recorded at positions NMP1 and NMP2 is detailed within Table 3-3: The values are the logarithmically averaged $L_{Aeq,T}$, the 10th highest night-time maximum L_{AFmax} , the highest hourly $L_{A01,T}$ occurring during rush hour times (taken as 07:00 – 09:00 and 17:00 – 19:00, onerously considered worst case levels for occupied office hours), and the range of $L_{A90,15min}$ and $L_{A10,15min}$ values measured. All values have been rounded to the nearest integer value (as fractions of a decibel are imperceptible) and were measured as free-field in dBA.

Position	Date	Period	Average $L_{Aeq,T}$ dB	10th highest night-time L_{AFMax} dB	Highest rush hour $L_{A01,1hour}$ dB	Range $L_{A90,15min}$ dB
NMP1	5/12/2022	Daytime (17:00 – 23:00 hours)	71	-	79	56 – 64
	5/12/2022 – 6/12/2022	Night-time (23:00 – 07:00 hours)	67	82	-	46 – 62
NMP2	18/01/2023	Daytime (12:00 – 23:00 hours)	55	-	63	57 – 65
	18/01/2023– 19/01/2023	Night-time (23:00 – 07:00 hours)	49	70	-	45 – 64
	19/01/2023	Daytime 07:00 – 15:15 hours)	55	-	66	54 – 60

Table 3-3: Summary of noise measurement data

With reference to entertainment noise in Conditions 22(a) and 23(a), Cundall can confirm that there are no nearby existing entertainment noise sources which contribute to the prevailing noise climate.

4.0

Condition 22 (a)

4.0 Condition 22(a)

4.1 Scheme of acoustic insulation for non-residential areas

A single credit is being targeted for the scheme under BREEAM issue Hea 05. This credit requires a schedule of sound insulation testing to demonstrate that the level of airborne and impact sound insulation has achieved a minimum 3 dB betterment to the Approved Document E sound insulation criteria.

The resultant project specific sound insulation requirements for party walls and floors are therefore detailed in Table 2 3:

BREEAM Hea 05 criteria	Element	Airborne sound insulation $D_{nT,w} + C_{tr}$ (dB)	Impact sound transmission $L'_{nT,w}$ (dB)
Purpose built rooms for residential purposes	Walls	≥ 46	-
	Floors and stairs	≥ 48	≤ 59

Table 4-1: Project specific sound insulation requirements for 1 credit under BREEAM issue Hea 05

The following subsections provide further detailed information regarding the scheme of acoustic insulation for residential agencies to non-residential areas, (i.e., ground floor community / commercial uses and Level 22 Gym).

4.1.1 Separating floors – Residential to commercial

The Employer's Requirement airborne and impact sound insulation criteria are defined in Table 4-1 of this report and represent a +3 betterment to the minimum requirements of (ADE).

The floor construction between first floor dwellings and ancillary spaces below is to generally comprise:

- Final floor finish
- 250 mm reinforced concrete slab (assumed density 2400 kg/m³)
- Ceiling services void
- Acoustically absorbent suspended ceiling treatments within ancillary spaces

Due to the significant mass afforded by the 250 mm reinforced concrete slab, it is expected that the principles of the above construction can comfortably achieve the Building Regulations Approved Document E (ADE) and enhanced BREEAM airborne sound insulation criteria for party floors provided.

Such a floor construction would typically be expected to achieve a weighted standardized impact sound pressure level of ≥ 50 dB $D_{nT,w} + C_{tr}$, representing a substantial improvement over the minimum requirements set out in Approved Document E (ADE). This level of sound insulation is considered sufficient to mitigate the potential for disturbance to adjacent student accommodation units.

