

Apartment Development, Bendix Street, New Cross, Manchester M4 5FQ

Noise Level Verification

For GMI Construction, Carvers Warehouse, 77 Dale Street Manchester M1 2HG

Our Reference	Your Reference	Issue Date	Author	Approver	Revision History
21924R04PKMW	-	02/05/2024	Paul Kelly MIOA	Miles Woolley MIOA	P01.
21924R04aSW	-	09/05/2024	Sam Williams MIOA	-	P02 – Previous section 2 removed.
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Executive Summary

Environoise Consulting Limited has been commissioned by GMI to provide verification testing for plant noise impact and noise breakout from a ground and first floor communal area, referred to as a 'Residential Amenity' space, affecting existing and proposed residential properties of the apartment development at Bendix Street, New Cross, Manchester M4. The assessment has been done to address planning conditions 13 to 15 of the decision notice. Findings are summarised below.

Planning Condition 13(a) – Plant Noise Impact Criteria

Externally mounted plant has been assessed to 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location and therefore the requirements of Planning Condition 13(a) have been met.

Planning Condition 13(b) – Plant Noise Impact

The noise impact from installed rooftop plant at the nearest existing noise-sensitive receptors (NSRs) has been assessed. Plant noise level measurements have been taken on site, close to plant.

The predicted plant noise level at the NSRs meets the requirements of Planning Condition 13(b) with no further noise mitigation measures necessary.

Planning Condition 14(a) – Internal Noise Surveys & Criteria

Extensive noise surveys have been done which include a rush hour period and have been assessed to the targets given and therefore the requirements of Planning Condition 14(a) have been met.

Planning Condition 14(b) – Internal Noise Levels

Internal noise level measurements were taken in apartments for part of the daytime period and for the whole night-time period. The 35dB $L_{Aeq,T}$ daytime target, 30dB $L_{Aeq,8hour}$ night-time target and the 45dB $L_{Amax,fast}$ maximum noise level target (limited to 15 excesses) was met in 18 tested apartments.

Planning Condition 15(a) - Residential Hub Noise Criteria

The assessment of music noise break-out from the installed sound system in the Residential Amenity space was assessed so that ambient entertainment noise was 10dB background noise levels (without entertainment noise) and octave band performances were also assessed. Therefore, the requirements of Planning Condition 15(a) have been met but is also dependent on maximum ambient music levels being recommended for planning condition 15(b).

Planning Condition 15(b) - Residential Hub Noise

Music noise break-out from the installed sound system in the Residential Amenity space at the nearest existing apartments has been assessed. The noise levels at the façade of the existing NSR and within the proposed Bendix Street apartments above meet the target requirements of Planning Condition 15(b) where the installed sound system music levels are limited as follows:

	Octave band (Hz) sound pressure level [L _{eq} (dB)]							Overall L _{Aeq} (dB)
	63	125	250	500	1k	2k	4k	
Music limiting levels (to be achieved in Residential Amenity Space & Lobby)	73	73	75	75	75	75	75	81

Music noise break-through from the Residential Amenity space into the proposed adjoining apartments on the first and second floors has been assessed. Planning Condition 15(b) noise criteria is met with the music noise levels limits applied.

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1 Planning Condition 13 – Plant Noise

1.1 Overview

- 1.1.1 Environoise Consulting Limited has been commissioned by GMI to provide verification measurements and assessment of the noise impact of plant associated with the proposed apartment development at Bendix Street, New Cross, Manchester M4 to address planning condition 13(b) of the decision notice. The condition is reproduced below alongside Planning Condition 13(a) which is given for context:

13(a)

Prior to the first occupation of the development hereby approved, details of externally mounted ancillary plant, equipment and servicing shall be submitted for approval in writing by the City Council, as Local Planning Authority. For the avoidance of doubt, externally mounted 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 (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

13(b)

Prior to the first occupation of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. Any mitigation measures shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority, and thereafter retained and maintained in situ.

1.2 BS 4142+A1:2019

- 1.2.1 BS 4142:2014+A1:2019ⁱ provides a method of determining the ‘impact of specific sound’ on dwellings due to industrial and commercial noise sources through comparison between the measured background noise level (L_{A90}) and the noise source rating level ($L_{A,T,r}$) under consideration. The rating level is the specific noise level plus penalties of up to 18dB added for features to account for the character of the noise as follows:

- **Tonality:** +2dB penalty: Just perceptible; +4dB penalty: Clearly perceptible and +6dB penalty: Highly perceptible.
- **Impulsivity:** +3dB penalty: Just perceptible; +6dB penalty: Clearly perceptible and +9dB penalty: Highly perceptible.
- **Intermittency:** +3dB penalty: identifiable on/ off conditions.
- **Other:** +3dB penalty: where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent.

1.2.2 When comparing the rating plant noise level against the background noise level, BS 4142:2014 provides the following noise impact descriptors:

- +10dB(A) is likely to be an indicator of 'a significant impact, depending on the context'.
- +5dB(A) is likely to be an indicator of 'an adverse impact, depending on the context'.
- No excess of the background noise level is an indicator of 'a low impact, depending on the context'.

1.3 Plant Noise Limit

1.3.1 A comprehensive reporting of the night-time background noise survey is given in Environoise report ref: 21462R03JBMW (GMI ref: D480-ENV-ZZ-XX-RP-Y-1007). This has informed a plant noise limit of 37dB $L_{A,T,r}$ set for both the daytime (07.00 – 23.00hrs) and night-time (23.00 – 07.00) period to meet the Planning Condition criterion.

