

Commercial Street Development, Knott Mill, Manchester

Noise Impact Assessment Report

28295/NIA1

28/10/2020

For:

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Document Control

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1.0 Introduction

A new residential development is proposed at the junction of Commercial Street and Constance Street.

Hann Tucker Associates has been commissioned to carry out a noise survey and subsequently assess potential operational noise impacts for the proposed scheme. Our assessment outlines provisional solutions likely to be required to control external (road/train) noise intrusion into habitable rooms, and to prevent the operation of development introducing any adverse noise impacts on the locality (namely, limits for plant noise emissions).

Our survey results and assessment findings are presented herein.

2.0 Objectives

- To review Local Authority requirements for baseline environmental noise surveys and noise impact assessments.
- To visit site to establish the prevailing environmental noise levels by automated monitoring over a minimum 24 hour period in general accordance with BS 7445.
- Based on the above, to undertake a noise impact assessment of the proposed development, covering:-
 - i. Incident external noise levels/sources & suitability of the site for residential use;
 - ii. Measures to achieve acceptable noise levels within new dwellings;
 - iii. Measures to achieve acceptable noise levels in new outdoor living spaces;
 - iv. Noise limits for future fixed plant and equipment to protect the locality.

To provide preliminary specifications for windows and ventilators to control external noise intrusion, along with preliminary guidance on commercial noise control measures

To set plant noise emission limits in accordance with Local Authority guidance.

3.0 Acoustic Terminology

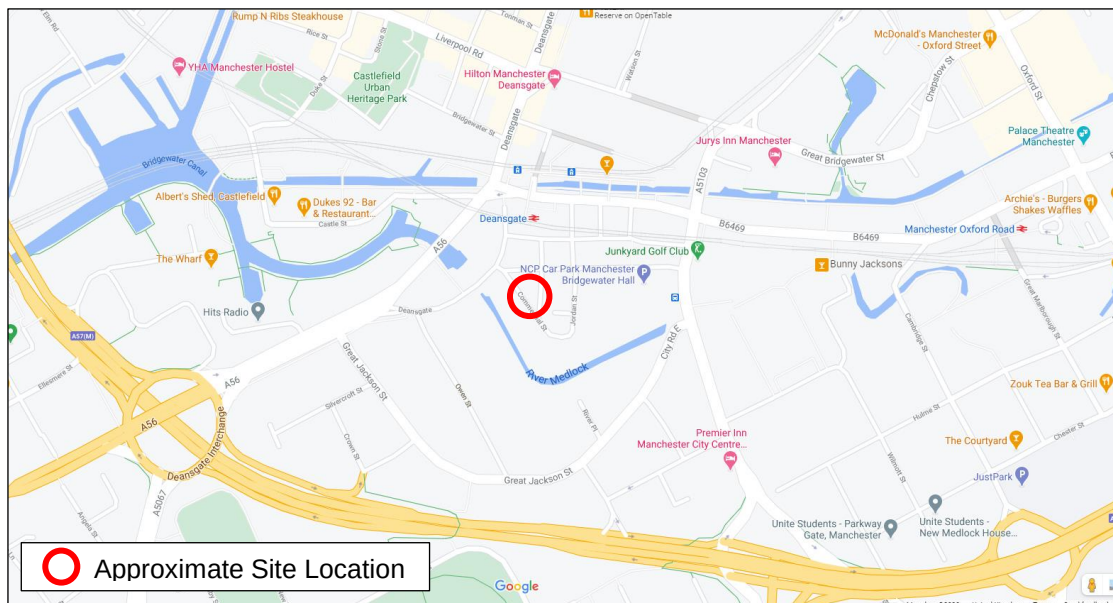
Please refer to Appendix A for an explanation of acoustic terminology used herein.



4.0 Site Description

4.1 Location

The proposed development is located at on the junction of Commercial Street and Constance Street in Manchester, and falls under the jurisdiction of Manchester City Council. See site location below.



