

ENVIRONMENT

Urban Splash Estates Limited

Old Mill Street, Manchester

Noise Assessment

ENVIRONMENT

Urban Splash Estates Limited

Old Mill Street, Manchester

Noise Assessment

Birmingham
Livery Place, 35 Livery Street, Colmore Business District
Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way
Leeds, LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street
Manchester, M1 3HU
T: 0161 233 4260

Nottingham
5th Floor, Waterfront House, Station Street
Nottingham, NG2 3DQ
T: 0115 924 1100

November 2023

DOCUMENT ISSUE RECORD

Document Number:	OMS-BWB-ZZ-ZZ-RP-YA-0001_NIA_S2_P02
BWB Reference:	221902-001

Revision	Date of Issue	Status	Author:	Checked:	Approved:
1	29/08/2023	ISSUE	Robb Young BEng (Hons), AMIOA	Lucy Elmer BA (Hons), MIOA Luke Smith BEng MIOA	Mike Barrett BSc (Hons), MIOA
2	24/11/2023	ISSUE	Robb Young BEng (Hons), AMIOA	Luke Smith BEng MIOA	Mike Barrett BSc (Hons), MIOA

Notice

This document has been prepared for the sole use of the Client in accordance with the terms of the appointment under which it was produced. BWB Consulting Limited accepts no responsibility for any use of or reliance on the contents of this document by any third party. No part of this document shall be copied or reproduced in any form without the prior written permission of BWB.

EXECUTIVE SUMMARY

BWB Consulting was instructed by Urban Splash Estates Limited to undertake a Noise Assessment to support a full planning application for the development of residential dwellings at Old Mill Street, Manchester.

Baseline noise data, collected for developments on and adjacent to the Site in 2016, was used to inform the assessment, in accordance with current standards and guidance.

This assessment considers the impact of road traffic on the proposed development and its future residents and where necessary, consideration has been given to mitigation measures.

For a number of proposed dwellings, the external noise criteria may be exceeded. However, based on the current masterplan there are expected to be communal areas which may be used as an alternative amenity space where noise levels are predicted to meet the recommended guideline level.

The assessment shows that with appropriate consideration of appropriate glazing and ventilation for apartments with a direct line of sight to Old Mill Street, an appropriate level of protection could be afforded to future noise sensitive receptors on the site.

For the worst affected apartments which have line of sight to Old Mill Street, recommended internal noise level criteria are likely to be achieved with double glazing which would need to provide a minimum performance of $R_w + C_{tr}$ 40 dB and acoustic vents which would need to provide a minimum performance of $D_{n,e,w} + C_{tr}$ 52dB.

Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development. It is therefore considered that noise need not be a determining factor in the granting of full planning approval for the Site.

CONTENTS

EXECUTIVE SUMMARY	iii
1. INTRODUCTION.....	3
Appointment & Background.....	3
Site Setting	3
Proposed Development	4
2. STANDARDS AND GUIDANCE	7
National Planning Policy Framework (NPPF)	7
BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings	7
World Health Organisation (WHO) 1999: Guidelines for Community Noise	8
BS 4142: 2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound	8
ProPG: Planning and Noise Professional Practice Guidance on Planning and Noise May 2017	9
Manchester City Council: Planning and Noise Technical Guidance document (2022) ...	10
3. BASELINE NOISE ENVIRONMENT.....	11
Summary	11
Arup Noise Measurements	12
Measurement Results	13
Wardell Armstrong Noise Measurements.....	16
Night-Time $L_{A_{Fmax}}$ Measurement Results	16
4. ASSESSMENT	17
Noise Model	17
Road Traffic Noise.....	18
Noise from Fixed Plant	22
5. MITIGATION.....	24
Internal Noise Levels	24
6. CONCLUSION	29
Noise.....	32
Acoustic Terminology	33

FIGURES

Figure 1.1: Site location plan

Figure 1.2: Proposed site plan – ground floor [REF: Glen Howells Architects 2450-GHA-ZZ-00-DR-A-(05)100]

Figure 1.3: Proposed site plan – typical residential floor [REF: Glen Howells Architects 2450-GHA-ZZ-03-DR-A-(05)103]

Figure 3.1: Noise measurement locations taken from existing noise reports

Figure 4.1: Daytime noise contour plot, dB $L_{Aeq,16h}$, 1.5m above ground

Figure 5.1: Scheme of labelling for units within development, for this assessment

APPENDICES

APPENDIX A: Glossary of Terms

1. INTRODUCTION

Appointment & Background

- 1.1 BWB Consulting (BWB) was instructed by Urban Splash Estates Limited (the Client) to undertake a Noise Assessment to support a full planning application for a proposed residential development at Old Mill Street, Manchester (the Site).
- 1.2 The Application Site benefits from a previous noise assessment and subsequent planning permission for a similar development (planning reference 111605/FO/2016/N2). To support the previous planning applications, noise assessments have been undertaken which have been supported by baseline noise surveys. The results of these surveys have been used as a basis for the following assessment work. Where appropriate, consideration has been given to noise mitigation measures to demonstrate how an appropriate level of protection could be afforded to future noise sensitive receptors on the Site.
- 1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

- 1.4 The proposed development Site is located to the south-west of Old Mill Street, Manchester. To the north-west, the Site is bordered by Old Mill Street, with residential dwellings in Weavers Quay Apartment Building beyond. To the north-east, the Site is bordered by residential dwellings off Piercy Street and Guest Street. The Site is bordered to the south-east by the Stubbs building, containing commercial and office space, with Ashton Canal beyond. To the south-west, the Site is bordered by Lampwick Lane, with Ancoats Dispensary and Lampwick Quay Apartment Building beyond.
- 1.5 **Figure 1.1** shows the Site location.