1.4 Noise Survey and Installed Plant

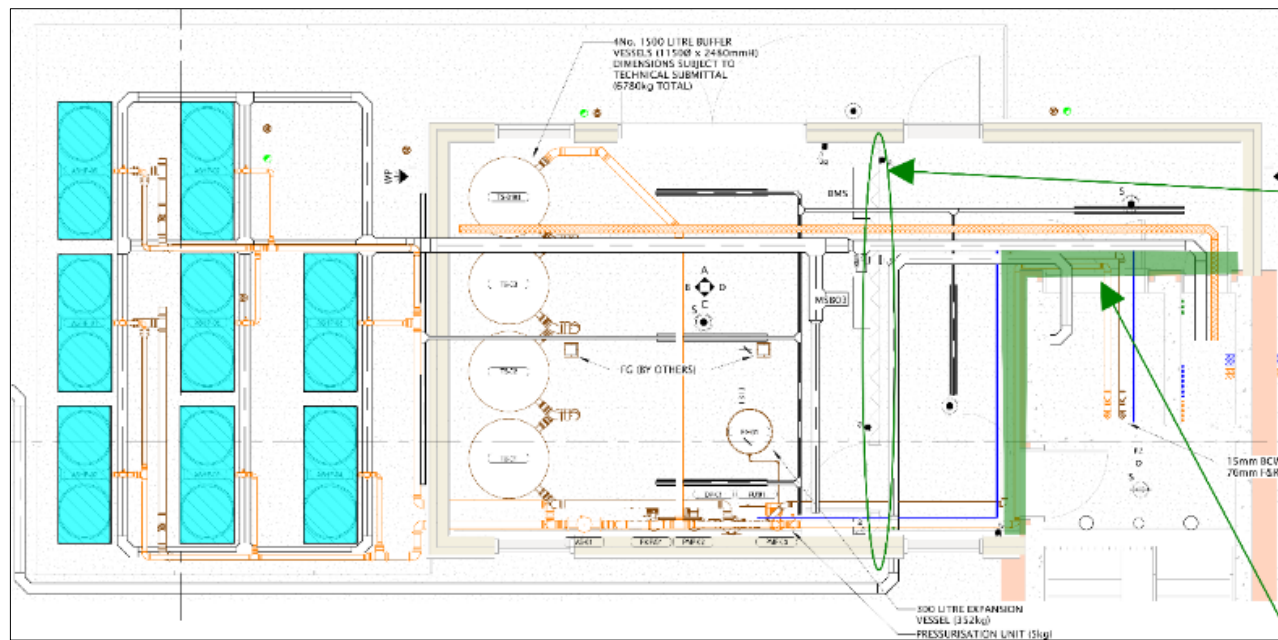
1.4.1 A noise survey was done between 13.12 and 13.44hrs on Wednesday 17th April 2024 to obtain in-situ noise level measurements of the rooftop condensers. Four 5-minute measurements were taken at one metre from the rooftop condensers (level with the top of the condenser).

1.4.2 Details of the installed rooftop condensers are given in Table 1.1 together with the associated logarithmically averaged sound pressure level obtained from the measurements on site. The rooftop location of these is shown in Figure 1.1.

Table 1.1: Installed plant and measured noise level.

Key	Item	Location	No. of units	Measured sound pressure level at 1m [$L_{Aeq,T}$ (dB)]
	Mitsubishi CAHV-P500YB-HPB (air source heat pump)	Rooftop	8	60

Figure 1.1: Locations of installed roof-top top air source heat pumps.



1.5 Assessment

- 1.5.1 Plant noise levels cannot be disaggregated from other noise sources (e.g. road traffic) at the NSRs due to the high levels of residual noise. Therefore, plant noise levels measured close to plant on site have been predicted at the 7th floor facades of the Hilltop Serviced Apartments building. Calculations have been done using SoundPLAN® noise propagation software as per guidance given in ISO 9613-2 and BS 4142, see Figure A1, Appendix A.
- 1.5.2 All plant has been considered to be operating continuously and simultaneously.

Acoustic Features Correction

- 1.5.3 Acoustic feature corrections have been applied independently for the plant room, substation and roof-top plant noise due to the differing distances, source heights and character of the noise between the sources, see Table 1.2.

Table 1.2: BS 4142 acoustic feature corrections for plant sources.

Generator element	Acoustic feature correction
Roof-top plant	Impulsivity & tonal: No correction due to the continuous, non-varying and broadband nature of plant equipment noise. The objective third-octave method was used to assess tonality.
	Intermittency: +4dB correction due to clearly identifiable on/off conditions of the condenser unit.

1.5.4 Table 1.3 summarises the noise emission assessments for roof-top plant area to the nearest residential receptor against the noise limits in section 1.3.

Table 1.3: Plant noise impact assessment at the considered NSRs.

NSR	Calculation stage	Noise level
Hilltop Serviced Apartments building	Plant noise level (dBA) at NSR	24
	Acoustic features correction (dB)	+4
	Rating level [dB(A)]	28
	Plant noise limit [dB(A)]	37
	Level of excess (dB)	0 (-9)

Discussion

1.5.5 As shown in Table 1.3, on-site measured plant noise levels have been predicted to meet the requirements of Planning Condition 13(b) at the Hilltop Serviced Apartments building and no further mitigation measures necessary.