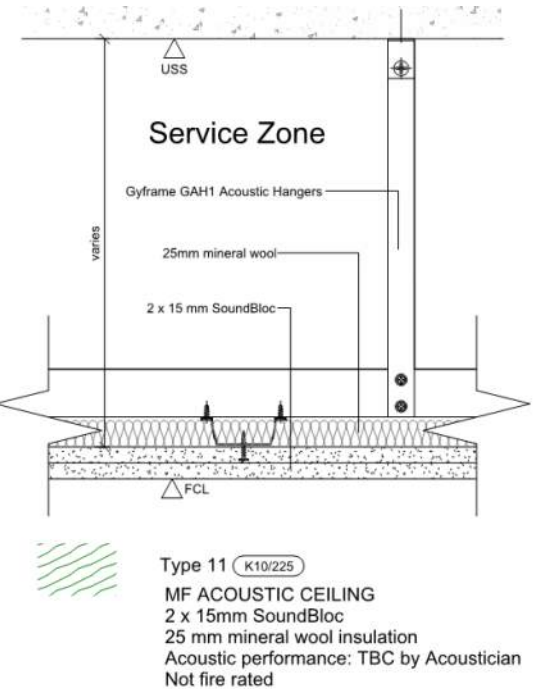
4.1.2 Separating floors – Gym to Residential (enhanced)

4.1.2.1 Airborne sound insulation

It is anticipated that the Level 22 Gym has the potential to generate a high level of noise and an increased level of sound insulation above the minimum ADE requirements is therefore necessary to reduce the potential for disturbance to Level 21 bedrooms below.

The current Ceiling Type 11 allows for the following enhanced build-up as follows:

- 250 mm reinforced concrete slab
- Gypframe GAH1 Acoustic Hangers
- 25 mm mineral wool insulation
- 2no. layers of 15 mm SoundBloc



The RCP extract presented in Figure 4-1 identifies the Level 21 Bedrooms located directly below the Level 22 Gym where this ceiling type is provided.

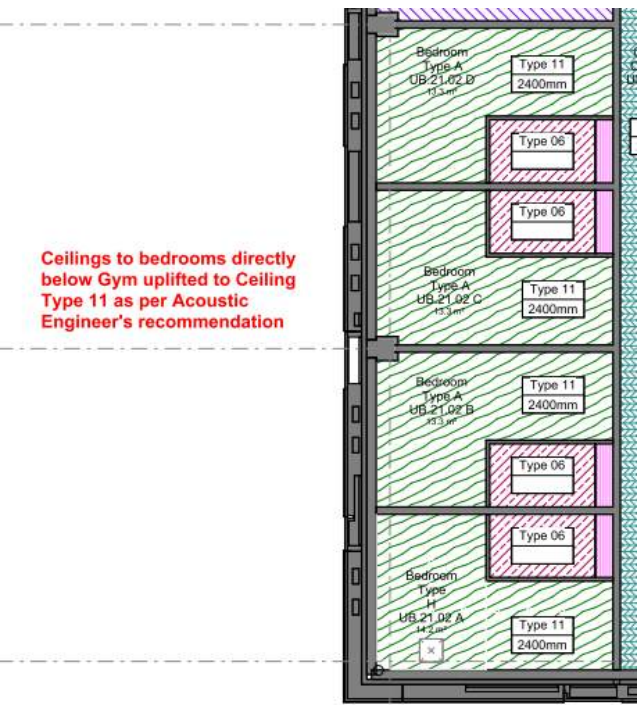


Figure 4-1: Recommendation for Type 11 ceilings to level 21 Bedrooms located below level 22 Gym

4.1.3 Re-radiated structureborne sound

For Gym areas it will also be necessary to consider the potential for structure borne re-radiated sound to occur in vertically adjacent dwellings. It is advised that the following G-curve values (as defined in ANC ProPG Gym Acoustic-Guidance) shall not be exceeded in residential areas due to 'heavy impact sound.'

Receptor type	Heavy impact sound $L_{max,F}$ (31.5Hz to 8kHz)
Residential	$\leq G25$ (07:00 – 23:00hrs) $\leq G20$ (23:00 – 07:00hrs)

Table 4-2: Heavy impact sound criteria for Gyms/Studio

Current proposals are for the Gym floor to comprise of floor finish 'FF.11 Minimum 30 mm specialist acoustic gym flooring. To be developed based on Client requirements' as part of the final fit-out.

