

32-34 Laystall Street Manchester

Stage 3 Acoustic Report
1001/AR1

25 November 2022

For:

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1.0 Introduction

This report outlines the acoustic requirements for the proposed residential development, reviews the current proposals and provides acoustic advice covering the following subjects:

- Indoor ambient noise levels (due to external noise intrusion and building services noise);
- Sound insulation between internal spaces;
- Reverberation times in common parts;
- Atmospheric plant noise emissions.

2.0 Requirements

The acoustic requirements for the development are taken from the following sources:

- Building Regulations Approved Document E 2010, "Resistance to the passage of sound" (ADE);
- Manchester City Council (MCC).

3.0 Indoor Ambient Noise Levels

3.1 Requirements

With regards to internal noise levels within the proposed residential flats Manchester City Council (MCC) have imposed the following condition (128911/FO/2020).

"30) NEW BUILD- Before the development commences a scheme for acoustically insulating and mechanically ventilating the residential accommodation against noise from adjacent roads shall be submitted to and approved in writing by the City Council as local planning authority.

The approved noise insulation scheme and vibration and reradiated noise mitigation measures shall be completed before any of the dwelling units are occupied. The following noise criteria will be required to be achieved:

*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}*

Prior to occupation a post completion report to verify that all of the recommended mitigation measures have been installed and effectively mitigate any potential adverse noise impacts in the residential accommodation shall be submitted and agreed in writing by the City Council as local planning authority. Prior to occupation any non compliance shall be suitably mitigated in accordance with an agreed scheme."

3.2 External Noise Intrusion

Our Acoustic Planning Report 1001/APR1 dated 14 November 2022 details the results of the environmental sound survey and acoustic specification for glazing/ventilation elements required across the proposed development in order to achieve the requirements.

3.3 Building Services Noise

Once detailed design proposals are developed an assessment of internal plant noise from the proposed plant items to the various internal spaces will be undertaken. This will determine whether any attenuation measures are required in order to achieve the proposed limits.

Manufacturers noise data for the following building services items should be forwarded for review:

- MVHR Units;
- Air Handling Units;
- Supply/Extract Fans;
- Chiller/Condenser Units;
- Pumps/Boosters;
- Standby Generator;
- Substation.

4.0 Sound Insulation

4.1 Requirements

4.1.1 Separating Walls & Floors

Building Regulations Approved Document E 2010, "Resistance to the passage of sound", provides performance standards for separating walls, separating floors and stairs that have a separating function. The table below presents the performance standards for purpose built flats.

Purpose built flats	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (Minimum values)	Impact sound insulation $L'_{nT,w}$ dB (Maximum values)
Walls	45	-
Floors and stairs	45	62

In addition, Building Regulations Approved Document E 2010 states the following with regard to communal or non-domestic spaces:

"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."

Plant rooms are situated at lower ground floor level. As such, the performance standards for normal domestic purposes may need to be increased between these spaces and adjoining flats.

Upon receipt of noise data for the items within the plantrooms, additional treatment will be proposed where required in order to achieve an appropriate level of sound insulation.

4.2.3 Corridor Walls

Building Regulations Approved Document E 2010 states the following with regard to corridor walls to purpose built flats:

"The separating walls described in this section should be used between corridors and rooms in flats in order to control flanking transmission and to provide the required sound insulation. However, it is likely that the sound insulation will be reduced by the presence of a door."

Corridor walls to proposed flats should therefore achieve the same minimum airborne sound insulation values as separating walls between proposed flats.

4.1.2 Internal Walls

Building Regulations Approved Document E 2010, provides performance standards for internal walls that separate a bedroom or a room containing a water closet and other rooms and internal floors. The table below presents the performance standards for purpose built flats.

Purpose built flats	Airborne sound insulation R_w dB (Minimum values)
Walls	40
Floors	40

Internal walls containing a door, or which separate an en-suite toilet from the associated bedroom do not need to achieve this requirement.

4.1.3 Doors

Building Regulations Approved Document E 2010 states the following with regard to doors to flats:

"Ensure any door has good perimeter sealing (including threshold where practical) and a minimum mass per unit area of 25kg/m². Alternatively, use a doorset with a minimum sound reduction index of 29dB R_w . (measured in the laboratory according to BS EN ISO 140-3:1995 and rated in according to BS EN ISO 717-1:1997)."

