

NXQ

Lever Street, Manchester

Noise Impact Assessment

Revision 02 _ 27.03.2024



ENVIRONMENT

Soller Nine
The NXQ Building, Lever Street
Manchester
Noise Impact Assessment

233555

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EXECUTIVE SUMMARY

BWB Consulting (BWB) was instructed by Soller Nine (the Client) to carry out a Noise Impact Assessment for a circa 18 storey office development at The NXQ Building, Lever Street, Manchester.

A baseline noise survey was undertaken in February 2024 and the subsequent assessment work has been undertaken in accordance with current standards and guidance, following consultation with Manchester City Council.

The assessment shows that, with consideration of appropriate glazing and façade construction, an appropriate level of protection could be afforded to future noise sensitive receptors on the Site.

For retained spaces within the development, recommended internal noise level criteria are predicted to be achieved with existing façade design.

For proposed construction within the development, recommended internal noise level criteria are likely to be achieved with double glazing which would need to provide a minimum performance of $R_w + C_{tr}$ 25 dB.

It is understood that ventilation of the spaces within the proposed development will be provided via a mechanical ventilation, heating and cooling system. Therefore, no provision of ventilation as a component of the façade has been made within this report.

Noise limits have been set at nearby receptors to which any fixed plant items and other applicable commercial noise should meet, based on the results of the baseline noise survey and requirements of BS 4142:2014+A1:2019.