Figure 1.1: Site location plan



Proposed Development

- 1.6 The proposals seek 'Full planning application for a residential-led development to provide 40 no. (Use Class C3) and ground floor commercial space (Use Class E), together with landscaping, parking, cycle parking, supporting infrastructure and associated works'. The proposed Site Plan is detailed in **Figure 1.2**.

Figure 1.2: Proposed site plan – ground floor
[REF: Glen Howells Architects 2450-GHA-ZZ-00-DR-A-(05)100]

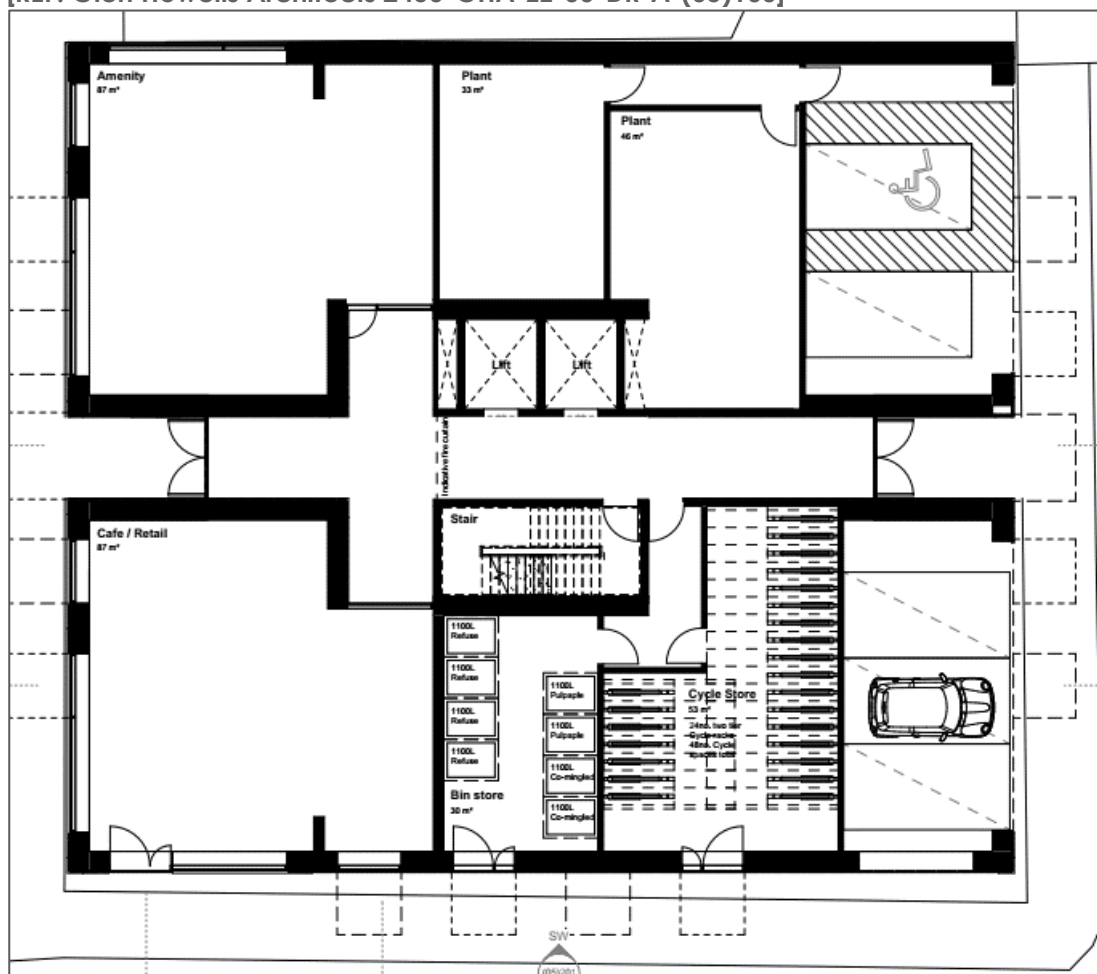


Figure 1.3: Proposed site plan – typical residential floor
[REF: Glen Howells Architects 2450-GHA-ZZ-03-DR-A-(05)103]



2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 2.1 Published in September 2023, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2021. It makes the following reference to noise in the section entitled Conserving and enhancing the natural environment:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

- 2.2 It also makes the following references to noise in the Section entitled Ground conditions and pollution:

"185. 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 life⁶⁰;

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.

⁶⁵ See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

- 2.3 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

- 2.4 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 2.1** below:

Table 2.1: Summary of internal ambient noise levels to be achieved in habitable Rooms when assessed in accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB LAeq, 16 Hour	-
Dining	Dining Room/area	40 dB LAeq, 16 Hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 Hour	30 dB LAeq, 8 Hour

- 2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or LA_{Fmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* below.
- 2.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

- 2.7 The World Health Organisation (WHO) guidance: 1999: *Guidelines for Community noise* includes guidance for individual maximum noise events during the night-time. This document draws upon guidance from Vallet and Vernay, which states:

"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LA_{Fmax} more than 10-15 times per night"

BS 4142: 2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 2.8 The BS 4142 Standard describes methods for rating and assessing the following:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment;

- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

2.9 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

2.10 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{A,r,T}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

2.11 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

2.12 Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of impact.