4.2 Separating Walls

Separating walls to flats should achieve a minimum on-site airborne sound insulation performance of $D_{nT,w} + C_{tr}$ 45dB.

It is understood that the separating walls between flats and between flats and corridors are to comprise the following construction:

- Wall Type P1-1;
- 2No. layers 15mm plasterboard (min. each 12.5kg/m²);
- Resilient bar;
- 104mm metal stud with 50mm mineral wool (10-30 kg/m³);
- Resilient bar;
- 2No. layers 15mm plasterboard (min. each 12.5kg/m²).

It is understood that the separating walls between flats and stairwells/lift shafts are to comprise the following construction:

- Wall Type P1-2;
- 3No. layers 15mm plasterboard (min. each 12.5kg/m²);
- Resilient bar;
- 104mm metal stud with 50mm mineral wool (10-30 kg/m³);
- Resilient bar;
- 3No. layers 15mm plasterboard (min. each 12.5kg/m²).

Due to the single stud constructions detailed above a high standard of workmanship will be required on-site in order for the specified constructions to achieve the minimum on-site airborne sound insulation requirement of $D_{nT,w} + C_{tr}$ 45dB along with suitable flanking details.

It must be ensured that plasterboard screws do not penetrate the metal studs and therefore bypass the resilient bars (i.e. correct length screws must be used for each of the 2 layers of plasterboard to ensure that the screws penetrate the resilient bars but do not contact the metal stud since this would reduce the performance).

Where lift shafts are adjacent to bedrooms/living rooms an independent wall lining is recommended on the bedroom/living room side in order to minimise structure borne noise transfer. This may typically comprise the following construction:

- **2No. layers 12.5mm plasterboard (min. each 10kg/m²);**
- **50mm mineral wool (10-30 kg/m³) between studs;**
- **Metal studs with min. 10mm clearance from the wall.**

4.3 Separating Floors

Separating floors to flats should achieve a minimum on-site airborne sound insulation performance of $D_{nT,w} + C_{tr}$ 45dB and a maximum on-site impact sound insulation performance of $L'_{nT,w}$ 62dB.

It is understood that the separating floor between ground floor flats and lower ground floor spaces is to comprise the following construction:

- Ground Floor;
- Floor finish;
- 75mm sand cement screed (T.B.C. kg/m²);
- 150mm rigid insulation;
- 250mm reinforced ground bearing concrete slab (T.B.C. kg/m²) or 160mm composite metal deck (T.B.C. kg/m²);
- Ceiling void (~250mm) containing 50mm mineral wool insulation (10-30kg/m³);
- MF system suspended on T.B.C. hangers;
- 1No. layer 12.5mm plasterboard (min. 10kg/m²).

This construction should be capable of achieving the minimum on-site airborne sound insulation performance of $D_{nT,w} + C_{tr}$ 45dB subject to suitable flanking details **(and confirmation of T.B.C. data)**.

The sand cement screed must not be continuous between flats as this would create a potential flanking path between flats. The suspended ceiling to plant areas may need to be uprated following the assessment of internal plant noise from the proposed plant items.

It is understood that the separating floor between upper floor flats is to comprise the following construction:

- Upper Floors;
- Floor finish;
- Resilient layer (T.B.C.);
- 160mm composite metal deck (T.B.C. kg/m²);
- Ceiling void (~250mm) containing 50mm mineral wool insulation (10-30kg/m³);
- MF system suspended on T.B.C. hangers;
- 1No. layer 12.5mm plasterboard (min. 10kg/m²).

This construction should be capable of achieving the minimum on-site airborne sound insulation performance of $D_{nT,w} + C_{tr}$ 45dB and a maximum on-site impact sound insulation performance of $L'_{nT,w}$ 62dB subject to suitable flanking details **(and confirmation of T.B.C. data)**.

It is understood that the floor finish will need to be removed and replaced when tenants of the flats change. In order to minimise any potential damage to the resilient layer a timber board with resilient layer bonded to the underside may be the best solution.

4.4 External Walls

It is understood that the external walls to flats are to comprise the following construction:

- Wall Type L3;
- 102mm Brickwork;
- 80mm cavity;
- 110mm mineral wool cavity insulation;
- Breather membrane;
- 1No. 12.5mm calcium silicate board;
- 100mm metal studs full fill with mineral wool insulation (T.B.C. kg/m³);
- 2No. layers 15mm plasterboard (min. each 12.5kg/m²).