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

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1. INTRODUCTION

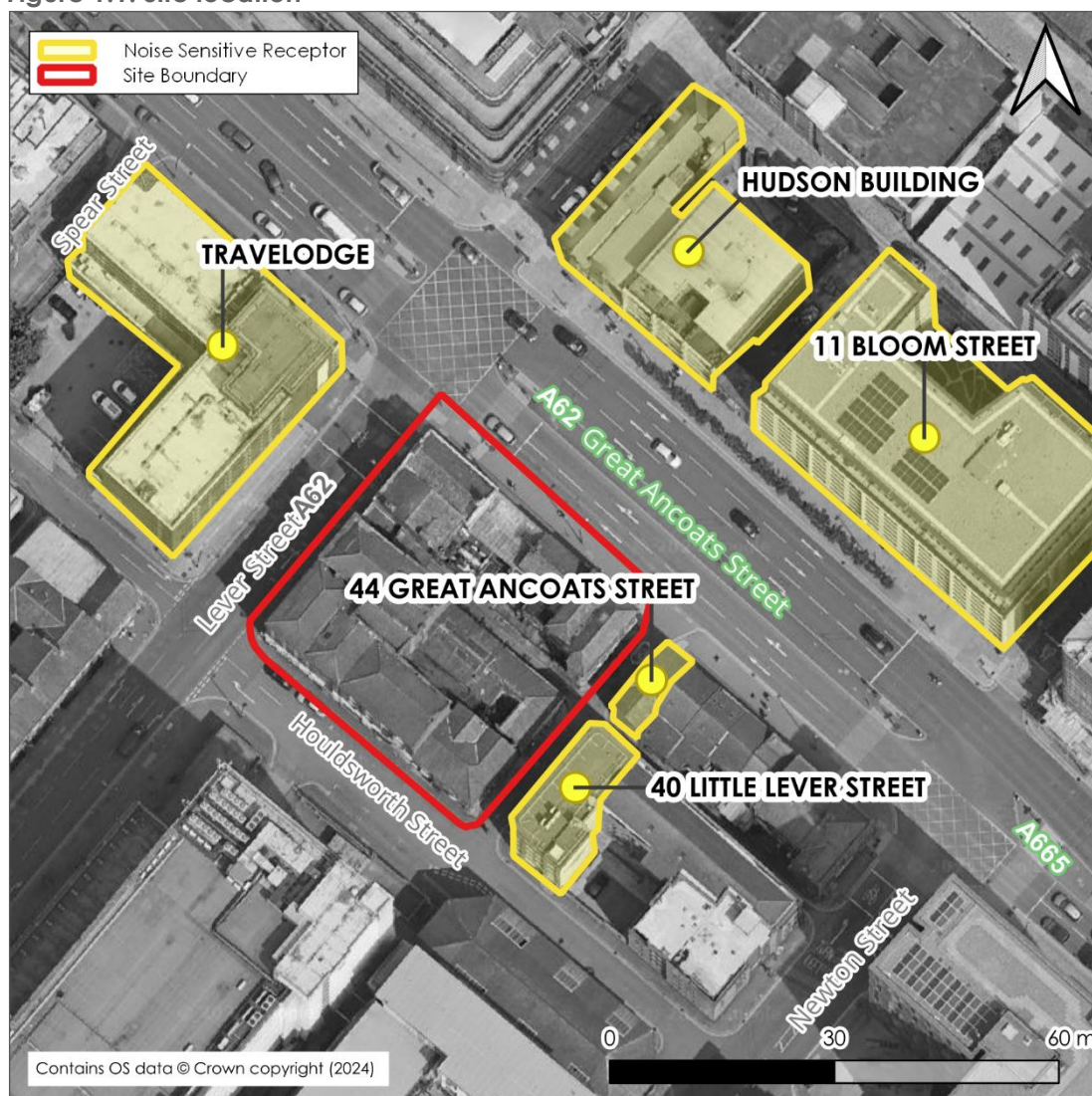
Instruction

- 1.1 BWB Consulting was instructed by Soller Nine to undertake a Noise Impact Assessment to support the planning application of The NXQ Building, a circa 18 storey office development on The NXQ Building, Lever Street Manchester (the Site).
- 1.2 This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance, following consultation with Manchester City Council.
- 1.3 Where appropriate, consideration has been given to noise mitigation measures to demonstrate how an appropriate level of protection could be afforded to existing Noise-Sensitive Receptors (NSRs) located adjacent to the Site as well as proposed NSRs within the Site.
- 1.4 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

- 1.5 The Site is located within the administrative boundary of Manchester City Council (MCC). There are a variety of existing buildings on site, including the Bem Brasil Restaurant, smaller takeaway restaurants along Great Ancoats Street and Houldsworth Street, accompanied by small commercial premises. The Site is bound to the northeast by Great Ancoats Street, a major thoroughfare around Manchester city centre; southeast by Little Leaver Street, the southwest by Houldsworth Street and northwest by Lever Street, a main thoroughfare through The Northern Quarter area of the city centre.
- 1.6 The following NSRs have been identified around the site:
 - Travelodge Hotel located at 22 Great Ancoats Street
 - Residential receptors at Hudson Building, 29-37 Great Ancoats Street
 - Residential receptors at 11 Bloom Street
 - Residential receptors 44 Great Ancoats Street
 - Residential receptors at 40 Little Lever Street
- 1.7 The location of the Site, along with the locations of the identified noise sensitive receptors are shown in **Figure 1.1**.

Figure 1.1: Site location



Proposed Development

1.8 The description of the proposed development is as follows:

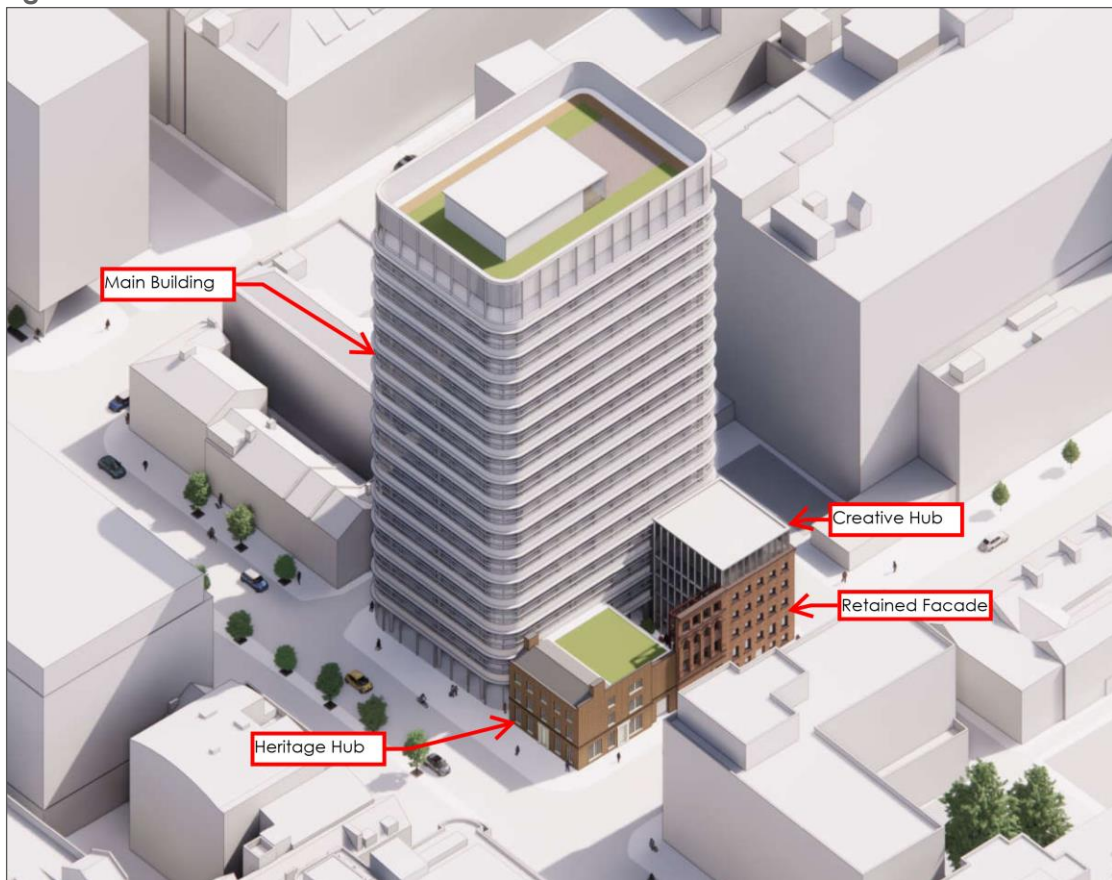
"Full planning application for part-retention, conversion and extension of existing buildings; selective demolition; the erection of a ground floor + 17 storey building comprising new office space (Use Class E) with ground floor reception area and ancillary uses; supporting infrastructure and ancillary facilities, roof top plant, and landscaping."

