

Land Between Old Market Street & Grant Close Manchester

Acoustic Planning Report
0785/APR1

30 April 2021

For:

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1.0 Introduction

Lighthouse Acoustics has been appointed by Zahid Khalid to undertake an environmental sound survey at land between Old Market Street and Grant Close, Manchester and to undertake a detailed sound assessment for the proposed residential development.

The survey methodology, results and assessments are presented in this report.

2.0 Objectives

To establish the Local Authority's acoustic requirements for the proposed residential development.

To visit site to undertake a detailed environmental sound survey in order to establish existing environmental sound levels at the proposed development due to surrounding transportation sound sources.

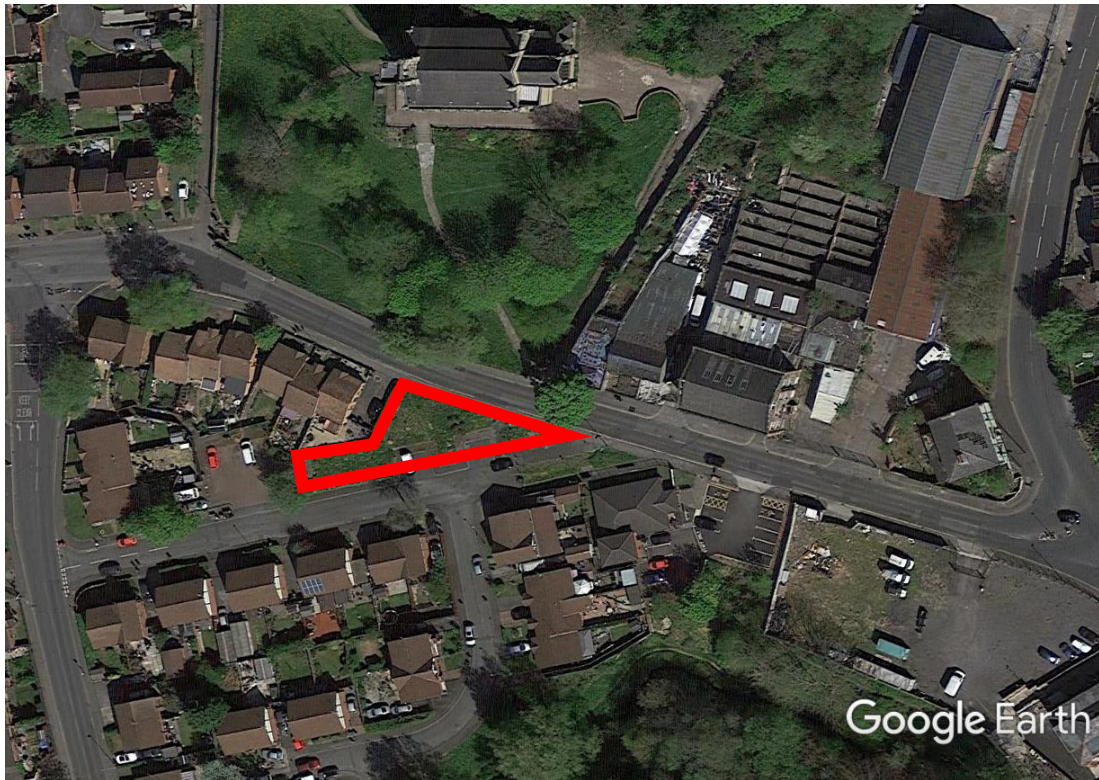
To undertake a detailed sound assessment to establish the acoustic specification for glazing/ventilation/screening elements required across the proposed development in order to achieve the acoustic requirements of the Local Authority.

3.0 Site Description

The proposed development is situated at land between Old Market Street and Grant Close, Manchester.

The site currently comprises vacant land situated to the east of No.31 Old Market Street. The site is bound by Old market Street to the north east, Grant close to the south and residential property to the west.

The site plan below indicates the extent of the site and the surrounding environment.



Site plan indicating the extent of the site and the surrounding environment

4.0 Local Authority Requirements

With regard to residential developments, Section 3.6.1.1 of the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states the following:

“Manchester City Council has adopted the following internal noise limits for residential properties:

- **Bedrooms (night time - 23.00 - 07.00) 30dB L_{Aeq} (individual noise events should not normally 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} ”**

5.0 Environmental Sound Survey

5.1 Measurements

Due to the lack of secure locations to install unmanned monitoring equipment, manned sound measurements were undertaken in order to obtain accurate measurements of environmental sound.