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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, depending on the context."

ProPG: Planning and Noise Professional Practice Guidance on Planning and Noise May 2017

2.13 The Professional Practice Guidance (ProPG) on Planning and Noise was produced to encourage better acoustic design in accordance with the National Planning Policy Framework (NPPF). ProPG details a framework which can be used to identify whether a site is a risk from a noise perspective and helps determine the feasibility of development. In particular, the ProPG strives to:

- *"advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;*

- *encourage the process of good acoustic design in and around new residential developments;*
- *outline what should be taken into account in deciding planning applications for new noise-sensitive developments;*
- *improve understanding of how to determine the extent of potential noise impact and effect; and*
- *assist the delivery of sustainable development."*

Manchester City Council: Planning and Noise Technical Guidance document (2022)

2.14 Manchester City Council's (MCC) Planning and Noise Technical Guidance document contains criteria and requirements for noise and vibration on sites within their jurisdiction.

2.15 Regarding fixed plant noise, the guidance states:

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location. "MCC guidance requires the following in relation to internal and external noise levels relating to residential amenity:

- Bedrooms (Night time – 23:00 to 07:00): 30dB L_{Aeq} (individual noise events should not normally exceed 45 dB L_{AFmax} by more than 15 times)
- Living Rooms (Day time 07:00 to 23:00): 35 dB (L_{Aeq})
- Gardens/External Amenity Areas 55 dB (L_{Aeq})

3. BASELINE NOISE ENVIRONMENT

Summary

- 3.1 At the time of this assessment being undertaken, Old Mill Street is operating with one-way traffic and the closure of one lane. Therefore, valid baseline noise measurements at the Site cannot be undertaken for the duration of this temporary alteration of road operation. Therefore, this assessment is based on publicly available data from recent planning developments adjacent to the Site.
- 3.2 There have been previous noise assessments undertaken at the application Site. In 2016, Wardell Armstrong undertook a noise survey at the location of the Site, in support of planning application 111605/FO/2016/N2, which has been reviewed. In 2018, Hawksmoor Engineering Ltd undertook a noise survey at the location of the Site, in support of planning application 120837/FO/2018, which has also been reviewed. It is understood that no noise survey data after 2018 have been made available for this area of Old Mill Street, at the time of this assessment.
- 3.3 In addition, environmental noise measurements at the adjacent Vesta [115947/FO/2017] and Old Mill Street Site [112658/FO/2016/N1] locations were undertaken by ARUP between March and November 2016. During these surveys, long term data was recorded at two locations along Old Mill Street which have been used to model the noise environment incident on the proposed development.
- 3.4 The Wardell Armstrong noise measurements undertaken in February 2016 are understood to have been taken in two separate shortened time periods, of a combined 7 hours. The measured data in the Wardell Armstrong report largely aligns with the 2016 ARUP data for the respective time of day measured, and therefore it is considered that the ARUP data provides the more robust L_{Aeq} and L_{A90} noise measurements, being undertaken for a minimum of 5 consecutive 24-hour periods at each location.
- 3.5 As the L_{AFmax} data provided in the ARUP reports is tabulated only as the minimum and maximum values over a given period, it is considered that the L_{AFmax} levels in the Wardell Armstrong provides the most robust assessment of night-time L_{AFmax} in **Section 4**.
- 3.6 A review of Department of Transportation road traffic statistics shows that for the period of 2016 through to 2019 (the peak year for recorded annual traffic data in Manchester to date), no considerable change in traffic flows occurred on the road network in the vicinity of Old Mill Street. Therefore, it is considered that the noise data captured in 2016 is representative of current year regular operating traffic flows for Old Mill Street.
- 3.7 The Hawksmoor noise measurements undertaken in 2018 showed lower noise levels at the site than the 2016 ARUP surveys and were undertaken over a shorter period of time, therefore this data has not been utilised.
- 3.8 BWB have taken forward the worst-case data, which provides greater confidence in its results due to being measured over a longer period of time, to ensure a robust assessment.

3.9 The noise measurement locations adopted are identified in **Figure 3.1**.

Figure 3.1: Noise measurement locations taken from existing noise reports



Arup Noise Measurements

3.10 Noise measurement data has been taken from the ARUP report “Vesta” dated April 2017 (ARUP Job Number 235055-85), for which the following methodological information was provided that is relevant to the data used in this assessment:

*“505. Measurements were made with the microphone mounted using a tripod **1.5m above ground level**. All measurement locations **were made under acoustically free field conditions** (i.e. at least 3m from any acoustically reflecting surface other than the ground)”*

- 3.11 Noise measurement data has also been taken from ARUP report “Old Mill Street Site” dated June 2016 (ARUP Job Number 235055-55), for which the following methodological information was provided that is relevant to the data used in this assessment:

*“B1.2... Measurements were made with the microphone mounted using a tripod **1.5m above ground level**. Measurements at locations F1, F2, N3 **and L1** were **made under acoustically free field conditions** (i.e. at least 3m from any acoustically reflecting surface other than the ground)”.*

Measurement Results

- 3.12 ARUP's measured levels that have been used within the assessment have been reproduced in **Figure 3.1** to **Figure 3.6**.

