23 Church Lane
Rochdale

Acoustic Planning Report
0657/APR1

24 January 2020

For:

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1.0 Introduction

Lighthouse Acoustics has been appointed by HM Properties to undertake an environmental sound survey at 23 Church Lane, Rochdale and to undertake a detailed sound assessment for the proposed development.

The proposed development comprises the change of use of the existing 2 storey building to form 6 residential flats.

The survey methodology, results and assessment for the proposed development are presented in this report.

2.0 Objectives

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

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

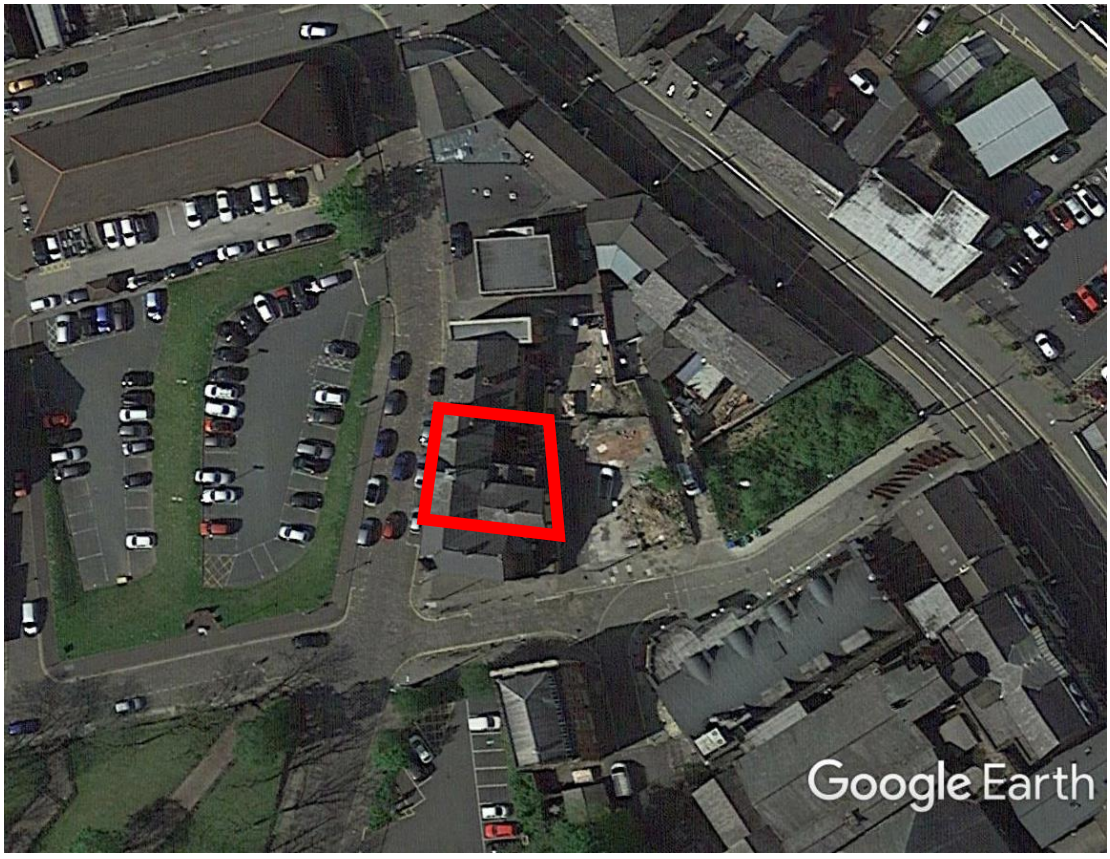
To undertake a detailed environmental sound assessment of the proposed residential development to establish the acoustic specification for glazing/ventilation elements in order to achieve the acoustic requirements of the Local Authority.

3.0 Site Description

The proposed residential development is at 23 Church Lane, Rochdale. The site comprises an existing 2 storey building.

The site is bound by an adjoining building to the north, access road to the east, adjoining building to the south and Church Lane 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

It is understood that the Environmental Health Officer at Rochdale Borough Council has requested the following:

> *"It is absolutely essential that a robust acoustic report is undertaken to establish existing external noise levels, in particular over the weekend nights where noise from existing night-time economy is of a high/very high level. This information will be used to design the accommodation to achieve the following internal noise levels:*
>
> - *35 dB(A) Leq (1 hour) in the bedrooms with windows shut and other means of ventilation provided between 7am and 11pm;*
> - *30dB(A) Leq 5mins in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;*
> - *35 dB(A) Leq (1 hour) in the living room/s with windows shut and other means of ventilation provided between 7am and 11pm;*
> - *40dB(A) Leq (1 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times."*

The above requirements should be considered extremely onerous due to the fact that they are to be achieved over 1 hour or 5 minute periods. In comparison, BS 8233:2014, "Guidance on sound insulation and noise reduction for buildings", requires that the above internal noise levels are achieved over 16 hour daytime (07:00 to 23:00) and 8 hour night-time (23:00 to 07:00) periods.