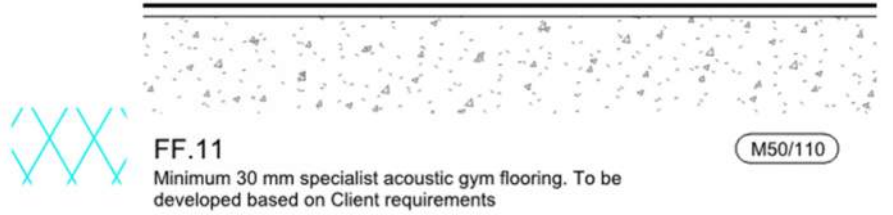


Figure 4-2: FF.11 specialist acoustic gym flooring to gym

Examples of potentially suitable acoustic mitigation measures to control re-radiated structureborne sound are identified below. These requirements are to be reviewed further based on final Client requirements and subject to final confirmation of operating hours.

Note: It has been advised that free weights are not permissible within the space, i.e., activities should be restricted to treadmills and fixed-pin resistance machines

- Minimum 30 mm specialist acoustic gym flooring tile to full extent of Gym / Studio cardio / machine areas e.g. Pliteq GenieMat FIT30.
- All treadmills to be fixed on resilient isolation pads e.g. Pliteq GenieMat TMIP (or acceptable alternative).
- All resistance machines with weights to incorporate weight stack isolators e.g. Pliteq GenieMat WSI (or acceptable alternative).

4.2 Entertainment noise assessment

The current design does not allow for significant amplified music systems to be included within ground floor amenity / commercial spaces or the Level 22 gym.

Nevertheless, in the event that amplified sound systems are introduced at a later date as part of final fit-out or separate tenancy, the Employer's Requirement Acoustic report has defined that a noise limiter shall be installed within the amplified sound signal chain and be calibrated so as not to exceed a sound level of 5 dB below the prevailing octave-band background sound levels at the nearest and / or most exposed noise sensitive receptor(s).

4.2.1 Airborne entertainment noise at sensitive receptors

If amplified music systems are to be included within ground floor amenity and commercial spaces, is it a requirement that a noise limiter should be installed within the signal chain and be calibrated so as not to exceed a sound level of 5 dB below the prevailing octave-band background sound levels at the nearest and / or most exposed noise sensitive receptors. For the nearest noise sensitive receptors, the arithmetic average values of octave band $L_{A90,15min}$ for each measurement period at position NMP2 has been calculated, with this spectrum then shifted to match the representative background levels

The resultant entertainment noise limits at off-site sensitive receptors are reproduced in Table 4-3, below:

Period	MCC limiting amplified noise criterion – dB $L_{eq,T}$						
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Daytime (07:00 – 23:00)	51	48	43	41	42	36	25
Night-time (23:00 – 07:00)	45	42	37	34	34	28	19

Table 4-3: Limiting entertainment noise levels

4.2.2 Structure-borne entertainment to adjoining student accommodation

For amplified noise directly to adjacent bedrooms, music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed 47 dB and 41 dB (L_{eq}), respectively, as per Condition 22(a) requirements.

In addition to the above limits in 63 Hz and 125 Hz octave bands, it is proposed that entertainment noise frequency content in other octave bands up to 8 kHz do not exceed NR 20 values where measured in adjacent habitable rooms.

The limiting levels from 63 Hz to 8 kHz are therefore as per Table 4-4, below:

Maximum permissible structure-borne entertainment noise levels, dB (L_{eq})							
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
47	41	31	24	20	17	14	13

Table 4-4: Maximum allowable music noise level in residential rooms due to entertainment noise

Whilst there is no allowance for amplified sound systems in the current design, in the event that amplified sound systems are introduced at a later date as part of final fit-out or separate tenancy, the Employer's Requirement Acoustic report has defined that a noise limiter shall be installed within the amplified sound signal chain and be calibrated so as not to exceed the above limiting criteria.

5.0

Condition 23(a)

5.0 Condition 23(a)

Note: The following subsection primarily considers the night-time LAeq,T internal ambient noise level criterion. This is because the night-time LAeq is the most onerous criterion and will see all other internal noise level targets achieved by default.

As detailed in Section 3.5, Cundall can confirm that there are no nearby existing entertainment noise sources which contribute to the prevailing noise climate.

