Hill Quays, Jordan Street
Manchester

Noise Impact Assessment Report

26875/NIA1

14 June 2019

For:

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Hann Tucker Associates

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Document Control

Issue	Date	Comment	Prepared by	Authorised by
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1.0 Introduction

It is proposed to construct new apartments at Hill Quays, Jordan Street, Manchester. The current proposals are to extend up from the existing roof to create a 9th and 10th floor incorporating around 12 new apartments.

Hann Tucker have therefore been commissioned to undertake an environmental noise survey and assess any potential impact on the proposed extension from nearby noise sources in order to ensure compliance with Local Authority requirements.

Our survey results and assessment findings are presented herein.

2.0 Objectives

To establish, by means of manned environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at selected accessible positions around the site.

To undertake detailed acoustic analysis of environmental noise intrusion into the building through the external building fabric.

To subsequently prepare sound reduction performance specifications for the external building fabric in order to achieve the specified internal acoustic design criteria.

To also assess the potential noise impact the development itself will have on the locality, covering noise emissions from fixed plant and equipment.

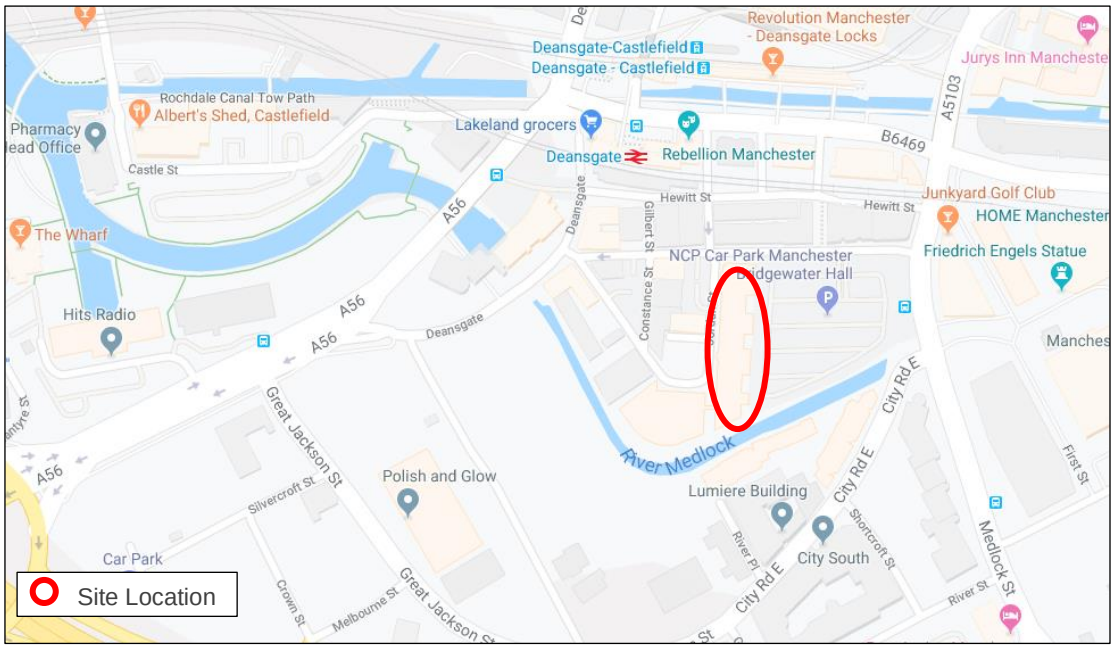
3.0 Acoustic Terminology

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

4.0 Site Description

3.1 Location

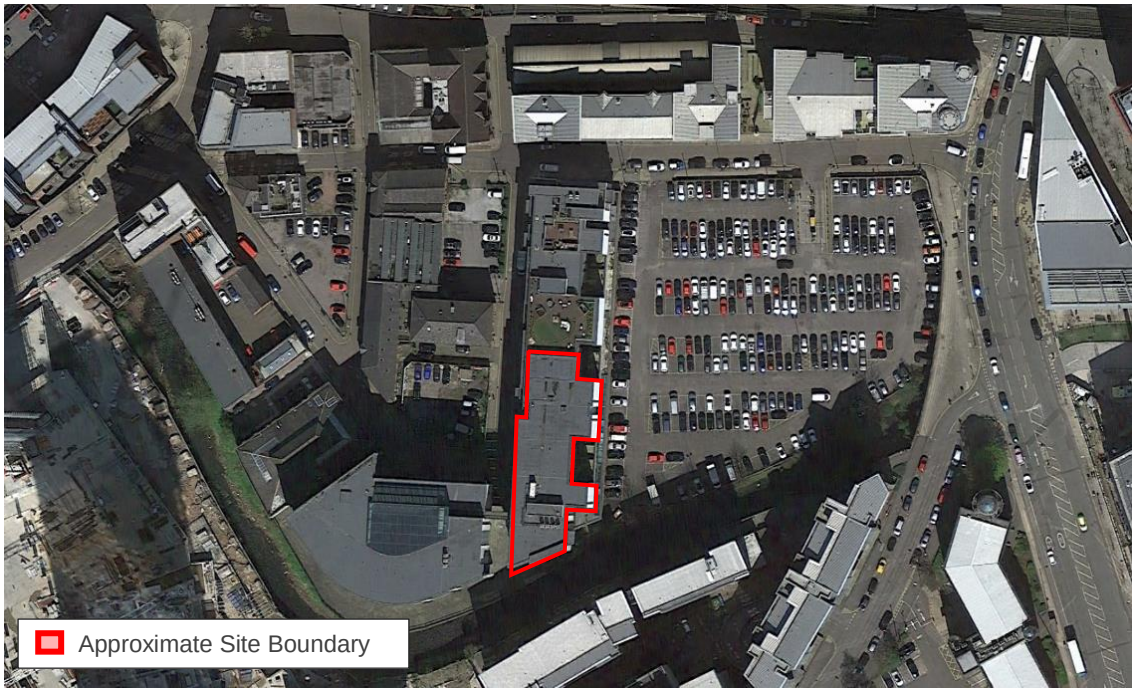
The site (Hill Quays) is located on Jordan Street in Manchester and falls under the jurisdiction of Manchester City Council. See site location plan below.



Site Location (maps.google.co.uk)

3.2 Description

The site is located on Jordan Street, Manchester, just South of Deansgate train station. The surrounding mainly residential developments and with some office buildings. The nearest noise sensitive premises to the development are considered to be the existing Hill Quays development. See site plan below.



Site Plan (maps.google.co.uk)

5.0 Acoustic Standards & Guidelines

6.1 Noise Policy Statement for England

