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Noise Impact Assessment...

Proposed Tesco Express, Building 2, New Square, Princess Steet / Whitworth Street, Manchester. M1 3AR.
Discharge of Conditions 16 and 17 of planning permission 137127/JO/2023

KR07191

Version 1.5 - 18th January 2024

Report Conclusion...

The proposed acoustic mitigation strategy included within the development of the three retail units in building 2 to a Tesco Express convenience store will ensure the external noise levels are 5 dB below the octave band L_{90} values and the internal noise levels within the residential dwellings are inaudible.

This report should be submitted to Manchester City Council to discharge condition 16 and condition 17 of planning permission 137127/JO/2023.



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Version History...

Reference	Version	Date	Author	Position	Document Status
KR07191	V1.5	18/01/24	R Scrivener	Consultant	Current document for issue
Details	Document for issue to the Local Authority				

Report Limitations...

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1. Technical Note...

1.1. Introduction

KR Associates have been instructed by Tesco Stores Ltd to provide the technical details to discharge condition 16 and 17 of planning permission 137127/JO/2023 relating to the development of a Tesco Express within building 2 of New Square located between Princess Street and Whitworth Street in the centre of Manchester.

1.2. Original Planning Permission

The original development was granted planning permission by Manchester City Council on 10th November 2023 under application 137127/JO/2023 with the following two conditions relating to noise.

“16). Prior to occupation of the development a scheme for the acoustic insulation of any externally mounted ancillary equipment associated with any of the commercial uses; to ensure that it achieves a background noise level of 5dB below the existing background (La90) in each octave band 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 for each phase (as set out in condition 2 (g) above) shall be implemented prior to occupancy of that phase and shall remain operational thereafter.”

“17) The development shall proceed in accordance with the compliance and acoustic insulation measures and performance set out in the Manchester New Square Final Acoustic Planning Report, prepared by Mach Group (Dated 21/08/19; Submitted and approved under application CDN/19/1016).

Before the development commences an acoustic attenuation scheme including particulars of the acoustic glazing and acoustically treated ventilation to be installed as part of the ground floor uses within these blocks; shall be submitted to and approved in writing by the City Council as local planning authority. The approved scheme shall be implemented in full for each phase (as set out in condition 2 (g) above) before use of the residential premises within that phase first commences. A post completion validation report shall be submitted to the council to confirm the acoustic attenuation scheme meets the recommendations set out within the Acoustic Report by Sandy Brown (dated 31 August 2017).”

1.3. Previous Application to Discharge Condition 16 and 17...

A previous application was submitted to Manchester City Council under reference CDC/22/0264 to discharge condition 16 and 17. However, the application was refused on 18th August 2022 for the following reason.

“Condition 17(b) (Acoustic insulation - ground floor)

On the basis of the information submitted the condition cannot be discharged.

Internal limits for the units and that lobbied doors have been provided but additional mitigation may be required depending on the tenants. No details of the measures that have been installed in the base unit i.e., window specs, wall/ceiling construction, alternative ventilation have been provided nor has information that the base build will be suitable for without any additional mitigation. The information provided is not really an acoustic scheme and more information is required.

Until a tenant is known for the units this condition cannot be discharged as the base unit build may not be sufficient for their needs and we would need to agree a specific mitigation scheme for the proposed use.”

1.4. Scope of this Report

It is proposed to locate the external CO₂ gas cooler on the roof of the building and the refrigeration pack within the internal plant room with an emergency CO₂ extract. This technical note is broken down into the following three sections to demonstrate compliance with condition 16 and condition 17 of permission 137127/JO/2023.

- Section 2: External noise from roof mounted gas cooler (16).
- Section 3: External noise from internally mounted pack (16).
- Section 4: Internal noise transfer to residents above (17)