Site Location (© maps.google.co.uk)

4.2 Description

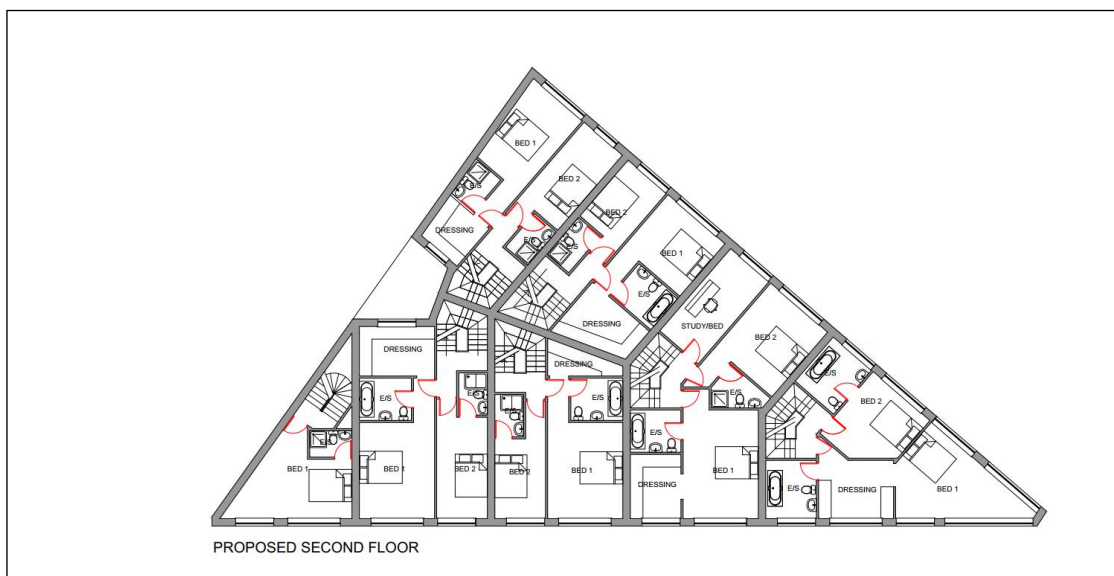
The site is bounded by Commercial Street to the west, Constance Street east, and 2 to 8 Little Peter Street to the north. The surrounding area comprises of residential apartment and office space buildings. Deansgate train station is approximately 77m from the site to the north. The site is currently an open access private car park.



Site Plan (© maps.google.co.uk)

4.3 Proposals

The proposed development will provide 7No town houses of 5No storeys each with a ground floor entrance lobby, car park, cycle store and rooftop private terraces. See typical residential upper floor layout and visuals below.





5.0 Acoustic Standards & Guidelines

5.1 Local Planning Requirements

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (December 2015).

5.1.1 Noise from Fixed Building Services Plant

Section 3.6.1.5.1 outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

5.1.2 Achieving Suitable Internal Noise Levels

Section 3.6.1.1 sets out the following noise levels to be achieved for residential developments:

- Bedrooms (Night time - 23:00 to 07:00): 30dB L_{Aeq} and individual noise events should not normally exceed 45 dB (L_{Amax}).
- Living Rooms (Day time 07:00 to 23:00): 35 dB (L_{Aeq}).
- Gardens and terraces (daytime) 55 dB (L_{Aeq}).



Section 5.3.1.3.1.2 of the Planning & Noise – Technical Guidance December 2015 document states the following with regards to maintaining internal ambient noise levels when it desired to keep windows closed but provide adequate ventilation:

“Occupants should be provided with a supply of fresh air in habitable rooms without having to open windows (whilst also having the option to do this for purge ventilation, or at the occupant’s discretion.

Where ambient noise levels are high a scheme of ventilation will need to be provided that does not compromise the acoustic attenuation afforded by glazing. This may come in the form of individual window trickle vents or acoustic trickle vents.”

5.2 National Planning Policy Framework

The following paragraphs are from the NPPF (revised Feb 2019):

180. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- a) *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

182. *Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”*

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

- *“Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”*



5.3 ProPG: Planning & Noise

ProPG: Planning & Noise 'Professional Practice Guidance on Planning & Noise' was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.