2 Planning Condition 15 – Residential Hub Noise

2.1 Overview

- 2.1.1 Environoise Consulting Limited has been commissioned by GMI to provide verification measurements and assessment of Residents Amenity space noise breakout (through the façade) and break through (through the separating floor) associated with the proposed apartment development at Bendix Street, New Cross, Manchester M4 to address planning condition 15(b) of the decision notice. The condition is reproduced below alongside Planning Condition 15(a) which is given for context:

15(a)

...a scheme of acoustic insulation for the commercial unit shall be submitted for approval by the City Council, as Local Planning Authority. Where entertainment noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 10dB below the L_{A90} (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63Hz and 125Hz octave band frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

15(b)

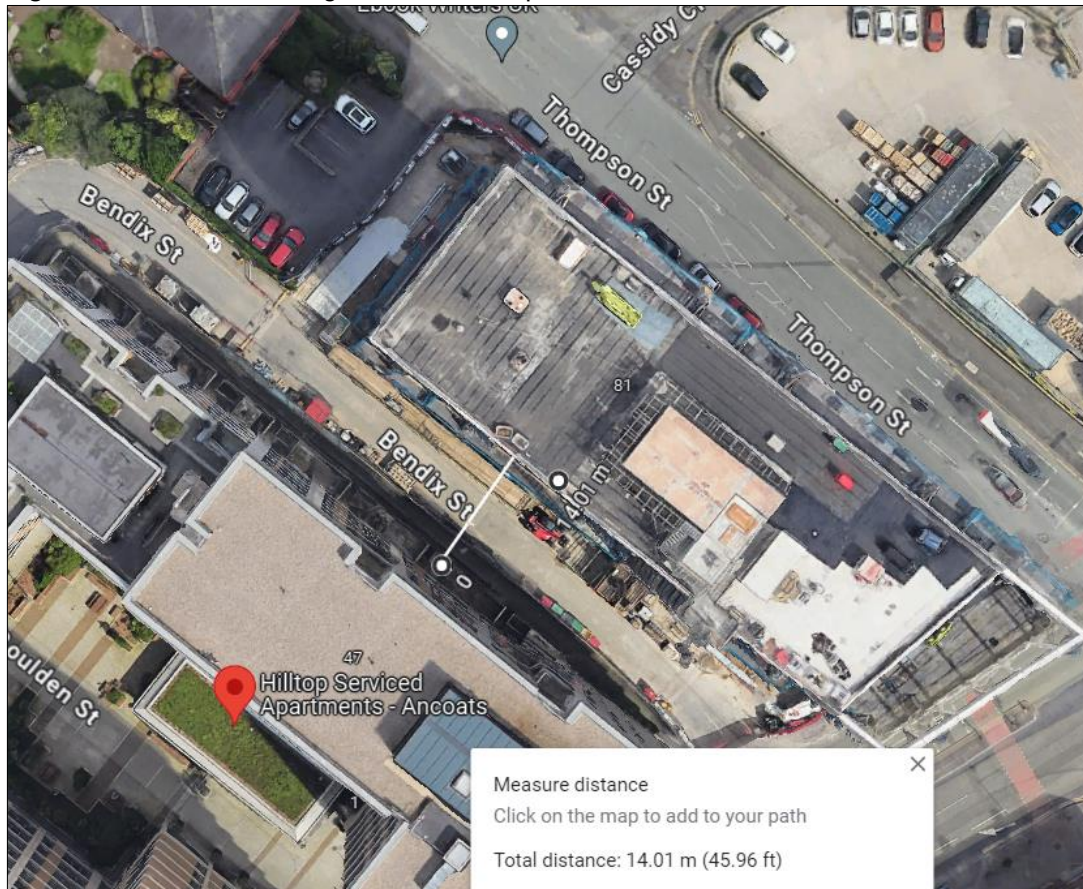
Prior to the first use of the commercial unit, a verification report will be required to validate that the work undertaken conforms to the recommendations and recommendations and requirements approved as part of (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria.

- 2.1.2 The ground and first floor residential amenity space is currently not designated a commercial unit and will be used predominantly as a co-working environment. However, the unit space has a built-in sound system and therefore can generate what can be considered as entrainment noise.
- 2.1.3 Assessments of Residential Amenity break-out and break-through noise have been done to demonstrate that proposed constructions are sufficient so that the Planning Condition 15(a) and 15(b) can be satisfied.

2.2 Residential Receptors

- 2.2.1 The nearest existing receptor is the Hilltop Services Apartments building 14 metres to the south-west of the site, see Figure 2.1.

Figure 2.1: Nearest existing residential receptors.



- 2.2.2 The adjoining receptors are proposed apartment 111, first floor which shares a separating wall and apartment 212, second floor directly above, sharing a separating floor, see Figures 2.2 and 2.3.

Figure 2.2: Proposed horizontally adjoining Apartment 111.