5.1 Noise modelling results

Road traffic noise sources within the 3D noise model have been calibrated based upon the night-time LAeq results obtained during the survey at position NMP1 for Upper Brook Street, and position NMP2 for Kincardine Road as detailed in Section 3.0.

Calculated free-field façade noise impacts have been divided into two separate noise ranges for the purpose informing the minimum glazing sound insulation requirements, as reproduced in Figure 5-1, below:

- BLUE** zone:
- LAeq level between 64 dB and 67 dB, the highest predicted level
- CYAN** zone:
- LAeq level less than 64 dB



Figure 5-1: Predicted free-field night-time noise levels from road traffic on façades at the PBSA Development: View from Kincardine Road (upper), View from Upper Brook Street (bottom)

Levels referred to in the following sub-sections are ‘free-field’ values at 1 m from the building façade.

5.2 Ventilation systems (whole dwelling ventilation)

It is a requirement of the building regulations that ‘whole dwelling ventilation’ (previously known as ‘background’ ventilation) is provided in dwellings.

Ventilation to habitable rooms will be provided by a Mechanical Extract Ventilation (MEV) system that extracts air continuously at a low rate within the bathroom (with the option for a ‘boost’ setting) with replacement fresh air entering through a ducted façade system terminating in the bedroom ceiling.

As ‘whole dwelling ventilation’ will be provided by a mechanical system, the only time windows will be required to be open for the purposes of ventilation will be for occasional control of overheating (discussed in Section 5.4) and ‘purge’ ventilation. With respect to noise levels during purge ventilation the ProPG states the following:

‘It should also be noted that the internal noise level guidelines are generally not applicable under “purge ventilation” conditions as defined by Building Control Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).’

It is therefore not considered necessary to further consider noise levels during purge ventilation conditions and using windows for this purpose is unlikely to result in any significant adverse effects.

5.2.1 Minimum glazing requirements

For buildings with attenuated ductwork supply/extract paths, the weakest elements of the external elevation are typically the glazing. The specification of glazing is therefore considered to be the primary factor in determining the internal ambient noise level within noise sensitive areas due to noise ingress from outside.

Whilst the predicted propagation of LAeq has been modelled, it is not possible to model a propagation of LAfmax in the same manner. As such for the sake of this

assessment, it has been assumed that the difference in LAeq and LAfmax levels is largely the same as those surveyed at position NMP1 (responding to calibration of the dominant noise source on the development from Upper Brook Street).

Calculation procedures for determining the glazing attenuation (Rw + Ctr) are as described in the “more rigorous calculation method” outlined in BS 8233:2014.

Based on the worst-case incident noise levels and considering rooms with the internal ambient noise level targets (IANL), the following table presents the required sound insulation required to see the IANL are achievable. Full details of the external noise intrusion calculations are available at request.

Zone	Predicted external free-field noise level on façade – maximum in the zone (dB)	Internal noise criteria	Minimum sound insulation
Blue Zone	67 LAeq,T	≤ 30 LAeq,T	Rw + Ctr 32 dB
	79 LAf,max	≤ 45 LAfmax	
Cyan Zone	64 LAeq,T	≤ 30 LAeq,T	Rw + Ctr 28 dB
	72 LAf,max	≤ 45 LAfmax	

Table 5-1: Required minimum sound insulation performances for student residential

5.2.2 Proposed glazing systems

The acoustic performance requirements for proposed glazing selections are identified in the following schedules:

- MAUBS-SRA-XX-XX-SH-AR-31100-P04 Upper Brook Street Block Sheet 1 of 2
- MAUBS-SRA-XX-XX-SH-AR-31101-P04 Upper Brook Street Block Sheet 2 of 2
- MAUBS-SRA-XX-XX-SH-AR-31102-P05 Window Schedule Kincardine Road

All proposed glazing systems to noise-sensitive spaces are rated **41 or 42 dB Rw + Ctr** and would therefore be considered compliant with the minimum acoustic requirements specified above in Table 5-1.

All glazing should be well sealed when closed. It is imperative that frames / non-glazed curtain walling components do not compromise the performance of the glazing. No gaps should be visible around the frame from the exterior.