It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is "not dominant".

ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The ProPG considers suitable guidance on internal noise levels found in BS8233:2014 'Guidance on sound insulation and noise reduction for buildings' with the addition of an "ideal" $L_{Amax,f}$ requirement for bedrooms at night.

5.4 Planning Practice Guidance

The Department for Communities and Local Government's Planning Practice Guidance (PPG) website was launched in 2014 and provides guidance on 'Noise' for new developments in line with NPPF policies.

Notably, the website provides a table to help recognise when noise could be a concern relevant to the NOEL, LOAEL and SOAEL effect levels described in NPSE, as below:-

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

There are no numeric values to reference in this guide; everything is descriptive and so cannot inform an objective assessment of noise.



5.5 BS 4142:2014

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- *“a difference of around +10dB or more is likely to be an indication of a significant adverse impact”*;
- *“a difference of around +5dB is of marginal significance is likely to be an indication of an adverse impact”*;
- *“where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”*.

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00 hr) and 15-minutes for operations during night-time hours (23:00 to 07:00 hr).

BS 4142:2014 states that if a noise source contains an 'acoustic feature', such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

5.6 BS 8233:2014

British Standard 8233: 2014 “Sound insulation and noise reduction for buildings” recommends design criteria for internal ambient noise levels for dwellings providing a reasonable or good level of protection from external noise. It states that it is desirable that ambient noise levels do not exceed the following guidelines:

Activity	Location	Desirable Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq, 16\text{hour}}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16\text{hour}}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16\text{hour}}$	30 dB $L_{Aeq, 8\text{hour}}$

The document goes on to state that all of the above target levels may be relaxed by 5 dB and “reasonable” internal conditions would still be achieved.

For outdoor living spaces, a desirable upper guideline value of 55dB $L_{Aeq, T}$ is quoted.



5.7 Summary

With reference to BS 8233:2014, ProPG and MCC guidance, the following ambient noise criteria are proposed for all habitable rooms and outdoor amenity spaces within the proposed development.

Location	Desirable Criteria	
	Daytime (07:00 – 23:00 hr)	Night-time (23:00 to 07:00 hr)
Living Rooms	35 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB* L_{Amax}
Outdoor Living Spaces	55 dB $L_{Aeq,16hr}$	-

* not normally exceeded (typically no more than 10-15 “events”)

For plant noise emissions, limits shall be set in line with the guidance contained within BS 4142:2014 and set to a level 5 dB below prevailing background L_{A90} noise levels.

6.0 Baseline Noise Survey

6.1 Procedure

Unattended noise level measurements were undertaken from 14:00 hours on Friday 23 October 2020 to 12:00 Tuesday 27 October 2020 in order to establish typical noise levels over weekday and weekend periods.

All measurements were taken of the A-weighted (dBA) L_{10} , L_{90} , L_{eq} and L_{Fmax} sound pressure levels over discrete 5 and 15 minute periods (15-minute periods reported herein). Measurements were undertaken in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

6.2 Instrumentation

The instrumentation used during the survey is presented in the Table below.

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	5104	28/07/2020
Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	4634	28/07/2020
Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	4569	28/07/2020
Type 1 Calibrator	Larson Davis	CAL200	3083	19/05/2018

The sound level meters at Position 1 & 2 were mounted on a pole with the microphone fitted with a windshield. All equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).



6.3 Weather Conditions

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the weather conditions throughout the entire survey period. However, upon set-up and collection of the equipment wind conditions were calm, road surfaces were dry and the sky was clear. Internet weather reports suggest conditions remained sufficiently calm to obtain representative noise level measurement results.

6.4 Measurement Positions

Automated free-field noise level measurements were undertaken at 2No positions on site, as described/illustrated below.