Figure 3.1: Summary of measured sound pressure levels at L1 – Old Mill Street Site, taken from ARUP report “Old Mill Street Site” issued June 2016

Location	Typical background level dBL _{A90,T}		dBL _{Aeq, 16hr} 07:00 – 23:00	dBL _{Aeq, 8hr} 23:00 – 07:00	dBL _{Amax,F} 23:00 – 07:00
	07:00 – 23:00	23:00 – 07:00			
L1	47	43	60 - 65	54 - 60	61 - 94

Figure 3.2: Summary of octave band ambient daytime sound pressure levels at L1 – Old Mill Street Site

Date	dBA	Octave band centre frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
28/04/2016	65	69	62	58	55	59	60	55	51
29/04/2016	63	67	61	56	52	58	58	53	48
30/04/2016	60	63	59	53	50	56	54	45	40
01/05/2016	61	63	57	52	50	57	55	50	46
02/05/2016	60	65	59	54	50	56	54	48	45

Figure 3.3: Summary of octave band ambient night-time sound pressure levels at L1 - Old Mill Street Site

Date	dBA	Octave band centre frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
27-28/04/2016	55	60	53	47	46	52	49	42	38
28-29/04/2016	60	61	55	49	50	55	56	51	47
29-30/04/2016	56	62	57	51	48	54	49	36	27
30/04 – 01/05/2016	56	60	54	48	48	53	49	35	27
01-02/05/2016	55	60	54	48	46	53	49	37	31

Figure 3.4: Summary of measured sound pressure levels at L1 - Vesta, taken from ARUP report "Vesta" issued April 2017

Location	Typical background level dBL _{A90,T}		dBL _{Aeq, 16hr} 07:00 - 23:00	dBL _{Aeq, 8hr} 23:00 - 07:00	dBL _{Amax,F} 23:00 - 07:00
	07:00 – 23:00	23:00 – 07:00			
L1	49	42	63 - 67	58 - 64	71 – 104

Figure 3.5: Summary of octave band ambient daytime sound pressure levels at L1 - Vesta

Date	dBA	Octave band centre frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
04/11/2016	67	71	63	60	60	62	61	59	54
05/11/2016	66	67	62	64	63	62	58	50	43
06/11/2016	63	65	58	56	56	60	57	52	47
07/11/2016	63	70	62	59	58	60	56	48	42
08/11/2016	66	71	63	60	60	62	59	55	50
10/11/2016	66	71	63	59	58	61	59	56	52
11/11/2016	67	72	64	59	58	62	61	59	54
12/11/2016	66	70	63	60	63	62	58	52	45
13/11/2016	66	66	59	57	57	61	60	58	53
14/11/2016	63	65	57	56	56	59	57	54	49
15/11/2016	65	71	62	59	57	61	58	56	51
16/11/2016	65	71	63	59	58	61	59	57	52
17/11/2016	66	70	62	58	58	61	60	57	53
18/11/2016	67	71	64	62	60	62	61	59	55

Figure 3.6: Summary of octave band ambient night-time sound pressure levels at L1 – Vesta

Date	dBA	Octave band centre frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
04/11/2016	61	62	54	53	53	57	55	53	48
05/11/2016	59	61	55	54	54	56	51	41	34
06/11/2016	60	61	53	52	52	56	54	49	43
07/11/2016	61	62	60	56	61	56	52	45	38
08/11/2016	63	61	53	52	53	57	57	56	51
10/11/2016	63	62	54	53	53	57	57	56	52
11/11/2016	60	61	54	54	53	56	53	46	40
12/11/2016	64	61	57	59	60	59	57	56	51
13/11/2016	61	61	54	55	55	57	54	48	45
14/11/2016	62	61	54	52	53	56	56	55	50
15/11/2016	62	61	54	52	52	56	56	55	51
16/11/2016	58	60	53	52	52	55	51	43	37
17/11/2016	62	62	54	53	53	56	56	54	50
18/11/2016	62	61	54	53	53	56	57	55	50

Wardell Armstrong Noise Measurements

- 3.13 Noise measurement data has been taken from Wardell Armstrong report "Upper Kirby Street Manchester" dated March 2016 (ARUP Job Number LE13344-04), for which the following methodological information was provided that is relevant to the data used in this assessment:

*"3.1.7. The noise measurements were made using Class 1, integrating sound level meters. The sound level meters were mounted vertically on tripods **1.2m above the ground**. The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift of more than 0.5dB in the calibration was noted during the survey."*

Night-Time $L_{A_{Fmax}}$ Measurement Results

- 3.14 The $L_{A_{Fmax}}$ level measured by Wardell Armstrong and used within the following assessment is shown in **Figure 3.7**.

Figure 3.7: Summary of measured sound pressure levels at ML1- Upper Kirby Street, taken from Wardell Armstrong report "Upper Kirby Street" issued March 2016

Monitoring Location 1						
Time	L_{Aeq} (dB)	L_{Amin} (dB)	L_{Amax} (dB)	L_{A90} (dB)	L_{A10} (dB)	Comments
18/02/2016 - Night Time						
0545-0700	63.9	39.5	84.2	44	68.5	Noise from occasional road traffic on Old Mill Street. Noise from the city. Birdsong

4. ASSESSMENT

- 4.1 The results of the baseline noise survey have been used as a basis for the noise assessment. This assessment considers noise from road traffic on Old Mill Street at proposed receptors.