The metal studs and external sheathing board are understood to be continuous past the slab edge and separating wall between flats. This is a potential flanking path between flats.

Met Structures have advised that previous developments using the same junction details as those proposed (i.e. without resilient bars) have achieved the airborne and impact sound insulation requirements for separating walls and floors to purpose built flats.

It is strongly recommended that 3No. adjoining flats (2No. adjacent and 1No. below) are fast tracked at construction stage for preliminary airborne/impact sound insulation tests in order to demonstrate compliance prior to the internal layers of plasterboard being installed to the external façade across the development.

Should the preliminary tests indicate a shortfall of the airborne/impact sound insulation requirements due to flanking via the external facade, this may be mitigated with the installation of resilient bars between the metal studs and internal layers of plasterboard to the external facade.

4.5 Internal Walls

Internal walls within flats should achieve a minimum sound reduction index of R_w 40dB unless they contain a door or separate an en-suite toilet from the associated bedroom.

It is understood that the internal walls within flats are to comprise the following constructions:

- Wall Type P1-3;
- 2No. layers 15mm plasterboard (min. each 12.5kg/m²);
- Resilient bar;
- 104mm metal stud with 50mm mineral wool (10-30 kg/m³);
- Resilient bar;
- 2No. layers 15mm plasterboard (min. each 12.5kg/m²).

It is understood that this is a loadbearing wall and as such the fire requirements dictate that the construction cannot be reduced. This system will achieve the minimum airborne sound insulation requirement of R_w 40dB.

- Wall Type P2;
- 1No. layer 12.5mm plasterboard (T.B.C. kg/m²);
- 70mm metal stud;
- 1No. layer 12.5mm plasterboard (T.B.C. kg/m²).

If the 12.5mm plasterboard is at least 10kg/m² then it will likely achieve the minimum airborne sound insulation requirement of R_w 40dB.

- Wall Type P3;
- 1No. layer 12.5mm plasterboard (T.B.C. kg/m²);
- 70mm metal stud with 25mm mineral wool (10-30 kg/m³);
- 1No. layer 12.5mm plasterboard (T.B.C. kg/m²).

If the 12.5mm plasterboard is at least 10kg/m² then the layer of mineral wool may be omitted and still likely achieve the minimum airborne sound insulation requirement of R_w 40dB.

It may be beneficial to have a single 70mm metal stud wall construction that achieves R_w 40dB to simplify the drawings/materials and avoid any potential confusion on site.

4.6 Doors to Flats

Entrance doors to flats should achieve a minimum sound reduction index of R_w 29dB.

4.7 Service Risers

Pipes and ducts are required to be enclosed full height where they penetrate separating floors between proposed flats. The enclosure should comprise a board material with a mass per unit area of at least 15kg/m² (typically 2No. layers of plasterboard) and the enclosure should be lined, or the duct/pipe should be wrapped within the enclosure with 25mm unfaced mineral wool.

In order to minimise fluid noise breakout the enclosure should not touch the pipe and changes in direction of the pipe should be avoided where possible and graduated where absolutely required. The use of acoustically treated pipe will further reduce fluid noise breakout.

For pipes below Level 01 in the entrance foyer and pipes below Level 00 in plantrooms and B.O.H. spaces, these will require the same level of acoustic treatment as a minimum. Upon receipt of noise data for the proposed plant items within the plantrooms, additional treatment will be proposed where required in order to achieve an appropriate level of sound insulation.

4.8 Steel Columns

Where steel columns are situated within stud walls they must not touch the studwork/plasterboard in order to minimise flanking.

4.9 Steel Beams

Where steel beams are situated within ceiling voids they must not touch the framework/plasterboard in order to minimise flanking.

4.10 Recessed Lighting

Recessed lighting should be carefully considered since it can reduce the acoustic performance of the ceiling in which they are installed. Where absolutely necessary, bulkheads, sacrificial ceilings or acoustic hoods to the rear of the fittings may be required.

4.11 Cavity Stops

Cavity stops are required at the following junctions unless the cavities are fully filled with insulation:

- Separating floors with external cavity wall constructions;
- Separating floors with separating cavity wall constructions;
- Separating walls with external cavity wall constructions;
- Separating walls with roof constructions.