5.0 Environmental Sound Survey

5.1 Measurements

Automated environmental sound measurements were undertaken from 13:00 hours on Friday 17 January 2020 to 13:00 hours on Monday 20 January 2020. During this period the L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels were measured continuously over 15 minute periods along with the corresponding octave band sound pressure levels.

5.2 Weather Conditions

At the start of the survey period there was a gentle westerly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 6°C.

At the end of the survey period there was a light westerly breeze (<3m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 7°C.

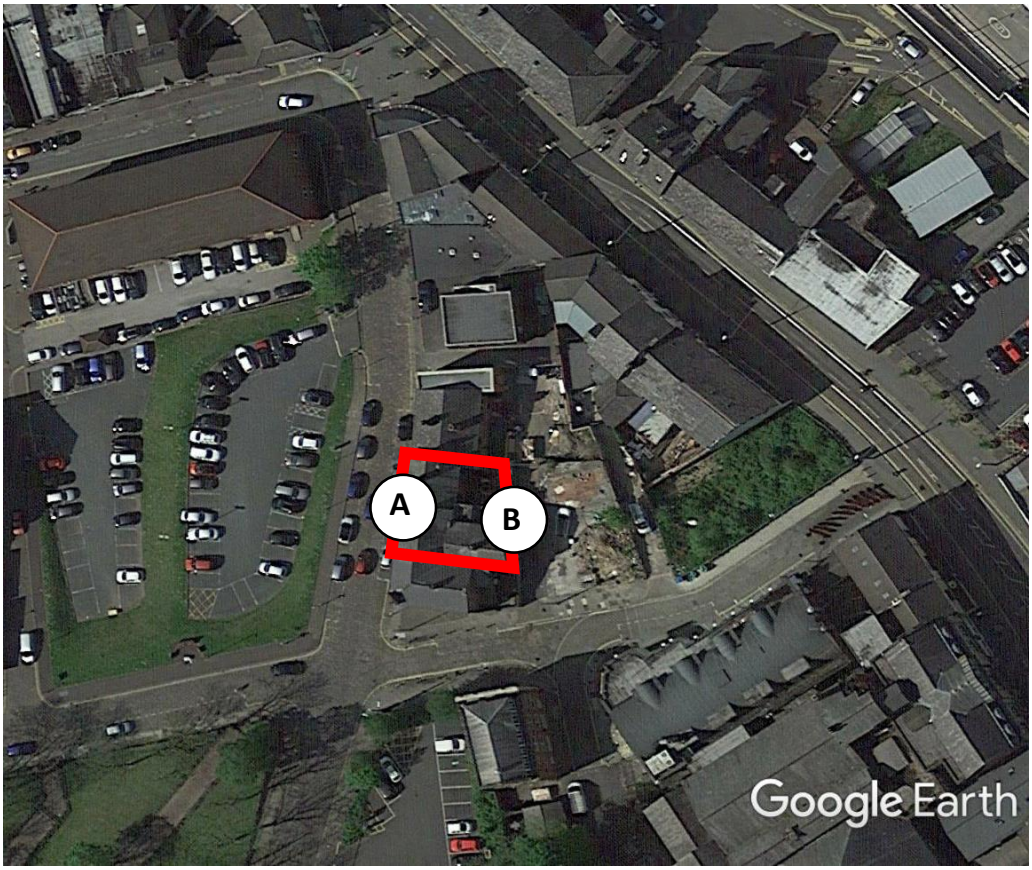
Based on publicly available weather data for the survey period we understand that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

5.3 Measurement Positions

Environmental sound levels were measured at 2No. positions on-site as described in the table below.

Position	Description
A	Microphone at 1st floor level at 1m from the west façade of the existing building overlooking Church Lane.
B	Microphone at 1st floor level at 1m from the east façade of the existing building overlooking the rear access road.

The measurement positions are shown on the site plan below.



