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Renaissance (Residential), Manchester

Environmental Noise Study

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1.0 SUMMARY

Fisher Acoustics Ltd has been commissioned by Deansgate SOF Alliance LeaseCo Limited, a joint venture between Property Alliance Group (PAG) and an affiliate of Starwood Capital (SCG), to conduct an environmental noise study relating to a proposed residential development at Renaissance, Deansgate, Manchester.

An assessment of environmental noise around the proposed site has determined the pre-existing environmental noise levels during the day and night at and around the site.

The recommended acoustic performance of the curtain wall and windows to achieve the recommended internal noise levels within apartment rooms has been determined. In particular, it has been determined that double glazed units that achieve specific acoustic performances would be acoustically suitable for the windows and the vision panels of the curtain wall to the proposed apartments.

The expected acoustic sound insulation performance of the solid elements of the façade are also identified.

Overall environmental noise limits have also been recommended for building services plant serving the development and in relation to noise egress from the proposed commercial units on the ground floor of the Development.

Internal activity noise limits are also given for the proposed commercial units.

2.0 INTRODUCTION

Fisher Acoustics Ltd has been commissioned by Deansgate SOF Alliance LeaseCo Limited, a joint venture between Property Alliance Group (PAG) and an affiliate of Starwood Capital (SCG) to conduct an environmental noise assessment relating to a full planning application for the residential element of its wider masterplan proposals for a mixed-use development at the Renaissance hotel complex. The proposals provide for a new residential development at ground plus twenty seven storeys that will provide approximately three hundred residential units with ground floor retail/ leisure units, supported by amenity space, including new riverside public realm with a new food and beverage offer, as well as riverside amenity space and communal and private roof terraces for new residents.

This report examines the pre-existing environmental noise conditions at the site and advises on the required sound insulation performance of façade elements to habitable rooms to achieve recommended internal noise criteria.

The steps undertaken in compiling this study are as follows:

- Assessment of daytime and night time external noise survey data to determine the typical levels of noise at the site during daytime and night time periods
- Calculation of the required sound reduction index of the vision panels and non-vision panels of the curtain wall to habitable rooms to allow the achievement of appropriate internal noise levels due to external noise sources.
- Determination of suitable overall noise limits for building services plant to safeguard residential amenity
- Calculation of noise egress from the proposed commercial units at ground floor of the Development.

Ordinarily an environmental noise assessment relating to a proposed residential development would involve the carrying out of an external noise survey to determine the pre-existing noise levels at and surrounding the development site due to typical external noise sources. However, due to reduced road traffic volumes and general activity in line with government guidelines relating to the ongoing Coronavirus pandemic at the time of the technical assessments discussed herein, it was not considered possible to obtain representative noise levels at noise sensitive receptors around the proposed development site.

Therefore, and in accordance with guidance published by the Association of Noise Consultants [ANC] and the Institute of Acoustics [IOA] 'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments', in order to establish appropriate environmental noise limits for the proposed development, this report references the England Noise and Air Quality Viewer published online by Extrium. The Noise Quality Viewer presents the results of the DEFRA strategic noise mapping study carried out in 2017 and can be accessed at http://www.extrium.co.uk/noiseviewer.html.

In addition, the results of previous environmental noise surveys undertaken by others around the development site have been reviewed with reference to reports published on the Manchester City Council Planning webpages.

During the detailed design phases of the development, on-site daytime and night time noise surveys will be conducted and the recommendations detailed in this report will be re-assessed as necessary..

The above approach has been discussed and agreed with Graeme Souter, Environmental Protection officer at Manchester City Council.

3.0 DESCRIPTION OF SITE

General Site Description

The site forms part of the wider Renaissance Hotel complex which has been a longstanding strategic regeneration priority for Manchester City Council (MCC) and is the last remaining undeveloped site within the 1999 City Centre Masterplan.

The site is located at the junction of Deansgate and Blackfriars Street within Manchester's central business district. The site currently comprises a vacant 15-storey, 203 bedroom hotel building, a multi-storey car park, a restaurant and a former office building (Premier House) which has been vacant for many years.

The wider site is bounded to the north by Victoria Bridge Street, Blackfriars Street to the South, to the east by Deansgate and to the west by the River Irwell.

Further to the west, across the River Irwell are Travelodge and Premier Inn hotels. Further to the north-east, east and south are retail outlets and shopping malls, offices, restaurants and pubs. To the north of the site are the premises of a former nightclub, the Bijou Club. It is understood that the night club is now closed. A new commercial venture is understood to be proposed for the premises.

Deansgate is a major road within the City Centre that is heavily trafficked with HGV's, cars and vans accessing the city. Victoria Bridge Street and Blackfriars Street are also normally heavily trafficked with HGV's, cars and buses. Deansgate, Blackfriars Street and Victoria Bridge Street are bus routes.

Figure 1 shows the overall Renaissance Development site in the context of the surrounding roads and buildings. Figure 1 also identifies the proposed footprint of the residential building.

Figure 2 shows the site boundary for the proposed residential development and the proposed footprint of the residential building.