1.9 The development will consist of three main elements:

- i. A main building consisting of a new-build 18 storey tower,
- ii. Retained building on the corner of Lever Street and Great Ancoats Street (Heritage Hub),

- iii. New 3-storey building, attached to the tower, located behind a retained façade on Lever Street and Houldsworth Street (Creative Hub).
- 1.10 The ground and first floor of the main building and Creative Hub will include amenity space, co-working and informal meeting spaces. Level 3 will include a business lounge and link to an outdoor terrace on the Creative Hub. Levels 4-18 of the main building will provide flexible office space. The basement will include a 'well-being' area, a cycle storage, shower and complimentary amenity space.
- 1.11 The retained building will include a dining area and a terrace on level 2.

Figure 1.2 3D visualization of scheme



- 1.12 The site plan showing the ground floor layout is presented in **Figure 1.3**.

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2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 2.1 Published in December 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:

"180. 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:

"191. 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 life⁶⁹;

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.

⁶⁹ See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

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

- 2.3 BS 4142:2014+A1:2019 (BS 4142) 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.
- 2.4 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. The Standard advises that the purpose of the methodology should include the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed or existing residential dwellings.
- 2.5 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 ($L_{Ar,Tr}$). The method compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$), measured in the absence of the specific sound.
- 2.6 The standard confirms that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present in the area, such as noise from existing plant.
- 2.7 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.
- 2.8 Comparison of the Rating Level to background noise level indicates the significance of the new noise source at the receptor under assessment. If the Rating Level is higher than the background noise level, then there may be an 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. 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.
- 2.9 In the case of low background noise levels and rating levels, BS4142 advises that absolute levels might be as, or more relevant than the margin by which the rating level exceeds the background. Furthermore, the context which the sound occurs is also important when assessing the possible impact.

Guidance for Internal Noise Levels in Offices

- 2.10 To help in the design of the building and the control of noise outside and in the building, reference has been made to relevant and credited guidance documents, notably, British Council for Offices¹ (BCO) and BS 8233:2014², which recommends suitable internal ambient noise levels (IANL) within commercial buildings to ensure the acoustic environment within different room spaces are appropriate to their function.
- 2.11 The guidance levels out in **Table 2.1** are applicable to steady external noise sources and building services noise serving the spaces but excluding any noise produced by the occupants and their activities. The time period, T, should be appropriate for the activity involved, which would usually be the typical working day for commercial uses.

Table 2.1 Internal noise criteria in unoccupied spaces

Room Space	BCO External Noise Intrusion Guidance	BS8233 L _{Aeq,T} Design Range	Criterion
Meeting Rooms	-	35-45	Reasonable conditions for study and work requiring concentration
Executive/ Cellular Offices	NR 35	35-40	
Speculative Offices	NR 38	-	
Open Plan Offices,	NR 40	45-50	Reasonable acoustic privacy in shared spaces
Concourse/Circulation/Reception	-	45-50	
Restaurant	-	40-55	
Corridors, Toilets	-	45-55	Reasonable speech or telephone conversations

Manchester City Council Noise and Vibration Planning Technical Guidance

- 2.12 MCC have developed their own noise guidance on which all planning applications will be assessed against to determine if the proposals are in line with their planning policy. The guidance draws on national and local planning policy; national and international standards to provide assessment criteria for common noise generating uses.
- 2.13 Manchester City Council's Noise and Vibration Planning Technical Guidance, guide states that noise from all developments must aim for a noise level between No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL).

¹ British Council for Offices (2019) Guide to Specification 2019

² The British Standards Institution (2014) BS8233 Guidance on sound insulation and noise reduction for buildings

Building Services and External Plant

- 2.14 MCC require the following design objective for noise from fixed plant, equipment and machinery:

"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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location."

Entertainment Noise

- 2.15 Noise from parts of the development which are considered 'entertainment' venues (this includes restaurants) must meet the following criteria:

"Entertainment noise (LAeq) should be controlled to 10dB below the background noise level (LA90) without the entertainment noise present, in each octave band at the nearest noise sensitive location."

- 2.16 The above criterion applies to entertainment venues which are not structurally connected to the noise sensitive receptor.

Consultation with Manchester City Council

- 2.17 Consultation was undertaken with MCC via email on 5th February 2024 outlining the proposed survey and assessment methodologies. A response was received on 12th February 2024.
- 2.18 MCC did not propose any changes to the methodology presented in this report.

3. BASELINE NOISE MONITORING

- 3.1 A baseline noise survey has been undertaken to measure the noise levels representative of existing and proposed noise sensitive receptors in the vicinity of the Site.

Measurement Locations

- 3.2 The measurement locations (ML) adopted during the survey are shown in **Figure 3.1**. Details of the monitoring undertaken at the measurement locations are provided in the paragraphs following the figure.