5.3 External wall

To control noise break-in from outside, it is considered good practice for the external wall panel construction to provide a sound reduction at least 10 dB above that of the glazing values given above.

External walls to habitable rooms comprise either Wall Type 2 (red coloured brick) or Wall Type 3 (buff coloured brick) as detailed in Figure 5-2 overleaf.

The expected sound insulation performance provided by both systems is expected to be greater than 10 dB above the minimum glazing performance requirements and proposals would therefore be considered acceptable from an acoustic perspective.

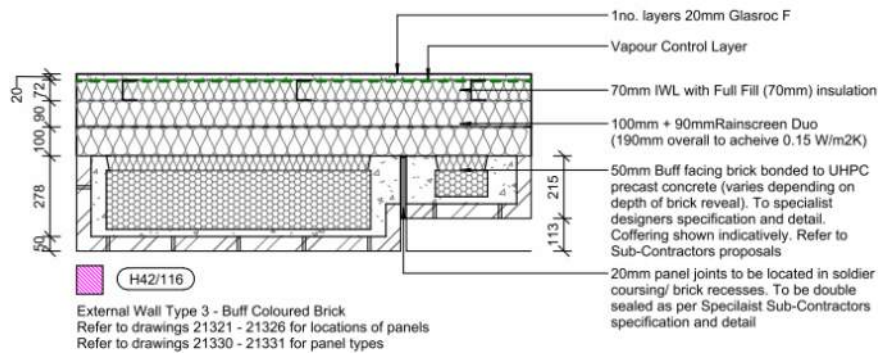
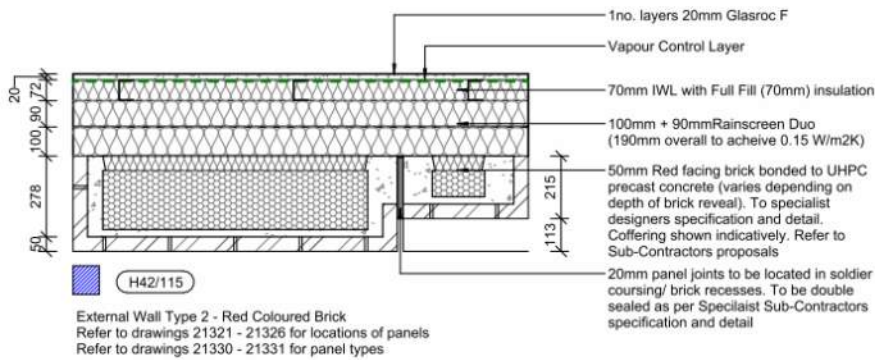
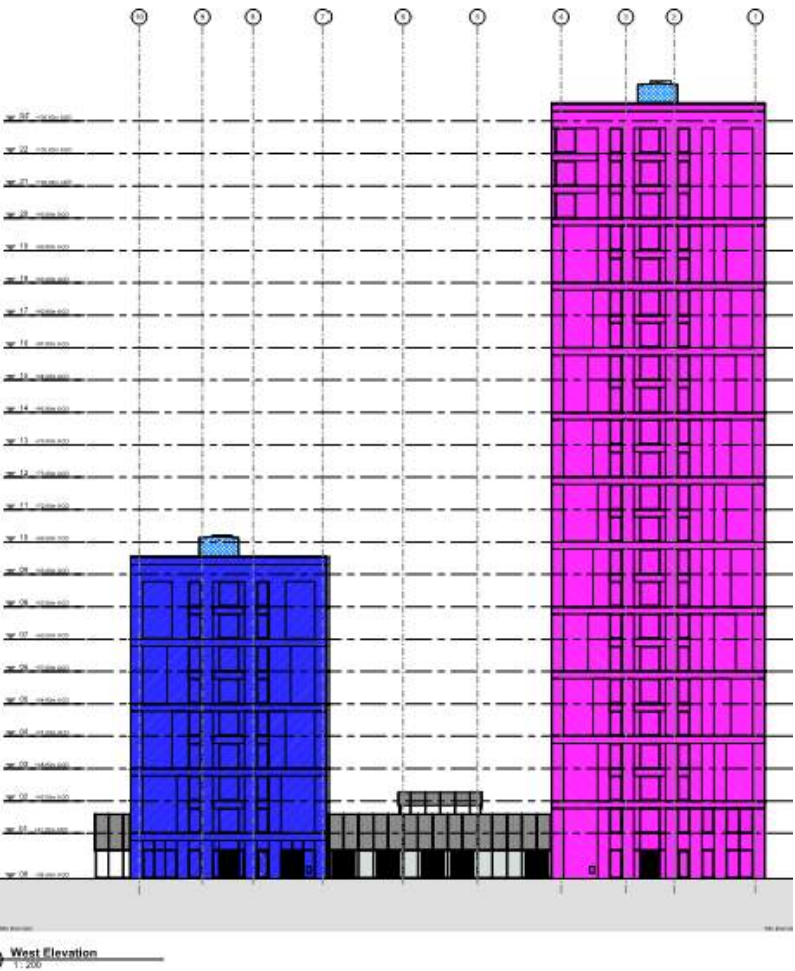