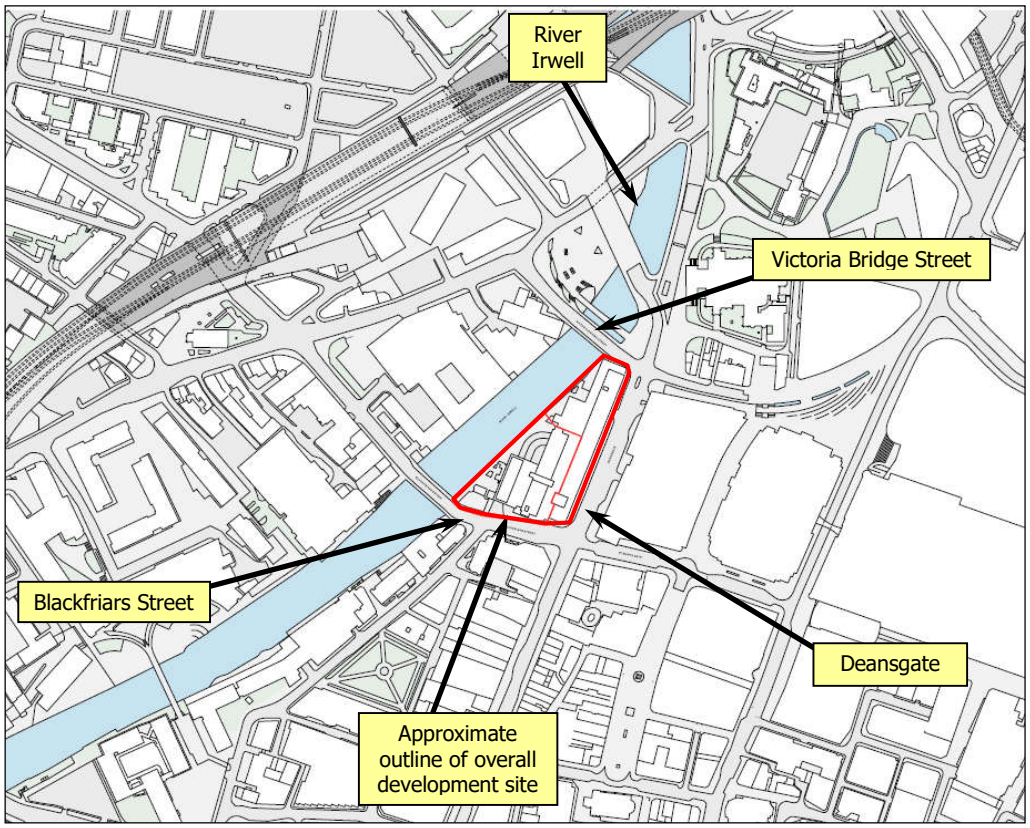

Figure 1: Site location plan – Renaissance Masterplan

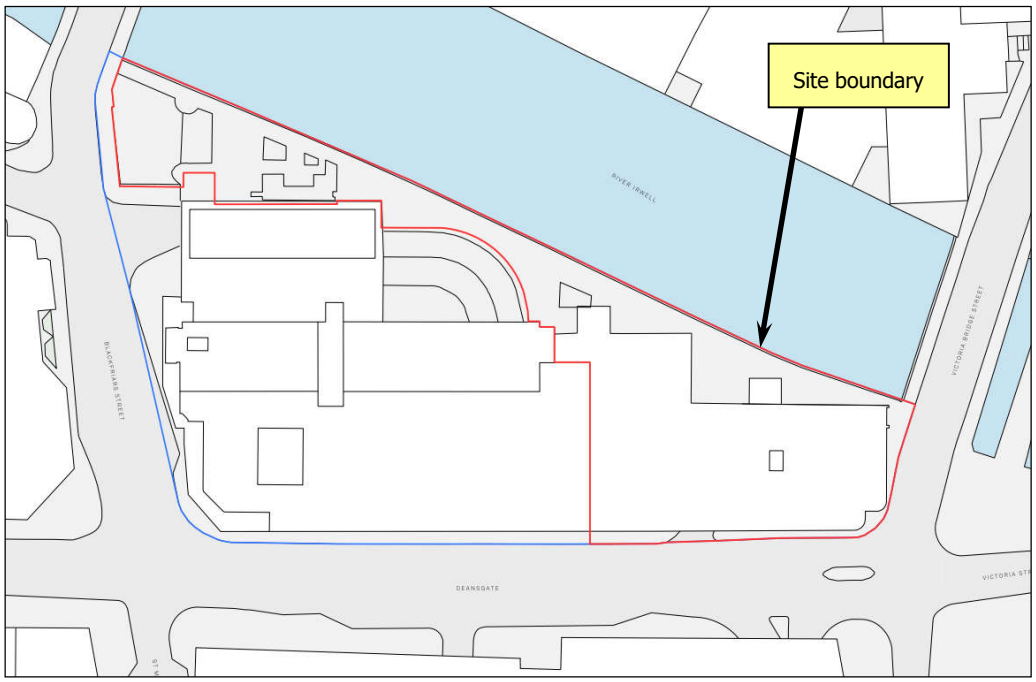

Figure 2: Site boundary plan for proposed residential development

4.0 DESCRIPTION OF PROPOSED DEVELOPMENT

Specific Development Description:

Erection of a part ground + 13 storey, part ground + 26 storey building to form 300 no. residential apartments and ground floor retail/ leisure floorspace (Class E/ Sui Generis), together with private amenity space for residents, new public realm including riverside walkway and leisure/ food and beverage space (Class E/ Sui Generis), new landscaping, parking, servicing, supporting infrastructure and associated works.

The proposed uses within the residential building are as follows:

- Level -02: Car parking
- Level -01: Apartments, Cinema Room, Postal Lounge, Accessible WC/Shower, Parcel Store, Cycle Store, Comms Room
- Ground Floor: Apartments, Reception, Parcel Store, Retail Units, Refuse Store, Substation, Switch Room
- Mezzanine Level: Apartments, Residents Gym, Yoga Studio, Accessible WC/Shower
- Level 01 to Level 13: Apartments
- Level 14: Apartments, Communal Roof Terrace
- Level 15-26: Apartments
- Level 27: Private Roof Terrace

The apartments of the proposed development are to be provided with continuously running supply and extract ventilation in order to achieve the background ventilation requirements of Approved Document F of the Building Regulations. Therefore, no passive trickle ventilators are required within the façade of the proposed habitable rooms. Purge ventilation is to be achieved through via opening windows.

Figure 3 shows the proposed ground floor plan of the building.