Figure 3.1 Baseline noise survey measurement locations



Measurement Location 1 (ML1)

- 3.3 Noise measurements were undertaken at ML1 from 13:30 on February 1st 2024 until 11:15 on February 2nd 2024. The microphone was positioned within 1m of the façade of the existing building approximately 6m above local ground.
- 3.4 The noise climate at ML1 was dominated by traffic on Great Ancoats Street during both the daytime and night-time periods.

Measurement Location 2 (ML2)

- 3.5 Noise measurements were undertaken at ML2 from 15:15 on February 1st 2024 until 12:42 on February 2nd 2024. The microphone was positioned out of a window on level 2 of the existing building approximately 7m above local ground.
- 3.6 The noise climate at ML2 was dominated by traffic on surrounding roads, mainly Great Ancoats Street. Minor sources at the measurement location were noise building services noise from surrounding buildings and uses.

Measurement Location 3 (ML3)

- 3.7 Noise measurements were undertaken at ML3 from 12:15 on February 1st 2024 until 10:15 on February 2nd 2024. The microphone was positioned out of a window on level 2 of the existing building, approximately 6m above local ground.
- 3.8 The noise climate at ML3 was dominated by traffic on Lever Street and Great Ancoats Street.

Measurement Location 4 (ML4)

- 3.9 Noise measurements were undertaken at ML4 between 13:15 and 14:15 on February 2nd 2024. The microphone was fixed to a tripod 2m above the ground in free-field conditions.
- 3.10 The noise climate at ML4 was dominated by traffic on Lever Street and Great Ancoats Street. Minor sources at the measurement location were noise building services noise from surrounding buildings and uses.

Measurement Equipment

- 3.11 The baseline noise survey was undertaken using the Class 1 noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards within the 24 months prior to the measurements. The portable calibrator was calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise measurement equipment

Measurement Location	Equipment	Make and Model	Serial Number
ML1	Sound Level Meter	01dB Fusion	14148
	Microphone	GRAS 40CD	466808
	Pre-amplifier	01dB PRE22	2113231
	Calibrator	Cirrus CD:515	96164
ML2 & ML4	Sound Level Meter	Svantek SVAN 971	72616
	Microphone	ACO 7052E	69463
	Pre-amplifier	Svantek SV18	72283
	Calibrator	Svantek SV33A	73412
ML3	Sound Level Meter	01dB Fusion	12079
	Microphone	GRAS 40CD	367009
	Pre-amplifier	01dB PRE22	1805158
	Calibrator	Cirrus CD:515	89092

Weather Conditions

- 3.12 During the survey period, weather conditions were generally conducive to environmental noise monitoring, it being dry with negligible wind speeds (<5ms⁻¹). Temperatures ranged from 6°C-12°C during the noise survey.

Measurement Results

- 3.13 All noise levels were measured within 1m of a façade. The noise levels presented below have not been adjusted to account for façade effect. Full results are provided in **Appendix C**.

ML1

- 3.14 A summary of measured sound pressure levels measured are presented in **Table 3.2** to **Table 3.3**.

Table 3.2 Summary of measured sound pressure levels at ML1

Period	Measurement Period	dB LAeq,T ¹	dB LA90,T ²	dB LAfMax,T ³
Daytime	13:30 – 23:00	69	59	-
Night-time	23:00 – 07:00	67	55	85
Daytime	07:00 – 11:15	70	59	-
¹ Logarithmic average of noise levels measured during the period ² The lowest of the mean, median or mode LA90 measurement during each time period ³ 10 th Highest LAfMax,1min during the night				

Table 3.3: Octave band ambient noise levels at ML1

Period	Octave Band Sound Pressure Levels (L _{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	71	67	64	63	65	63	58	51	69
Night-Time	67	63	61	60	63	62	53	46	67

ML2

- 3.15 A summary of measured sound pressure levels measured are presented in **Table 3.4** to **Table 3.5**.

Table 3.4 Summary of measured sound pressure levels at ML2

Period	Measurement Period	dB L _{Aeq,T} ¹	dB L _{A90,T} ²	dB L _{AFMax,T} ³
Daytime	14:15 – 23:00	54	50	-
Night-time	23:00 – 07:00	52	47	67
Daytime	07:00 – 12:15	56	50	-

¹Logarithmic average of noise levels measured during the period
²The lowest of the mean, median or mode L_{A90} measurement during each time period
³10th Highest L_{AFMax,15min} during the night

Table 3.5: Octave band ambient noise levels at ML2

Period	Octave Band Sound Pressure Levels (L _{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	63	60	56	51	51	46	37	32	55
Night-Time	59	57	53	48	47	43	31	22	52

ML3

- 3.16 A summary of measured sound pressure levels measured are presented in **Table 3.6** to **Table 3.7**.

Table 3.6 Summary of measured sound pressure levels at ML3

Period	Measurement Period	dB L _{Aeq,T} ¹	dB L _{A90,T} ²	dB L _{AFMax,T} ³
Daytime	12:15 – 23:00	69	60	-
Night-time	23:00 – 07:00	65	53	83
Daytime	07:00 – 11:15	71	62	-

¹Logarithmic average of noise levels measured during the period
²Lowest L_{A90} measurement during each time period
³10th Highest L_{AFMax} during the night

Table 3.7: Octave band ambient noise levels at ML3

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	75	68	63	63	65	63	59	54	69
Night-Time	70	64	59	59	61	60	53	48	65

ML4

- 3.17 A summary of measured sound pressure levels measured are presented in **Table 3.8** to **Table 3.9**.

