42 – 50 Thomas Street Northern Quarter Manchester

Noise Impact Assessment Report

23169/NIA1

09 August 2017

For:
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Document Control

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			Jamie Ross Consultant MSc, BEng(Hons), AMIOA	Andrew Jameson Director BSc(Hons), MIOA, MAES
B	09/08/2017	Revised Section 7 & 8 following comments from Local Authority		
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This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.

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1.0 Introduction

It is proposed to redevelop 42 – 50 Thomas Street within the Northern Quarter, Manchester into a new mixed-use development containing a restaurant, retail units and residential dwellings. The development will incorporate conversion of existing structures and new build sections.

An environmental noise survey has been undertaken by Hann Tucker Associates in order to establish the existing noise levels due to road traffic and other sources. The data obtained has subsequently been used to assess the suitability of the site for the proposed use.

Our findings and recommendations are presented herein.

2.0 Objectives

To establish, by means of unmanned environmental noise monitoring over a minimum 72-hour period encompassing a weekend, the existing A-weighted and octave band L_{90}, L_{eq} and L_{max} environmental noise levels at selected accessible positions around the site over daytime and night-time periods.

To undertake detailed acoustic analysis of road traffic, entertainment noise and other noise intrusion into the building through the external building fabric.

To subsequently prepare preliminary sound reduction performance specifications for the external building fabric in order to achieve the internal acoustic design criteria commensurate with Manchester City Council and BS 8233:2014 requirements.

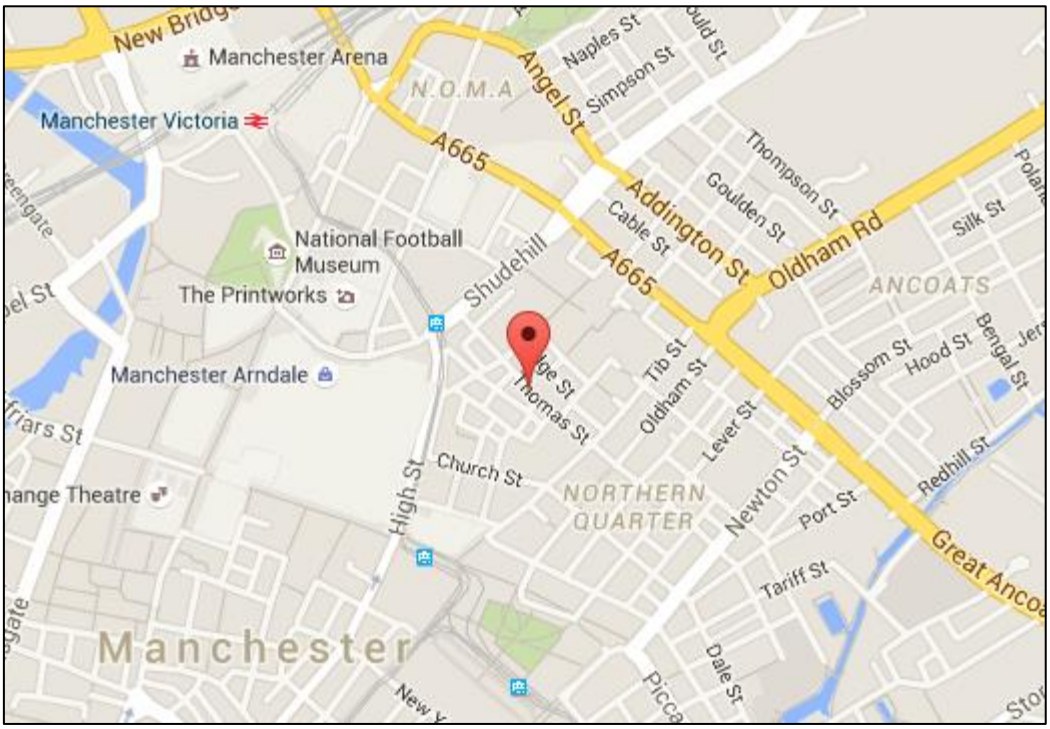
To set plant noise emission limits based on the results of the survey and the requirements of Manchester City Council.

To assess the impact of the proposed restaurant areas on the proposed on-site and existing off-site noise sensitive receptors.

3.0 Site Description

3.1 Location

The site is located at 42 – 50 Thomas Street and falls within Manchester City Council's jurisdiction. See Location Map below.



Location Map (Map Data ©2016 Google)

3.2 Description

The site is bounded by Thomas Street to the north-east, Back Turner Street to the south-west and Kelvin Street to the south-east. The site is adjoined to a retail property to the north-west. The surrounding buildings range in height from ground plus 1No. storey to ground plus 5No. storey commercial buildings. On Thomas Street these buildings generally comprise retail or bar/restaurant frontage at ground floor level. On Back Tuner Street at ground floor level there is a café/bar entrance, currently empty residential properties, and the side of the Muslim Youth Foundation building.

A Site Plan is included in Appendix B which shows the site location and the locations of nearby noise sources including roads and licenced venues.

4.0 Acoustic Terminology

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

5.0 Acoustic Standards & Guidelines

5.1 Noise Policy Statement for England

The Government's Noise Policy Statement for England (March 2010) sets out the long term vision for Government noise policy, which is to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

The NPSE includes three primary aims to be achieved through effective management of environmental, neighbour and neighbourhood noise; (1) avoid "significant adverse" impacts on health and quality of life, (2) mitigate and minimise "adverse" impacts on health and quality of life, and (3) where possible, contribute to the improvement of health and quality of life.

