



Westfields

MEADOWSIDE PLOTS 2 & 3

Acoustic Assessment





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TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70051606

DATE: FEBRUARY 2022

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks				
Date	21/02/2022			
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Checked by	Robert Marriner			
Signature				
Authorised by	Robert Marriner			
Signature				
Project number	70020194			
Report number	70020194 RP AC 01			

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1 INTRODUCTION

WSP has been instructed by Westfields to undertake a post construction acoustic survey in Plots 2 & 3 of their Meadowside development in order to discharge part (b) of Manchester City Council (MCC)'s planning condition 32. Planning condition 32 states:

32) (a) *Prior to the first occupation of the residential accommodation with a phase hereby approved, the accommodation shall be insulated in accordance with a scheme submitted for approval in writing by the City Council, as Local Planning Authority. (b) The approved scheme shall be implemented and prior to the first occupation of the residential element within a phase and post construction survey (including appropriate mitigation measures and time scales for implementation if necessary) shall be submitted for approval in writing by the City Council, as Local Planning Authority. The measures agreed thereafter retained and maintained in situ.*

The purpose of this report is to outline the results of a baseline sound level survey undertaken within the development to demonstrate compliance with MCC guidance.

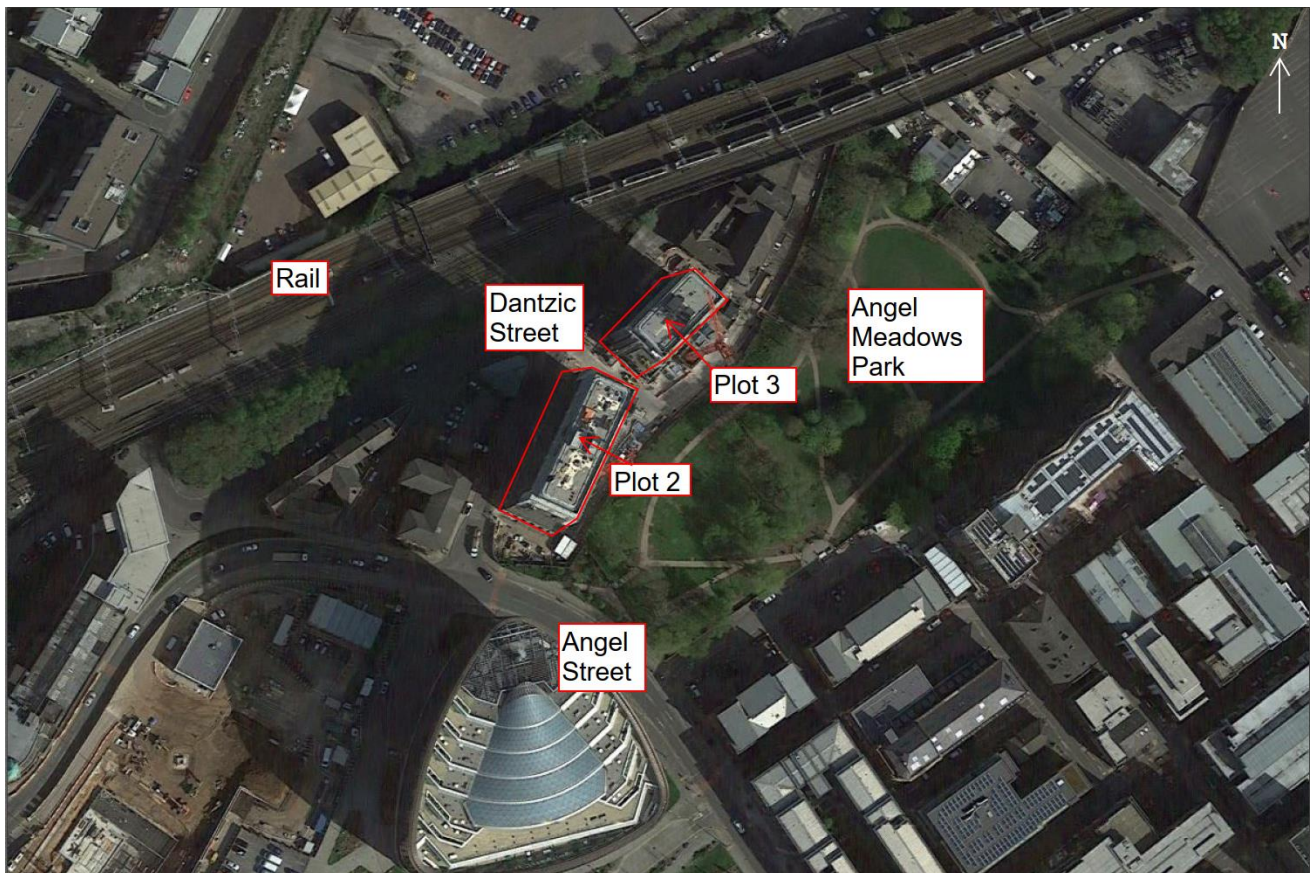
This report is necessarily technical in nature, and a glossary is provided in Appendix A to assist the reader.