Table 3.8 Summary of measured sound pressure levels at ML4

Period	Measurement Period	dB $L_{Aeq,T}^1$	dB $L_{A90,T}^2$
Daytime	13:15 – 14:15	64	54

¹Logarithmic average of noise levels measured during the period
²Lowest L_{A90} measurement during each time period

Table 3.9: Octave band ambient noise levels at ML4

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	73	66	63	61	60	56	50	47	64

4. ASSESSMENT

Noise Model

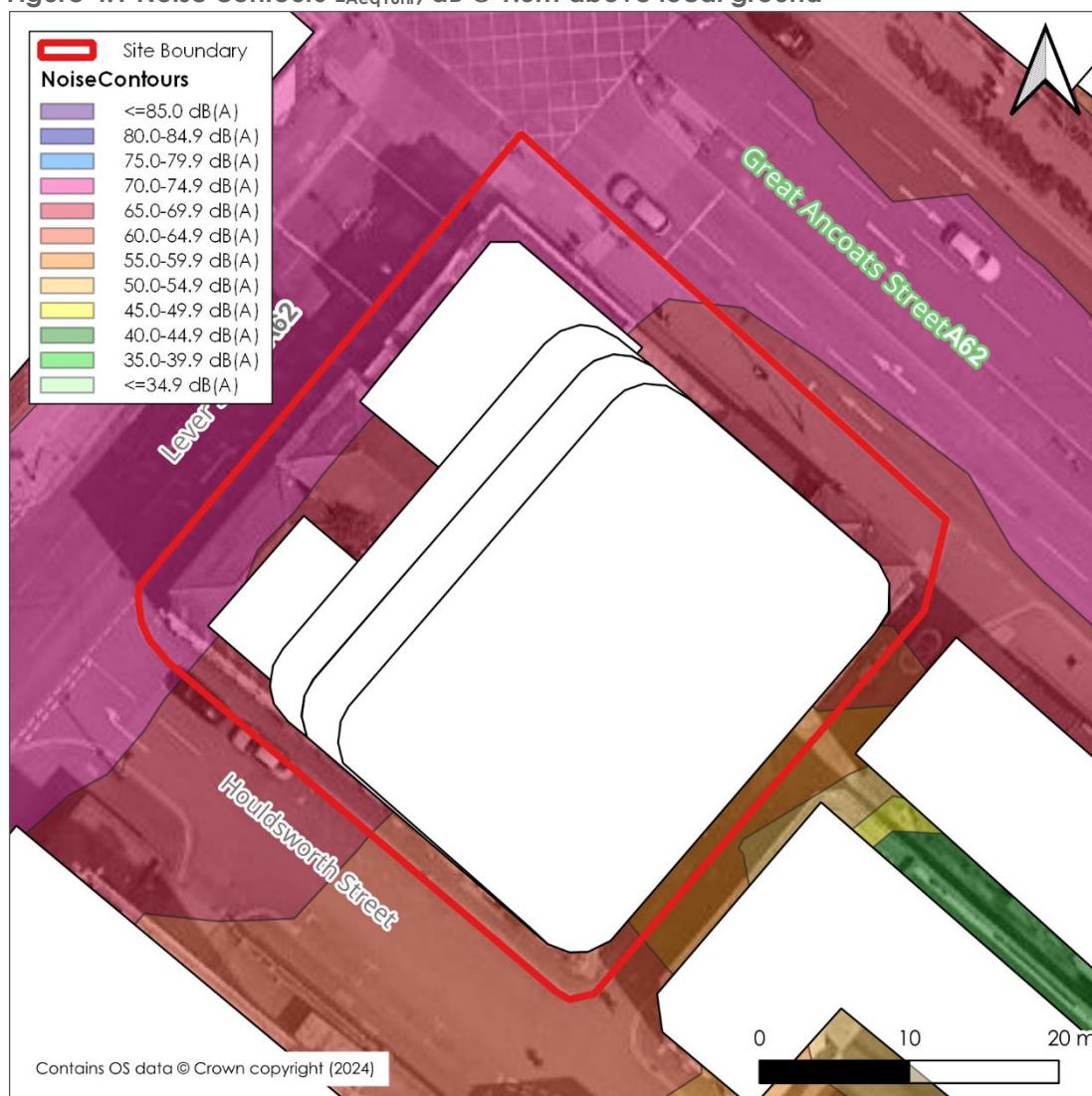
- 4.1 A detailed acoustic model of the site has been generated in order to calculate the noise propagation across the site. This noise model was generated applying the following methodology:
- The model was generated using the PC based CadnaA® noise modelling software.
 - The noise model was set up to apply the noise prediction methodology set out in Calculation of Road Traffic Noise (CRTN)³ for road traffic noise sources.
 - Indicative ground topography was approximated using surveyed topography data for areas within the red and blueline boundaries, supplemented by LIDAR Composite 1m DTM for areas outside the Site boundaries; LIDAR data information freely available from the data.gov website.
 - The model was set to include second order reflected noise from solid structures.
 - To reflect the local ground cover, ground absorption was set $G = 0.0$ (100% reflecting).
 - The model was set to include second order reflected noise from solid structures.
 - Due to the limitations of the modelling software, it is not possible to model the retained façade with openings, therefore as a worst-case scenario, it has been omitted from the model.
 - The levels measured during the baseline noise survey have not been corrected to free-field levels.
- 4.2 The site layout, shown in **Figure 1.3**, has been incorporated into the model, and the free-field level at each façade has been calculated. The predicted noise levels have been used to inform the assessment.
- 4.3 ML1, ML2, ML3 and ML4 have been included in the model and the resultant road traffic noise levels have been adjusted until the model was equal to the levels detailed in **Table 3.2** through **Table 3.9** for the daytime and the night-time periods.