Noise Model

- 4.2 A detailed noise model has been generated in order to calculate the daytime and night-time noise propagation across the Site from the surrounding roads. The following prediction methodologies were adopted for the modelling exercise:
- The model was generated using the PC based CadnaA® noise modelling package;
 - The noise model was set up to apply the noise prediction methodology set out in the 1988 Department of Transport and the Welsh Office document *Calculation of Road Traffic Noise* for road traffic noise sources¹;
 - The model was set up to apply the noise prediction methodology set out in ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation²;
 - Mapping of the Site and the surrounding area was calibrated into the noise model based on known Ordinance Survey grid reference points;
 - Indicative ground topography was approximated using the LIDAR Composite 1m DTM information freely available from the data.gov website;
 - To reflect the local ground cover, ground absorption was set to $G = 0.0$ (100% acoustically reflective ground);
 - The model was set to include third order reflected noise from solid structures;
 - The Site layout as shown in **Figure 1.2** has been incorporated into the noise model in order to account for screening that is provided by the development itself; and,
 - Off-Site buildings which would provide screening to the Site have been incorporated as reflective façades.
- 4.3 Receiver points have been included within the noise model at L1 – Old Mill Street Site and L1 – Vesta to validate the predicted road noise levels.
- 4.4 The modelled road has been calibrated to existing environment conditions at the time of the baseline noise survey in 2016, so that the predicted noise levels at the modelled receiver points are equal to the measured noise levels at these locations.
- 4.5 The modelled levels with all sources in operation have been compared to the measured levels in **Table 4.1**. Receiver points have been used within CadnaA at the locations of L1

¹ 1988 Department of Transport and the Welsh Office document *Calculation of Road Traffic Noise* for road traffic noise sources¹

² International Organization for Standardization (1996) ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation;

– Old Mill Street Site and L1 – Vesta, at the heights stated in those surveys and reproduced in **Section 3**.

Table 4.1: Difference between measured and modelled noise levels

ML	Period (T)	Measured Level dB L _{Aeq,T}	Modelled Level dB L _{Aeq,T}	Difference
L1 – Old Mill Street Site	Daytime	62.3	62.4	+0.1
	Night-time	56.9	56.8	-0.1
L1 – Vesta	Daytime	65.6	65.6	+0.0
	Night-time	52.9	56.6	+3.7

- 4.6 The values shown in **Table 4.1** show that daytime noise levels can be considered representative of the noise levels taken at both L1 – Old Mill Street Site and L1 – Vesta. Night-time modelled levels are representative at L1 – Old Mill Street Site and elevated at L1 – Vesta compared to measured data. The modelled is over-predicting the night-time noise level at L1 – Vesta by +3.7dB, which is considered to be robust.
- 4.7 Noise contours have been calculated showing the external free-field noise level in external areas, at the proposed development Site. The predicted noise levels have been used to inform the assessment.

Road Traffic Noise

External Daytime Noise Levels

- 4.8 For private and communal external amenity areas, such as terraces, no balustrade or vertical barrier has been modelled to provide a worst-case noise level in these spaces.
- 4.9 The noise contour plot, shown in **Figure 4.1** indicates that for terraces with no direct line of sight to Old Mill Street, external noise levels are predicted to be below the lower guideline of 50dB L_{Aeq,16h} as set out in BS8233 and WHO Guidelines.
- 4.10 However, for the majority of the Site, external noise levels are expected to be above the upper guideline value of 55 dB L_{Aeq,16h}, set out in BS 8233 and WHO guidance, and in MCC guidance, as detailed in **Table 4.2** below and shown in **Figure 4.1**.

Table 4.2: Modelled noise levels in external amenity areas

Floor	Modelled noise levels (dB L _{Aeq,16h})	Maximum exceedance of Upper Guideline Value (dB)
1 st Floor	34-68	+13
2 nd Floor	34-67	+12
3 rd Floor	34-65	+10
4 th Floor	35-65	+10
5 th Floor	38-64	+9

Figure 4.1: Daytime noise contour plot, dB LAeq,16h, 1.5m above ground



- 4.11 The results of the modelling show residual exceedances of the upper guideline value by up to 13 dB at proposed terraces with line of sight to Old Mill Street. However, BS 8233 states the following:

'Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.'

- 4.12 Where the recommended guideline noise levels are exceeded, BS 8233 goes on to state:

'These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be

designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.'

- 4.13 Based on the current revision of the masterplan, there is expected to be communal terrace areas within the development, on each floor, which may be used as an alternative amenity space.
- 4.14 Communal terraces are shown to be present on the north-west façade on the 1st, 3rd and 5th floors, as well as on the south-east façade on the 2nd and 4th floors. The south-east façade is the most screened from Old Mill Street, and the 2nd and 4th floor communal terraces are both predicted to experience incident noise levels of 43 dB. These areas would therefore be considerably below the upper guideline value of 55dB L_{Aeq,16h} in accordance with MCC guidance.
- 4.15 ProPG states that where adverse noise impacts remain, the impact may be partially offset if residents are provided with a relatively quiet alternative external amenity space. It is therefore considered that the exceedances predicted on proposed private terraces may be acceptable as residents will have access to quieter amenity spaces, and, as such, further consideration to mitigation is not considered to be warranted.

Internal Noise Levels

- 4.16 **Table 4.3** details the external free-field façade levels for each façade of the proposed development.