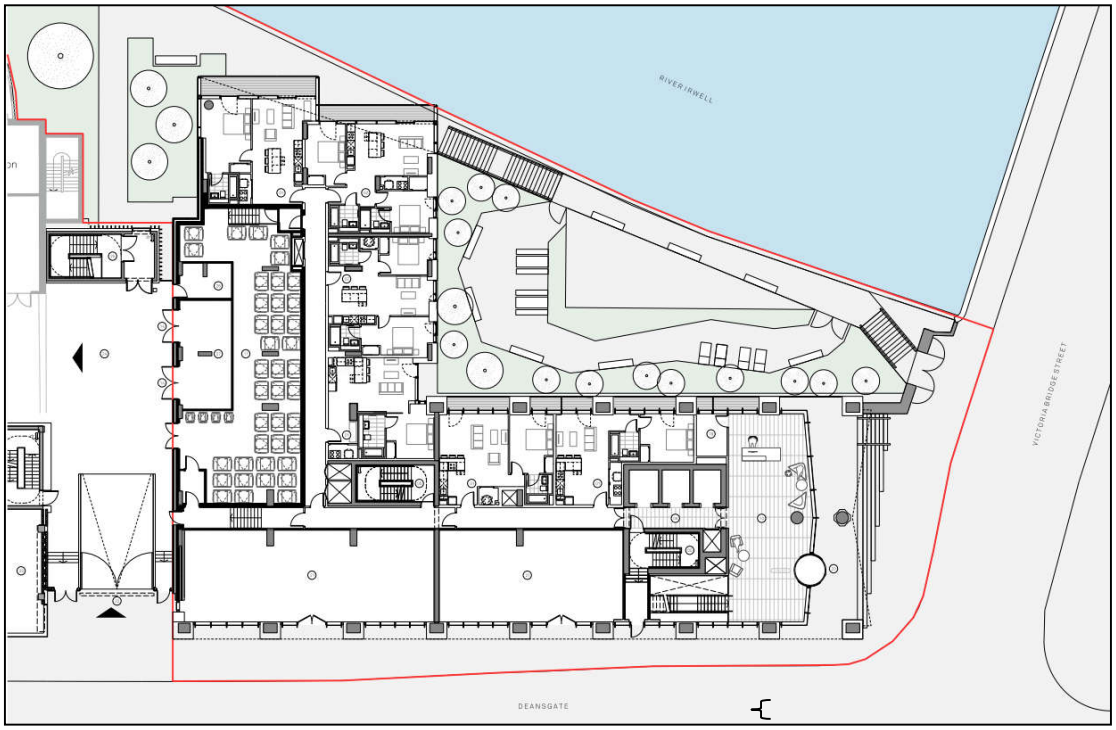

Figure 3: Ground Floor Plan

5.0 RELEVANT GUIDANCE DOCUMENTS

NATIONAL PLANNING POLICY

The National Planning Policy Framework (NPPF), published in July 2021 by the Ministry of Housing, Communities and Local Government 'sets out the Government's planning policies for England and how these should be applied'.

Clause 174 of the National Planning Policy Framework states that 'Planning policies and decisions should contribute to enhance the natural and local environment by:

> 'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'.

Clause 185 of the National Planning Policy Framework states:

> "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:
>
> a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
>
> b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
>
> c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

The National Planning Policy Framework document cross references the 'Explanatory Note to the Noise Policy Statement for England'. The 'Noise Policy Statement for England' (NPSE) was published by the Department for Environment Roof and Rural Affairs in March 2010.

The NPSE does not give suggested external noise criteria for commercial Developments. In the absence of specific criteria, reference shall be made in this document to established guidance and principles, as established in British Standards and the local Planning policy.

National Planning Practice Guidance – Noise

'Planning Practice Guidance – Noise' is a web-based resource provided by the Ministry of Housing, Communities and Local Government (last revision date 22 July 2019) which gives guidance on Planning considerations in relation to noise.

The document identifies the subjective grading of noise and the recommended actions and different effect levels. Again, as Planning Practice Guidance – Noise' does not refer to objective criteria, reference shall be made in this document to established guidance and principles, as established in British Standards and the local Planning policy

LOCAL PLANNING POLICY

Manchester City Council's Core Strategy was adopted on 11th July 2012 and is the key Development Plan Document in the Local Development Framework (LDF).

Section 13.6 'Development Management' of the Core Strategy states that 'all new developments should follow the 'Development Principles' and accord with the design guidance set out in the Supplementary Planning Documents.

Policy DM 1, 'Development Management' of the Core Strategy states that:

- All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:-Effects on amenity, including …..noise, vibration…. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.

'Planning & Noise, Technical Guidance', dated December 2015 has been issued by the Environmental Protection, Environmental Health and The Neighbourhoods Service sections of Manchester City Council. The document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development. Reference is also made in the document to the relevant supporting information and guidance documents that Developers are expected to refer to when submitting a planning application.

Internal noise criteria

Internal noise levels within the proposed living accommodation must be appropriate for the intended use.

With regard to noise ingress to residential dwellings, section 3.5 'National & International Standards' of the 'Planning & Noise, Technical Guidance' advises that Manchester City Council has adopted the internal noise limits for residential properties identified in Table 1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq, 16 hours}$	-
Dining	Dining room / area	40 dB $L_{Aeq, 16 hours}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 hours}$	30 dB LAeq, 8 hours 45dB LAmax (fifteen excesses over 45dB LAmax allowed per night)

Table 1: Intrusive noise criteria

Building Services Noise

With regard to external noise due to building services plant, Section 3.6.1.5.1 of 'Planning & Noise, Technical Guidance' states:

- 'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'

Noise from Commercial Operations

Noise egress from the proposed commercial units at the development must be controlled to appropriate levels so as to avoid noise nuisance to existing sensitive receptors.

With regard to entertainment venues, 'Planning & Noise, Technical Guidance' states:

- 'When considering the potential impact of a proposal for an entertainment venue, consultants should consider the overall noise level (LAeq) and the 63 Hz and 125 Hz octave band noise levels (Leq). Music noise in the 63 Hz and 125 Hz octave bands, which is often described as "bass noise", is particularly difficult to contain and the impulsive character of this low frequency music noise is particularly disturbing for local residents exposed to it'.

- 'A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

  Entertainment noise (LAeq) should be controlled to 10dB below the background noise level (LA90) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

6.0 ENVIRONMENTAL NOISE SURVEY

At the time of the assessments discussed herein, due to reduced road traffic volumes and general activity in line with government guidelines relating to the ongoing Coronavirus pandemic, it was not considered possible to obtain representative noise levels at the noise sensitive receptors around the proposed development site.

Therefore, as agreed with Manchester City Council, in order to determine the typical environmental noise levels in the area, reference has been made to the England Noise and Air Quality Viewer published online by Extrium. The Noise Quality Viewer presents the results of the DEFRA strategic noise mapping study carried out in 2017 and can be accessed at http://www.extrium.co.uk/noiseviewer.html.

Figure 4 shows the calculated annual average daytime noise levels for the 16-hour period between 0700 hrs and 2300 hrs ($L_{Aeq,16\ hrs}$) at and around the proposed site.