5.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF, March 2012) sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

5.3 Suitable Internal Noise Levels

5.3.1 Local Authority Requirements

Manchester City Council (MCC) have recently published a new document *Planning & Noise – Technical Guidance December 2015* (released March 2016). Section 3.6.1.1 sets out the following noise levels to be achieved for residential developments:

> *"BS 8233 and the World Health Organisation (WHO) have recommended specific limits for internal noise levels inside residential properties to allow appropriate living and sleeping conditions. MCC has adopted the following internal noise limits for residential properties:*
>
> - *Bedrooms (Night time - 23:00 to 07:00): 30dB LAeq and individual noise events should not normally exceed 45 dB (LAmax).*
> - *Living Rooms (Day time 07:00 to 23:00): 35 dB (LAeq).*
> - *Gardens and terraces (daytime) 55 dB (LAeq).*
>
> *Where it is necessary to keep windows closed to achieve the required internal noise levels it may be a requirement to provide additional mechanical ventilation to ensure that residential properties can be adequately ventilated if its occupants choose to keep their windows closed for noise reasons. … Where additional ventilation is required it should be capable of achieving the same noise reduction as the closed glazing and building structure."*

The development will also be subject to noise from the operation of nearby bars. In this regard, MCC outlined their requirements in Section 3.6.1.2 of their Planning & Noise – Technical Guidance, which states:-

"Noise from entertainment venues e.g. noise from recorded music, live bands, or karaoke, can be particularly annoying for local residents and businesses if it is not adequately contained within the venue.

When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (L_{Aeq}) and the 63Hz and 125Hz octave band noise levels (L_{eq}).

There is a lack of consensus on an assessment method for noise levels within habitable rooms with regard to entertainment noise. The design aim however, should be to design to 'inaudible'.

Therefore, a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments … would be:

'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (inhabitable rooms) 47dB and 41dB (L_{eq}), respectively'."

5.3.2 BS 8233: 2014

British Standard 8233:2014 "Sound insulation and noise reduction for buildings" recommends design criteria for internal ambient noise levels for dwellings. It states that it is desirable that internal ambient noise levels do not exceed the following guidelines:

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

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

With regard to external amenity spaces an upper guideline value of 55 dB $L_{Aeq,T}$ is quoted.

5.3.3 Summary

Based on the above, we would propose the following internal acoustic design criteria for external noise intrusion.

Room Type	Period	Ideal Target
Living Areas	Daytime (07:00-23:00)	35 dB $L_{Aeq,16hr}$
Bedrooms	Daytime (07:00-23:00)	35 dB $L_{Aeq,16hr}$
	Night Time (23:00-07:00)	30 dB $L_{Aeq,8hr}$ 45 dB* L_{Amax}
Any Habitable Room	Any time	47 dB L_{eq} at 63Hz** 41 dB L_{eq} at 125Hz**
Gardens and Terraces	Daytime (07:00-23:00)	55 dB $L_{Aeq,16hr}$

*Not to be regularly exceeded, **Music noise only

The above BS 8233 L_{Aeq} limits could, however, be increased by 5 dB and "reasonable" internal noise levels achieved.

5.4 Internal Noise Transfer (Commercial to Residential)

5.4.1 Building Regulations' Approved Document E

The separating floors between adjacent apartments and between an apartment and another other part of the building (e.g. the restaurant) will need to satisfy the statutory requirements of Building Regulations' Approved Document E (ADE): 2003 Edition.

The listed section of the development that will form a conversion may need to retain certain architectural features. This may limit the achievable sound insulation performance of separating elements and, in this regard, ADE states:

> *"In the case of some historic buildings undergoing a material change of use, it may not be practical to improve the sound insulation to the standards* [of ADE]*. The need to conserve the special characteristics of such historic buildings needs to be recognised, and in such work, the aim should be to improve sound insulation to the extent that it is practically possible, always provided that the work does not prejudice the character of the historic building, or increase the risk of long-term deterioration to the building fabric or fittings."*

In line with the above, the sound insulation performance of the separating floors between ground floor commercial and upper floor residential apartments should achieve a minimum airborne sound insulation performance of 43 dB and 45 dB $D_{nT,w} + C_{tr}$ in the conversion and new-build sectors respectively. (The former being an aspirational target rather than absolute requirement).

5.4.2 Local Authority Requirements

The commercial units may be let for A3 use (restaurants and cafes). MCC requirements in this regard are discussed in Section 5.3.1 above. In addition, for mixed use developments it states:-

> "*Where a planning application includes a proposal to contain a potentially noisy development within the same building as a noise sensitive use or visa versa the noise survey should consider the transfer of noise between the noisy and noise sensitive uses. An example of where this should be considered would be a proposal for a bar or club within the same building as residential properties. Consultants should demonstrate that the structure of the development will be sufficient to adequately contain the noise generated within the development. In doing so consultants should consider:*
>
> - *Flanking noise;*
> - *Structure born noise;*
> - *The overall level of noise (LAeq) generated by the use in question and any tonal or impulsive characteristics that the noise may contain; and*
> - *The acoustic properties of the development (Including the construction of party floors and/or walls, windows and doors, ventilation systems, and structural columns".*