Position	Description
1	Unattended free-field measurement overlooking north of the site Street, microphone approx. 9 metres above ground.
2	Unattended façade measurement at second floor level overlooking Constance Street, microphone approx. 9 metres above ground.
3	Unattended free-field measurement overlooking Commercial Street Approximately 3 metres above ground



Site Plan (© maps.google.co.uk)

6.5 Results

The results of the automated survey have been plotted on Time History Graphs 28295/TH1 – TH3 enclosed. These graphs present the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each position throughout the duration of the survey.



A summary of the results from the automated noise survey, as used to inform subsequent assessments against current guidelines, is presented in the table below. L_{A90} values represent the 'typical lowest' 15-minute level (observed) and $L_{A_{fmax}}$ values are taken as the 'mean 10th highest' 5-minute value. All results are free-field levels.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	$L_{A_{fmax},5min}$
1	58 dB	49 dB	54 dB	43 dB	73 dB
2	58 dB	49 dB	53 dB	43 dB	71 dB
3	59 dB	49 dB	55 dB	44 dB	77 dB

6.6 Discussion of Noise Climate

Due to the nature of the unmanned survey, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period, the dominant noise sources were noted to be distant traffic noise from Deansgate, A56 and Mancunian Way.

At Position MP3 there was two short periods of artificially raised noise levels, these period occurred between; 16:00 Monday 26th October to 01:30 Tuesday 27th October and 06:30 Tuesday 27th October to 12:00 Tuesday 27th October. Evidence of the raised noise levels is not present at either of the other measurement positions. The period of raised noise levels can be seen as a localised anomalous results and have therefore been excluded from our assessment.

6.7 Previous Noise Survey

A previous noise survey was undertaken as part of a development adjacent to the site (069457/FO/2003/C3) in November 2003, undertaken by Peter Jackson. Due to the ongoing COVID-19 conditions Hann Tucker Associates has undertaken a comparison of the previous noise survey with the one presented in this report as to validate our findings.

The table below presents the summary of our findings compared to that of the previous planning application:

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	$L_{A_{fmax}}$
Previous Survey	58 dB	48 dB	52 dB	43 dB	73 dB
Hann Tucker Survey	59 dB	49 dB	55 dB	44 dB	62 dB
Difference	+1	+1	+3	+1	+11*



The previous survey and our survey can be seen to have measured similar noise levels within 3dB, with the exception of maximum noise levels. Maximum noise levels cannot be directly compared due to the previous survey measurement parameters differing from the measurement parameters used at present.

The above is an indication that the measure noise levels are representative of the typical noise climate in the locality of the site.

7.0 Achieving Acceptable Internal Noise Levels

7.1 Overview

This section assesses external noise intrusion into residential rooms (living rooms and bedrooms) in order to determine preliminary acoustic performance specifications for the critical façade elements, namely windows and ventilators.

The design proposals allow for brick or clad & SFS external walls with punched-in thermal double glazing and background ventilation by means of either whole-house MVHR or constant mechanical extract ventilation (MEV) and trickle ventilators in window heads (1 x 2,500 mm² min. per habitable room). These units shall be appropriately sized to achieve Building Regulations Part F background ventilation rates with purge ventilation provided via openable windows.

The external walls are expected to comprise brick or outer cladding with insulated steel frame system (SFS) comprising an outer weather-board and 2 layers of plasterboard internally. The overall sound reduction afforded by the walls is expected to be at least 50 dB $R_w + C_{tr}$, which will far surpass the sound reduction requirements for this site.

Our calculations follow BS 8233 procedures and consider bedroom and living room dimensions and window sizes as per the latest design drawings (at the time of writing), and the intent is to ensure internal noise levels do not exceed limits proposed in Section 5.7.

7.2 Preliminary Guidance for Windows & Ventilators

Based on the noise survey results and the calculation methods/assumptions discussed above, we would proposed the following preliminary minimum acoustic performance specifications for windows and ventilators to residential habitable rooms in order to satisfy BS 8233 internal noise limits.

Guidance is provided on systems expected to be capable of meeting the specification, although other solutions are likely to be available and it would ultimately be the supplier's responsibility to ensure any advised solution is capable of comply with the specifications.