Figure 5-2: External wall types to residential areas

5.4 Overheating assessment

5.4.1 Approved Document O

A preliminary TM59 thermal comfort evaluation undertaken by TATE Consulting has determined that for summertime overheating, the requirements of Approved Document O will be satisfied with windows fully closed for the full night-time assessment periods between the hours of 11pm and 7am.

As such, since noise requirements for Approved Document O relate to open windows during night-time hours (23:00 – 07:00), compliance with this element of the Building Regulations should be achieved by default.

5.4.2 AVO Guide assessment

Where an AVO Guide Level 2 assessment is required for transport noise sources, Table 3-3 of the document presents a summary of the assessment of adverse effect based on internal ambient noise level and duration.

The AVO Guide risk criteria are summarised below, with corresponding external free-field façade levels also defined. This is based on the openable area required to mitigate overheating providing an external to internal noise reduction of 9 dB (opening area typically equivalent to 4% of floor area).

AVO risk category	Internal ambient noise levels $L_{Aeq,day}$ (07:00 – 23:00)	Corresponding external free-field façade level if windows are partially open $L_{Aeq,daytime}$ (07:00 – 23:00)
RED High Risk	>50 dB	>59 dB
AMBER Medium to Low	36 to 50 dB	44 to 59 dB
GREEN Negligible	≤35 dB	≤44 dB

Table 5-2: AVO Guidance for noise assessment of noise from transport noise sources relating to overheating condition.

Based on the above external free field façade criteria, external façade noise maps are presented below which detail the AVO guide risk categories across the site if relying on opening window ventilative cooling during the daytime assessment period.



Figure 5-3: AVO Guide risk categories across the scheme based on openable windows: View from Kincardine Road (upper), View from Upper Brook Street (bottom)

Whilst Table 3-3 of AVO provides no quantitative guidance regarding the combined effect of level and duration for the overheating condition, the outcome is summarised qualitatively in Figure 3-2 of the AVO Guide, as reproduced below.