Site plan showing measurement positions

The measurement positions were selected in order to assess typical environmental sound levels incident upon the front and rear facades of the proposed residential 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	5262813	07/06/2019
Preamplifier	Casella	495	003391	07/06/2019
Microphone	Casella	251	1031	07/06/2019
Class 1 Sound Level Meter	Casella	633C	2811231	07/06/2019
Preamplifier	Casella	495	001239	07/06/2019
Microphone	Casella	251	1841	07/06/2019
Class 1 Sound Calibrator	Casella	120/1	3864878	15/11/2019
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 meters prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

5.5.1 Time History Graphs

The results of the environmental sound survey are presented on Time History Graphs 0657/THG1 and 0657/THG2 enclosed at the rear of the report. The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.5.2 $L_{Aeq,T}$ Ambient Sound Levels

In order to compare the results of the environmental sound survey with the internal noise level requirements it is necessary to convert the $L_{Aeq,15min}$ sound levels into daytime $L_{Aeq,1hour}$ sound levels. This has been calculated using the following formula:

$$L_{Aeq,T} = 10\,log_{10}\left(\frac{1}{N}\sum_{i}^{N} 10^{L_{Aeq,15min}{}^{i}/10}\right)$$

The highest calculated daytime $L_{Aeq,1hour}$ sound levels at each measurement position are presented in the table below along with the highest measured night-time $L_{Aeq,15min}$ sound levels.

Position A		Position B	
Daytime $L_{Aeq,1hour}$ (dB)	**Night-time $L_{Aeq,15min}$ (dB)**	**Daytime $L_{Aeq,1hour}$ (dB)**	**Night-time $L_{Aeq,15min}$ (dB)**
64	61	56	52

The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

The corresponding daytime $L_{Aeq,1hour}$ and night-time $L_{Aeq,15min}$ octave band sound pressure levels at each measurement position are presented in the table below.

Position	Period	L_{eq} Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
A	Daytime (1 hour)	65	63	56	59	62	55	44	32	64
	Night-time (15 minute)	68	63	57	59	58	52	44	35	61
B	Daytime (1 hour)	56	53	53	52	52	48	42	37	56
	Night-time (15 minute)	56	51	49	48	48	45	39	36	52

The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.6 Discussion of Sound Climate

At the start and end of the survey period the dominant sound sources at Position A were noted to be frequent road traffic along Church Lane and the surrounding road network.

At the start and end of the survey period the dominant sound sources at Position B were noted to be frequent road traffic from the surrounding road network.

Whilst we are unable to comment on dominant sound sources or individual sound events during the survey period, based on the surrounding environment it is likely that road traffic remained the dominant sound source.

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 $L_{Aeq,1hour}$, and night-time $L_{Aeq,15min}$ 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 indicies of the façade elements, the area of the facade and the absorption within the room at octave band centre frequencies.

6.2 Proposed Development

The assessment has been based on the following drawings.

Author	Drawing No.	Revision	Date
jg-d Architecture and Design	(19003)3	C	Dec 19
	(19003)4	A	Dec 19
	(19003)7	A	July 19
	(19003)8	A	Dec 19

The proposals include the change of use of the existing 2 storey building to form 6 residential flats.

6.3 Acoustic Requirements

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

Room Type	07:00 to 23:00	23:00 to 07:00
Living Room/Kitchen	35dB $L_{Aeq,1hour}$	-
Bedroom	35dB $L_{Aeq,1hour}$	30dB $L_{Aeq,5min}$

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 Dimensions	Typical Room Finishes / Furnishings
Living Room/ Kitchen	5m x 4m x 2.4m	Front 2m x 2m Rear 4m x 2m	Wood/vinyl floor, curtains, sofa, table. chairs
Bedroom	3m x 3m x 2.4m	Front 2m x 1m Rear 2m x 1m	Carpet & underlay, 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 dwellings 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 Indicies 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 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 (Church Lane)	Living Room/ Kitchen	21	25	22	33	40	43	44	48
	Bedroom	24	28	32	43	46	48	55	59
Rear	Living Room/ 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 (Church Lane)	Living Room/ Kitchen	35	10mm/16mm/4mm
	Bedroom	45	10mm/16mm/16.8mm
Rear	Living Room/ 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 (Church Lane)	Living Room/ Kitchen	27	33	39	39	43	50	50	50
	Bedroom	42	48	46	49	54	65	65	65
Rear	Living Room/ 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 (Church Lane)	Living Room/ Kitchen	40	Acoustic Window Ventilators (e.g. Greenwood EAR42W)
	Bedroom	50	Acoustic Wall Ventilator (e.g. Greenwood MA3051) Or Acoustically Treated Forced Mechanical Ventilation
Rear	Living Room/ 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 to provide continuous background ventilation, this may be in the form of separate fans serving individual rooms or a larger system which provides whole house ventilation.

The system should achieve noise levels of L_{Aeq} 30dB in living rooms and bedrooms and L_{Aeq} 35dB in 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 Purge Ventilation

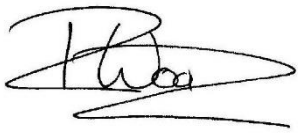
Purge ventilation will be provided via openable windows at the occupants discretion. As such, the internal daytime and night-time requirements may potentially be exceeded during purge ventilation conditions.