5.4.3 Summary

Based on the above, the separating structures between ground floor commercial and upper floor apartments should be designed to achieve the following minimum requirements:-

Source Room	Receive Room	Source Noise	Requirement
Commercial Unit	Apartment (Habitable)	Music	47 dB L_{eq} at 63Hz 41 dB L_{eq} at 125Hz
		All Entertainment	L_{Aeq} – 10 dB
	Apartment	(Sound Insulation)	$\geq$ 45 dB* $D_{nT,w}$ + C_{tr}

* new-build only. 43 dB for refurbishment (aspirational target only)

5.5 Commercial Noise Break-Out

5.5.1 Local Authority Requirements

With regard to noise break-out from the commercial units (A3 use), Section 3.6.1.2 of the Manchester City Council (MCC) Planning & Noise – Technical Guidance December 2015 states:-

> *"Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location."*

In addition, their requirements outlined in Section 5.4.2 regarding low frequency noise would apply.

5.5.2 Summary

Based on the above, commercial units shall be designed to control noise break-out to nearby noise sensitive receptors in line with the following requirements:-

Source Room	Receive Room	Source Noise	Requirement
Commercial Unit	Within Any Existing Nearby Existing Dwelling	Music	47 dB L_{eq} at 63Hz** 41 dB L_{eq} at 125Hz**
		All Entertainment	L_{A90} – 10 dB

5.6 Noise from Fixed Plant/Equipment

5.6.1 Local Authority Requirements

MCC requirements are outlined in Section 3.6.1.5.1 of their Planning & Noise – Technical Guidance December 2015 which states:-

> *"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_{90}) level at the nearest noise sensitive location."*

Noise from all plant should be free from tonal, intermittent or irregular characteristics otherwise more onerous requirements (or acoustic penalties) would apply.

5.6.2 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 hours) and 15-minutes for operations during night-time hours (23:00 to 07:00 hours).

A penalty should apply to plant emitting noise of a tonal, irregular or impulsive nature.

6.0 Environmental Noise Survey

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 13:00 hours on Friday 6 May 2016 to 13:00 hours on Monday 9 May 2016 in order to establish typical and worst-case (i.e. during a Friday and Saturday evening) noise levels.

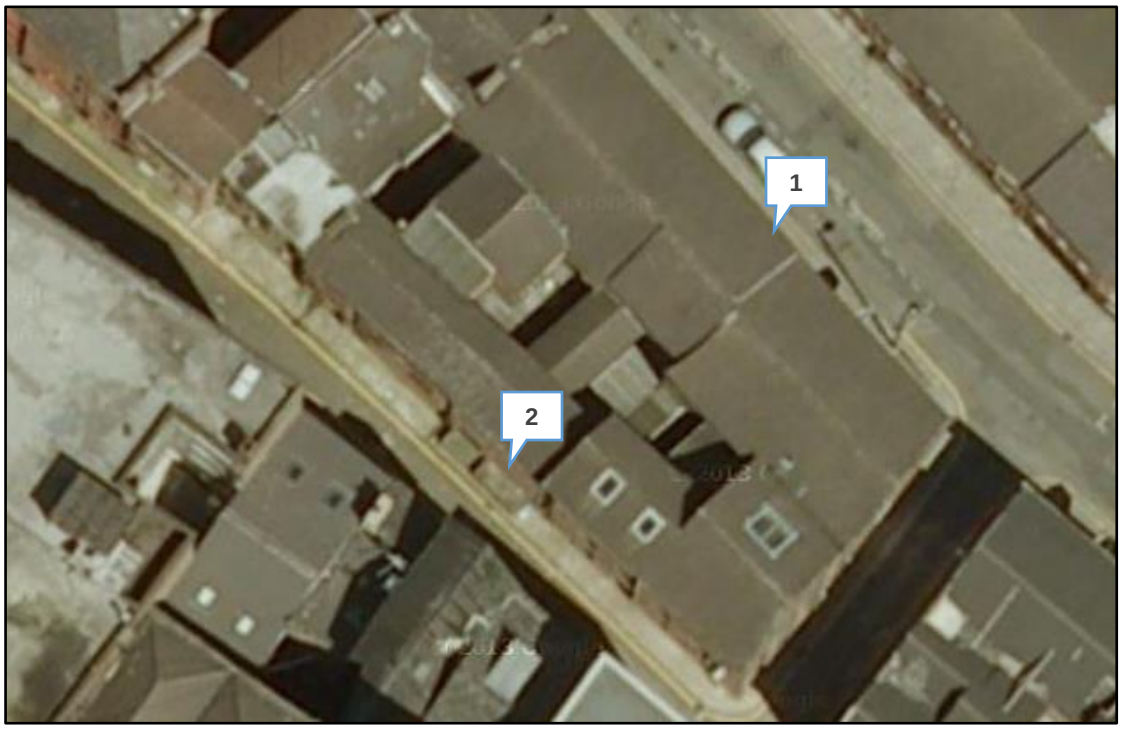
Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

6.2 Measurement Positions

The noise level measurements were undertaken at 2No. positions around the development site. The measurement positions are described in the table below.

Position No	Description
1	Façade measurement out of second floor window overlooking Thomas Street, approximately 7 metres above ground level. Position selected to obtain typical incident noise levels on the north façade of the development.
2	Façade measurement out of second floor window overlooking Back Turner Street, approximately 7 metres above ground level. Position selected to obtain typical incident noise levels on the south façade of the development.