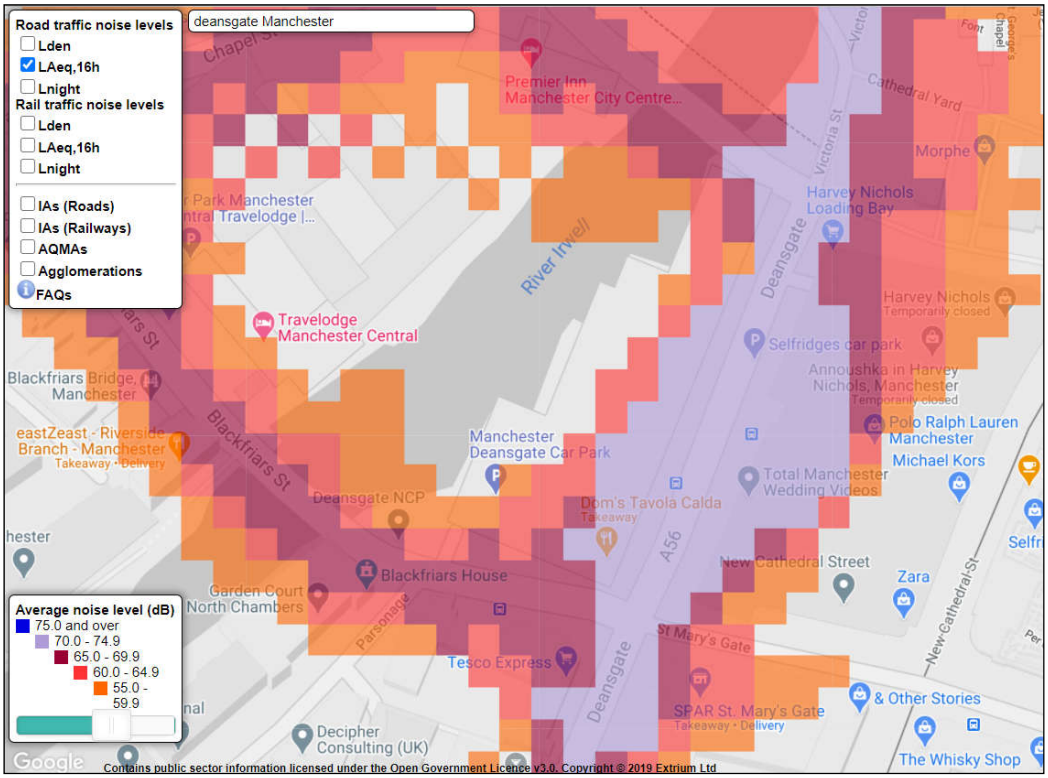

Figure 4: Extrium (© 2019) Noise database (Daytime) - Proposed Renaissance site

Figure 5 shows the calculated annual average night time noise levels for the 8-hour period between 2300 hrs and 0700 hrs ($L_{Aeq,8\ hrs}$) at and around the proposed site.

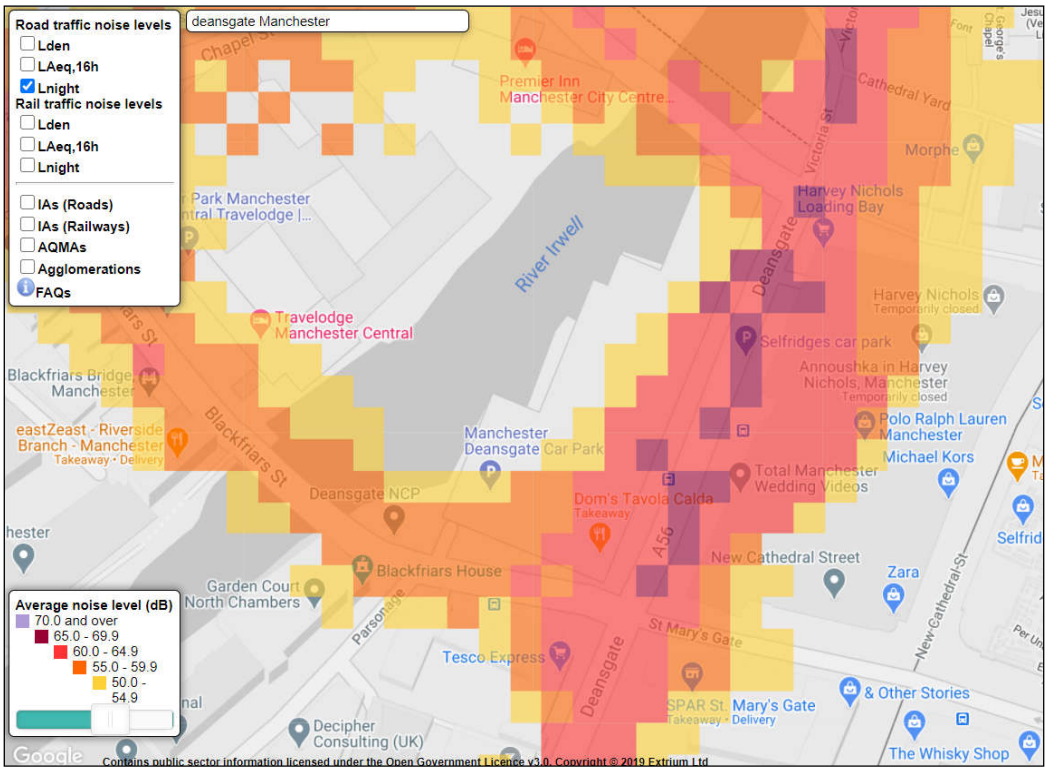

Figure 5: Extrium (© 2019) Noise database (Night-time) - Proposed Renaissance site

In addition, reference has been made to the results of relatively recent environmental noise surveys undertaken by others in support of planning application 126328/FO/2020 - Speakers House, 39 Deansgate, Manchester, planning application 121979/ FO/ 2018 - Blackfriars House, Parsonage, Manchester, M3 2JA and planning application 117864/FO/2017 – No.1 Deansgate, as published on the Manchester City Council Planning web pages.

Previous noise surveys conducted in the area by Fisher Acoustics has shown that at night time, particularly at the weekend, Deansgate can be subjected to high levels of noise generated by high-performance vehicles. Noise data held on file for such vehicles has been used to determine the potential weekend night time noise maxima alone Deansgate and Victoria Bridge Street. Noise surveys conducted during the detailed design stage of the proposed development will confirm if such vehicles remain a feature of the weekend noise climate along Deansgate.

The long-term noise environment at and around the Application Site is determined by road traffic on Deansgate, Blackfriars and Victoria Bridge Street.

With reference to the above-noted sources of information, the external noise levels expected upon the general return to pre-pandemic levels of daytime and night time activity have been estimated. The expected typical free-field noise levels are summarised in Table 2.

Location	**Measured Noise Level**			
	Daytime (7 am to 11 pm)		**Night time (11 pm to 7 am)**	
	dB, L_{Aeq}	**dB L_{A90}**	**dB, L_{Aeq}**	**dB L_{A90}**
Deansgate	70	60	65	53
Blackfriars Street	65-70	55	60-65	50
Victoria Bridge Street	65-70	55	60-65	50
River Irwell	57	50	54	47

Table 2: Summary of expected environmental noise levels

7.0 NOISE INGRESS

By taking into account the measured levels of noise at the site, the areas of façade elements and the likely reverberation time of the apartment rooms, the required sound insulation performance of the facade elements to achieve the target internal noise criteria can be determined.