Since road traffic is the dominant sound source at the site the daytime sound measurements were undertaken in accordance with the shortened measurement procedure detailed in the Department of Transport document Calculation of Road Traffic Noise (CRTN) 1988.

This involves the measurement of the L_{A10} sound levels over representative time periods during any three consecutive hours between 10:00 and 17:00 hours. The three hourly L_{A10} values are then arithmetically averaged to give a 3 hour L_{A10} value. From this the 18 hour L_{A10} can be calculated by subtracting 1dB from the 3 hour L_{A10} value.

The 18 hour L_{A10} value can then be converted to provide the daytime 16 hour L_{Aeq} value by subtracting 2dB as stated in BS 8233: 2014, "Guidance on sound insulation and noise reduction for buildings".

For the night-time period there is no established shortened measurement procedure. However, it is accepted that for sites where road traffic is the dominant sound source, sound levels are typically at there highest at the start and end of the night-time period (23:00 to 07:00 hours).

Furthermore, the decrease and increase in sound levels at the start and end of the night-time period respectively are approximately symmetrical over time.

As such, the measurement of the L_{Aeq} sound levels over representative time periods during two consecutive hours at either the start or end of the night-time period provides a good representation of the night-time 8 hour L_{Aeq} value when logarithmically averaged. Measurements between 05:00 and 07:00 hours may be considered 'worst case' since they will include early morning commuter/delivery vehicles.

Based on the above, manned environmental sound measurements were undertaken between 05:00 and 07:00 hours and 10:00 and 13:00 hours on Thursday 22 April 2021.

During these periods the L_{Amax} , L_{A10} , L_{Aeq} and L_{A90} sound levels were measured consecutively over 1 hour periods along with the corresponding octave band sound pressure levels.

5.2 Weather Conditions

During the night-time survey period the wind conditions were calm (<1m/s) and the sky was clear. There was no rainfall and road surfaces were dry. The temperature was approximately 0°C.

During the daytime survey period the wind conditions were calm ($<1\text{m/s}$) and the sky was clear. There was no rainfall and road surfaces were dry. The temperature was approximately 8°C .

The weather conditions during the survey periods are therefore considered to be suitable for undertaking measurements of sound levels.

5.3 Measurement Position

Environmental sound levels were measured at a single position on-site as described in the table below.

Position	Description
A	Microphone situated toward the north western site boundary at 1.5m above ground level overlooking Old market Street in free field conditions.

The measurement position is shown on the site plan below.



Site plan showing measurement position

The measurement position was selected in order to assess typical environmental sound levels incident upon the proposed facades of the development.

5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Casella	633C	0721319	25/09/2019
Preamplifier	Casella	495	001446	25/09/2019
Microphone	Casella	251	1996	25/09/2019
Class 1 Sound Calibrator	Casella	120/1	3864878	26/10/2020
Environmental Noise Kit	Casella	6847	-	-
Microphone Extension Cable	Casella	C6717/5	-	-
Weather Protection System	Casella	6737	-	-

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

5.5.1 Measured Sound Levels

The results of the daytime and night-time environmental sound survey periods are presented in the table below.

Position	Hourly Period	Measured Sound Pressure Levels (dB)			
		L _{Amax,1hour}	L _{Aeq,1hour}	L _{A10,1hour}	L _{A90,1hour}
A	05:00 – 06:00	78	59	63	44
	06:00 – 07:00	78	61	66	47
	12:00 – 13:00	83	62	65	49
	13:00 – 14:00	78	62	65	50
	14:00 – 15:00	86	62	65	49

5.5.2 Daytime L_{Aeq,16hour}

The three hourly L_{A10} values are arithmetically averaged to give a 3 hour L_{A10} value. From this the 18 hour L_{A10} can be calculated by subtracting 1dB from the 3 hour L_{A10} value. The 18 hour L_{A10} value can then be converted to provide the daytime 16 hour L_{Aeq} value by subtracting 2dB.

Position	L _{A10,3hour} (Arithmetic Average)	L _{A10,18hour} (-1dB)	L _{Aeq,16hour} (-2dB)
A	65	64	62

The corresponding daytime L_{Aeq,16hour} octave band sound pressure levels at each measurement position are presented in the table below.

Position	Daytime L _{eq,16hour} Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
A	68	62	59	56	59	55	48	40	62

5.5.3 Night-time $L_{Aeq,8hour}$

The two hourly L_{Aeq} values are logarithmically averaged to provide the night-time 8 hour L_{Aeq} value.