These positions are indicated on the plan below.



Plan Showing Unmanned Measurement Positions (maps.google.co.uk)

6.3 Weather Conditions

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were light and the sky was generally clear. We understand that generally throughout the survey period the weather conditions were generally similar to those stated above and are suitable for conducting an environmental noise survey.

6.4 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	824	3701	20/04/2015
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3699	24/04/2015
Type 1 Calibrator	Larson Davis	CAL200	3083	18/04/2016

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a Larson Davis windshield. The equipment was calibrated prior to and on completion of the surveys. No significant deviations occurred (no more than 0.1 dB).

6.5 Results

The results have been plotted on Time History Graphs 23169/TH1 & TH2 enclosed presenting the 15 minute A-weighted L_{90}, L_{eq} and L_{max} levels at both measurement positions throughout the duration of the survey.

The most prevalent results recorded per day are summarised below:-

Date	Position	Period	Sound Pressure Level (dB)		
			Log Average $L_{Aeq,T}$	Typical Lowest $L_{A90,15min}$	Range $L_{Amax,15min}$
Friday 06/05/2016	1	Daytime*	67	55	-
		Night-Time	70	45	86 - 94
	2	Daytime	60	52	-
		Night-Time	59	45	75 - 92
Saturday 07/05/2016	1	Daytime	68	45	-
		Night-Time	72	44	93 - 94
	2	Daytime	60	47	-
		Night-Time	60	46	82 - 93
Sunday 08/05/2016	1	Daytime	63	44	-
		Night-Time	59	41	76 - 85
	2	Daytime	58	46	-
		Night-Time	49	41	71 - 81
Monday 09/05/2016	1	Daytime	59	56	-
		Night-Time	N/A	N/A	N/A
	2	Daytime*	55	45	-
		Night-Time	N/A	N/A	N/A

NB daytime = 07:00-23:00 hrs, night-time = 23:00-07:00 hrs

* not full period

6.6 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, 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 source was noted to be road traffic noise from Thomas Street and pedestrian noise.

Noise levels increase significantly during Friday and Saturday evenings (particularly L_{Amax} peak noise levels) which is attributed to patrons of the local pubs, clubs and late bars which surround the site.

7.0 Assessment of External Noise Intrusion

7.1 Incident Noise Levels

Based on the results of our noise survey we have determined the typical worst-case 16-hour daytime and 8-hour night-time noise levels incident on the front and rear of the development, as presented below. A suitable correction for façade reflections has been applied to give "free-field" values for calculation purposes.

Facade	Free-field Incident Noise Level (dB)		
	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	Night-time L_{Amax}*
Front (Thomas Street)	65	69	87
Rear (Back Turner Street)	57	57	83

* typical 10-15th highest (determined from number/value of instantaneous events recorded per 15-min period).

7.2 Incident Music/Entertainment Noise Levels

As numerous bars operate on Thomas Street and the surrounding area an assessment of possible disturbance arising from entertainment noise needs to be considered.

Both of the unmanned measurement positions were located opposite the predominant entertainment noise sources affecting the development site. Position 1 was located opposite Cain and Grain on Thomas Street and Position 2 was positioned opposite Montpellier's Café and Bar. Based on the noise levels measured at these positions entertainment noise appears to peak at around 00:00 hours on the night of Saturday 7 May 2016. As late-night music is a relatively steady state sound source the measured L_{90} levels will be used for the assessment which should negate the contribution of individual noise events such as shouting pedestrians etc.

The MCC requirements for entertainment noise are specified in the 63Hz and 125Hz octave bands therefore the worst-case levels in these octave bands within 1-hour of midnight of the Saturday night will be used in our assessment and are presented below:

Position	Time	L_{90} (dB) at Octave Band Centre Frequency	
		63 Hz	125 Hz
Position 1	00:15 – 00:30	68	67
Position 2	00:15 – 00:30	63	60

7.3 Achieving Internal Noise Limits

Provision exists to provide appropriate sound insulation solutions as required. We have undertaken BS 8233 calculations based on the measured environmental noise levels at the site. Our calculations indicate that due to the location of the site, in a popular night-life area, noise from activates associated with the surrounding licenced venues means achieving the MCC night time criteria in bedrooms on busy evenings is not practically achievable.

It is our opinion that given residents will be aware of the context of the area this criteria can be relaxed by 5 dB and reasonable internal noise conditions achieved, as stated in BS 8233.

A 5 dB relaxation on internal ambient noise criteria during the night time has therefore been agreed by Laura Miller (Strategic Lead, Compliance & Community Safety) of Manchester City Council within an internal memorandum dated 19 June 2017 (Ref. 563493). This relaxation is based upon the context of the site and the demographic that is likely to occupy the building, who are likely to be fully aware of the potential for elevated noise levels on weekend evenings.

We have proposed preliminary acoustic specifications for glazing and ventilators. Note, full detailed acoustic specifications must be developed through detailed design – the provided figures must not form tender specifications.

7.3.1 Façade Performance Requirements

The derivations of the façade performance requirements are shown below. The criteria below incorporates a 5 dB relaxation on night time criteria agreed by Manchester City Council.