Road Traffic Noise

- 4.4 The noise contour plot shown in **Figure 4.1** shows the external noise levels at the site as a result of road traffic noise.

³ Department of Transport and the Welsh Office (1988) Calculation of Road Traffic Noise

Figure 4.1 Noise contours $L_{Aeq16hr}$, dB @ 1.5m above local ground



- 4.5 According to the project brief, natural ventilation is to be provided by windows, which are opened by actuators with comfort cooling and heating provided by a Hybrid Variable Refrigerant Flow heat recovery system. It is understood that mechanical ventilation will also be provide to the offices.
- 4.6 By using the predicted external noise levels and assuming a 15dB reduction through an open window, it is possible to determine the internal ambient noise level based on the proposed internal layout.
- 4.7 Where criteria for areas and uses are denoted in NR curves, such as open plan and speculative office spaces, the relationship stated in BS8233 Annex B has been applied, where:

$$"NR \approx dBA - 6"$$

- 4.8 **Table 4.1** presents the external free-field noise levels for each façade and the predicted internal noise level, assuming 15dB reduction through an open window.

Table 4.1 Predicted noise levels

Area	Use	Level	Highest predicted External noise level, $L_{Aeq,16h}$, (dB) (0700-2300)	Adopted Criteria to be achieved dB(A)	Internal noise level assuming 15dB reduction through an open window, $L_{Aeq,T}$ (dB)	Criteria Achieved
Main Building	Reception area	Ground	65	50	50	Yes
	Flexible Space	Ground	69	44	54	No
	Business Lounge	Level 3	62	44	47	No
	Open plan offices	Levels 1-17	69	46	54	No
Creative Hub	Creative Hub (Speculative office)	Ground - 2	69	44	54	No
Heritage Hub	Café	Ground	70	50	55	No
	Dining	Ground - 2	70	50	55	No

4.9 **Table 4.1** shows that external levels are such that internal noise levels cannot be achieved with open windows.

4.10 The exception to this are noise levels in the reception area, the 18th floor open plan office and the Houldsworth Street elevation from levels 8-18 where noise levels are $\leq L_{Aeq,T}$ 61 dB. However, the majority of the building envelope on each level is exposed to noise levels which are greater than the respective highest external level capable of meeting criteria. Since the open plan offices extend the entire floor plate, noise break-in through open windows will result in exceedances in the internal noise level.

4.11 Therefore, mitigation for the building envelope will be required which is discussed in the following Section.

Predicted Noise from Operational Activity

Heritage Hub - Terrace

4.12 A terrace will be located on the 2nd floor of the Heritage Hub, attached to the dining areas on the remainder of the floor. Noise generated by this open space is considered at the nearby noise sensitive receptors at the Travelodge opposite the site on Lever Street.

4.13 This assessment considers the noise generated by raised voices of patrons of the terrace, with an assumed density of one person per 1.5m² of floor area.

- 4.14 As the floor area of the Terrace is shown to be approximately 29m², this equates to 20 people, at a density of 1 per 1.5m², rounded up for robustness.
- 4.15 The typical sound pressure level of a raised voice has been taken from the values given in *ANSI/ASA S3.5-1997 (R2020)*⁴, detailed in **Table 4.2**.

Table 4.2: Typical sound pressure levels of human voice at 1m, dB

Voice	dB @ Octave band centre frequency, Hz							dB(A)
	125	250	500	1k	2k	4k	8k	
Normal	51	57	60	54	49	44	39	60
Raised	56	62	66	62	57	51	43	67

- 4.16 Logarithmic addition of the raised voice sound pressure level of 67 dB to account for the 20 people on the terrace, results in a combined noise level of 80 dB at 1m distance.
- 4.17 The distance from the closest point of the terrace to the nearest noise sensitive receptor location is 18m. Accounting for point source distance propagation of the noise level generated at the terrace, the predicted noise level at the worst-affected receptor is 55 dB.
- 4.18 The measured noise level at the nearest measurement location ML3 is 69 dB $L_{Aeq,16h}$ during the daytime, and 65 dB $L_{Aeq,8h}$ during the night-time. These noise levels are considered representative of the noise environment at the worst-affected noise sensitive receptors within the Travelodge.
- 4.19 It is noted that the spectral make-up of the voice is different from that of road traffic noise, and therefore it is possible that the sound of voices will be audible. The noise from the terrace is predicted to be significantly below the ambient noise levels measured at ML3 which is considered representative of the receptor and is therefore unlikely to result in adverse impacts at nearby receptors. Therefore, no mitigation of this source is required.