Position	$L_{Aeq,2hour}$ (Logarithmic Average)	$L_{Aeq,8hour}$ (-0dB)
A	60	60

The corresponding night-time $L_{Aeq,8hour}$ octave band sound pressure levels at each measurement position are presented in the table below.

Position	Night-time $L_{eq,8hour}$ Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
A	63	57	54	54	57	54	46	36	60

5.5.4 $L_{Amax,F}$ Sound Level Events

The highest 15No. individual $L_{Amax,F}$ sound level events measured during the night-time survey period at each position are presented in the table below along with the corresponding octave band sound pressure levels.

Position	$L_{max,F}$ Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
A	85	80	80	76	74	69	62	56	78
	90	76	69	71	72	74	67	57	78
	84	80	78	70	71	70	67	58	76
	80	73	68	70	72	69	61	51	75
	84	69	65	68	72	69	60	58	75
	81	78	72	73	71	65	57	50	75
	80	78	77	73	68	66	60	54	74
	79	71	65	67	71	68	62	56	73
	80	75	68	66	70	69	60	60	73
	77	71	63	64	70	68	59	48	73
	76	66	62	64	69	68	59	48	72
	84	70	67	71	69	66	59	49	72
	80	73	69	66	70	66	57	49	72
	78	76	72	67	69	66	57	50	72
	77	69	68	67	68	66	58	49	72

5.6 Discussion of Sound Climate

During the night-time survey period the dominant sound source at Position A was noted to be frequent road traffic along Old Market Street. During lulls in local road traffic along Old Market Street, road traffic from the surrounding road network contributed towards the measured sound climate along with passing pedestrians and birdsong.

During the daytime survey period the dominant sound source at Position A was noted to be frequent road traffic along Old Market Street. During lulls in local road traffic along Old Market Street, road traffic from the surrounding road network contributed towards the measured sound climate along with passing pedestrians and birdsong.

6.0 Detailed Sound Assessment

6.1 Assessment Method

In order to establish the acoustic specification for glazing/ventilation elements required to achieve the internal daytime $L_{Aeq,16hour}$, night-time $L_{Aeq,8hour}$ and night-time $L_{Amax,F}$ requirements an assessment has been undertaken in accordance with the more rigorous calculation method detailed in BS 8233:2014, "Guidance on sound insulation and noise reduction for buildings".

This calculation method takes into account the external sound pressure level, the sound reduction indices of the façade elements, the area of the facade and the absorption within the room at octave band centre frequencies.

6.2 Proposed Site Layout

The assessment has been based on the following drawings.

Author	Drawing No.	Revision	Date
P4B Architecture	19003 02	-	-
	19003 03	-	-
	19003 04	-	-
	19003 05	-	-

The proposals include the construction of 1No. detached single storey residential house with front and rear gardens.

6.3 Acoustic Requirements

The proposed residential houses comprise living room, kitchen/dining and bedroom spaces along with rear gardens. Based on the requirements of the Local Authority detailed in Section 4.0, the following internal and external sound limits have been assessed to.

Room Type	07:00 to 23:00	23:00 to 07:00
Living Room	35dB $L_{Aeq,16hour}$	-
Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45dB L_{Amax}^*
Rear Garden	50-55dB $L_{Aeq,16hour}$	-

* should not be exceeded more than 15 times per night.

6.4 Room Assumptions

The following typical dimensions and finishes/furnishings have been assumed for the purpose of the assessment.

Room Type	Typical Room Dimensions	Typical Window Area	Typical Room Finishes / Furnishings
Living Room	4m x 3m x 2.4m	2m ²	Wood/vinyl floor, curtains, sofa
Dining/Kitchen	6m x 5m x 2.4m	5m ²	Wood/vinyl floor, table, chairs
Bedroom	4m x 3m x 2.4m	1m ²	Carpet, curtains, bed

Should the proposed dimensions/finishes/furnishings differ from those detailed above a re-assessment may be required.

6.5 Construction Proposals

It is understood that the external walls and roof of the buildings will comprise the following typical constructions.

Element	Typical Construction
External Walls	Brickwork with cavity, insulation and internal plasterboard lining
Roof	Tiles with insulation in void and plasterboard ceiling

The following typical Sound Reduction Indices have been assumed for the various elements.

Element	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
External Walls	32	40	44	45	51	56	56	56
Roof	20	28	34	40	45	49	49	49

6.6 Glazing Specifications

In order to achieve the internal daytime and night-time requirements the glazing/external door system as a whole including glass, frame, seals and openings shall provide the following minimum sound insulation performance when tested in accordance with BS EN ISO 10140-2: 2010.