1.5. Reliance on third Party Reports

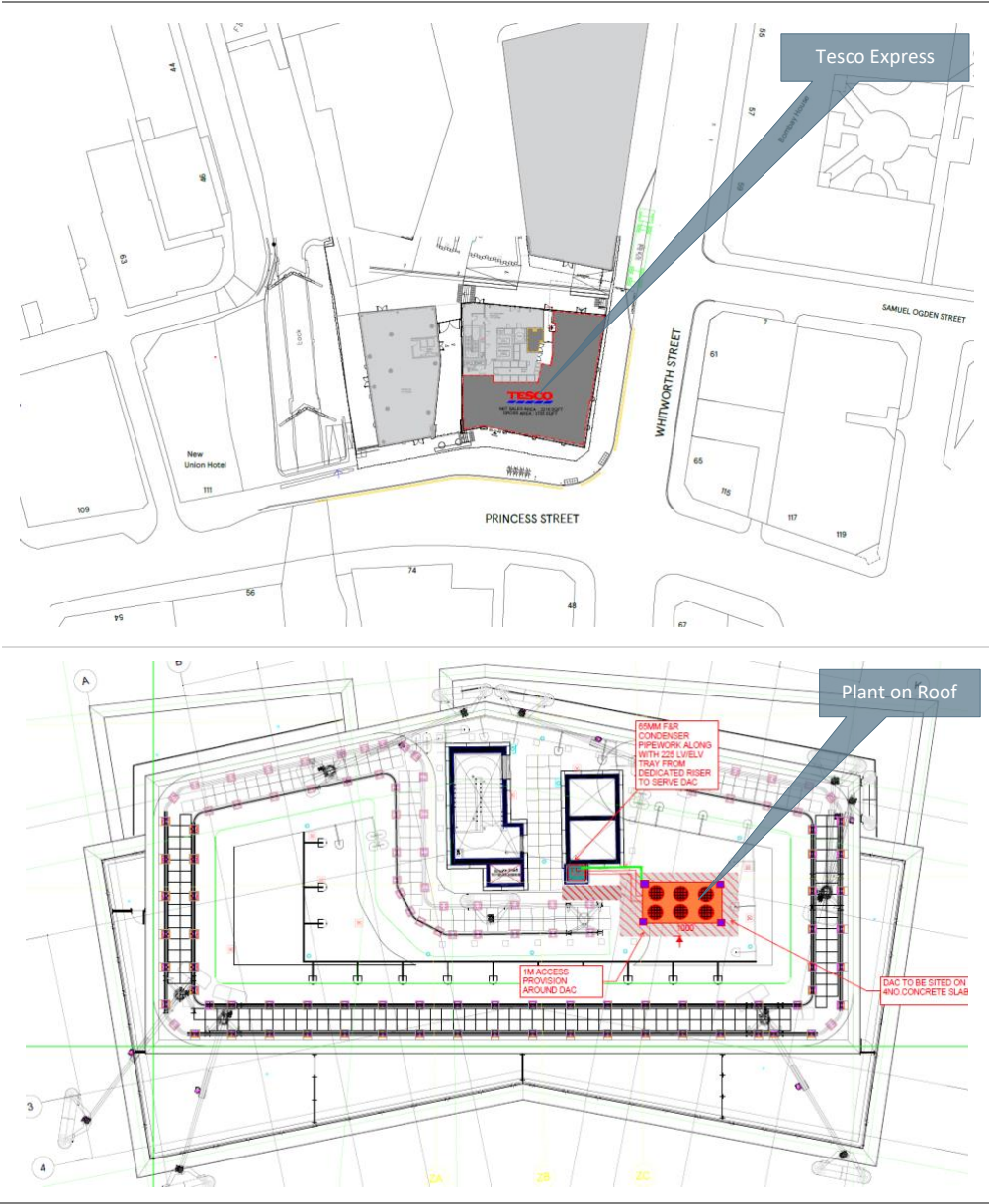
This report will rely on the following external reports by third party consultants.

- Mach Acoustic – Environmental Noise Levels – Revision 01 dated 1st July 2019 (details of the external background noise levels)
- Noise Solutions Ltd report reference 91023/NIA/Rev 01 dated 12th October 2022 (prediction of the external noise levels from the internal plant room)

1.6. Layout of Site

1.6.1 Supplied Drawings

The following are extracts from the latest drawings supplied to KR Associates (UK) Ltd.

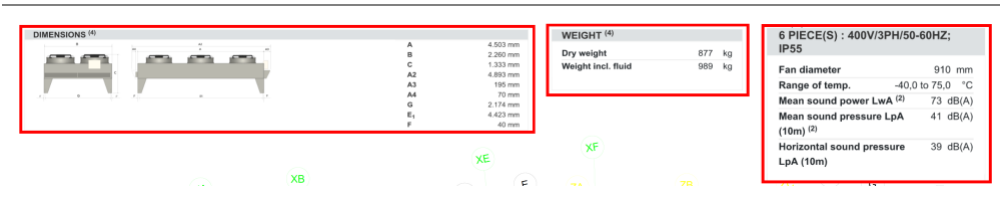


1.6.2 Extracts from Google Earth – Plant on Roof



2. External Noise from Gas Cooler...

2.1.1 Manufacturer's Data



2.1.2 Assumed Octave Band Sound Power Levels

The following are the octave band sound power levels that equate to an overall sound power level of L_{w(A)} 73 dB(A). It is assumed that on the drawing the supplied sound power levels relates to operation of the gas cooler with all 6-No fans operating.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{w(A)}
		63	125	250	500	1K	2K	4K	8K	
a	24 hours per day, L _{Aeq,15m}	72	75	73	71	68	65	61	59	73

Sound Power Level, L_w (dB) – Reference 1 x 10⁻¹² watts.