7.0 Conclusions

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

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

A detailed environmental sound assessment of the proposed residential development has been undertaken and acoustic specifications for glazing/ventilation elements have been provided in order to achieve the requirements of the Local Authority.



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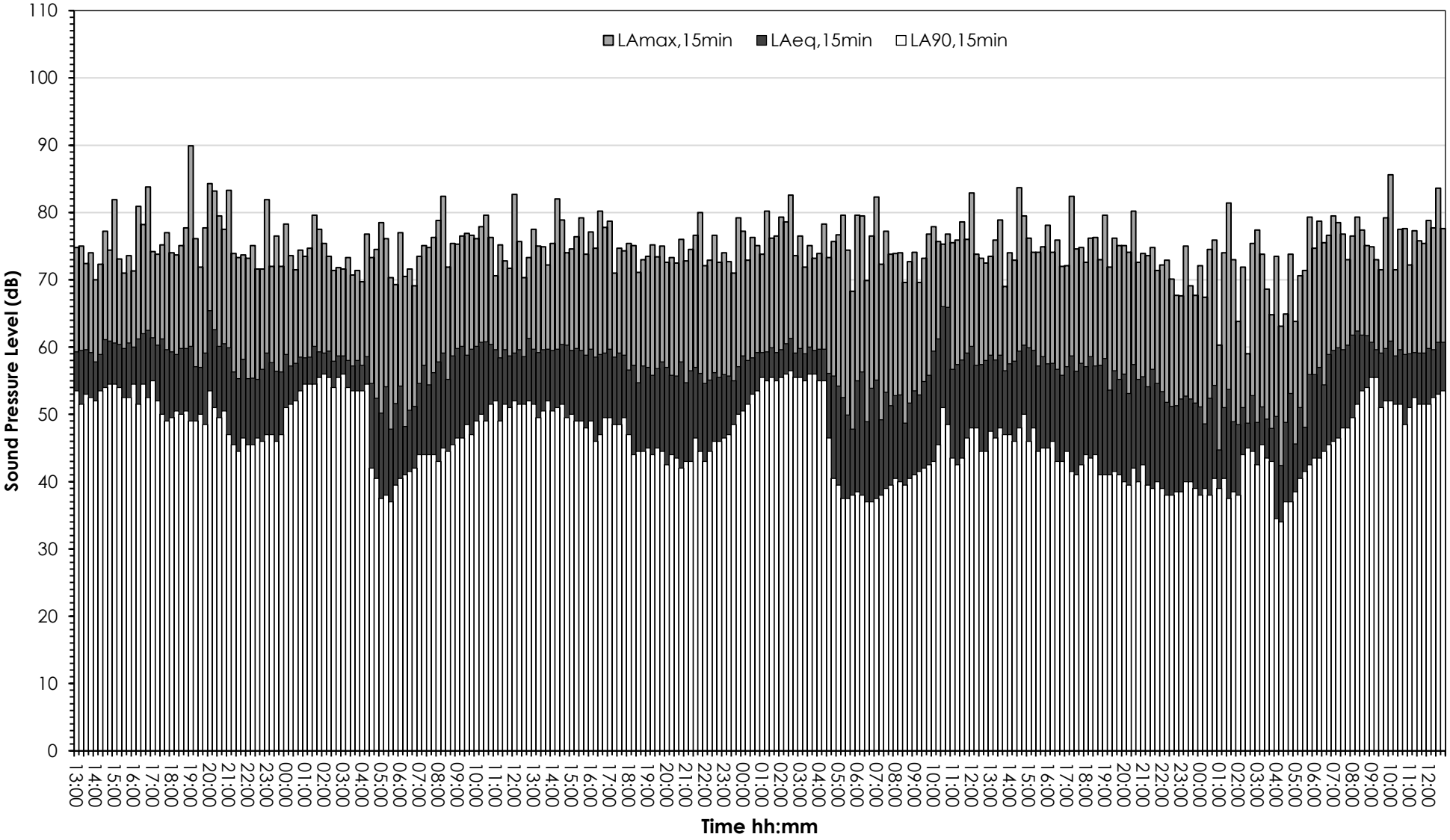
LIGHTHOUSE ACOUSTICS

0657/THG1

23 Church Lane, Rochdale

Time History Graph - Friday 17 January 2020 to Monday 20 January 2020

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A



0657/THG2

23 Church Lane, Rochdale

Time History Graph - Friday 17 January 2020 to Monday 20 January 2020

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position B