The Government's Noise Policy Statement for England (NPSE, 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.

6.2 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.

Prior to the NPPF, Planning Policy Guidelines (PPG) 24: 1994 'Planning & Noise' was the general guidance document for assessing the suitability of a site for residential use.

6.3 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.

6.4 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.

6.5 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).

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."

Plant Noise

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."

6.6 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 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 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.

6.7 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.

6.0 Baseline Noise Survey

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:45 hours on Friday 6 June to 10:45 hours on Monday 10 June 2019 in order to establish the baseline noise levels in the vicinity of the site. Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{Fmax} sound pressure levels over 15 minute periods. Supplementary continuous automated measurements were made over shorter periods, 5 minutes, in order to verify night-time L_{Fmax} events.

Measurements were undertaken in accordance with BS 7445-1:2003 Description and Measurement of Environmental Noise.

6.2 Weather Conditions

Due to the nature of the survey, i.e. automated, it is not possible to comment accurately on the weather conditions throughout the survey period. However, weather reports indicate that temperatures ranged from 6°C to 17°C and that some rain showers did occur during the survey period.

Although, rains showers did occur the survey was sufficiently long to measure periods unaffected by rain. Therefore, we consider the overall weather conditions suitable for taking noise measurements.

6.3 Measurement Positions

The noise level measurements were undertaken at two (2No.) positions around the development site, as described/illustrated below.

Position	Description
1	Installed on the roof of Hill Quays, overlooking Jordan Street
2	Installed on the roof of Hill Quays, overlooking a carpark and Medlock Street