Facade	Description	Daytime	Night-time		Entertainment Noise	
		$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AFmax}	63 Hz	125 Hz
Thomas Street	External incident noise level (dB)	65	69	87	68	67
	Criteria (dB)	35	35[1]	50[1]	47	41
	Required sound reduction (dB)	**31**	**37**	**40**	**24**	**29**
Back Turner Street	External incident noise level (dB)	57	57	83	63	60
	Criteria (dB)	35	35[1]	50[1]	47	41
	Required sound reduction (dB)	**23**	**24**	**35**	**18**	**21**
[1] 5 dB relaxation applied						

7.3.2 Required Mitigation Measures

Based on our calculations we would propose the following preliminary acoustic specifications to control the internal ambient noise levels. The below specifications would be expected to control noise associated with the surrounding licensed venues to achieve the requirements of MCC and BS 8233:2014 with the 5dB relaxation of the night time criteria. A typical steel frame structure has been assumed for the façade construction.

Facade (Room Type)	Façade Element	Octave Band Centre Frequency (Hz)						Overall Performance Required
		125	250	500	1000	2000	4000	
Any (Living Room)	Window (dB *R*)	22	25	32	37	37	37	31 dB $R_w + C_{tr}$
	Trickle Vent (dB D_{ne})	34	38	43	42	34	36	38 dB $D_{ne,w} + C_{tr}$
Back Turner Street (Bedroom)	Window (dB *R*)	28	31	34	38	38	38	35 dB $R_w + C_{tr}$
	Trickle Vent (dB D_{ne})	*n/a – Mechanical ventilation required*						
Thomas Street (Bedroom)	Window (dB *R*)	29	39	49	50	50	50	41 dB $R_w + C_{tr}$
	Trickle Vent (dB D_{ne})	*n/a – Mechanical ventilation required*						

The performances recommended above for the façade elements to living rooms are indicative of standard double glazing (e.g. 10 / 16 / 6mm) and acoustic trickle ventilators.

The recommended performance of windows to bedrooms overlooking Back Turner Street are indicative of high performance laminated acoustic glazing (e.g. 10 / 16 / 6.4mm) with a MVHR system used for ventilation.

The recommended performance of windows to bedrooms overlooking Thomas Street is based upon the use of a MVHR system for ventilation and is indicative of specialist laminated acoustic glazing (e.g. 9.1 / 20 / 13.1mm).

Note, any MVHR systems will be required to maintain the overall acoustic performance of the façade.

It is understood that the windows will have openable side panels intended for purge ventilation. It is important that these units are carefully selected during the design stage to maintain the overall acoustic performance of the window units when in the closed position.

In summary, our calculations have indicated that the internal ambient noise criteria should be achievable through the use of appropriately specified façade elements.

7.3.3 General Guidance

For the listed area of the development site, if certain elements of the façade cannot be altered and is restrictive all reasonable means should be taken to achieve the above sound insulation performances where possible throughout the design. This may include full refurbishment of exiting window frames and the addition of secondary glazing where existing windows are to be retained.

We would recommend a full detailed acoustic assessment is carried out of the external building fabric at detailed design in order to confirm precise façade performance requirements in all areas. Hann Tucker Associates would be pleased to assist.

Note that glazing and ventilator systems achieving the specifications of Section 7.3.2 should have more than sufficient low frequency performance to achieve the external to internal entertainment sound reduction figures at 63 Hz and 125 Hz, as discussed in Section 7.2.

During purge ventilation conditions (e.g. summertime cooling or fume omission), windows may be opened and internal noise levels will increase. However, it would be prudent to provide occupants the option to increase ventilation without opening windows and sacrificing acoustic

comfort, particularly for summertime cooling and particularly on the Thomas Street facade. Under these conditions, a whole-apartment MVHR ventilation solution could come with a boost function to reduce the number of hours per year occupants may need to have windows open for cooling.

7.4 Outdoor Living Areas

It is understood external terraces areas are proposed at fourth and fifth floor levels. It is understood that all terraces at fourth floor level and those overlooking Thomas Street and Back Turner Street at fifth floor level will have solid brickwork balustrades up to a minimum height of 1.1 metres above the terrace level. It is understood the more central terraces at fifth floor level will not have balustrades but will benefit from screening of the principal noise sources from the lower floors of the building.

Based on the results of the survey, daytime noise levels on the worst-affected terraces overlooking Thomas Street should just achieve the 55 dB $L_{Aeq\ 16\text{-}hour}$ criteria. The worst-affected areas of the terraces may occasionally experience noise levels greater than 55 dBA during certain daytime periods however it is important to consider the following excerpt from BS 8233: 2014 regarding outdoor amenity spaces:

"…it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

8.0 Assessment of Commercial Internal Noise Transfer

Internal noise transmission should be controlled so as not to exceed (in adjoining habitable rooms) 47 dB and 41 dB (L_{eq}), in the 63 Hz and 125 Hz octave centre frequency bands, respectively. It is recommended that the broadband L_{Aeq} be controlled to 10 dB below the internal ambient noise criteria.

The exact use of the commercial unit at ground floor level has not yet been finalised, although at this stage café/restaurant uses are expected. It is therefore appropriate to design the first-floor separation between the commercial unit and residential units based on worst-case noise levels from a busy restaurant.

Noise level measurements have previously been undertaken within a bustling modern bar/restaurant within Manchester City Centre with relatively loud music playing. The following table presents the results of our measurements which shall be used to inform our assessment of operational noise transfer.

Description	Music/Entertainment Sound Pressure Level (dB $L_{eq,15min}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Busy Bar/Restaurant	83	87	83	85	78	75	71	56	85

Areas which are to form a conversion have been assessed separately from the main development.