As described above, the proposed ventilation strategy is such that trickle ventilators within the façade will not be required to achieve the requirements of Approved Document F of the Building Regulations for the proposed habitable rooms.

Design recommendations

Calculations of noise ingress have been carried out to determine the façade specifications to achieve the internal noise criteria detailed in Section 5 of this report. The calculations are based upon the glazing areas and room sizes and layouts shown on the drawings submitted for Planning purposes.

Curtain Wall

It has been determined that a range of acoustic specifications for the curtain wall vision panels to the proposed apartment rooms will be required to achieve the recommended internal noise levels. Figures 6 to 10 identify the locations of the various recommended specifications. The window acoustic specifications are detailed below.

Table 3 identifies the minimum recommended sound reduction index of the curtain wall specifications referred to below and in Figures 6 to 10. The recommended performance values in Table 3 relate to the composite performance of the full curtain wall assembly including glazing, frames and seals. Confirmation must be provided by the curtain wall contractor that the performance requirements will be achieved by the proposed systems.

As discussed above, prior to the Covid pandemic, high levels of weekend night time noise was generated along Victoria Bridge Street and Deansgate by high-performance vehicles. Noise data held on file for such vehicles has been used to determine the potential night time noise maxima alone Deansgate and Victoria Bridge Street.

In turn, these high levels of external noise have influenced the required sound insulation performance of the curtain wall to achieve the internal noise criteria. The performance requirements identified for the curtain wall and detailed in Table 3 are therefore considered to be worst-case.

Noise surveys conducted during the detailed design stage of the proposed development will confirm if such high performance requirements remain appropriate.

Window type (See Figure 4)	**Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
TYPE A	28	35	40	46	47	51	55
TYPE B	27	31	36	42	42	48	52
TYPE C	25	27	32	37	43	46	50
TYPE D	21	28	34	38	38	36	45

Table 3: Minimum Recommended Sound Reduction Index of windows

To provide an indication of the glass thicknesses and type that are likely to be required, the following glazing configurations are expected to allow compliance with the above acoustic performance values:

- Type A: 14.8 mm acoustic laminate / 24 mm cavity / 10.8 mm acoustic laminate
- Type B: 12 mm / 20 mm cavity/ 8.8 mm acoustic laminate
- Type C: 10 mm / 15 mm cavity / 8.8 mm acoustic laminate
- Type D: 10 mm / 12 mm cavity / 6mm

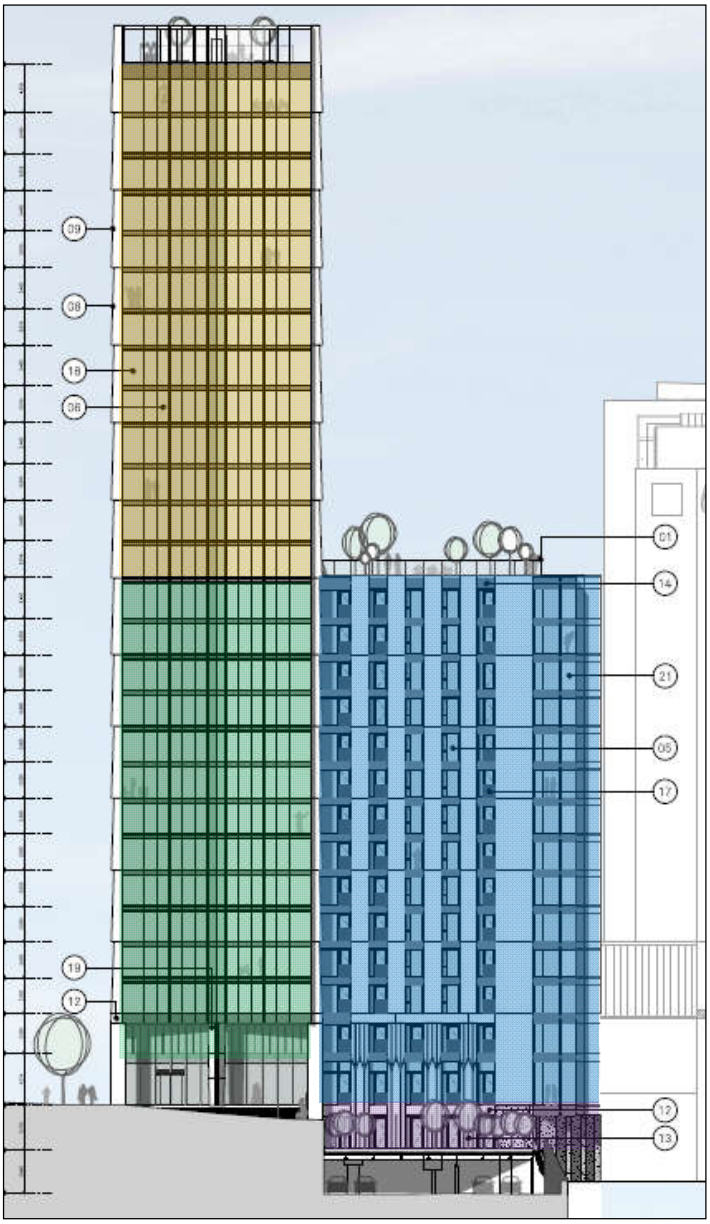

Figure 6: Acoustic specification location plan, north elevation, Living Room & Bedrooms

KEY

Acoustic Spec A

Acoustic Spec B

Acoustic Spec C

Acoustic Spec D

Figure 7: Acoustic specification location plan, east elevation (Deansgate), Living Rooms