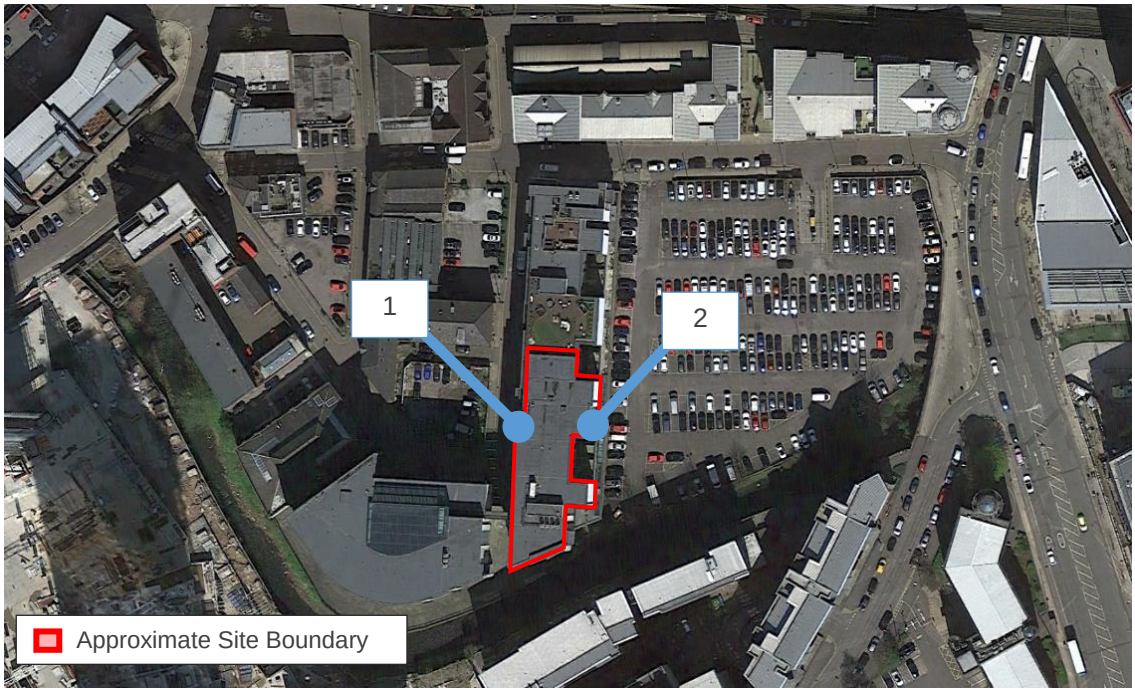


Image Showing Measurement Positions (maps.google.com)

6.4 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Sound Level Meter *(Position 1)*	Larson Davis	LxT	4086	24/08/2018
Type 1 Sound Level Meter *(Position 2)*	Larson Davis	LxT	4634	24/08/2018
Type 1 Calibrator	Larson Davis	CAL200	3083	23/04/2019

Each microphone was 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).

6.5 Results

The results of the automated survey have been plotted on Time History Graphs 26875/TH1 to 26875/TH2 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 environmental noise survey are presented in the table below. These values represent the free-field incident noise levels that will inform our subsequent assessments.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16h}$	Lowest $L_{A90,15min}$	$L_{Aeq,8h}$	Lowest $L_{A90,15min}$	10th Highest $L_{Amax,15min}$*
1	60	52	55	49	73
2	61	52	58	47	71

6.6 Discussion of Noise Climate

Due to the nature of the automated 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 distinct road traffic noise and occasional construction noise from nearby building works. .

7.0 Internal Ambient Noise Levels Assessment

7.1 Overview

This section aims to determine the acoustic performance specifications for critical façade elements, all external noise has been considered.

The information presented herein is intended as planning guidance only, with the aim of demonstrating that solutions are available to suitably mitigate noise intrusion. Detailed acoustic façade specifications shall be produced through detailed design.

Our preliminary calculations are based on BS 8233 methods and consider room dimensions and window sizes as shown on SimpsonHaugh drawings dated April 2019. External walls are noted to be formed of an aluminium frame system with a plasterboard lining and with glazed windows at each level.

We expect that the aluminium frame and internal plasterboard lining will achieve a minimum performance of $R_w + C_{tr}$ 37 dB. As such, glazing and ventilator specifications have been calculated based on this performance.

We also understand that the proposed ventilation strategy is for MVHR units in each apartment so we have excluded any guidance on above window trickle vents.

7.2 Façade Performance specifications

The survey results indicate that the noise levels would be similar on all proposed facades. As such the façade performances for all facades are presented in the following table.

Room Type	Minimum Façade Sound Reduction Performance, $R_w + C_{tr}$ (dB)
Living Room and Bedroom	26

Example glazing configurations to achieve the minimum performances set out above are details below.

Required R_w+C_{tr}	Example Configuration
26 dB	6 / 16 / 6mm double glazing

7.3 Ventilation and Cooling

The above presents solutions to satisfy the proposed internal ambient noise limits within dwellings during normal ventilation conditions where windows are closed on the MVHR units are providing background ventilation.