It is understood that the floors will generally be a concrete construction of approximately 250mm thickness. Achieving the criteria above should be achievable with an appropriately specified plasterboard fit-out ceiling.

Areas of the development that are to form a conversion may have design constraints such as listed elements that need to be exposed. In this instance the separating floor constructions between commercial areas and residential demises should be designed using best practical means. Achieving the criteria in these areas will likely require a raised floor and high performance acoustic ceiling below (e.g. 3No. layers of 15mm Soundbloc plasterboard hung from acoustic hangers).

However, the source noise levels used within the assessment above are very high for a ‘typical’ restaurant/café as proposed here. Therefore, it may be more appropriate to set limiting operational noise levels as below, while still allowing enough headroom for background music.

Description	Operational Sound Pressure Level (dB $L_{eq,15min}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Limiting sound pressure level	75	80	75	70	70	70	70	70	77

With the limiting noise levels above, for the areas of the development where concrete floors are to be used, the criteria should still be achievable with an appropriately specified plasterboard fit-out ceiling.

For areas of the development retaining the existing timber floors, the limiting noise levels above should allow for a lower performance construction than detailed previously. An indicative construction which would be expected to suitably control noise transfer from the commercial space to the residential spaces above is as follows:

- Flooring board (min. 25kg/m^2);
- 50mm timber battens laid perpendicular to joists at 600mm centres with void filled with 50mm insulation (min. 30kg/m^3);
- Existing floorboards (gaps to be sealed);
- 250mm timber joists with 100mm insulation (min. 30kg/m^3) ; and
- 2No. layers of 15mm Soundbloc plasterboard (or equivalent) supported by resilient channels to timber joists above.

It is recommended that, as part of the design stage, maximum noise levels for the ground floor commercial spaces are agreed based on the final separating floor construction in order to not impact dwellings. It would then be appropriate to specify these noise limits within the tenant's handbook that will ensure the prospective tenant is responsible to control noise to this level. If they wish to generate higher levels of noise to those specified, the handbook should confirm that the tenant is responsible for additional acoustic treatment (e.g. a mass barrier ceiling) as part of their fit out. The local Planning Authority may wish to secure this with a condition of planning.

The constructions detailed above are intended as indicative constructions to demonstrate that the MCC criteria is achievable, full detailed acoustic specifications should be developed through detailed design, particularly where listed design constraints apply.

9.0 Assessment of Commercial Noise Breakout

Entertainment noise generated by the operation of the proposed commercial units should not unduly impact on the locality and occupants of neighbouring buildings. As these units may be assigned for A4 used, potential noise breakout shall be assessed in line with MCC's entertainment noise criteria.

The following table presents typical background (L_{90}) noise levels recorded during our automated survey. These levels were measured between 03:00 and 03:15 hours on 8 May 2016 (Saturday night after all nearby venues are closed) and are representative of typical lowest background noise levels during normal restaurant and bar opening hours in the area.

Location	Typical Background Noise Level (dB $L_{90,15min}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Position 1	55	51	48	48	46	43	38	28	55
Position 2	54	48	43	42	42	37	33	19	46

Based on the above, in order to comply with the requirements of MCC as presented in Section 5.5 entertainment noise should not exceed the following limits within nearby noise sensitive receptors. A 10 dB allowance has been made for external to internal noise reduction through a partially opened window (less at low frequency).

Position	Music/Entertainment Noise Limit (dB $L_{Aeq,15min}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
1	47	41	-	-	-	-	-	-	35
2	47	41	-	-	-	-	-	-	26

Noise level measurements have previously been undertaken within a bustling modern bar/restaurant within Manchester City Centre. The following table presents the results of our measurements which shall be used to inform our assessment of operational noise breakout.

Location	Internal Reverberant Noise Level (dB $L_{eq,1hr}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Bar/Restaurant	83	87	-	-	-	-	-	-	85

The external building fabric is likely to consist of brick/block construction with partially glazed frontages (double glazing with laminated pane for security/safety).

Based on the above data, typical worst-case restaurant frontage dimensions and a typical spectral shape for double glazed windows we have calculated the noise levels at a noise receptor at a distance of 5 metres.

Location	Noise Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Source level	83	87	-	-	-	-	-	-	85
Window sound reduction	*-19*	*-22*	-	-	-	-	-	-	*-34*
+10log(S/r2), 5m	*-4*	-4	-	-	-	-	-	-	*-4*
-14	*-14*	*-14*	-	-	-	-	-	-	*-14*
Noise level at receptor	48	47	-	-	-	-	-	-	33
Ext-Int Sound reduction	*-5*	*-7*	-	-	-	-	-	-	-10
Noise level within apartment	43	40	-	-	-	-	-	-	23
Limit	47	41	-	-	-	-	-	-	26
Exceedance	-	-	-	-	-	-	-	-	-

The above table demonstrates that operational noise output from the commercial areas should be well below the prevailing ambient noise climate in the locality.

If the commercial unit is to be operated by a restaurant or cafe playing music that can be described as ‘greater than simply background music’, entrance doors to the unit should be lobbied with one of the door sets having acoustic seals to achieve an overall sound reduction of 30 dB R_w. There should no need for the inclusion of sound limiters within typical restaurants and cafés but they may be required if ground floor premises wish to play louder music. If required we would be pleased to assist with the specification of noise limits and the preparation of acoustic requirements for inclusion in the tenant’s handbook.