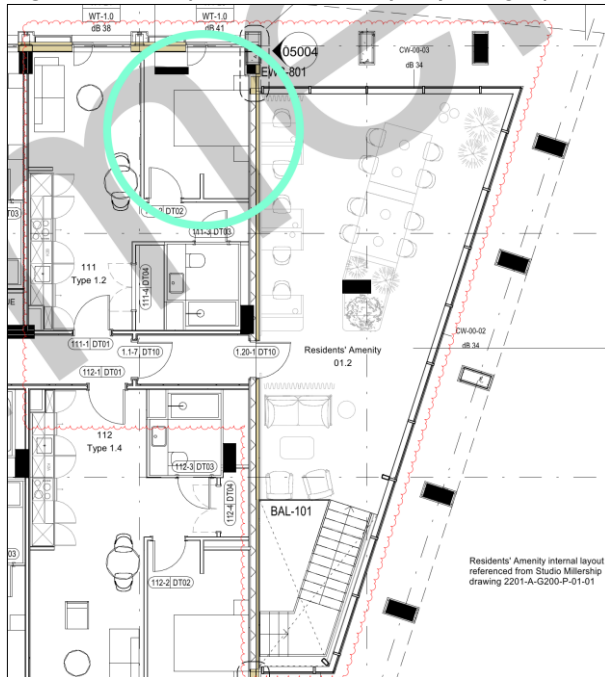
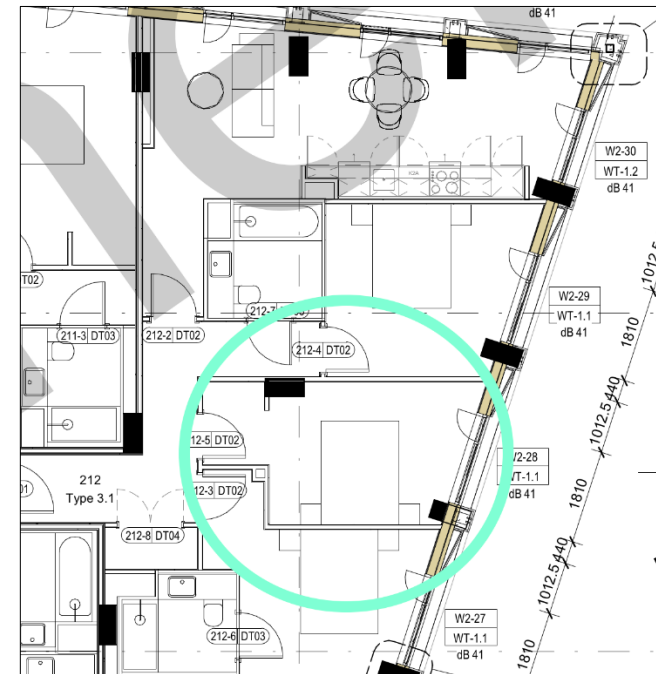


Figure 2.3: Proposed vertically adjoining Apartment 212.



2.3 Music Breakthrough to Apartments Adjoining Apartments

Noise Survey

2.3.1 Noise level measurements were taken on Wednesday 17th April 2024 within the Residential Amenity space and within Apartments 111 and 212. The following measurements were taken:

- 2 x 10-minute ambient ($L_{Aeq,10min}$) noise level measurements within a bedroom of Apartments 111, first floor and Apartment 212, second floor with the installed sound system in the Residential Amenity space off to determine a baseline level.
- 3 x 10-minute ambient ($L_{Aeq,10min}$) noise level measurements taken simultaneously in the Residential Amenity space and within a bedroom of Apartments 111, first floor and Apartment 212, second floor with the installed sound system in the Residential Amenity space turned on. The source was electronic music reproduced at 81dB $L_{Aeq,30min}$ with a significant and consistent low frequency component which is suitable for the purpose of testing the level of music breakthrough against Planning Condition 15(a) criteria at 63Hz and 125Hz.

- 2.3.2 Noise survey results for are given in Table 2.1, with the values being the logarithmic average of each set of measurements (individual measurements given in Appendix A).

Table 2.1: Measured music noise levels.

Room	Measurement	Octave band (Hz) sound pressure level [L _{Aeq,T} (dB)]	
		63	125
Residential Amenity space	Sound system turned on	81	83
Bedroom, Apartment 111	Baseline with speaker turned off	53	41
	Sound system in Residential Hub turned on	56	45
Bedroom, Apartment 212	Baseline with speaker turned off	49	42
	Sound system in Residential Hub turned on	50	43

Assessment

- 2.3.3 In Table 2.2, the Residential Amenity music levels are compared to the Bedroom noise levels corrected (through logarithmic subtraction) for the baseline (non-music) noise to obtain music breakthrough levels which are compared to Planning Condition 15(a) criteria.

Table 2.2: Internal music levels in Bedrooms of Apartment 111 and 212 compared to Planning Condition 15(a) criteria.

Proposed Apartments	Octave band (Hz) sound pressure level [L _{Aeq,T} (dB)]	
	63	125
Bedroom, Apartment 111		
Music level in apartment [A]	53	43
Planning condition 15(a) criteria [B]	47	41
Level of excess [= A – B]	6	2
Bedroom, Apartment 212		
Music level in apartment [A]	43	36
Planning condition 15(a) criteria [B]	47	41
Level of excess [= A – B]	0 (-4)	0 (-5)

- 2.3.4 As shown in Table 2.2, measured music breakthrough levels meet the Planning Condition 15(a) criteria for 'structurally adjoined residential properties' within Apartment 212 via the separating floor system; however, the criteria is exceeded in Apartment 111 via the separating wall.