Table 4.3: Predicted ambient noise level (dB)

Floor	Façade	Predicted External Ambient Noise Level ¹		Predicted Internal Ambient Noise Level ²	
		Daytime dB LAeq,16h (0700-2300)	Night-time dB LAeq,8h (2300-0700)	Daytime dB LAeq,16h (0700-2300)	Night-time dB LAeq,8h (2300-0700)
1 st Floor	North-west	67-68	60	52-53	44
	South-east	34	27	19	12
	South-west	57-64	49-55	45-49	37-40
2 nd Floor	North-west	68	59	53	44
	South-east	34	27	19	12
	South-west	56-64	49-55	45-49	37-40
3 rd Floor	North-west	64-66	57-58	49-51	42-43
	South-east	34	27	19	12
	South-west	55-63	49-55	40-48	34-40
4 th Floor	North-west	65-66	58	50-51	43
	South-east	35	28	20	13
	South-west	54-63	49-55	39-48	34-40
5 th Floor	North-west	62-65	55-57	47-50	40-42
	South-east	37	30	22	15
	South-west	56-62	49-55	41-47	34-40
¹ NB – The range of noise levels presented details the lowest and highest predicted noise level found across a given floor for each façade of the development.					
² Assuming a 15 dB loss through a partially opened window in accordance with BS 8233.					

- 4.17 The modelling results indicate that the highest predicted levels are predicted on the north-west façade at lower floors.

Night-time Max Level

- 4.18 It is considered that the loudest period of the night-time, where the primary source of noise is road noise, is likely to be the final hours of the night-time due to road traffic increasing as commuting occurs. Therefore, the highest LA_{Fmax} value over the 05:45-07:00 period has been used to inform this assessment and is considered a robust approach.
- 4.19 In order to assess the predicted LA_{Fmax} noise level at the façade, the LA_{Fmax} level of 84 dB reported in the Wardell Armstrong 2016 document has been distance corrected to the nearest façade on each floor. This results in a worst-case LA_{Fmax} level of 81 dB. Assuming a 15dB loss through a partially open window, the predicted internal LA_{Fmax} level is 66dB.
- 4.20 The results of the noise modelling indicate that there are likely to be exceedances of the internal habitable noise level criteria in some habitable rooms at the proposed development.

- 4.21 Internal ambient noise level criteria are likely to be exceeded for the daytime on the north-west and south-west façades with partially open windows. The criteria from habitable rooms with open windows on the south-east façade are likely to be met.
- 4.22 Night-time noise level criteria are likely to be exceeded on north-west and south-west façades, with criteria for partially open windows likely to be met on the south-east façade.
- 4.23 Based on the results of the assessment, consideration has been given to mitigation in **Section 5**.

Noise from Fixed Plant

- 4.24 It is anticipated that there may be fixed plant and equipment associated with the proposed development that may have the potential to generate noise. However, at this stage details of the proposed type, number, and precise location of any such plant or the nature of its operation are not available at this stage. In the absence of detailed information, it is appropriate to specify suitable noise emission limits to which any plant and equipment should conform. These limits should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142.
- 4.25 In accordance with MCC guidance, it is considered that the rating level of fixed plant noise sources should not exceed 5dB below the prevailing background sound level when measured at the nearest receptors. The cumulative effect of all external plant should be specified so that the rating level is less than or equal to the prevailing background noise level.
- 4.26 In summary, noise from fixed plant within the proposed development Site should achieve the following noise level limits, shown in **Table 4.4**.

Table 4.4: Noise limits from fixed plant

Rating Level Limit to be Achieved at Existing Sensitive Receptors (dB L _{A,Tr})	
Daytime (0700-2300)	Night-time (2300-0700)
42	38
NB – Fixed plant limits have been derived from measured background noise levels at L1 – OLD MILL STREET SITE as these are considered most representative of the nearest existing receptors	

- 4.27 In accordance with BS 4142, the assessment of plant noise emissions should include appropriate rating corrections for tonal, irregular, or intermittent plant where applicable, before comparison with the above limits.
- 4.28 Once the detailed nature of such future uses is confirmed, noise from any fixed plant can be considered to ensure that the proposed limits are met.
- 4.29 It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant serving the proposed development. As such, noise emissions from individual items of plant will need to be

lower than the given limit, although the exact limit for each individual item of plant will be dependent upon its type, noise characteristics, location etc.

- 4.30 It is proposed that noise emissions from fixed plant are addressed through a Planning Condition, which may be worded as follows:

"Rating noise levels from fixed plant associated with the proposed development shall not exceed 5dB below the prevailing background noise level when measured or calculated in accordance with BS4142:2014+A1:2019 at 1m from the facade of nearby existing dwellings".

5. MITIGATION

- 5.1 In Section 4, it has been determined that consideration should be given to mitigation measures to protect the amenity of sensitive receptors associated with the proposed development.

Internal Noise Levels

- 5.2 It is anticipated that the use of partially open windows within the development would result in noise levels in excess of those recommended in BS 8233.
- 5.3 It is widely considered that first noise amelioration measure available to an occupant will be to close windows. Therefore, in order to assess the noise mitigation required to ensure an adequate level of protection against noise, it is appropriate to explore the protection that could be afforded by the sound insulation performance of the external building fabric, and in particular the glazing elements.
- 5.4 Detailed noise break-in calculations have been undertaken in accordance with the rigorous method from section G.2 from BS 8233 based on the frequency spectra measured on Site and the following dimensions and assumptions;
- Room dimensions and glazed window dimensions as shown on the layouts provided;
 - External building fabric elements shall achieve a sound reduction performance of at least $R_w + C_{tr}$ 41dB; and,
 - A reverberation time of 0.5 seconds.
- 5.5 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,16h}$ adopted for this assessment, based on the worst affected façade, a reduction of 33dB(A) would be required for habitable rooms. To achieve the internal criterion of 30 dB $L_{Aeq,8h}$ and 45 dB L_{AFmax} during the night-time, adopted for this assessment, a reduction of up to 36 dB(A) would be required for habitable rooms.
- 5.6 In the instance where a proposed dwelling experiences noise incident on two glazed facades leading on to noise sensitive spaces, a minimum of 3 dB of headroom above the criterion at the worst case façade shall be required.
- 5.7 **Table 5.1** shows the example glazing and ventilation specification used in this assessment.