2 SITE DESCRIPTION

Meadowside Plots 2 & 3 are located beyond the northwest border of Angel Meadow Park, Manchester. The northwest and northeast façades of both plots overlook Dantzic Street and the railway lines running to and from Manchester Victoria. The southwest façade of Plot 2 overlooks Angel Street whilst the southwest façade of Plot 3 overlooks Dantzic Street. The southeast façades of both plots overlook Angel Meadows with the southeast façade of Plot 2 also overlooks Angel Street at its most southern side.

A satellite image of Plots 2 & 3 in context is included in Figure 2:1.

Figure 2:1 – Plots 2 & 3 in context



Plot 2 is a 21-storey building and Plot 3 is a 16-storey building. Both have commercial unit space on the ground floor and Plot 2 also has a residents' gym and private dining room at Level 2.

3 ASSESSMENT CRITERIA AND GUIDANCE

3.1 INTERNAL NOISE CRITERIA

Table 3:1 provides a summary of the internal noise criteria specified by Manchester City Council (MCC) for residential developments.

Table 3:1 – Manchester City Council internal noise criteria for residential developments

Internal space	Internal noise limit	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living rooms	35 dB L_{Aeq}	-
Bedrooms	-	30 dB L_{Aeq} & 45 dB L_{Amax} *

* MCC stipulate that individual noise events in bedrooms should not exceed L_{Amax} 45 dB more than 15 times per night.

Due to ongoing construction work at the development site during daytime hours, this assessment is focussed on the night-time periods only. The daytime periods have been omitted from this assessment.

4 NOISE SURVEY & SUMMARY

4.1 OVERVIEW

Unattended internal noise level surveys were undertaken at 6 locations in Plots 2 & 3 over various periods between Thursday 27 January 2022 and Monday 21 February 2022.

The measurement locations were within bedrooms spread over a range of apartments on the third floor of each plot. These locations were chosen to monitor the noise break-in due to the different environmental noise sources affecting the various façades of the development i.e. road traffic noise, rail noise. The measurements were undertaken on the third level as a 'worst case' level, because this level is low in the building (closer to the noise sources) and not set back from the footprint of the building.

The apartments were fully complete (i.e. ready for handover) and their front doors were locked throughout the measurement periods so that the measurement equipment would not be disturbed for the duration.

The measurement locations are summarised in Table 4:1 and can be seen in Figure 4:1 and Figure 4:2.

Table 4:1 – Measurement locations summary

Measurement Location	Plot, Apartment, Room	Measurement Period	Equipment Used
P2.1	Plot 2, Apartment 301, Bedroom	27/01/22 – 03/02/22	Rion 2
P2.2	Plot 2, Apartment 305, Bedroom	27/01/22 – 03/02/22	Solo 13
P2.3	Plot 2, Apartment 310, Bedroom	16/02/22 – 21/02/22	Duo 5
P3.1	Plot 3, Apartment 306, Living/Dining Room	03/02/22 – 10/02/22	Solo 19
P3.2	Plot 3, Apartment 302, Bedroom	03/02/22 – 10/02/22	Rion 2
P3.3	Plot 3, Apartment 303, Bedroom	03/02/22 – 10/02/22	Solo 13