2.4 Music Break out to Existing & Proposed Apartments

Noise Survey

- 2.4.1 A noise survey was done on Wednesday 17th April 2024 with a noise measurement done over 3 x 10-minute intervals externally 1m from the façade of the Residential Amenity curtain walled façade with the installed sound system on within the Residential Amenities space. A further 2 x 10-minute measure measurements were done with the sound system off to determine an external baseline noise level so that corrections for residual noise could be made to the break-out levels. However, the residual noise level was not sufficiently low enough (due to passing road traffic) for a reliable measurement of noise breakout to be made. Therefore, noise break-out has been predicted inside the Hilltop Serviced Apartments and the proposed Bendix Street apartments based on sound propagation calculation using details of the measured sound system noise levels and the sound insulation performance of the installed curtain walling system glazing.
- 2.4.2 We have referred to the octave band measured music levels from the survey done in the Residential Amenity space to assess the level of break-out via the facade, see Table 2.3.

Table 2.3: Measured Residential Amenity space reverberant music noise level.

Type of Space	Octave band (Hz) sound pressure level [L _{eq} (dB)]							Overall L _{Aeq} (dB)
	63	125	250	500	1k	2k	4k	
Residential Amenity space	81	83	75	73	76	75	73	81

- 2.4.3 The sound insulation performances of the installed curtain walling glazing¹ to the Residential Amenity space is provided in Table 2.4.

Table 2.4: Installed curtain walling glazing system and sound insulation performances.

Building element	Construction	Measured level difference [D (dB)] at octave-band frequency (Hz)						
		63	125	250	500	1k	2k	4k
Curtain walling - glazing	8.8mm SGG Protect laminated Silence pane / 16mm argon cavity / 8mm SGG Stadip Securit pane	17	22	31	40	48	49	55

¹ As per drawing reference D480-EAS-XX-XX-SP-X-0002 Rev C04.

2.5 Assessment

2.5.1 Tables 2.5 and 2.6 provides the predicted Residential Amenity space noise levels at the façade of the existing NSRs and internally within proposed adjoining apartments due to the Residential Amenity space music noise break-out and break-through with a comparison with Planning 15(a) criteria. The assessments consider the area of curtain walling, partially open windows (providing a 15dB reduction between external and internal levels) to the proposed habitable spaces, dimensions and a reverberation time of 0.5s in adjoining habitable spaces and octave band background (L_{90}) noise levels associated with the overall 42dB L_{A90} level given in Environoise report ref: 21462R03JBMW (GMI ref: D480-ENV-ZZ-XX-RP-Y-1007).

2.5.2 Detailed calculations are presented in Figures B1 and B2, Appendix B.

Existing Apartments

Table 2.5: Predicted internal noise levels at existing Hilltop Serviced Apartments due to Residential Amenity space music noise break-out.

Existing Apartment	Octave band (Hz) sound pressure level (dB)						
	63	125	250	500	1k	2k	4k
Noise level at façade of existing NSR dB L_{eq} [A]	49	46	29	18	13	11	3
Background noise levels dB L_{90} [B]	52	46	41	40	37	33	26
Planning condition 15(a) criteria dB L_{90} [C = B – 10]	42	36	31	30	27	23	16
Level of excess dB [= A – C]	7	10	0	0	0	0	0

Proposed Adjoining Apartments

Table 2.6: Predicted internal noise levels in proposed adjoining apartments due to Residential Amenity space noise break-through.

Proposed Apartments	Octave band (Hz) sound pressure level (dB)	
	63	125
Highest predicted internal noise level in apartment (via floor) dB L_{eq} [A]	43	36
Highest predicted internal noise level in apartment (via façade) dB L_{eq} [B]	49	46
Predicted overall internal noise level in apartment [C = A log add B]	50	46
Planning condition 15(a) criteria dB L_{eq} [D]	47	41
Level of excess [= C – D]	3	5

Discussion

2.5.3 As shown in Table 2.5, the noise levels at the façade of the existing NSR is predicted to exceed targets at 63kHz and 125kHz only.

2.5.4 As shown in Table 2.6, the internal noise levels in the adjoining proposed apartments exceed the targets of Planning Condition 15(a).

2.6 Music Noise Levels Limits

2.6.1 Music limiting levels are given for the installed sound system in Table 2.7 with reference to the measured levels in Table 2.3 and the highest levels of excess in Tables 2.5 and 2.6. This is so that Planning Conditions 15(b) requirements are met in all cases.

Table 2.7: Music limiting levels in Residential Hub.

	Octave band (Hz) sound pressure level [L _{eq} (dB)]							Overall L _{Aeq} (dB)
	63	125	250	500	1k	2k	4k	
Music limiting levels (to be achieved in Residential Amenity Space & Lobby)	73	73	75	75	75	75	75	81

3 Planning Condition 14 – Internal Noise Levels

3.1 Overview

- 3.1.1 Environoise Consulting Limited has been commissioned by GMI to provide verification measurements of internal noise levels in habitable apartment spaces associated with the proposed apartment development at Bendix Street, New Cross, Manchester M4 to address planning condition 14(b) of the decision notice. The condition is reproduced below alongside Planning Condition 14(a) which is given for context:

14(a)

Prior to the first occupation of the residential element of the development, a scheme for acoustically insulating the proposed residential accommodation against noise from Oldham Road and local traffic network shall be submitted for approval in writing by the City Council, as Local Planning Authority. The approved noise insulation scheme shall be completed before the first occupation of the development. Noise survey data must include measurements taken during a rush-hour period and night-time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30dB L_{Aeq} (individual noise events shall not exceed 45dB $L_{Amax,f}$ by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35dB L_{Aeq}

Gardens and terraces (daytime) 55dB L_{Aeq}

14(b)

Prior to the first occupation of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. Any mitigation measures shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority, and thereafter retained and maintained in situ.