Location	Preliminary Minimum Sound Reduction Specification		Example Configuration (For Guidance Only)
	Window $R_w + C_{tr}$	Ventilator $D_{ne,w} + C_{tr}$	
All Bedrooms & Living Rooms	32 dB	38 dB	- 10 / 16 / 6.4 mm lam. double glazing. - 1 x 2,500 mm² acoustic trickle ventilator per habitable room with MEV, or mechanical (MVHR recommended).

NB: Detailed (octave band) sound reduction performance specifications for windows should be produced through detailed design. The above preliminary specifications should not be used for tender purposes.

7.3 Ventilation & Overheating

The above presents solutions to satisfy the proposed internal ambient noise limits within dwellings during normal ventilation conditions where windows are closed but ventilators (to meet Part F minimum ventilation requirements) are operational.

Openable windows are likely to be required for rapid ventilation (i.e. to assist in expelling smoke from burnt toast or paint fumes), which would only be required for a short amount of time during which acoustic conditions would not be a concern.

Where openable windows will be relied upon to assist with summer cooling to prevent overheating, 'reasonable' internal acoustic conditions should be maintained. 'Reasonable' limits would arguably be within 5-10 dB of the normal condition BS 8233 limits; 5 dB being ideal in line with BS 8233 and 10 dB being an absolute maximum above which an onset in serious annoyance might occur as per ANC draft guidelines.

BS 8233:2014 states that: *"If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB..."*

Based on the above, openable windows to assist with summertime cooling might be considered appropriate where external noise levels do not exceed 60 dB $L_{Aeq,16hr}$ daytime or 55 dB $L_{Aeq,8hr}$ night-time. In the case of the development it would be acceptable to rely on openable windows to assist with summertime cooling across the whole development.

8.0 Outdoor Living Areas

On this scheme, there is private roof terraces at the fourth floor level across the roof of the entire development, this regard, BS 8233:2014 states a desired level of 55 dB $L_{Aeq,T}$, which "might not be possible at the outer edge of these areas, but should be achievable in some areas of the space".

Our calculations indicate that the private roof terraces should be expected to achieve the desired level of 55 dB $L_{Aeq,T}$ across the majority of the spaces.



9.0 Fixed Plant Noise Emissions

On the basis of the aforementioned acoustic standards and guidance we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window with all plant associated with the proposed development operating simultaneously.

Period	Cumulative Plant Noise Emission Limit (BS 4142:2014 Rating Level)
Daytime (07:00-23:00)	44 dBA
Night-time (23:00-07:00)	38 dBA

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. Emergency plant items (e.g. smoke extract equipment) should be subject to more relaxed criteria to be agreed with MCC.

The above limits shall be subject to the final approval of MCC.

10.0 Conclusions

A detailed environmental noise survey and noise impact assessment has been undertaken in relation to the proposed residential development (when operational).

Our assessment indicates:-

- Acceptable internal noise levels are achievable with appropriately specified acoustic double glazing and the use of acoustic ventilator openings.
- Openable windows can be provided for purge, but it is recommended the overheating strategy aims to satisfy targets within apartments without any reliance on openable windows. If unachievable, measures should ensure reliance is severely restricted.
- Noise levels in external amenity areas are expected to achieve the desired criteria.
- Plant noise emission limits have been set for new items of fixed plant.

Appendix A

The acoustic terms used in this report are defined as follows:

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
L _{eq,T}	L _{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, <i>T</i> .
L _{max}	L _{max} is the maximum sound pressure level recorded over the period stated. L _{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L _{eq} noise level.
L _p	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
L _w	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