Table 5.1: Example glazing and ventilation requirements

Colour	Example Glazing	$R_w + C_{tr}$	Example Ventilation	$D_{new} + C_{tr}$
Red	10mm / 16mm argon / 9.1mm Optiphon	40	Greenwood MA3051	52
Blue	4mm / 12mm / 4mm	25	Greenwood 5000EA +1 Acoustic Set	37

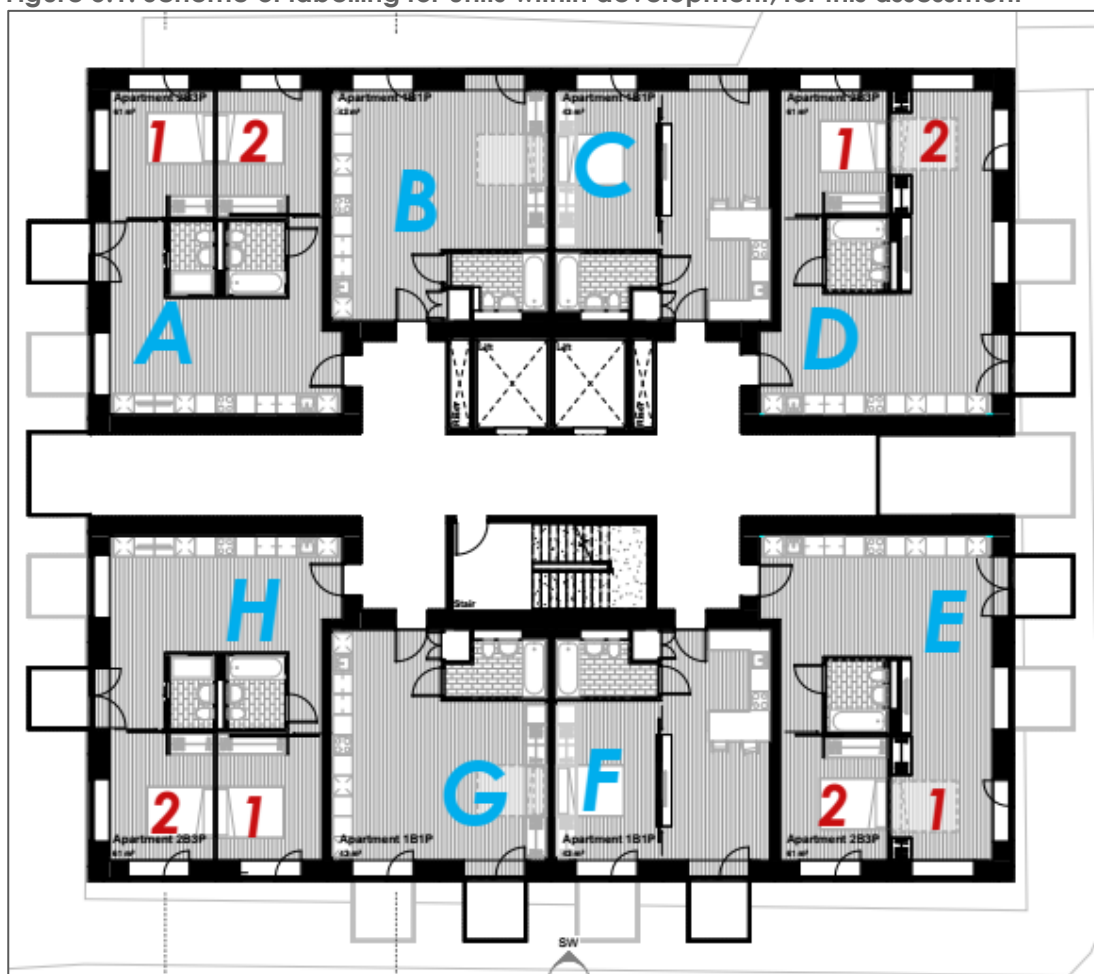
Colour	Example Glazing	$R_w + C_{tr}$	Example Ventilation	$D_{new} + C_{tr}$
Green	4mm / 12mm / 4mm	25	Trickle vent with indirect air path	32

Table 5.2: Example glazing sound reduction octave band data

Colour	Typical Sound Reduction R_w (dB) per Octave Band (Hz)					
	125	250	500	1000	2000	4000
Red	29	33	44	46	49	57
Blue	21	17	25	35	37	31
Green	21	17	25	35	37	31

- 5.8 A detailed assessment of the mitigation measures required to achieve the aforementioned criteria has been performed for each proposed unit within the development. In the absence of any other naming scheme **Figure 5.1** shows the order of naming used in this assessment to denote a specific dwelling, with A through H ordered clockwise within each floor, and bedrooms also counted clockwise within the building (where required).