Amenity/Wellbeing area

- 4.20 An amenity space will be located in the basement level, under the reception and flexible working area. There will be a 325mm reinforced concrete slab between the reception and flexible working area.
- 4.21 The assessment presented below shows the highest noise level which can be achieved in the wellbeing area while keeping within the noise levels shown in **Table 2.1** in the adjoining spaces.

⁴ Acoustical Society of America (2020) Methods For Calculation Of The Speech Intelligibility Index

Table 4.3: Noise limits for amenity area

Description	dB @ Octave band centre frequency, Hz							dB
	63	125	250	500	1k	2k	4k	
Predicted SRI of 325mm RC slab, R	49	48	55	62	68	72	77	R _w 66
Noise level limit in Reception, L _{Aeq,T}	58	64	52	44	34	26	20	50
Corresponding Noise Limit within Amenity Area, L _{Aeq,T}	97	102	97	96	92	88	87	98

- 4.22 The assessment above shows that noise levels within the amenity space can reach up to L_{Aeq} 98 dB before exceeding the recommended internal noise levels for a reception area. It is unlikely that such noise levels would be reached during normal usage, therefore it can be considered that no further mitigation, such as treated ceilings will be required for the amenity area.

Plant Noise Limits

- 4.23 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. In the absence of detailed information, it is appropriate to specify suitable noise control limits to which any plant should conform.
- 4.24 Noise from external plant on the development site should achieve the following noise level limits, shown in **Table 4.4**.
- 4.25 Consideration has been given to noise levels measured at all measurement locations, which have been corrected by -3dB to account for the effect of the façade. A further -5 dB correction has been applied to reflect MCC design objective for building services plant to be 5dB below the background L₉₀ noise level.

Table 4.4 Noise limits for fixed plant

Noise sensitive receptors	Measurement Position	Rating Noise Limit to be Achieved at NSRs (L _{A,r,T}), dB	
		Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Travelodge	ML3	52	45
Hudson Building & 11 Bloom Street	ML1	51	47
44 Great Ancoats Street & 40 Little Lever Street	ML2	42	39

-
- 4.26 In accordance with BS4142, 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.
- 4.27 Once the detailed nature of such plant is confirmed, noise from any fixed plant can be considered to ensure that the proposed limits are met.
- 4.28 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.

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 would result in noise levels in excess of those set in BCO and 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 and elevations provided;
 - External building fabric elements shall achieve a sound reduction performance of at least $R_w + C_{tr}$ 30dB, unless otherwise stated;
 - Glazing shall achieve a sound reduction performance of at least $R_w + C_{tr}$ 25dB, unless otherwise stated;
 - Reverberation time calculations specific to each room informed by its dimensions; and,
 - Due to the design brief stating that heating and cooling is to be provided by HVRF, no quantum of additional window or wall ventilators have been included in the calculations.
- 5.5 In the instance where a proposed space 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, to ensure that the internal noise levels are achieved.

Tech Hub

- 5.6 The predicted internal noise levels with the above-mentioned specification of mitigation for each floor of the Tech Hub spaces can be found in **Table 5.1**.

Table 5.1: Predicted internal noise levels in Tech Hub with mitigation, dB

Space	Use	Relevant Noise Criteria for Use (dB $L_{Aeq,16h}$) [NR where relevant]	Predicted Internal Noise Level (dB) $L_{Aeq,16h}$
Ground Floor – Tech Hub	Speculative office	44 [NR38]	40
1 st Floor – Tech Hub	Open plan office	46 [NR40]	40
2 nd Floor – Tech Hub	Open plan office		39
3 rd Floor – Tech Hub	Open plan office		40
4 th Floor – Tech Hub	Open plan office		38
5 th Floor – Tech Hub	Open plan office		38
6 th Floor – Tech Hub	Open plan office		37
7 th Floor – Tech Hub	Open plan office		37
8 th Floor – Tech Hub	Open plan office		36
9 th Floor – Tech Hub	Open plan office		36
10 th Floor – Tech Hub	Open plan office		36
11 th Floor – Tech Hub	Open plan office		35
12 th Floor – Tech Hub	Open plan office		35
13 th Floor – Tech Hub	Open plan office		35
14 th Floor – Tech Hub	Open plan office		35
15 th Floor – Tech Hub	Open plan office		34
16 th Floor – Tech Hub	Open plan office		34
17 th Floor – Tech Hub	Open plan office		34
18 th Floor – Tech Hub	Open plan office		33

Creative Hub

- 5.7 Regarding the Creative Hub, it is understood that a brick façade is to be retained around the new proposed development facing onto Lever Street and Houldsworth

Street. Based upon the drawings provided, it is assumed that glazing is to be installed/retained in the existing gaps in the façade brickwork.