MCC are likely to require confirmation of intended uses and confirmation that the measures discussed herein shall be adhered to. This may be secured by a condition of planning.

10.0 Assessment of Plant Noise Emissions

10.1 Proposed Limits

Based on the results of our noise survey we propose the following plant noise emission limits which are to be achieved at 1m from any noise sensitive window based on achieving a level 5 dB below the prevailing background noise level. The nearest noise sensitive properties outside of the development site are the residential properties on Back Turner Street. Even though these are currently unoccupied the development should protect against potential future residents. We are not aware of any noise sensitive premises on Thomas Street that may be affected by plant

noise emissions. The following plant noise emission limits should also be applied to residential windows within the proposed development.

Receptor (Noise Sensitive Windows to the…)	Plant Noise Emission Limit (dB L_{Aeq})	
	Daytime (07:00 – 23:00 hr)	Night time (23:00 – 07:00 hr)
North (over Thomas St)	47	39
South (over Back Turner St)	45	43

Noise shall be assessed in accordance with BS 4142. The above limits are based on 'typical' background noise levels for the full daytime and night-time periods. More relaxed criteria may be applicable when details of operational hours of plant are available.

10.2 Noise Mitigation Measures

Given the nature of the development significant plant items are likely to be serving the commercial areas of the development.

Provisions shall be made for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures where necessary.

At this stage it is envisaged that the risk of excessive building services noise can be mitigated by design and this can be secured by a suitably worded condition of planning.

11.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the prevailing environmental noise climate at the development site.

The acoustic requirements of national/local policies and current industry guidelines have been reviewed and used to inform an assessment of road traffic, entertainment noise and other noise sources affecting the proposed residential properties.

Given the location and context of the site a relaxation of Manchester City Council's night time criteria is proposed for the Thomas Street façade which is defined as 'reasonable' by BS 8244: 2014.

Our assessment indicates that acceptable internal noise levels should be achievable using acoustically enhanced double-glazing to living rooms and bedrooms on Back Turner Street and specialist high-performance acoustic glazing systems for bedrooms overlooking Thomas Street. Acoustic trickle ventilators can be used to provide background ventilation for living rooms

however bedrooms are likely to require mechanical ventilation solutions such as MVHR.

An assessment of potential entertainment noise break-out from the ground floor bar/restaurant demises has been undertaken. Based upon typical noise levels and constructions the assessment concludes that Manchester City Council's requirements should be satisfied.

Plant noise emission criteria have been set based on the results of the survey and in line with the requirements of Manchester City Council.

Appendix A – Acoustic Terminology

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 *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

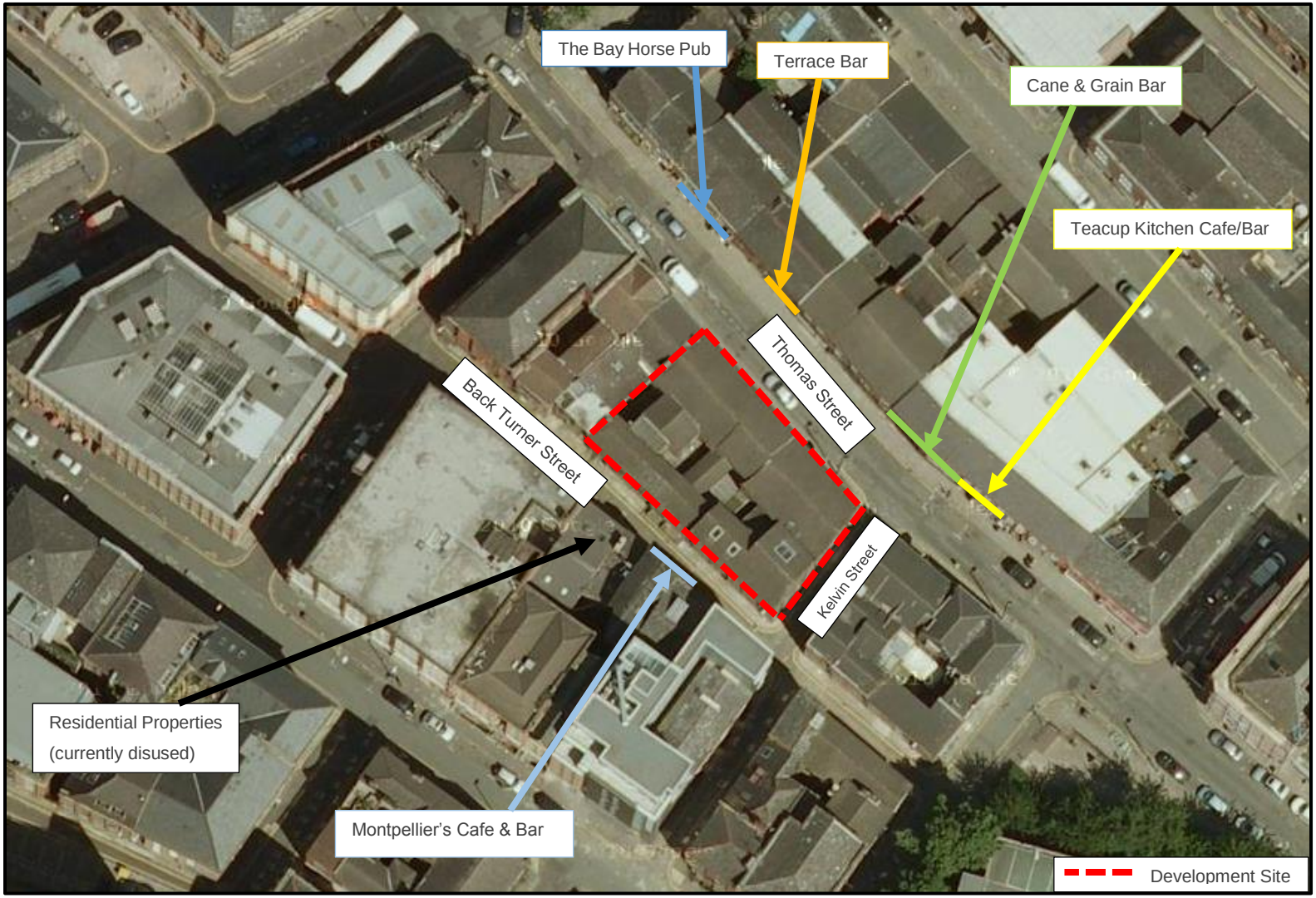
$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