2.1.3 Distance to Residential

The distance between the centre of the gas cooler and the residential dwelling is 21m.



2.1.4 Resultant Noise Levels at Residential Façade

The following are the resultant noise levels at the residential façade from the gas cooler operating with all 6-fans running at the maximum set point (L_{w(A)} 73 dB) accounting for the separation distance of 21m.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
C	Resultant Levels at Residential Façade	35	38	36	34	31	28	24	22	36

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

2.2. External Background Noise Levels Mach Acoustics

The following are the external noise levels recorded by Mach Acoustics in May 2019 during the day and night time period based on the minimum levels recorded on a Sunday day and over-night to Monday and is replicated from section 3.1 of their report.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
Day	Day Time LAeq Levels	61	56	56	54	54	51	45	--	58
Night	Night Time LAeq Levels	59	54	56	54	53	49	43	--	57

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

2.3. Proposed External Noise Criterion

The operation of the Tesco Express will need to meet the following external noise level 1m from any residential dwelling. This assumes the octave band L₉₀ values are 10 dB below the corresponding L_{eq} values, and the criterion required is 5 dB below that i.e. – 15 dB.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
Crit	-5 dB Criterion (Cond 16)	44	39	41	38	37	34	28	26	42

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

2.3.1 Noise Solutions Ltd Background Noise Levels

As a point of reference, the Noise Solutions Ltd background noise survey established a minimum $L_{A90,15\text{ min}}$ background noise level between 23:00 and 07:00 of $L_{A90,15\text{ min}}$ 52 dB. The proposed criterion of 42 dB $L_{Aeq,15\text{ minutes}}$ assumes a background noise level of 37 dB $L_{A90,15\text{ minutes}}$. Therefore, the criterion is considered appropriate.

2.4. Assessment of External Noise Levels

Ref	Description	$L_{p(1m\text{ facade})}$ – Octave Band Centre Frequency (Hz)								$L_{p(A)}$
		63	125	250	500	1K	2K	4K	8K	
C	Resultant Levels at Residential Façade	35	38	36	34	31	28	24	22	36
Crit	-5 dB Criterion (Cond 16)	44	39	41	38	37	34	28	26	42
--	Compliance	Y	Y	Y	Y	Y	Y	Y	Y	Y

Sound Pressure Level, L_p (dB) – Reference $2 \times 10^{-5} \text{ Nm}^{-2}$.

The above table indicates the installation of the proposed 6-fan gas cooler operating at the maximum set-point ($L_{w(A)}$ 73 dB) will comply with the requirements of condition 16 of planning permission 137127/JO/2023.

3. Internal Noise from Internally Mounted Pack

3.1.1 Manufacturer’s Data

KR Associates (UK) Ltd has not been supplied the internal noise levels of the proposed CO₂ pack. Based on the experience from previous sites the pack will have a sound power level of $L_{w(A)}$ 85 dB.

3.1.2 Assumed Octave Band Sound Power Levels

The following are the octave band sound power levels assuming the pack has an overall sound power level of $L_{w(A)}$ 85 dB(A).