KEY

Acoustic Spec A

Acoustic Spec B

Acoustic Spec C

Acoustic Spec D

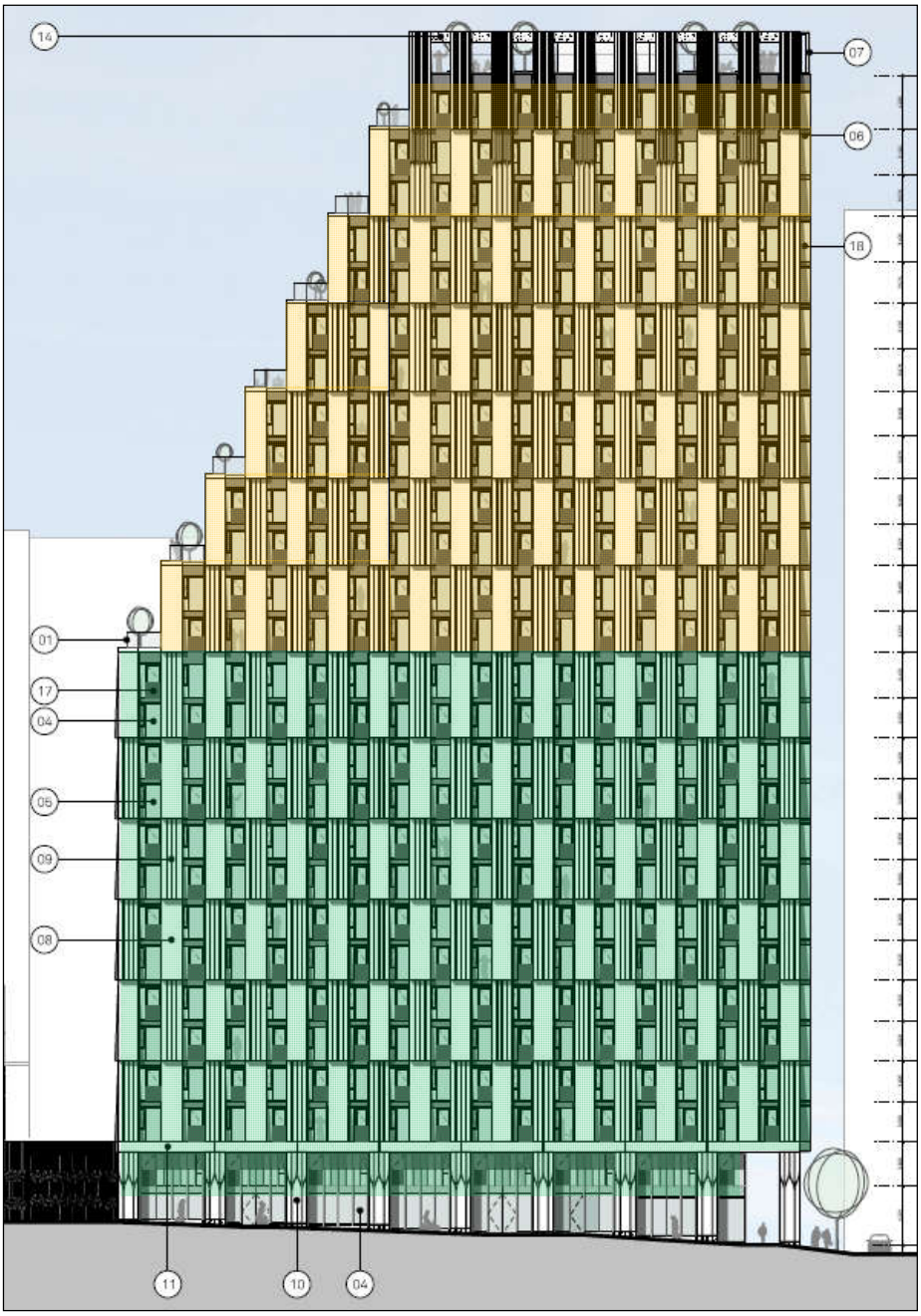

Figure 8: Acoustic specification location plan, east elevation (Deansgate), Bedrooms

KEY

Acoustic Spec A

Acoustic Spec B

Acoustic Spec C

Acoustic Spec D

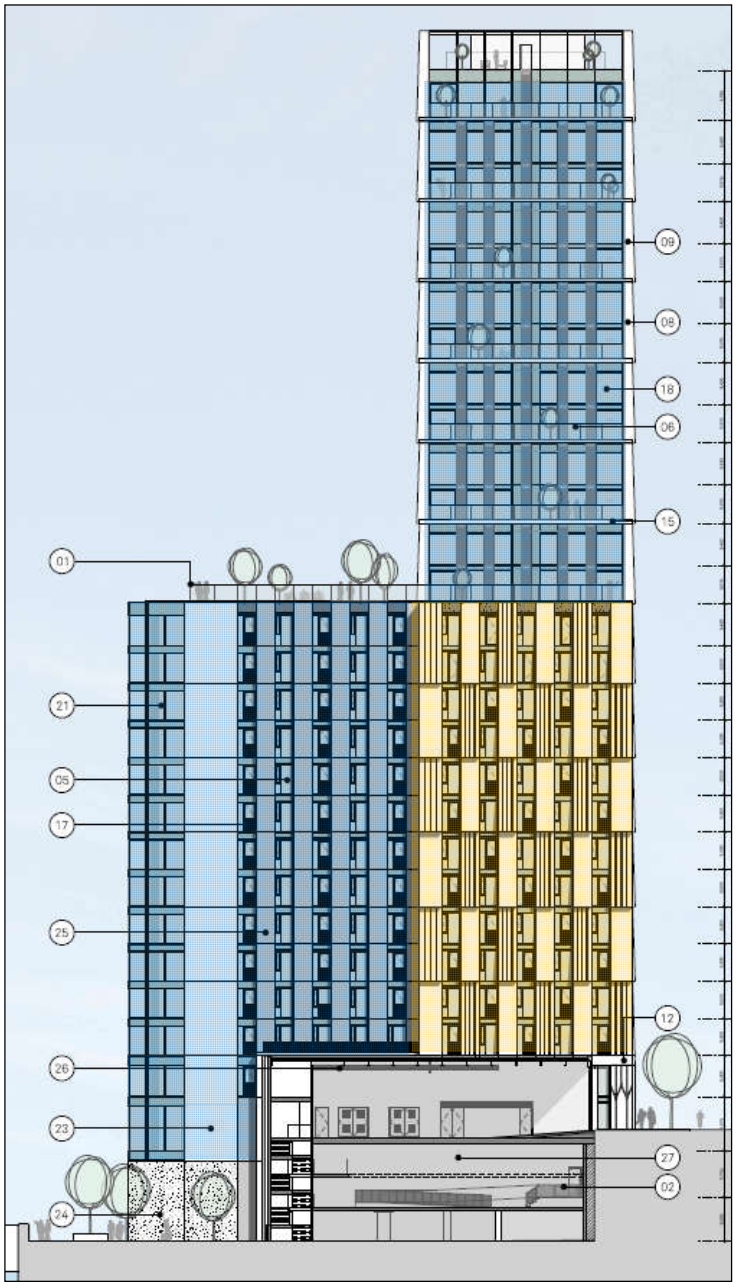

Figure 9: Acoustic specification location plan, south elevation, Living Rooms & Bedrooms