3.2 Methodology

- 3.2.1 Internal noise level measurements were taken in 18 of the 161 apartments (i.e. minimum 10%) for part of the daytime period and for the whole night-time period. The daytime measurement period consisted of 17.00 – 23.00hrs (covering the evening rush-hour period).

- 3.2.2 The noise meters were set to measure overall fast 'A' weighted maximum and ambient noise levels for contiguous one-minute periods (i.e., $L_{Amax,fast}$ and $L_{Aeq,1min}$). All meter clocks were synchronised, and the meters were set to record all instantaneous noise levels over 45dBA. An MVHR unit was situated in a services cupboard in each apartment and fresh-air ventilation was in standard operation (i.e. not in boost or extract mode) during the measurements². Tests were done in apartments across different floors and at various facades of the building, with a greater concentration on lower floors where apartments are most exposed to road traffic noise.
- 3.2.3 Windows were closed and sealant, with no gaps, present around each pane, in all tested Bedrooms.
- 3.2.4 The sound level meters were calibrated at the start and end of the noise surveys to 94dB at 1kHz. There was a recorded drift of up to 0.2dB across the noise surveys which is acceptable.

3.3 Noise Data Summary

- 3.3.1 A summary of the measured daytime and night-time ambient noise level ($L_{Aeq,T}$) and night-time maximum noise level ($L_{Amax,fast}$) results for each tested apartment are given in Table 3.1.

Table 3.1: Measured daytime and night-time internal noise levels within tested apartments.

Date	Apartment	Elevation	Daytime	Night-time	
			Ambient noise level [$L_{Aeq,16hour}$ (dB)]	Ambient noise level [$L_{Aeq,8hour}$ (dB)]	No. of excesses over 45dB $L_{Amax,fast}$.
23/04/2024 to 24/04/2024	912	Oldham Road	30	30	6
	812	Oldham Road	29	28	5
22/04/2024 to 23/04/2024	706	Thompson Street	32	31*	6
17/04/2024 to 18/04/2024	507	Thompson Street	30	30	2
	410	Thompson Street	29	28	1
16/04/2024 to 17/04/2024	102	Bendix Street	27	26	0

*An excess of the night-time target of 1dB obtained in Apartment 706 is a negligible excess where a +3dB difference is generally considered to be of 'just noticeable difference to someone of good hearing in normal listening conditions'.

² Confirmed verbally to Craig Williams (Environoise) by Rob Hurst (GMI) 23rd July 2024.

Table 3.1 (continued): Measured daytime and night-time internal noise levels within tested apartments.

Date	Apartment	Elevation	Daytime	Night-time	
			Ambient noise level [$L_{Aeq,6hour}$ (dB)]	Ambient noise level [$L_{Aeq,8hour}$ (dB)]	No. of valid excesses over 45dB $L_{Amax,fast}$
23/07/2024 to 24/07/2024	712	Oldham Road	28	26	4
	607	Thompson Street	23	20	0
	604	Cross Keys Street	26	22	0
	514	Bendix Street	25	22	2
24/07/2024 to 25/07/2024	412	Oldham Road	30	27	7
	401	Bendix Street	25	23	2
25/07/2024 to 26/07/2024	205	Cross Keys Street	25	23	1
	202	Bendix Street	27	26	2
	107	Thompson Street	28	25	11
31/07/2024 to 01/08/2024	512*	Oldham Road	27	29	3
	312	Oldham Road	29	22	4
13/11/2024 to 14/11/2024	005	Thompson Street	29	24	13

*Measurements considered up to 03.11hrs only due to smoke alarm beeping from this time.