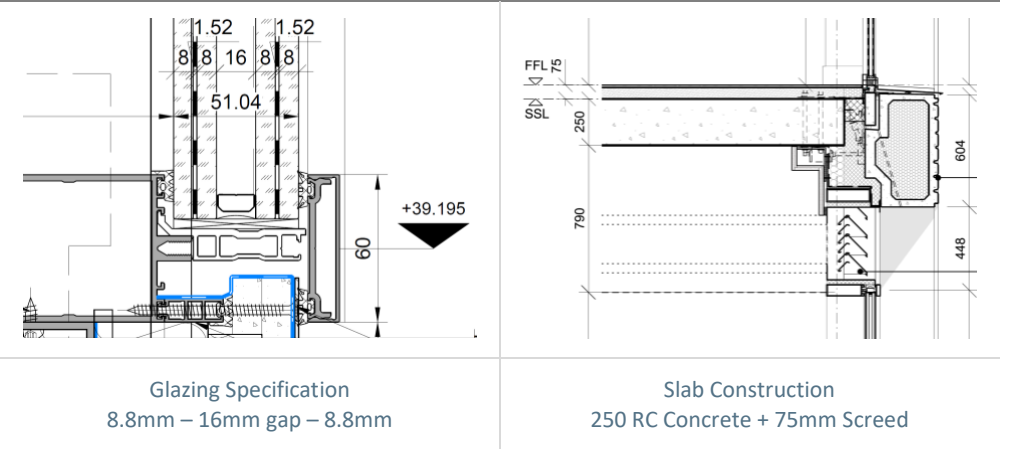
Ref	Description	$L_{p(1m\text{ facade})}$ – Octave Band Centre Frequency (Hz)								$L_{w(A)}$
		63	125	250	500	1K	2K	4K	8K	
a	24 hours per day, $L_{Aeq,15m}$	78	79	84	81	78	77	76	75	85

Sound Power Level, L_w (dB) – Reference 1×10^{-12} watts.

3.1.3 Landlord’s As-built Construction

The following is the existing landlord’s construction.

- 252194-CLM-29-BX-LXX-DET-0414 AB (As Built) for the glazing specification.
- 11-BO-A-G251-S-A:-101 Revision R (As Built) for the slab construction.



The louvres within the internal plant room will be blocked up with 1.5mm steel plate.

3.1.4 Performance of the Façade

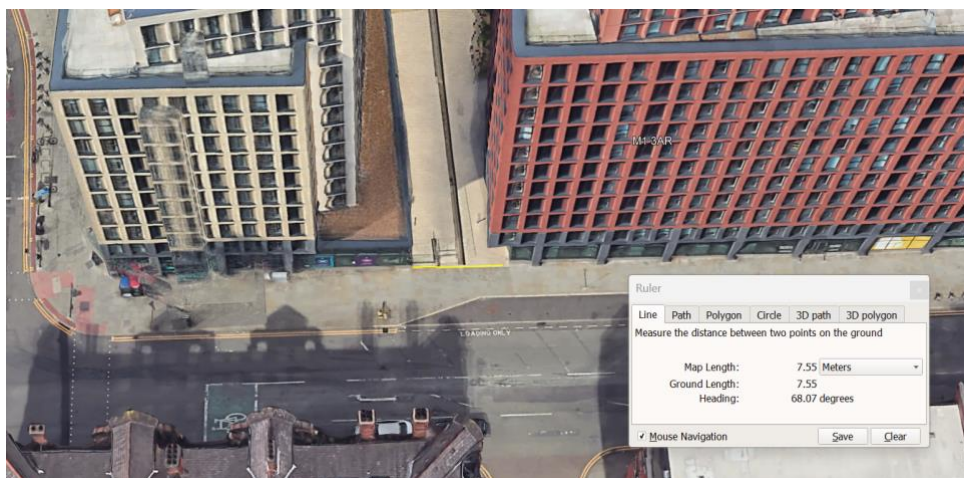
The following is the overall performance of the façade of the plant room with the louvres blocked up internally with 1.5mm steel sheet and the emergency CO₂ extract duct termination through a small section of the louvres. The details of the emergency extract were supplied by Noise Solutions Ltd and are included in Appendix A for reference.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								R _w
		63	125	250	500	1K	2K	4K	8K	
b	Glazing Façade	27	25	30	41	48	51	61	61	43
c	Emergency Extract	7	10	12	21	26	26	24	18	23

Sound Power Level, L_w (dB) – Reference 1 x 10⁻¹² watts.

3.1.5 Distance to Residential

The distance between the CO₂ Extract and the 1st floor residential dwelling is 8m.



3.1.6 Resultant Noise Levels at Residential Façade

The following are the resultant noise levels at the residential façade from the internally mounted pack. The calculations account for the internal sound power level of the pack of (L_{w(A)} 85 dB), the reverberant nature of the plant room, a correction of -5 dB for the reverberant to diffuse field and a distance correction of 8m.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
D	Resultant Levels at Residential Façade	40	38	41	29	21	20	21	26	35

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

3.2. Proposed External Noise Criterion

The proposed background noise criterion is taken from section 2.2 and 2.3 above.