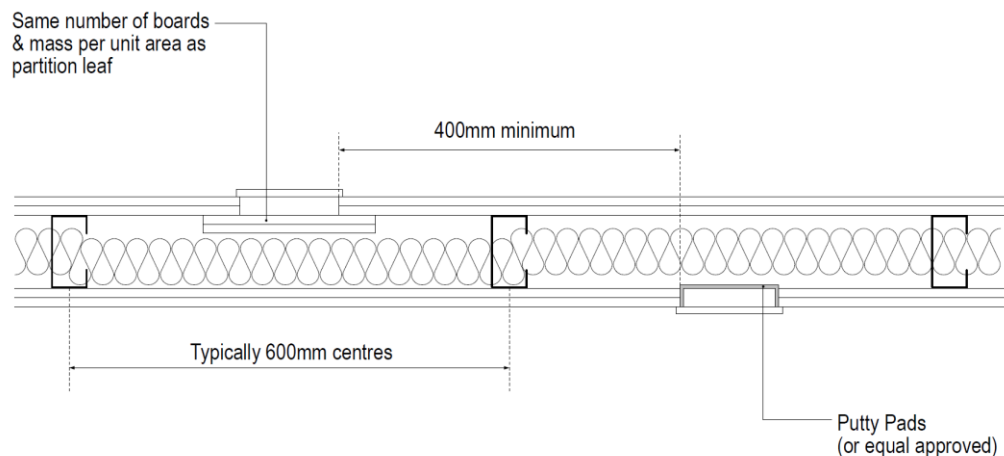
Neither ADE nor Robust Details specify performance criteria for cavity stops.

4.12 Ductwork

It is understood that there is no ductwork which is common between flats in the development. **Please advise if this is not the case.**

4.13 Sockets & Switches

Sockets and switches should ideally not be situated in separating walls between proposed flats. Where unavoidable, they must not be situated back to back and should be staggered by at least one stud width (e.g. 600mm) as indicated in the sketch below.



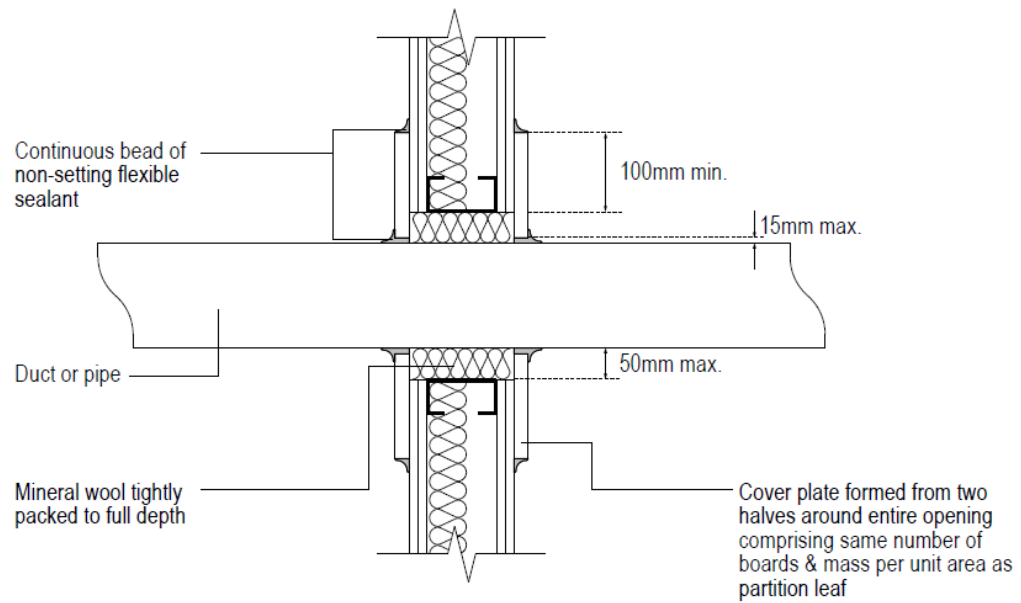
Sockets and switches should be boxed in to the rear with a material having the same mass per unit area as the wall leaf in which they are inserted. These socket boxes may either be constructed on-site or pre-manufactured products.

Alternatively, where multiple sockets/switches are unavoidable, a sacrificial layer may be added to form a services void to one/both sides of the separating wall construction. The width of the void should be the minimum required (e.g. 25mm) and be formed by fixing a stud/batten directly to the separating wall construction.