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 – Site Plan

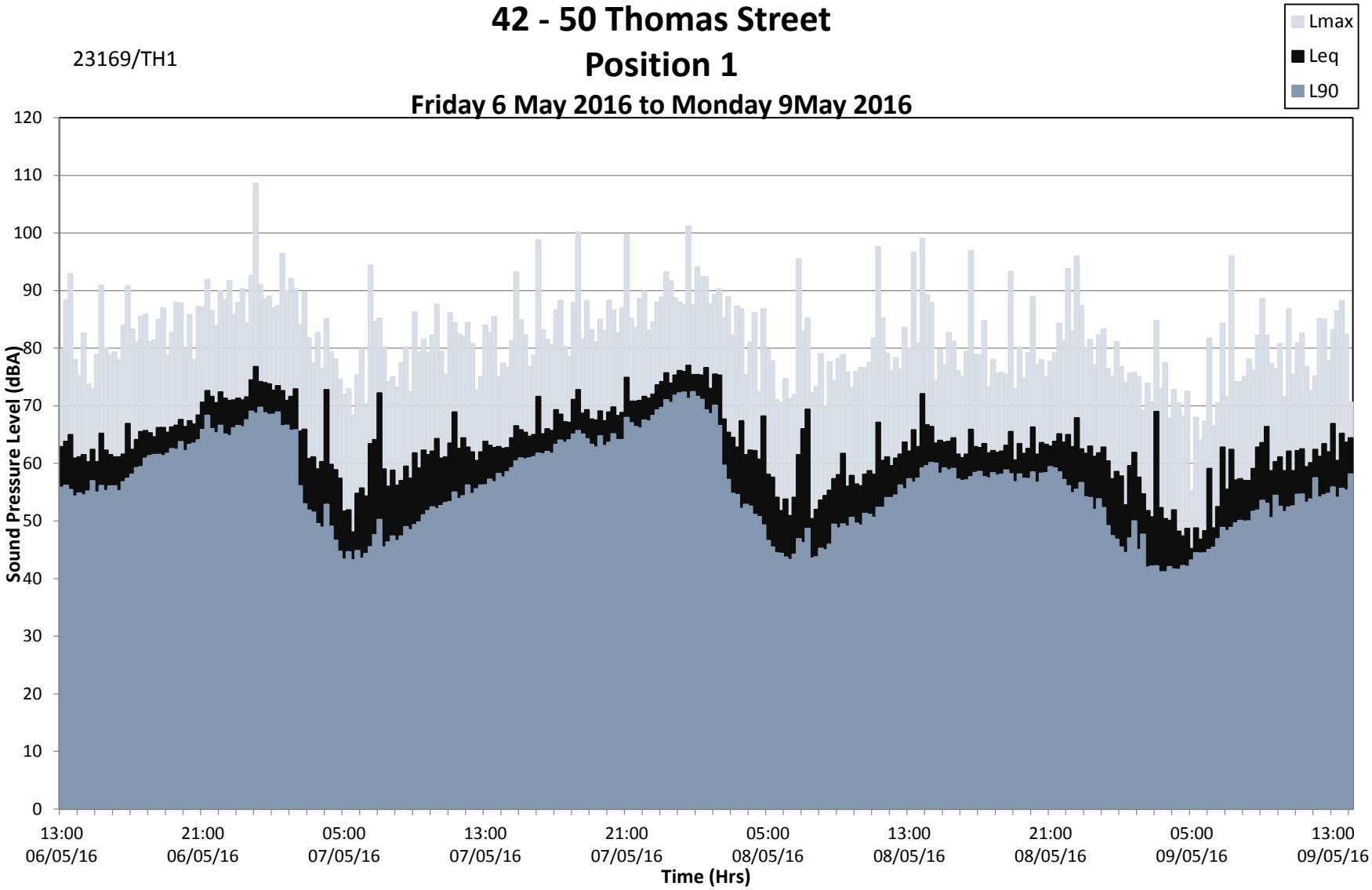


42 - 50 Thomas Street

Position 1

23169/TH1

Friday 6 May 2016 to Monday 9May 2016



42 - 50 Thomas Street
Position 2
Friday 6 May 2016 to Monday 9May 2016

23169/TH2