KEY

Acoustic Spec A

Acoustic Spec B

Acoustic Spec C

Acoustic Spec D

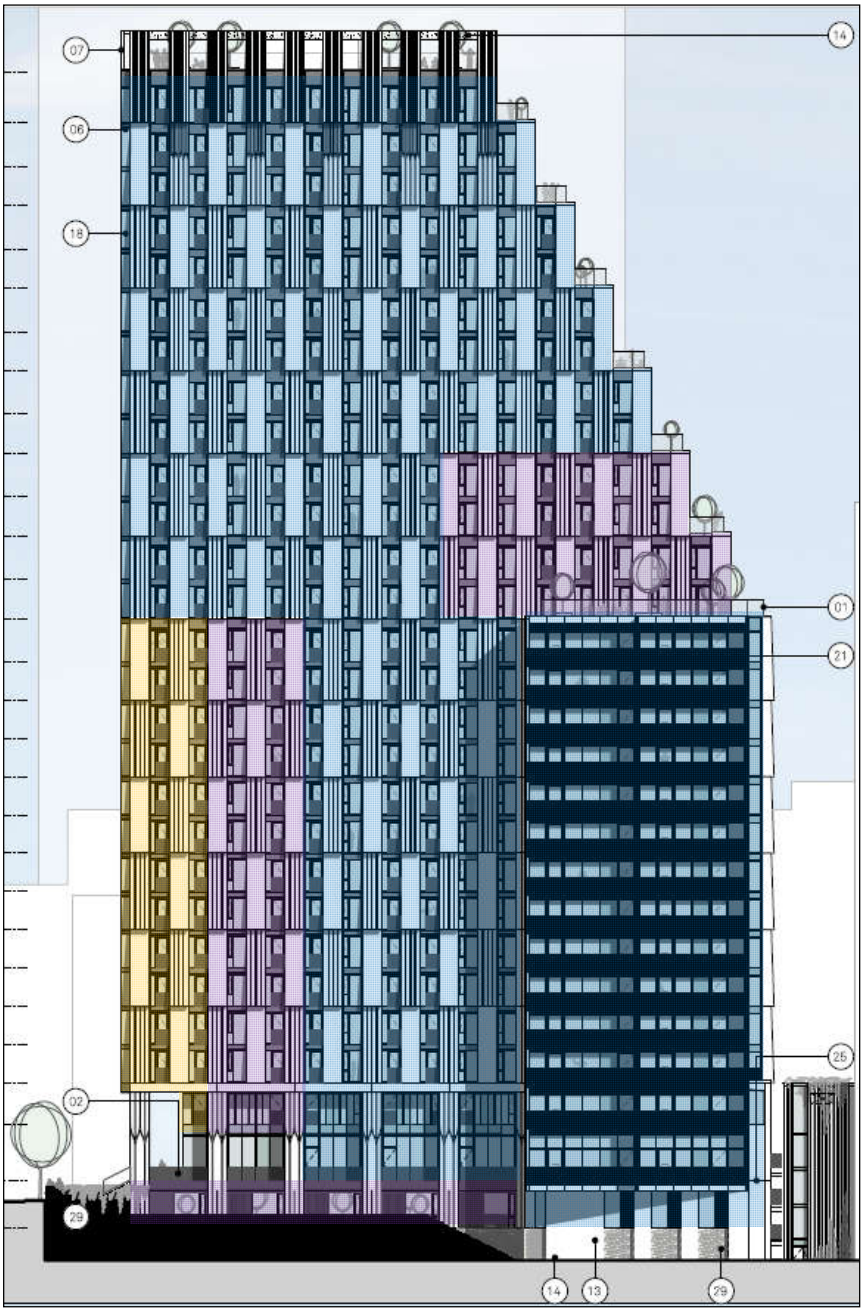

Figure 10: Acoustic specification location plan, west elevation, Living Rooms and Bedrooms

KEY

Acoustic Spec A

Acoustic Spec B

Acoustic Spec C

Acoustic Spec D

External Wall

It is understood that the external wall of the proposed apartments is to be formed by an external concrete panel of approximate thickness 150 mm, drylined and thermally insulated internally.

Table 4 identifies the minimum expected sound reduction index of the drylined external wall to the apartments.

External Wall Construction	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
External concrete panel: 150 mm thick, drylined internally	35	42	48	55	58	63	65

Table 4: Minimum recommended Sound Reduction Index of external wall construction

Roof

The principle acoustic elements of the proposed roof of the development are a concrete slab and a ceiling that comprises a single layer of 12.5 mm wallboard fixed to a suspended metal frame. The expected minimum weighted sound reduction index of the roof construction is 60dB Rw. This performance is fully commensurate with the achievement of the target internal noise levels within the proposed apartments.

External noise ingress via MVHR ductwork

It is possible that in-line ductwork silencers would need to be introduced to some of the proposed apartment MVHR systems to reduce external noise ingress via the atmosphere terminations of the MVHR systems (i.e. the intake and exhaust of the MVHR fans) and to achieve the recommended internal noise.

As the detailed design progresses, the acoustic requirements of any in-line ductwork silencers will need to be assessed.

Conclusion

Compliance with the recommended sound insulation performances of the façade and roof elements is expected to allow full compliance with the daytime and night time 'average' noise level criteria identified in Section 5 above.

Given the recommended sound insulation performances given above for the façade and roof, compliance with the recommendations of the World Health Organisation in relation to maximum (LAmax) internal noise events is expected.

8.0 EXTERNAL NOISE LEVELS DUE TO BUILDING SERVICES

The measured background noise levels around the site can be used to establish the acceptable level of noise from plant serving the development. Final plant selections have not been made at this early design stage. In the absence of specific selection of plant items, overall plant noise limits can be provided.

With reference to the discussion in Section 5, the cumulative rating level due to all simultaneously operating non-emergency plant must be at least 5dB lower than the typical pre-existing background noise level at the nearest residential receptors to the site.

Table 5 identifies the allowable combined noise level at the nearest residential receptors to the development, due to all simultaneously-operating non-emergency building services plant and equipment.

Location	**Rating noise level (dB L_{Aeq})**	
	Daytime (07:00 hrs to 23:00 hrs)	**Night time (23:00 hrs to 07:00 hrs)**
Victoria Bridge Street Elevation (North-east)	50	45
Deansgate Elevation (South -east)	55	48
River Irwell Elevation (North- west)	45	42
Hotel Elevation (South-west)	50	45

Table 5: Environmental noise limits for non-emergency building services plant

Emergency plant

If any emergency plant is required at the Development, it is expected that such plant would only operate during emergencies and during periodical test runs (perhaps test runs of thirty minutes every two weeks).