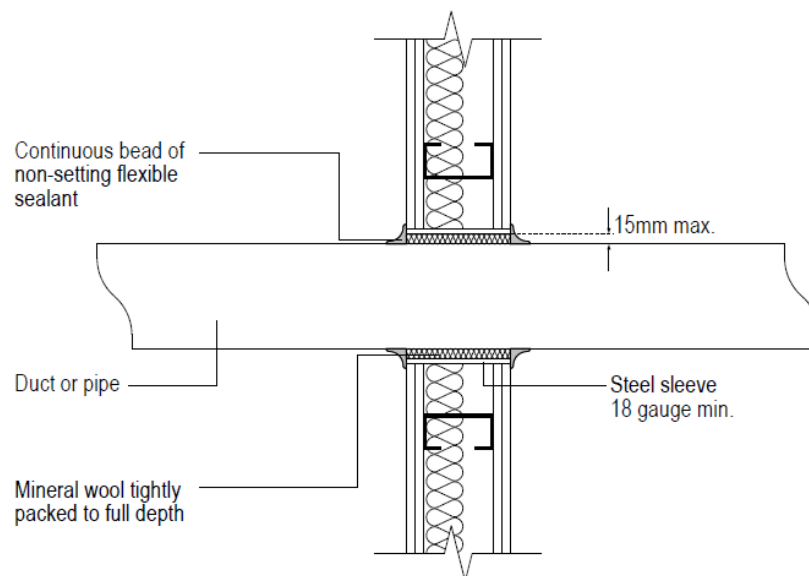
4.14 Penetrations

All penetrations of walls, partitions and floors by ducts, pipework and cables must be adequately sealed in order to minimise flanking as detailed in the sketches below. Penetrations to rooms should ideally be situated above the door as opposed to situated in separating walls between rooms.