3.4 Discussion of Results

Ambient Noise Levels

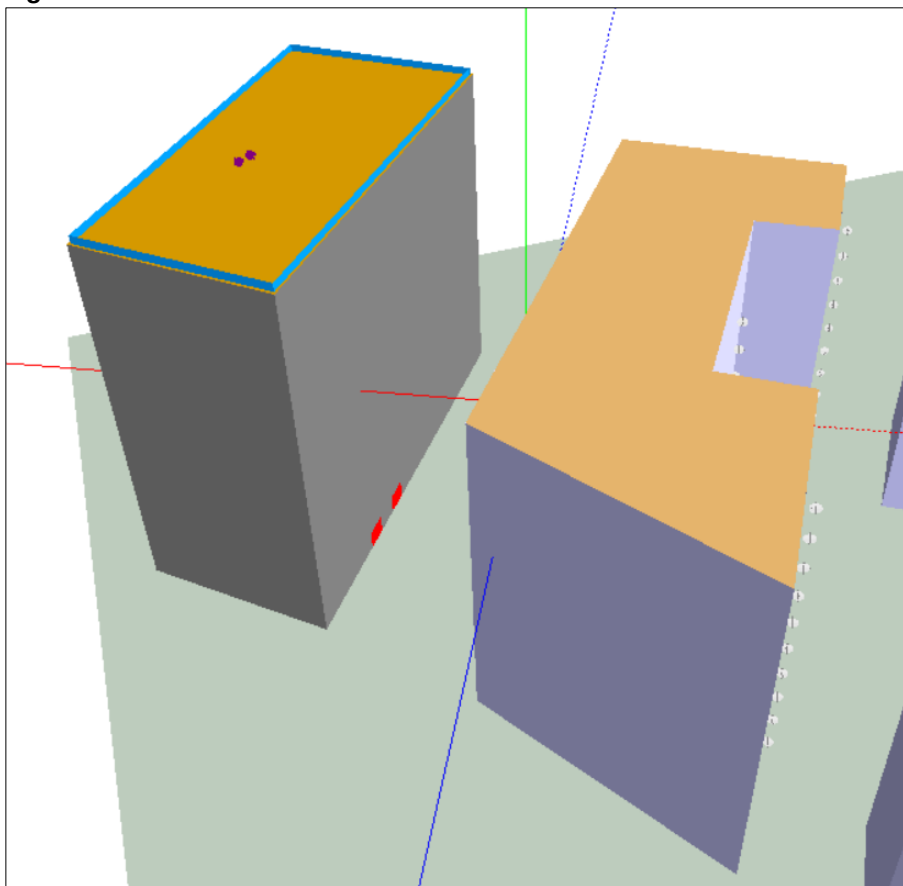
3.4.1 As shown in Table 3.1, internal ambient noise levels met both the 35dB $L_{Aeq,T}$ daytime target and 30dB $L_{Aeq,8hour}$ night-time target in 18 tested apartments.

Maximum Noise Levels

3.4.2 As shown in Table 3.1, the night-time 45dB $L_{Amax,fast}$ maximum noise level target was not exceeded more than 15 times in the 18 tested apartments.

Appendix A: SoundPLAN Model

Figure A1: 3D view of SoundPLAN model



Appendix B: Calculations

Figure B1: Residential Hub noise breakout – existing dwelling.



Proposed apartment Receptor

Project	Bendix Street									
Client	GMI									
Receive Room	Proposed apartment Receptor									
Description of Source								E 1 -	All front elevation glazing	
								E 2 -	Front Doors	
								E 3 -	Description	
								E 4 -	Description	
Restaurant / bar										
Element 1	All front elevation glazing							Directiv		4
Element area	50 m ²									
Receiver	Description									
Distance to Receiver	3 m									
Facade Correction	0 dB							Freefield = 0dB		
Frequency Hz	63	125	250	500	1000	2000	4000	dB(A)		
Internal Level dB	81	83	75	73	76	75	73	81		
SRI of element	17	22	31	40	48	49	55			
Additional Directivity Shielding										
Frame Correction	3	3	3	3	3	3	3			
External Freefield Level at Receiver										
Element 1	64	61	44	33	28	26	18	46		
A-weighted	38	45	35	29	28	27	18			
Element 2	-	-	-	-	-	-	-	-		
A-weighted	-	-	-	-	-	-	-			
Element 3	-	-	-	-	-	-	-	-		
A-weighted	-	-	-	-	-	-	-			
Element 4	-	-	-	-	-	-	-	-		
A-weighted	-	-	-	-	-	-	-			
Total (-15dB)	49	46	29	18	13	11	3	46		
A-weighted	38	45	35	29	28	27	18			
Criterion	42	36	31	30	27	23	16			

Figure B2: Residential Hub noise break-in (via facade) – proposed apartment

										Proposed apartment Receptor						
Project		Bendix Street														
Client		GMI														
Receive Room		Proposed apartment Receptor														
Description of Source Restaurant / bar		All front elevation glazing 50 m²										E 1 - All front elevation glazing				
												E 2 - Front Doors				
												E 3 - Description				
												E 4 - Description				
Element 1		Description 3 m 0 dB										Directiv				4
Element area																
Receiver																
Distance to Receiver																
Facade Correction		Freefield = 0dB														
Frequency Hz		63	125	250	500	1000	2000	4000	dB(A)							
Internal Level dB		81	83	75	73	76	75	73					81			
SRI of element		17	22	31	40	48	49	55								
Additional Directivity Shielding																
Frame Correction		3	3	3	3	3	3	3								
External Freefield Level at Receiver																
Element 1		64	61	44	33	28	26	18	46							
A-weighted		38	45	35	29	28	27	18								
Element 2		-	-	-	-	-	-	-	-							
A-weighted		-	-	-	-	-	-	-								
Element 3		-	-	-	-	-	-	-	-							
A-weighted		-	-	-	-	-	-	-								
Element 4		-	-	-	-	-	-	-	-							
A-weighted		-	-	-	-	-	-	-								
Total (-15dB)		49	46	29	18	13	11	3	46							
A-weighted		38	45	35	29	28	27	18								
Criterion		42	36	31	30	27	23	16								

Figure C1: Mechanical ventilation detail drawings.