Openable windows could 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.

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

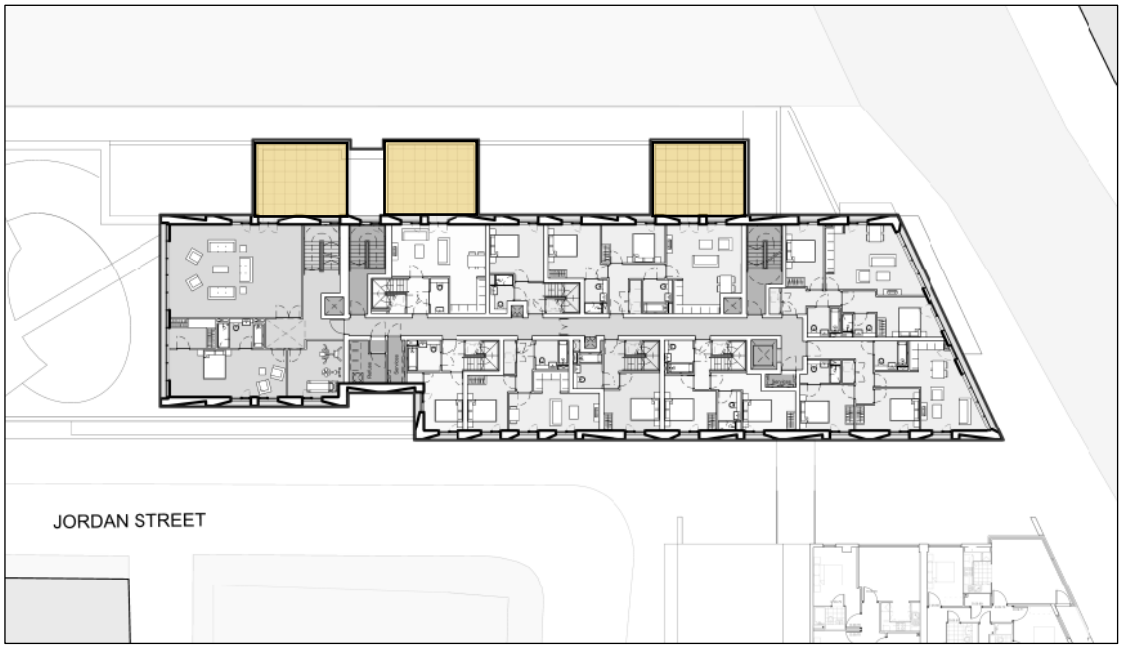
On this basis, the internal ambient noise level criteria would be compromised in bedrooms on all facades with windows open. If the overheating strategy relies on openable windows it may be prudent to consider the use of MVHR units that are oversized and provided with a manual boost switch to reduce the reliance on openable windows.

8.0 Assessment of Noise Levels in Outdoor Living Spaces

On this scheme, we understand outdoor living spaces will be apartment roof terraces. Small balconies are not generally considered as 'outdoor living' due to their size. In this regard, BS 8233 states:-

"Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation… Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

The locations of the proposed terraces are located to the East of the proposed extension as shown below in yellow:



The terraces highlighted above are in the vicinity of measurement position 2. However, the microphone was extended 1.5 m over the roof parapet and as such was not screened from the noise sources (ie Medlock Street and distant construction activity).

Calculations indicate that where line of sight between the balcony and the noise sources is broken, a noise level reduction of around 5 dBA would be achieved, thus reducing the noise level to around $L_{Aeq,16h}$ 55 dB, in-line BS8233 guidance.

9.0 Building Services Noise

9.1 Plant Noise Emission Limits

Based on the results of our noise survey and the requirements of the LPA, we propose the following incident plant noise emission limits to be achieved at 1m from all nearby noise sensitive windows in the vicinity of the east and west of the site respectively, including the residential windows of the proposed dwellings.

Period	Cumulative Plant Noise Emission Limit (BS 4142:2014 Rating Level)
Daytime (07:00-23:00)	47
Night-time (23:00-07:00)	42

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. standby generators, smoke extract equipment) should be subject to more relaxed criteria.

The above limits shall be subject to the final approval of Manchester City Council.

10.0 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, current industry guidelines and other relevant documentation have been reviewed and used to inform a detailed noise impact assessment of incident environmental noise affecting the development.

Specifications for the different façade zones, external walls, and glazing required in order to meet the internal noise criteria have been provided.