Figure 4:1 – Plot 2 measurement locations

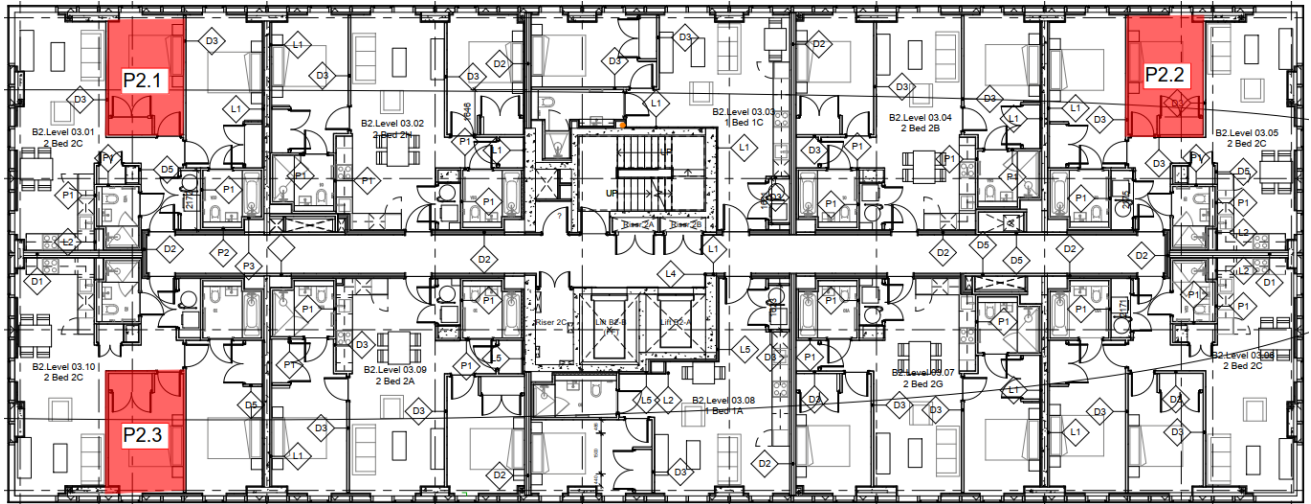
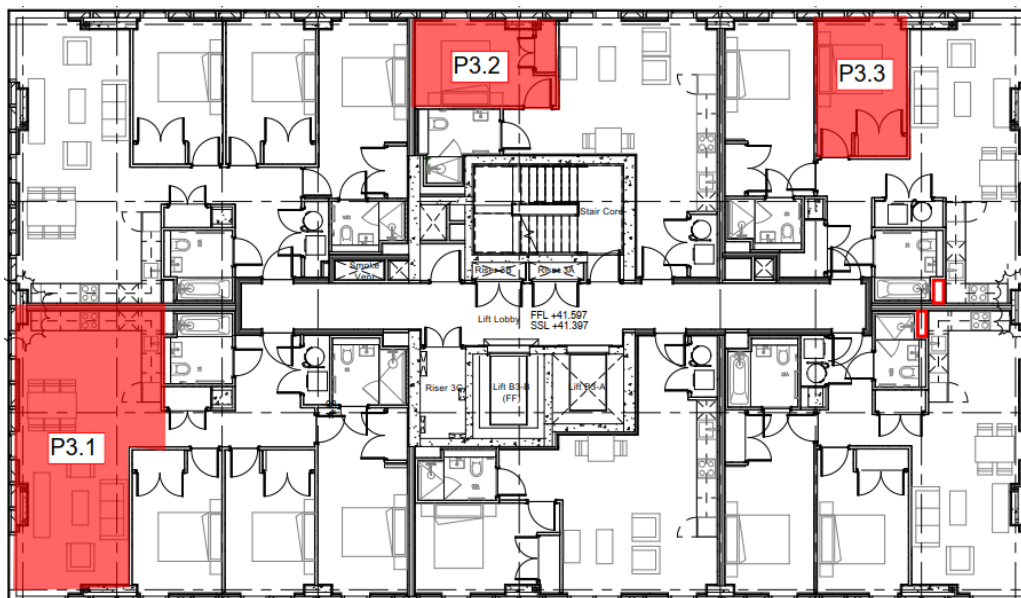


Figure 4:2 – Plot 3 measurement locations



Measurements were at an approximate height of 1.5 m above floor level. The microphones were positioned at an off-centre location to avoid adverse room mode effects.

The surveys were carried out using the Class 1 measurement equipment, as detailed in Table 4:2. The measurement systems had been calibrated to traceable standards within the previous 24 months, and the field calibrators had been calibrated within the previous 12 months. Each system was calibrated on-site before starting and after finishing each measurement using a field calibrator, no significant calibration drifts occurred during the survey. Copies of the calibration certificates are available on request.