Facade	Room Type	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Front & Sides	Living Room	23	27	29	36	41	42	52	56
	Bedroom	23	27	29	36	41	42	52	56
Rear	Dining/Kitchen	20	24	20	25	34	37	35	39
	Bedroom	20	24	20	25	34	37	35	39

The table below presents typical configurations and R_w sound insulation values which may be expected to achieve the sound insulation performance specified above.

Facade	Room Type	Typical R_w Sound Insulation Value (dB)	Typical Configuration
Front & Sides	Living Room	40	10mm/16mm/6.4mm
	Bedroom	40	10mm/16mm/6.4mm
Rear	Dining/Kitchen	30	6mm/16mm/4mm
	Bedroom	30	6mm/16mm/4mm

Acoustic test data for the proposed glazing systems should be forwarded for review.

6.7 Ventilation Provision

6.7.1 Background Ventilation

In order to achieve the internal daytime and night-time requirements openable windows must remain closed. Background ventilation shall therefore be provided by ventilators in the building façade and shall provide the following minimum element normalised level differences in the open position when tested in accordance with BS EN ISO 10140-2: 2010.

Facade	Room Type	Element Normalised Level Difference, $D_{n,e}$ (dB) in Open Position at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Front & Sides	Living Room	27	33	39	39	43	50	50	50
	Bedroom	27	33	39	39	43	50	50	50
Rear	Dining/Kitchen	31	34	39	34	41	31	33	35
	Bedroom	31	34	39	34	41	31	33	35

Should more than one ventilator be required per room the above element normalised level differences shall be increased by the following values:

Number of Ventilators Required Per Room	Additional Performance Required Per Ventilator (dB)
1	0
2	+3
3	+5
4	+6

The table below presents typical configurations and $D_{n,e,w}$ sound insulation values which may be expected to achieve the sound insulation performance specified above.

Facade	Room Type	Typical Open $D_{n,e,w}$ Sound Insulation Value (dB)	Typical Configuration
Front & Sides	Living Room	40	Acoustic Window Ventilators (e.g. Greenwood EAR42W)
	Bedroom	40	Acoustic Window Ventilators (e.g. Greenwood EAR42W)
Rear	Dining/Kitchen	35	Standard Window Ventilators
	Bedroom	35	Standard Window Ventilators

Acoustic test data for the proposed ventilators should be forwarded for review.

Should acoustically treated forced mechanical ventilation be considered, the system should achieve noise levels of $L_{Aeq} \leq 30$ dB in living rooms and bedrooms and $L_{Aeq} \leq 35$ dB in dining rooms, kitchens and bathrooms where providing continuous background ventilation.

A mechanical services engineer should be consulted to ensure that a suitable system is proposed. Detailed proposals should be forwarded for review acoustically.

6.7.2 Summer Cooling Ventilation

In addition to background ventilation Manchester City Council require rapid/summer cooling ventilation in order to minimize the need for occupants to open windows during hot summer days.

In order to provide this, the acoustically treated forced mechanical ventilation should feature a user controllable 'boost' function which delivers increased air flow at the occupants discretion.

A mechanical services engineer should be consulted to ensure that a suitable system is proposed. Detailed proposals should be forwarded for review acoustically.

6.7.3 Purge Ventilation

Purge ventilation will be provided via openable windows at the occupants discretion. As such, the internal daytime and night-time requirements may potentially be exceeded during purge ventilation conditions. It is understood that this method of providing purge ventilation is deemed acceptable by Manchester City Council.

6.8 Screening Provision

A daytime $L_{Aeq,16hour}$ sound level of 62dB was measured at Position A which exceeds the daytime requirement of $L_{Aeq,16hour}$ 55dB in rear gardens.

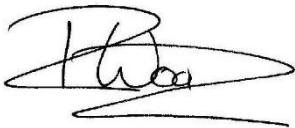
The proposed house will provide a significant amount screening between road traffic along Old Market Street and the rear garden. As such, daytime $L_{Aeq,16hour}$ sound levels of ≤ 55 dB are expected within the rear garden. The fences to the rear garden do not therefore need to comply with any acoustic specification.

7.0 Conclusions

The Local Authority's acoustic requirements for the proposed residential development have been established.

A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the proposed development due to surrounding transportation sound sources.

A detailed sound assessment of the proposed development has been undertaken and glazing/ventilation specifications have been provided in order to achieve the internal daytime and night-time requirements of the Local Authority.



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