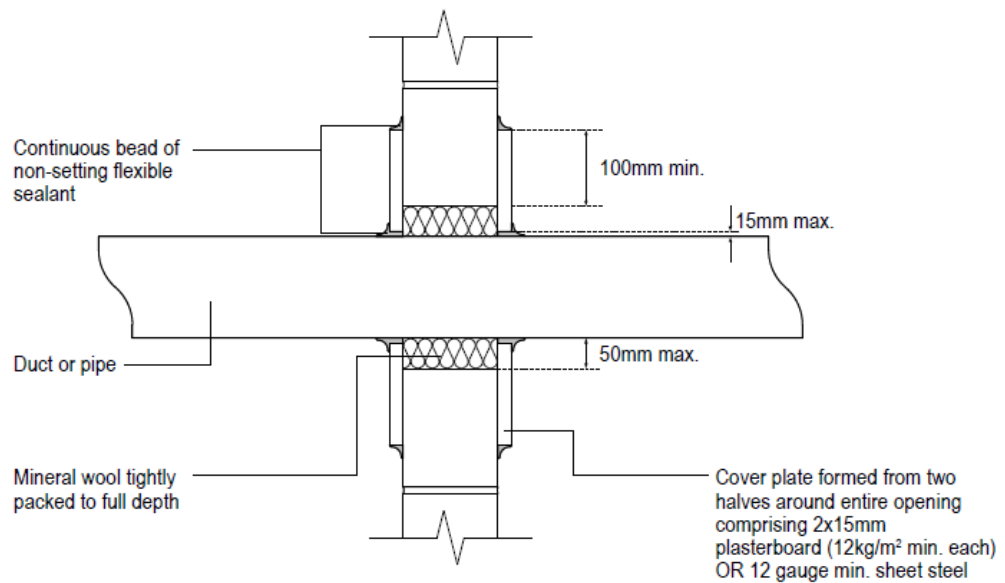
DRYWALL DETAIL - LARGE OPENING



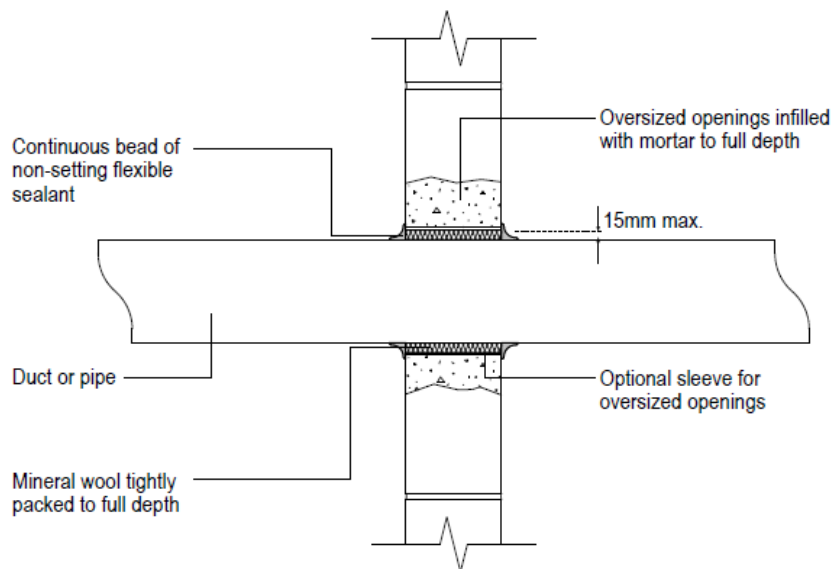
DRYWALL DETAIL - SMALL OPENING



MASONRY/CONCRETE DETAIL - LARGE OPENING



MASONRY/CONCRETE DETAIL - SMALL OPENING



5.0 Reverberation Times

5.1 Requirements

Building Regulations Approved Document E 2010, provides a requirement for reverberation in common parts of buildings (corridors, stairwells, hallways and entrance halls) which give access to flats.

The amount of additional acoustic absorption required is based on the dimensions of the space which is determined via calculations.

5.2 Absorbent Finishes

It is understood that all proposed flats are accessed via common corridors. As such, these will require acoustically absorbent treatment.

In the first instance, it is suggested that corridors which give access to proposed flats are carpeted and that the ceilings are fitted with a Class C absorbent treatment or better (i.e. suspended mineral fibre ceiling tiles, perforated metal ceiling tiles or perforated plasterboard).

6.0 Atmospheric Plant Noise Emissions

6.1 Requirements

With regards to atmospheric plant noise emissions from proposed plant items Manchester City Council (MCC) have imposed the following condition (128911/FO/2020).

"28) NEW BUILD- Prior to occupation of the residential accommodation a scheme for the acoustic insulation of any externally mounted ancillary equipment (including any Mechanical Ventilation Heat Recovery (MVHR) systems associated with the development to ensure that it achieves a background noise level of 5dB below the existing background (LA90) at the nearest noise sensitive location shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be completed before the premises is occupied and a verification report submitted for approval by the City Council as local planning authority and any non compliance suitably mitigated in accordance with an agreed scheme prior to occupation. The approved scheme shall remain operational thereafter."

6.2 Atmospheric Plant Noise Emission Limits

As detailed in our Acoustic Planning Report 1001/APR1 dated 14 November 2022, the lowest representative daytime and night-time $LA_{90,15min}$ background sound levels measured at each position during the survey period are detailed in the table below.

Position	Lowest Representative $LA_{90,15min}$ Background Sound Levels (dB)	
	Daytime	Night-time
A (Pigeon Street)	49	45
B (Brock Street)	49	46

Based on the requirements and the lowest representative background sound levels, cumulative atmospheric plant noise emissions should not exceed the following limits at the nearest noise sensitive receptors.

Position	L _{Aeq} Cumulative Atmospheric Plant Noise Emission Limits (dB) at Nearest Noise Sensitive Receptors	
	Daytime (07:00–23:00)	Night-time (23:00–07:00)
A (Pigeon Street)	44	40
B (Brock Street)	44	41

The above atmospheric plant noise emissions limits are subject to final approval by MCC.

Plant noise emissions should be assessed in terms of BS 4142: 2014.

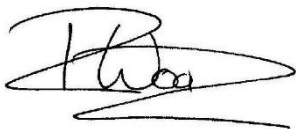
Building services proposals should be designed to achieve the cumulative atmospheric plant noise emission limits at the nearest noise sensitive receptors.

6.3 Plant Items

Once detailed design proposals are developed an assessment of atmospheric plant noise emissions from the proposed plant items to the nearest noise sensitive receptors will be undertaken. This will determine whether any attenuation measures are required in order to achieve the proposed limits.

Manufacturers noise data for the following building services items should be forwarded for review:

- MVHR Units;
- Air Handling Units;
- Supply/Extract Fans;
- Chiller/Condenser Units;
- Pumps/Boosters;
- Standby Generator;
- Substation.



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