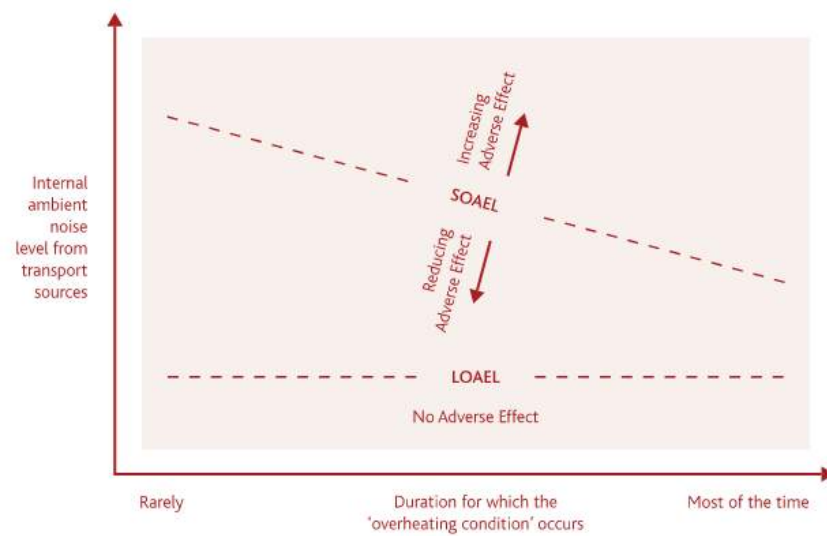


Figure 5-4: Figure 3-2 of AVO Guide

From the preliminary TM59 thermal comfort evaluation undertaken by TATE Consulting, compliance with the requirements of Approved Documents O and TM59 criteria for daytime hours have been demonstrated with the following conditions:

- **Studio bedrooms on elevation fronting onto Upper Brook Street:** No requirement for open window ventilative cooling during night-time. Very occasional requirement for open window ventilative cooling between 7pm-11pm (i.e. late evening once rush-hour noise levels have subsided). This overheating condition has been calculated by TATE to occur for a maximum of 0.5% annual occupied daytime hours (and 0.005% of total hours throughout the year)
- **All other cluster and studio bedrooms:** No requirement for open window ventilative cooling during daytime or night-time.

It is therefore expected that during very occasional daytime periods when ventilative cooling is required to control summertime overheating, levels of ≥ 50 dB $L_{Aeq,T}$ may be experienced in some habitable rooms.

However, the following context is considered applicable to the Development and should be considered when determine the outcomes of the AVO Guide Part 2 assessment and context within the Noise Exposure Hierarchy.

The majority of bedrooms across the development (>60%) are not reliant on open window passive ventilation.

No opening window ventilative cooling is required for the more sensitive night-time period. Night-time internal ambient noise levels are expected to be compliant with BS 8233 internal noise limits all year round.

Where daytime opening windows are required, this is confined to short periods in the evening once rush-hour traffic noise levels have subsided.

The road transport network is expected to be mostly electric vehicles in future years (as a result of both UK wide policy of the ban of new diesel and petrol cars by 2030 and MCCs own target of Manchester being a zero carbon city by 2038), and it is expected that this will further reduce noise from the road

transport network and therefore reduce the amount of bedrooms exposed to the highest risk category.

The current interdependency between acoustics, ventilation and overheating has been designed in line with the Noise Policy Statement for England (NPSE) vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on 'sustainable development'. In clarifying how the term 'the context of Government policy on sustainable development' should be interpreted, some assistance can be obtained from the Government decision letter associated with the Thames Tideway Tunnel project. In that letter, it is stated that:

"The National Planning Policy Framework, the National Planning Practice Guidance on noise and the Noise Policy Statement for England are all clear that noise management should be determined in the context of sustainable development including the environmental, economic and social benefits of the proposal."

The Planning Policy Guidance Noise (PPG(N)) states that local authority planning policies can include noise standards which apply to various forms of proposed development and locations in their area. The PPG(N), however, states that care should be taken to avoid these standards from being applied as rigid thresholds as specific circumstances may justify some variation being allowed.

Considering the above, and the illustration of the Cundall's interpretation of the daytime condition in the AVO diagram in Figure 5-5, the predicted levels are below the "SOAEL" level, and below a level at which noise causes a material change in behaviour in Table 3-3 of the AVO Guide.

They are therefore considered to be suitable for occupants given the very low overheating risk, and hence limited periods of time that windows are required to be open to mitigate overheating during the day (and with no requirement to open windows to mitigate cooling at night).