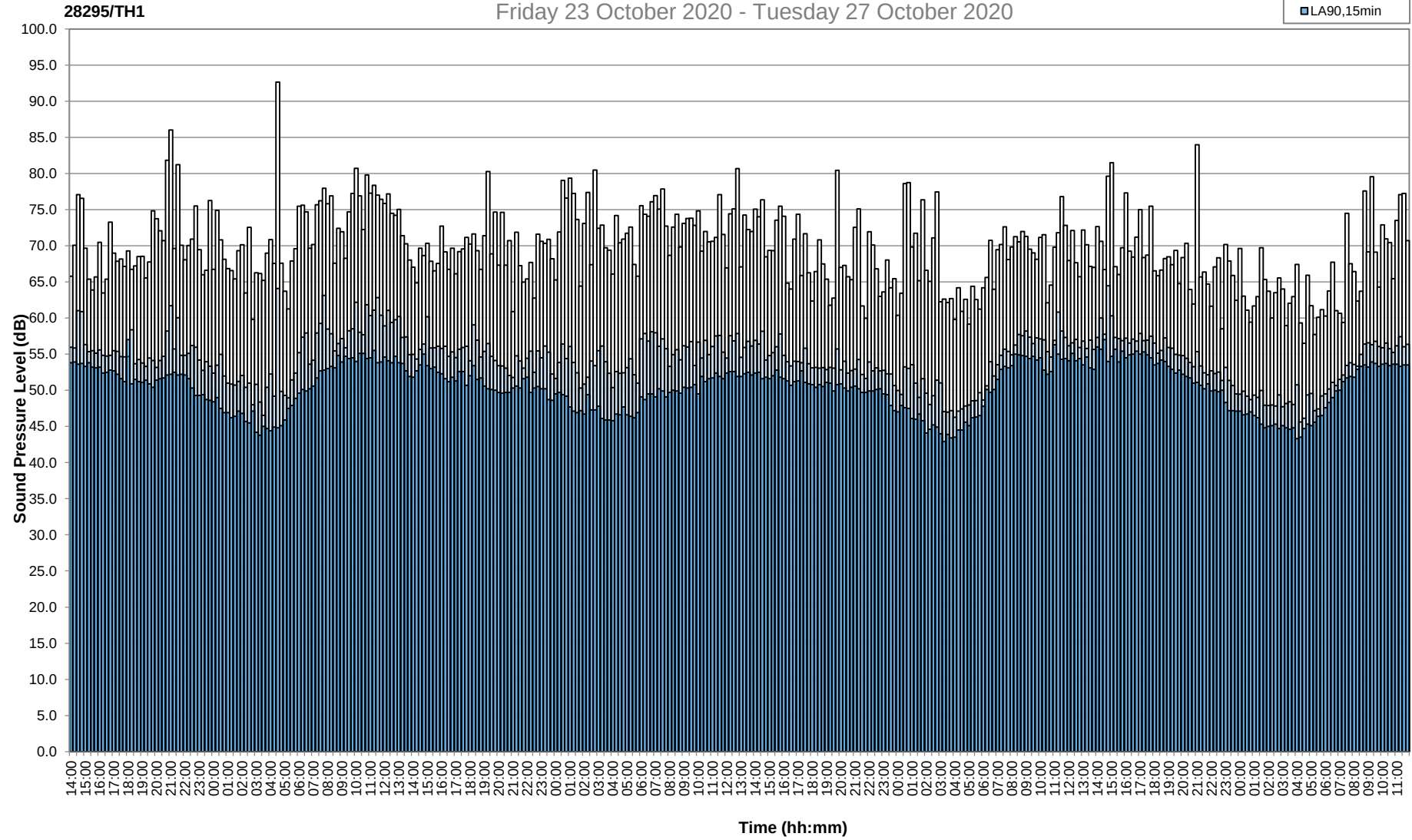
Appendix B

Environmental Noise Survey Results

Commercial Street Development, Manchester

A-weighted Sound Levels at Automated Position 1

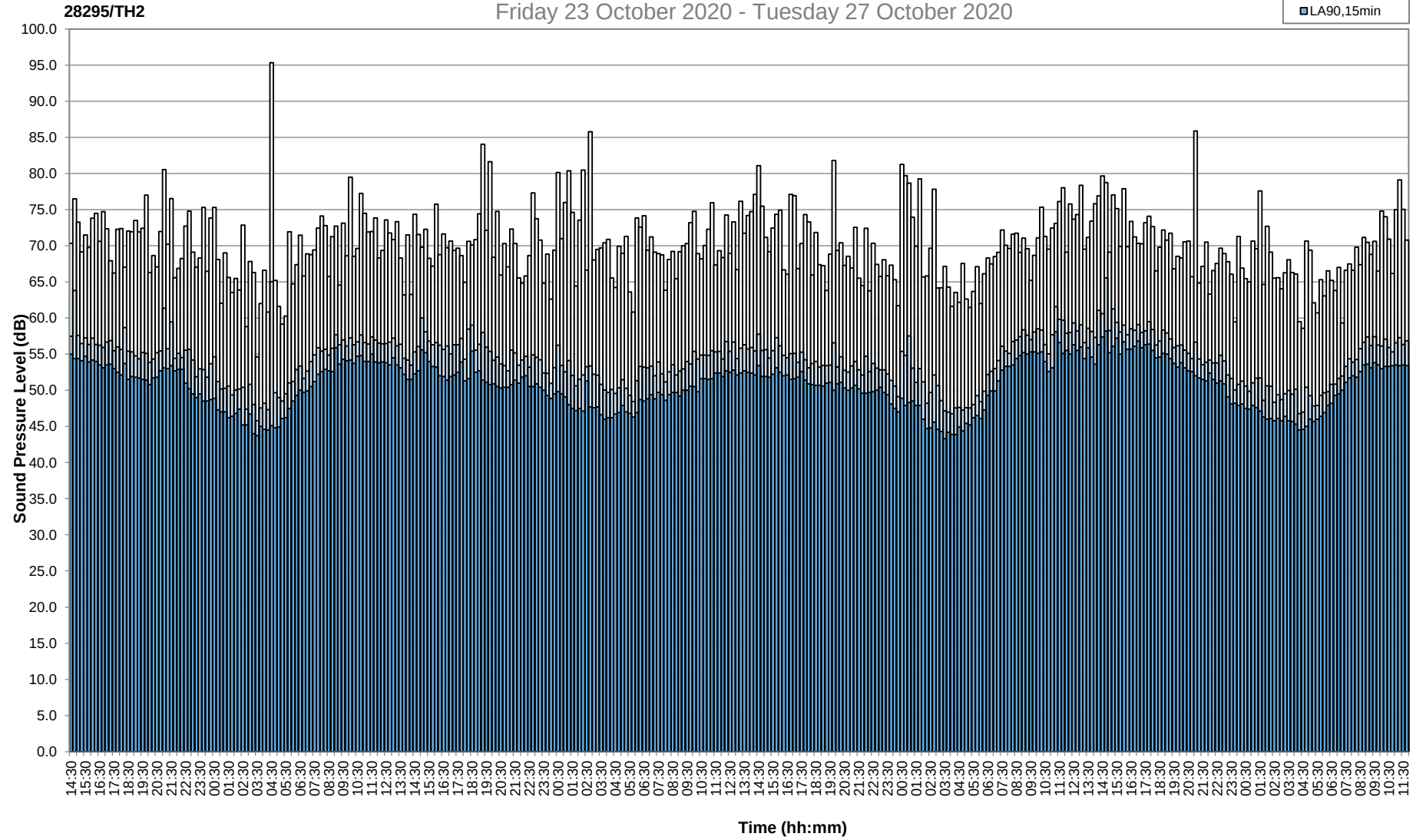
Friday 23 October 2020 - Tuesday 27 October 2020



Commercial Street Development, Manchester

A-weighted Sound Levels at Automated Position 2

Friday 23 October 2020 - Tuesday 27 October 2020



Commercial Street Development, Manchester

A-weighted Sound Levels at Automated Position 3

Friday 23 October 2020 - Tuesday 27 October 2020

□ L_{Amax},15min

□ L_{Aeq},15min

■ L_{A90},15min

28295/TH3