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
Crit	-5 dB Criterion (Cond 16)	44	39	41	38	37	34	28	26	42

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

3.3. Assessment of External Noise Levels

Ref	Description	L _{p(1m facade)} – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
D	Resultant Levels at Residential Façade	40	38	41	29	21	20	21	26	35
Crit	-5 dB Criterion (Cond 16)	44	39	41	38	37	34	28	26	42
--	Compliance	Y	Y	Y	Y	Y	Y	Y	Y	Y

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

The above table indicates the installation of the proposed pack within the internal plant room (L_{w(A)} 85 dB) will comply with the requirements of condition 16 of planning permission 137127/JO/2023.

4. Internal Noise Transfer...

4.1. Internal Tesco Express Levels

The following are the internal noise levels from the proposed operation of the Tesco Express. It should be noted that the internal plant room is not below any residential dwellings and has an external exposed flat roof above.

Ref	Description	L _p (1m facade) – Octave Band Centre Frequency (Hz)								L _p (A)
		63	125	250	500	1K	2K	4K	8K	
a	Internal Operating Level	58	62	63	65	69	68	65	62	74
Maximum Sound Pressure Level, L _p (dB) – Reference 2 x 10 ⁻⁵ Nm ⁻² .										

4.2. Proposed Internal Noise Criterion

The original planning permission does not establish any suitable internal noise criterion within the residential flats above. Therefore, it is considered appropriate to ensure that the internal noise levels as a result of the internal noise transfer should be inaudible to the occupiers of the flats.

For reference the threshold of hearing is taken from BS EN ISO 389: Part 7: 2019 entitled “Acoustics: Reference zero for the calibration of audiometric equipment. Reference threshold of hearing under free-field and diffuse-field listening conditions.”. The threshold of hearing within the 1st floor flat above the proposed Tesco Express will depend on the existing background noise levels and will be higher than this absolute criterion. The criterion is set 5 dB above the threshold of hearing.

Ref	Description	L _p (1m facade) – Octave Band Centre Frequency (Hz)								L _p (A)
		63	125	250	500	1K	2K	4K	8K	
Crit	Criterion in Residential Flats	50	33	22	15	13	11	10	10	26
Maximum Sound Pressure Level, L _p (dB) – Reference 2 x 10 ⁻⁵ Nm ⁻² .										

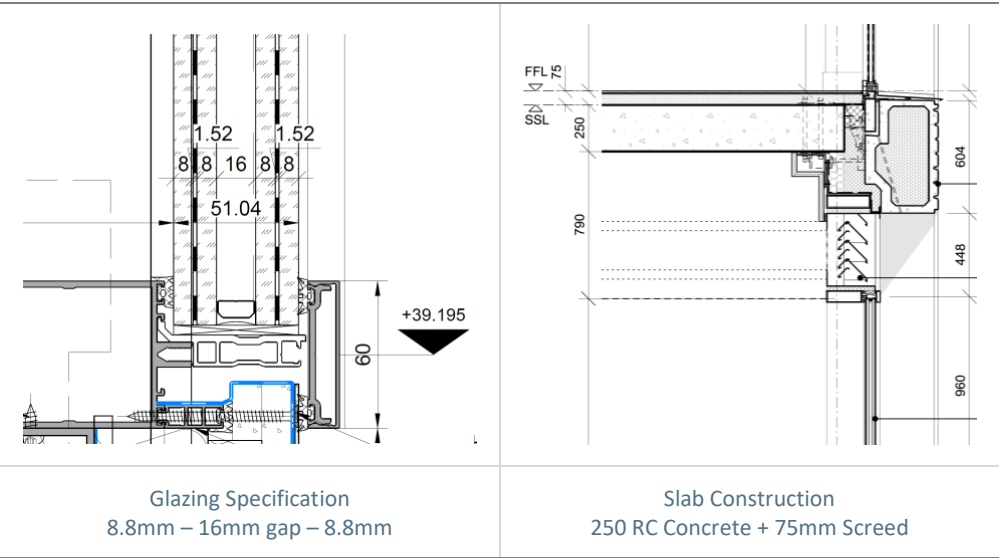
It should be noted that the above levels fall below NR 20 dB L_{Max}.

4.3. Landlord’s As-built Construction

The following assessments of the external and internal noise levels impacting the residential dwellings rely on the information within the following two drawings provided by the Landlord.

- 252194-CLM-29-BX-LXX-DET-0414 AB (As Built) for the glazing specification.
- 11-BO-A-G251-S-A:-101 Revision R (As Built) for the slab construction.