Table 4:2 – Measurement Equipment Details

ID	Equipment	Manufacturer & Type	Serial Number
Rion 2	Sound Level Meter	Rion NL52 Sound Level Meter	00510145
	Pre-amplifier	H25 Preamplifier	10138
	Microphone	Condenser Microphone	02850
	Calibrator	Rion NC-74 Sound Calibrator	34615220
Solo 13	Sound Level Meter	01dB-METRAVIB Black Solo 'Datalogging Integrating Sound Level Meter'	65303
	Pre-amplifier	01dB-Metravib PRE 21 S	15976
	Microphone	01dB Metravib MCE 212 Microphone	142812
	Calibrator	01dB-Stell Cal 21	34213780
Solo 19	Sound Level Meter	01dB-METRAVIB Black Solo 'Datalogging Integrating Sound Level Meter'	65806
	Pre-amplifier	01dB-Metravib PRE 21 S	16461
	Microphone	01dB Metravib MCE 212 Microphone	166412
	Calibrator	01dB-Stell Cal 21	34323904
Duo 5	Sound Level Meter	01dB-Stell Duo 'Datalogging Integrating Sound Level Meter'	10594
	Pre-amplifier	01dB-Stell PRE 21 S Preamplifier	1507076
	Microphone	G.R.A.S Type 40CD Condenser Microphone	224313
	Calibrator	01dB Cal 21	34924020

4.2 RESULTS

A summary of the measured sound level data is presented in Table 4:3 for Plot 2 and Table 4:4 for Plot 3.

Table 4:3 – Results at the locations within Plot 2

Night-time Period of:	P2.1		P2.2		P2.3	
	dB L _{Aeq, 8} hour	Number of Exceedances >45dB L _{Amax}	dB L _{Aeq, 8} hour	Number of Exceedances >45dB L _{Amax}	dB L _{Aeq, 8} hour	Number of Exceedances >45dB L _{Amax}
27/01/2022	22	6	23	1	-	-
28/01/2022	23	10	24	0	-	-
29/01/2022	25	9	25	5	-	-
30/01/2022	23	5	26	0	-	-
31/01/2022	23	2	23	0	-	-
01/02/2022	22	2	23	0	-	-
02/02/2022	22	3	22	0	-	-
16/02/2022	-	-	-	-	30	3
17/02/2022	-	-	-	-	26	1
18/02/2022	-	-	-	-	27	1
19/02/2022	-	-	-	-	29	4

Table 4:4 – Results at the locations within Plot 3

Night-time Period of:	P3.1		P3.2		P3.3	
	dB L _{Aeq, 8hour}	Number of Exceedances >45dB L _{Amax}	dB L _{Aeq, 8hour}	Number of Exceedances >45dB L _{Amax}	dB L _{Aeq, 8hour}	Number of Exceedances >45dB L _{Amax}
03/02/2022	26	5	24	1	27	0
04/02/2022	26	0	23	0	27	0
05/02/2022	27	2	23	1	26	0
06/02/2022	25	4	23	3	26	0
07/02/2022	25	2	23	2	26	0
08/02/2022	26	6	24	5	27	1
09/02/2022	26	3	23	1	27	0

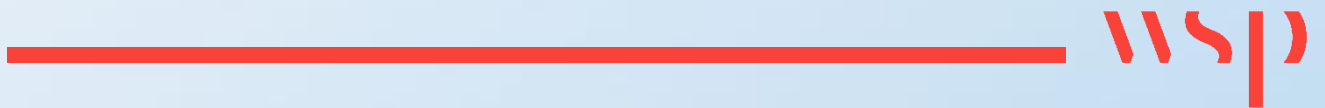


4.3 SUMMARY

As seen in Table 4:3 and Table 4:4, the night-time $L_{Aeq, 8\text{hour}}$ does not exceed 30dB during any of the measured night-time periods. Likewise, the number of times the L_{AFmax} exceeded 45dB for each night-time measurement period was never above 15. This demonstrates that the MCC internal noise criteria are met in each of the rooms tested at the development site. Therefore, it is considered that part (b) of Condition 32 can be discharged.

Appendix A

GLOSSARY OF ACOUSTIC TERMINOLOGY



Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Range of sound levels commonly found in the environment

Sound levels	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of pain



ACOUSTIC TERMINOLOGY

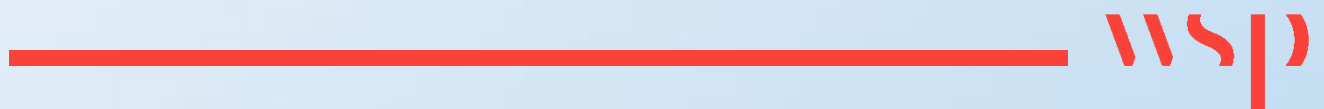
Terminology

Meaning

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{Aeq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

Appendix B

LIMITATIONS TO THIS REPORT





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