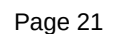
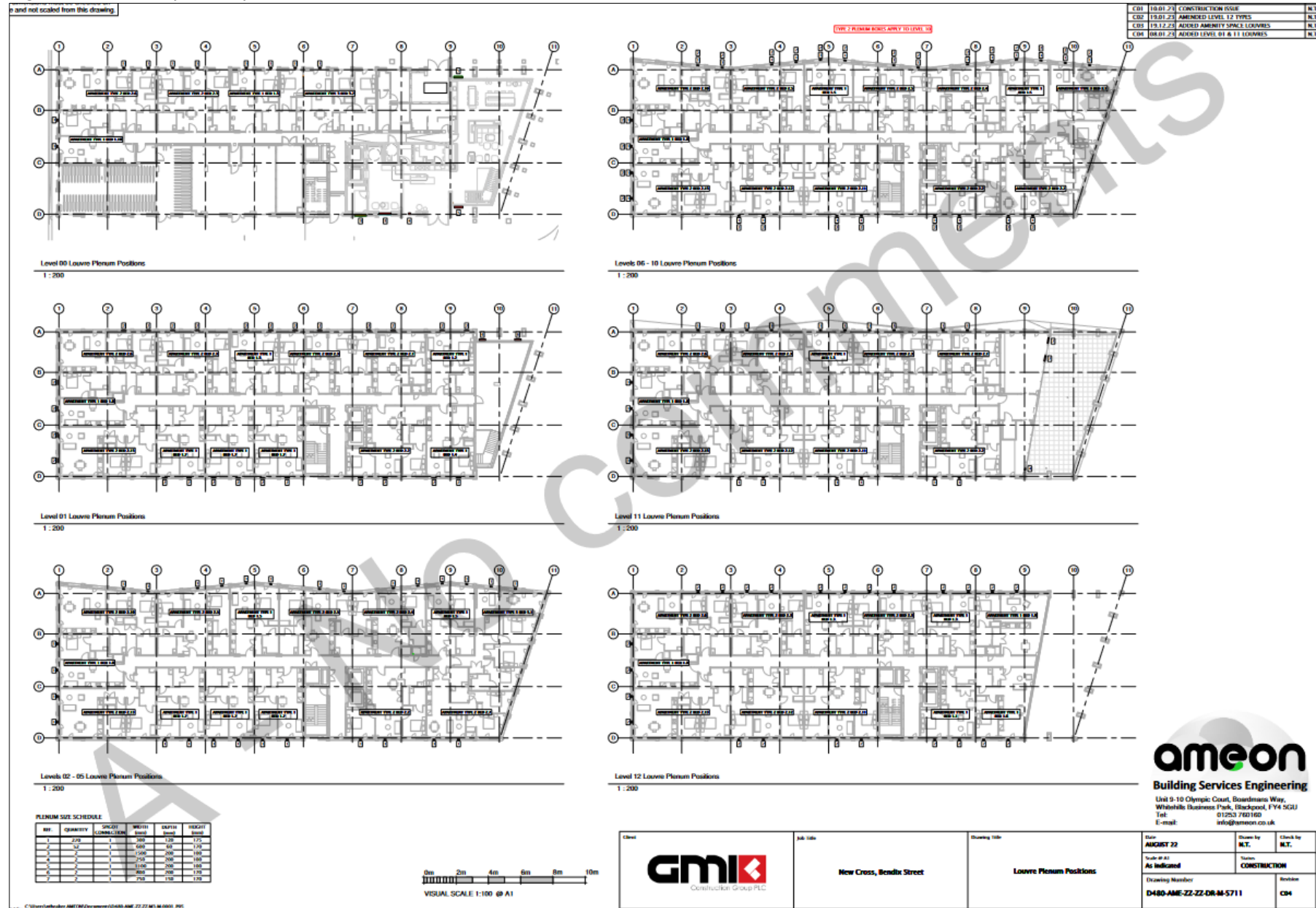


Figure C3: Louvre plenum positions.

Legend:

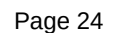
- Cavity Barrier
- Cavity Barrier - Subsequent
- Spec Inf F112 Fire Glazing
- Refer to detail drawings for Structural Frame Insulation
- MS-117 OSB Insulation
- MS-112 Cavity Insulation
- MS-111 Underside Insulation
- MS-113 Side Edge Insulation
- Structural Member
- General Cladded Area
- Cavity Strip
- SPF Vets Membrane
- Sequestration Layer
- Tanking
- EPDM by Window Subcontractor

Notes:

- Changes to be noted in conjunction with Architectural Specifications, Structural Engineer's Comments and Specifications, Mechanical & Electrical Engineer's Comments and Specifications, and Environmental Information, including but not limited to Cladded Fire Ratings, Acoustic Rating, Thermal Impact & Condensing Potential.
- The position of the Work is to be confirmed without acceptance of the required conditions for the Completion.
- Main Contractor to confirm relevant documents in building regulations and legislation approval authorities as required to comply with the Specification.
- Refer to 2D section plans for Base Type Options.
- Halter to drawing 21869 for External Wall Types.
- Refer to 41 Series drawings for cladding types.
- Get all wall fixings pre-installed with integral support brackets to cladding subcontractors' value.
- CSC Joint done in alignment.

Client: Mulberry City
Project: 0324 Bendix Street
Title: Typical Window Details
Stage: STAGE 5
Project number: D480
Drawn by: CF
Checked by: DM
Date: As indicated @A1
Revision: C01
Drawing No.: D480-TGA-JX-XX-DR-A-21100

All dimensions must be checked on site and not scaled from this drawing.



References

ⁱ BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.