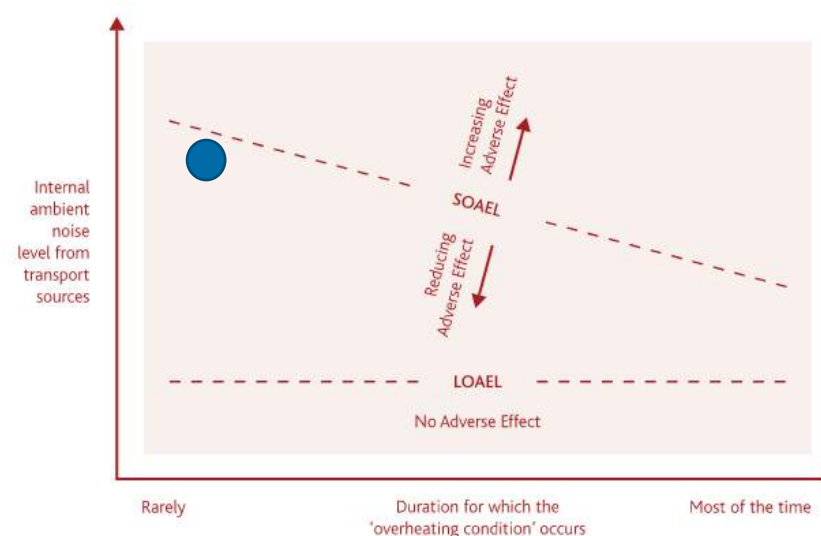


Figure 5-5: AVO Assessment

5.5 Wind noise

High wind speeds have the potential to generate noise and vibration within the building, particularly where light-weight building elements/façade details include holes, perforations, slots and sharp edges. It is recommended that the aerodynamics of any external building elements that are proposed should be reviewed by the project Wind Consultant in terms of their potential to generate noise and vibration.

5.5.1 Wind noise control

Some amplification of wind noise might result if the elements generating the tonal noise are rigidly fixed to the building envelope and match a natural resonance in the structure. Even without amplification, structure-borne noise may be transmitted to the interior as well as airborne noise.

Proposals for decorative amenity panels as detailed in the following drawing are reproduced in Figure 5-6.

- MAUBS-SRA-XX-XX-DR-AR-31700-P05 – External Metal Work – Purge Panel & Decorative Amenity Panel

The proposals include regular arrays of sharp-edged apertures with dimensions of less than 80 mm, which could potentially lead to vortex shedding. However, due to the relatively small area of each panel and the proximity of the panels to the glazing, the overall risk of wind noise generation is deemed low.

Accurately assessing the potential for wind noise impacts cannot be reliably achieved through desktop calculations alone. The only reliable method is to conduct laboratory wind tunnel testing on full-sized panels under varying wind speeds and incident angles.

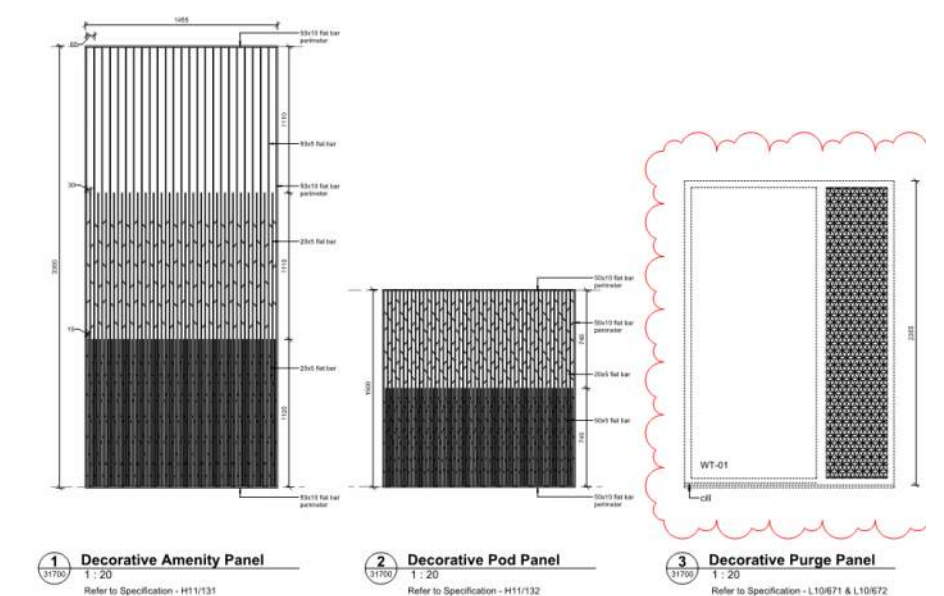


Figure 5-6: Amenity panels