Figure 5.1: Scheme of labelling for units within development, for this assessment



5.9 **Table 5.3** shows the resultant internal noise levels in the proposed dwellings, with prescribed mitigation in place.

Table 5.3: Predicted external and internal noise levels with mitigation, dB

Floor/Unit/Bed	Spec	Predicted External Noise Level, free-field (dB)		
		L _{Aeq,16h}	L _{Aeq,8h}	L _{Afmax}
1A Bed 1	RED	68	60	81
1A Bed 2	RED	64	55	77
1B Bed 1	BLUE	60	52	73
1C Bed 1	GREEN	58	50	72
1D Bed 1	GREEN	54	47	69
1D Bed 2	GREEN	53	46	68
1E Bed 1	GREEN	56	58	68
1E Bed 2	GREEN	57	49	69
1F Bed 1	GREEN	59	51	72
1G Bed 1	BLUE	59	51	73

Floor/Unit/Bed	Spec	Predicted External Noise Level, free-field (dB)		
		L _{Aeq,16h}	L _{Aeq,8h}	L _A F _{max}
1H Bed 1	RED	64	55	77
1H Bed 2	RED	65	56	80
2A Bed 1	RED	68	59	78
2A Bed 2	BLUE	63	55	76
2B Bed 1	GREEN	62	54	74
2C Bed 1	GREEN	58	50	71
2D Bed 1	GREEN	55	47	69
2D Bed 2	GREEN	53	46	68
2E Bed 1	GREEN	56	48	68
2E Bed 2	GREEN	56	48	69
2F Bed 1	GREEN	59	48	71
2G Bed 1	GREEN	62	54	74
2H Bed 1	BLUE	64	55	76
2H Bed 2	RED	65	56	78
3A Bed 1	RED	67	59	76
3A Bed 2	BLUE	63	55	75
3B Bed 1	GREEN	60	53	72
3C Bed 1	GREEN	58	50	71
3D Bed 1	GREEN	55	47	69
3D Bed 2	GREEN	53	46	68
3E Bed 1	GREEN	56	48	67
3E Bed 2	GREEN	55	49	69
3F Bed 1	GREEN	59	51	71
3G Bed 1	GREEN	60	52	72
3H Bed 1	BLUE	63	55	75
3H Bed 2	RED	67	58	76
4A Bed 1	RED	66	58	75
4A Bed 2	BLUE	62	55	74
4B Bed 1	GREEN	62	54	72
4C Bed 1	GREEN	60	53	70
4D Bed 1	GREEN	55	49	68
4D Bed 2	GREEN	54	47	68
4E Bed 1	GREEN	55	48	67
4E Bed 2	GREEN	56	49	68
4F Bed 1	GREEN	57	51	70
4G Bed 1	GREEN	61	53	72

Floor/Unit/Bed	Spec	Predicted External Noise Level, free-field (dB)		
		L _{Aeq,16h}	L _{Aeq,8h}	L _{Afmax}
4H Bed 1	BLUE	62	55	74
4H Bed 2	RED	63	55	74
5A Bed 1	BLUE	65	58	73
5A Bed 2	BLUE	62	54	72
5B Bed 1	GREEN	61	53	72
5C Bed 1	GREEN	60	53	70
5D Bed 1	GREEN	57	51	68
5D Bed 2	GREEN	55	49	67
5E Bed 1	GREEN	55	48	67
5E Bed 2	GREEN	56	49	68
5F Bed 1	GREEN	57	51	70
5G Bed 1	GREEN	59	52	72
5H Bed 1	BLUE	62	54	72
5H Bed 2	BLUE	63	55	73

- 5.10 It should be noted that the minimum sound insulation performance requirement for trickle ventilators outlined above assume that one ventilator is required in each room to meet the whole dwelling ventilation rates from ADF of the Building Regulations. Should additional ventilators be required, the minimum sound insulation performance of each ventilator is required to increase as per the values in **Table 5.4**.
- 5.11 The specification of the required number of ventilators to achieve compliance with ADF requirements is beyond the scope of this report and should be confirmed by the project Mechanical and Electrical Engineers.

Table 5.4: Correction to ventilator performance depending on number of ventilators

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

6. CONCLUSION

- 6.1 BWB Consulting was instructed by Urban Splash Estates Limited to undertake a Noise Assessment to support a full planning application for the development of residential dwellings at Old Mill Street, Manchester.
- 6.2 Baseline noise data, collected for developments on and adjacent to the Site in 2016, was used to inform the assessment, in accordance with current standards and guidance.
- 6.3 This assessment considers the impact of road traffic on the proposed development and its future residents and where necessary, consideration has been given to mitigation measures.
- 6.4 For a number of proposed dwellings, the external noise criteria may be exceeded. However, based on the current masterplan there are expected to be communal areas which may be used as an alternative amenity space where noise levels are predicted to meet the recommended guideline level.
- 6.5 The assessment shows that with appropriate consideration of appropriate glazing and ventilation for apartments with a direct line of sight to Old Mill Street, an appropriate level of protection could be afforded to future noise sensitive receptors on the site.
- 6.6 For the worst affected apartments which have line of sight to Old Mill Street, recommended internal noise level criteria are likely to be achieved with double glazing which would need to provide a minimum performance of $R_w + C_{tr}$ 40 dB and acoustic vents which would need to provide a minimum performance of $D_{n,e,w} + C_{tr}$ 52dB.
- 6.7 Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development. It is therefore considered that noise need not be a determining factor in the granting of full planning approval for the Site.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