For reference, the following shows an exert from each drawing.



4.4. Proposed Mitigation Measures

4.4.1 Slab

The separating slab between the ground floor Tesco Express demise and the 1st floor residential dwellings is a 250mm post tensioned RC concrete slab with a 75mm screed. It is proposed to line the internal plant room walls with the following construction which has been selected to provide the necessary thermal protection from the internal plant room i.e. a U-value of at least 0.22 Wm⁻²K⁻¹.

- ISO Clad 100mm Firestop 10 Panel (26.89 Kgm⁻²)
- The panel on its own has an overall acoustic performance of R_w 31 – 33 dB.

4.4.2 Performance of Separating Element

Ref	Description	L _p (1m facade) – Octave Band Centre Frequency (Hz)								R _w
		63	125	250	500	1K	2K	4K	8K	
b	250 RC + 75mm Screed + TL	43	44	46	51	57	58	58	61	55

Sound Power Level, L_w (dB) – Reference 1 x 10⁻¹² watts.

4.4.3 Supporting Mechanical Equipment

Any mechanical equipment including AC cassettes, door heaters or any other equipment should be installed on pre-installed drop rods incorporating spring hangers located below the acoustic ceiling with a minimum isolation efficiency of 90%.

4.5. Resultant Internal Noise Levels

The following calculations are undertaken using the L_{Max} levels within the sales floor and internal plant room to determine if the resultant internal noise levels within the residential dwellings directly above the 1st floor will be audible to the future occupiers.

4.5.1 Internal Noise Transfer from Sales Floor

Ref	Description	L _p (1m facade) – Octave Band Centre Frequency (Hz)								L _{p(A)}
		63	125	250	500	1K	2K	4K	8K	
a	Internal Operating Level	58	62	63	65	69	68	65	62	74
b	250 RC + 75mm Screed + TL	43	44	46	51	57	58	58	61	55
--	Resultant Levels	15	18	17	14	12	10	7	6	18
Crit	Criterion in Residential Flats	50	33	22	15	13	11	10	10	26
--	Compliance	Y	Y	Y	Y	Y	Y	Y	Y	Y

Sound Pressure Level, L_p (dB) – Reference 2 x 10⁻⁵ Nm⁻².

The above table indicates the operation of the Tesco sales floor and back of house with a level not exceeding 74 dB L_{Amax} will comply with the requirements of condition 17 of planning permission 137127/JO/2023. The noise from the Tesco will be inaudible.

5. Appendix A – Attenuator Specification

Noise Solutions Ltd have proposed installing an Elta Raptor SDA 314 / 4 -1 AC extract fan with the corresponding 2D attenuator. The noise levels from the fan are supplied below but this will only ever operate in an emergency situation and therefore this has not been considered within the calculations.

RAPTOR SDA

Sound Data



Single Phase 220V to 240V / 50Hz

Product Code		Sound Power Level dBW @ Octave Band Hz								Total dB
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
SDA250/4-1AC	Inlet	68	70	59	55	52	52	49	42	73
	Outlet	67	72	58	54	53	53	48	41	73
SDA315/4-1AC	Inlet	64	70	63	65	63	55	51	45	73
	Outlet	67	70	63	65	61	56	52	46	73

FLANGED SILENCER

Dynamic Insertion Loss & Pressure Graphs

Dynamic Insertion Loss

Fan Size	Silencer Length	Silencer Type	Insertion Loss @ Octave Band (Hz)							
			63	125	250	500	1k	2k	4k	8k
0250	1D	ENP	-2	-5	-6	-9	-13	-11	-6	-6
		EP	-4	-6	-8	-11	-14	-16	-11	-10
	2D	ENP	-4	-7	-10	-15	-19	-16	-12	-9
		EP	-7	-10	-15	-16	-15	-17	-13	-13
0315-0560	1D	ENP	-2	-5	-6	-9	-13	-11	-6	-6
		EP	-4	-6	-8	-11	-18	-19	-17	-14
	2D	ENP	-4	-8	-12	-17	-23	-17	-12	-10
		EP	-7	-10	-12	-21	-26	-26	-24	-22
0630-0600	1D	ENP	-3	-4	-9	-15	-15	-8	-7	-6
		EP	-4	-6	-8	-17	-23	-20	-18	-10
	2D	ENP	-6	-8	-13	-22	-22	-13	-12	-9
		EP	-8	-11	-16	-27	-32	-31	-29	-19

end of technical note