On this basis, it is not considered appropriate to require emergency plant to comply with the noise limits for continuously operating non-emergency plant. It is therefore suggested that the noise level from any emergency plant is no more than 10dB(A) greater than the ambient noise level (measured as an L_{Aeq}) at any residential receptor.

It is therefore recommended that the noise level at any residential façade during operation of any emergency plant does not exceed the daytime noise levels given in Table 6.

Location	Daytime noise level (dB L_{Aeq})
Victoria Bridge Street Elevation (North-east)	75
Deansgate Elevation (South -east)	75
River Irwell Elevation (North- west)	67
Hotel Elevation (South-west)	70

Table 6: Environmental noise limits for emergency building services plant

The above noise limits for non-emergency and emergency plant must be forwarded to the project's Mechanical Engineer to allow the selection of appropriate equipment and any associated noise control hardware. Building services equipment must also be provided with appropriate vibration isolation to minimise the risk of disturbance to the building occupants by structureborne noise.

9.0 NOISE EGRESS FROM COMMERCIAL UNITS

In order to avoid potential noise nuisance to the existing and proposed noise-sensitive buildings around the site, activity noise egress from the proposed commercial units at the ground floor of within the building must be controlled. As the proposed Planning Class for the commercial units includes food & beverage, it is recommended that environmental noise limits for the commercial units are established.

As detailed in Section 5 above, Manchester City Council suggests that external music noise levels (measured as an L_{eq} noise level) external to a residential property due to an entertainment venue should be 10dB lower than the prevailing background noise level in each octave band.

Octave band noise limits at the nearest noise sensitive receptors have been determined by reference to previous noise survey data in the area.

Table 7 identifies the recommended maximum allowable cumulative daytime and night time free-field noise levels at the closest residential façades due to music noise from the commercial units within the proposed development to comply with the guidance of Manchester City Council.

Location/period	**Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
No 1 Deansgate (0700 to 2300)	49	46	44	42	43	37	27
No 1 Deansgate (2300 to 0700)	44	41	39	37	38	32	22
Renaissance residential, Deansgate elevation (0700 to 2300)	49	46	44	42	43	37	27
Renaissance residential, Deansgate elevation (2300 to 0700)	44	41	39	37	38	32	22

Table 7: Maximum allowable external music noise levels due to proposed commercial units

At this stage, operational noise levels for the proposed commercial units are not known. However, guidance can be given based on the potential acoustic performance of façade elements. The façades of the proposed commercial units are to be predominantly glazed. The principal determinant of noise egress from the development will therefore be the sound reduction index of the glazed curtain wall.

Given the size of the glazing units to the commercial units, the expected composition of the glazed units is expected to be as follows as a minimum:

- 10 mm float glass/ 16 mm cavity/ 10 mm float glass, sound reduction index 37dB Rw

In addition, the recommended weighted sound reduction of the external doors to the Commercial units is 30dB Rw. To achieve this performance, acoustic/weather seals to the full perimeter of each door would be required.

Environmental noise egress calculations have been carried out in order to determine the expected external noise levels due to internal noise within the commercial units. The calculations have initially assumed that the outer entrance door to the commercial units are closed or that door lobbies are installed, such that during access and egress of patrons, one of the doors of the lobby is closed to prevent intermittent increases in external noise.

Table 8 identifies the noise levels that could be generated in each commercial unit without exceeding the daytime external noise limits given in Table 7.

Location	**Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Commercial Unit	78	82	88	91	93	86	81

Table 8: Maximum allowable daytime internal noise levels within the commercial units, doors closed

Table 9 identifies the noise levels that could be generated in each commercial unit without exceeding the night time external noise limits given in Table 7.

Location	**Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Commercial Unit	73	77	83	86	88	81	76

Table 9: Maximum allowable night time internal noise levels within the commercial units, doors closed

The noise levels detailed in Table 8 and Table 9 would allow typical retail outlets or a 'lively' restaurant with background music replay to be accommodated.

If the external doors to the commercial units are opened without the benefit of an internal lobby, then the sound insulation of the facade will be reduced. Therefore, the maximum allowable noise levels in the units would be reduced.

Table 10 identifies the noise levels that could be generated in each commercial unit without exceeding the daytime external noise limits given in Table 7 if the entrance doors to the units are open.

Location	**Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Commercial Unit	74	76	77	75	76	70	60

Table 10: Maximum allowable daytime internal noise levels within the commercial units, doors open

Table 11 identifies the noise levels that could be generated in each commercial unit without exceeding the night time external noise limits given in Table 7 if the entrance doors to the units are open.

Location	**Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Commercial Unit	69	71	72	70	71	65	55

Table 11: Maximum allowable night time internal noise levels within the commercial units, doors open

The noise levels detailed in Tables 10 and 11 would allow a typical retail outlet or relatively quiet restaurant with low-level background music replay to be accommodated.

However, a lively restaurant with music replay is likely to exceed the allowable internal noise levels given in Tables 10 and 11, particularly at night time. It is therefore expected that a lively restaurant or similar operation whose opening hours extend beyond 11pm would need

to introduce a door lobby in order to comply with the requirements of Manchester City Council.

Given the above, it is expected that the proposed commercial units within the development will be able to operate within the proposed Planning Class without causing disturbance to existing and proposed residential receptors.

It is also recommended that the proposals for acoustic treatment and the noise levels to be generated within the commercial units be formally submitted by any potential tenant by way of an application to discharge relevant conditions that may be attached to the planning permission.

INTERNAL NOISE TRANSFER

There are residential apartments directly above the proposed commercial units. There is therefore the possibility of internal noise transfer between the units and the apartments above via the party floor structural slab. In order to avoid potential noise nuisance, it is recommended that the internal noise levels within an apartment due solely to music replay in the commercial units do not exceed the values given in Table 12.

Room	**Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Apartment	40	30	23	20	17	15	12

Table 12: Maximum recommended noise levels in apartments due to music replay in commercial units

The ‘shell’ party floor between the commercial units and the apartments directly above is a 200 mm thick flat concrete slab underdrawn. Given the ‘shell’ party floor slab and associated structures, Table 13 identifies the calculated maximum allowable music noise levels in the commercial units without exceeding the noise limits given in Table 12.

Room	Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Commercial Unit	76	70	66	70	76	82	85

Table 13: Maximum allowable noise level in commercial units – re internal noise transfer via shell

If a tenant of the commercial units wishes to generate higher internal noise levels than those identified in Table 13, the tenant must install appropriately designed mitigation measures to improve the sound insulation of the unit shell, such as an imperforate ceiling.