In lieu of specific plant selections plant noise emission limits have been set in line with Local Authority criteria.

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 *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).

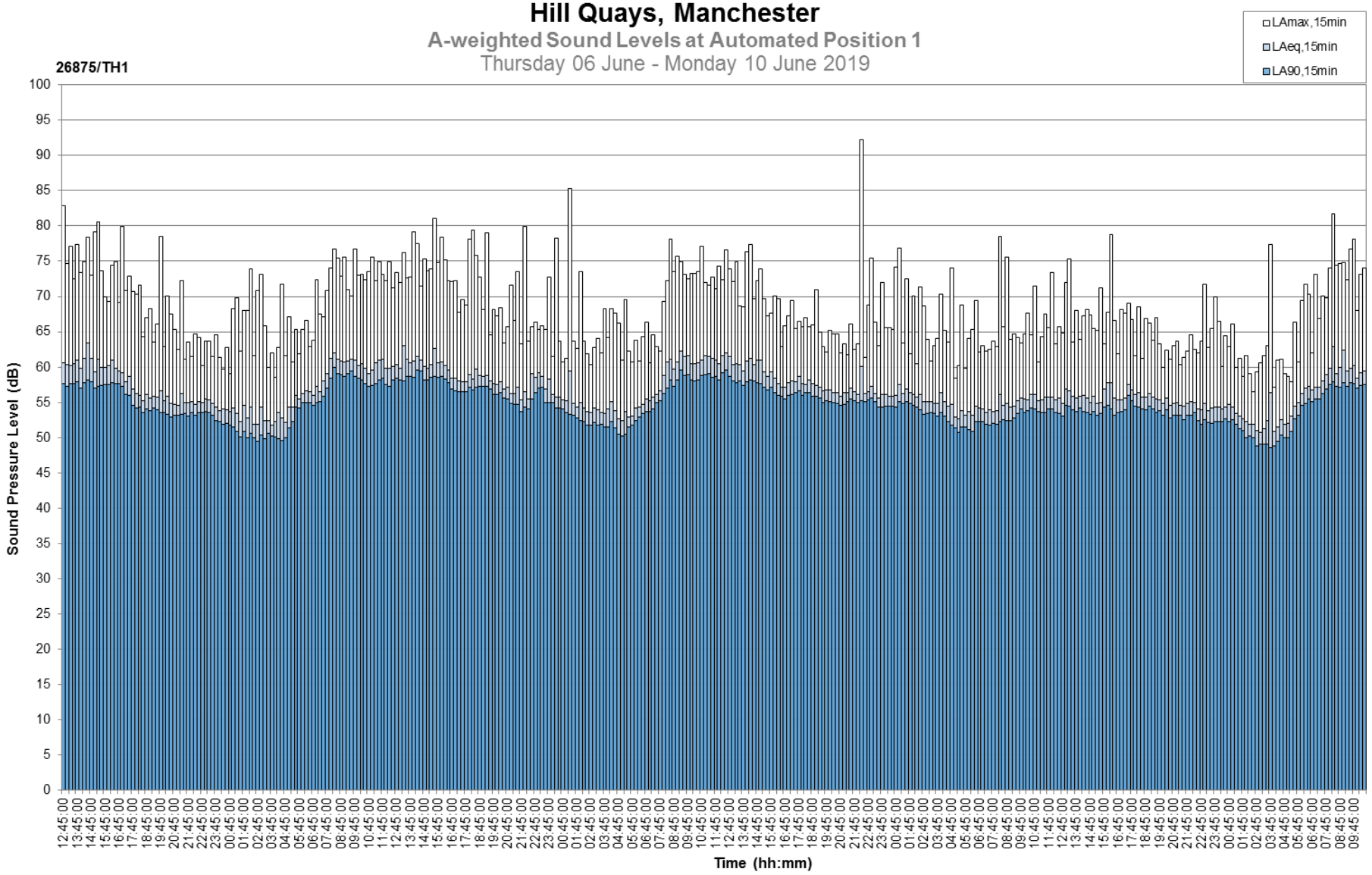
Appendix B

Time History Graphs 26875/TH1-2

Hill Quays, Manchester

A-weighted Sound Levels at Automated Position 1

Thursday 06 June - Monday 10 June 2019



Hill Quays, Manchester

A-weighted Sound Levels at Automated Position 2

Thursday 06 June - Monday 10 June 2019

26875/TH2