- 5.8 A brick façade is likely to achieve a sound reduction performance of at least $R_w + C_{tr}$ 40dB, which would provide a betterment to the internal noise levels for the Creative Hub beyond the assessed noise levels.
- 5.9 The drawings provided show that the proposed façade of the Creative Hub will be glazed. As such, the break-in calculations have been performed with 100% glazing to the proposed façade, and excludes any performance of the retained façade. The results are presented in **Table 5.2**.

Table 5.2: Predicted internal noise levels in Creative Hub with fully glazed façade, dB

Space	Use	Relevant Noise Criteria for Use (dB $L_{Aeq,16h}$) [NR where relevant]	Predicted Internal Noise Level (dB) $L_{Aeq,16h}$
Ground Floor – Creative Hub	Speculative office	44 [NR38]	42
1 st Floor – Creative Hub	Speculative office		41
2 nd Floor – Creative Hub	Speculative office		40

- 5.10 Given that the above does not meet the criteria with a 3dB overhead, further calculations have been undertaken to assess the potential acoustic performance of the retained wall.
- 5.11 As a robust case, calculations have been performed with 50% of the internal glazed façade being obscured by the retained brick façade, and with no reduction offered by the glazed element in the retained façade. The brick façade has been modelled as 103mm deep, with an $R_w + C_{tr}$ 43dB.
- 5.12 It is noted that the 2nd Floor of the Creative Hub extends beyond the retained façade in the provided drawings, and as such has not been modelled in this instance. The results from this assessment can be found in **Table 5.3**.

Table 5.3: Predicted internal noise levels in Creative Hub with 50:50 glazing to brick, dB

Space	Use	Relevant Noise Criteria for Use (dB $L_{Aeq,16h}$) [NR where relevant]	Predicted Internal Noise Level (dB) $L_{Aeq,16h}$
Ground Floor – Creative Hub	Speculative office	44 [NR38]	39
1 st Floor – Creative Hub	Speculative office		38

- 5.13 With the incorporation of the retained break wall associated with the existing building, covering 50% of the proposed façade associated with the ground and first floors, the adopted internal noise criteria can be achieved with the proposed glazing mitigation.

Heritage Hub

- 5.14 Areas within the Heritage Hub, marked as Café/Bar, and Dining, have been assessed against the relevant noise criteria for restaurants as stated in **Table 2.1**. As this is a retained structure, the façade has been modelled to accurately reflect its construction.
- 5.15 For the Heritage Hub, the façade has been assumed to be 2x103mm brick with a 75mm airgap, with an acoustic performance of $R_w + C_{tr}$ 48 dB. Glazing has been assumed to be the same as the Tech Hub and Creative Hub i.e at least $R_w + C_{tr}$ 25dB.
- 5.16 For each floor of the Heritage Hub, the worst-case room with respect to the internal noise levels has been presented in **Table 5.4**.

Table 5.4: Predicted internal noise levels in worst-case rooms in Heritage Hub with mitigation, dB

Space	Use	Relevant Noise Criteria for Use (dB $L_{Aeq,16h}$)	Predicted Internal Noise Level (dB) $L_{Aeq,16h}$
Ground Floor – Heritage Hub	Café/Bar	55	40
1 st Floor – Heritage Hub	Dining	55	39
2 nd Floor – Heritage Hub	Dining	55	40

- 5.17 The above presents solutions to satisfy the proposed internal ambient noise limits within occupied spaces during normal ventilation conditions across the three buildings within the proposed development.
- 5.18 The final glazing and façade schedule should be finalised on a room-by-room basis at the appropriate design stage by a qualified consultant once the proposed construction and acoustic performance of the façade components is known.

6. CONCLUSIONS

- 6.1 BWB Consulting (BWB) was instructed by Soller Nine (the Client) to carry out a Noise Impact Assessment for a circa 18 storey office development at The NXQ Building, Lever Street, Manchester.
- 6.2 A baseline noise survey was undertaken in February 2024 and the subsequent assessment work has been undertaken in accordance with current standards and guidance, following consultation with Manchester City Council.
- 6.3 The assessment shows that, with consideration of appropriate glazing and façade construction, an appropriate level of protection could be afforded to future noise sensitive receptors on the Site.
- 6.4 For retained spaces within the development, recommended internal noise level criteria are predicted to be achieved with existing façade design.
- 6.5 For proposed construction within the development, recommended internal noise level criteria are likely to be achieved with double glazing which would need to provide a minimum performance of $R_w + C_{tr}$ 25 dB.
- 6.6 It is understood that ventilation of the spaces within the proposed development will be provided via a mechanical ventilation, heating and cooling system. Therefore, no provision of ventilation as a component of the façade has been made within this report.
- 6.7 Noise limits have been set at nearby receptors to which any fixed plant items and other applicable commercial noise should meet, based on the results of the baseline noise survey and requirements of BS 4142:2014+A1:2019.
- 6.8 Based on the results of the assessment, it has been demonstrated that The Site is suitable for the proposed use. It is therefore considered that noise need not be a determining factor in granting approval for the proposed development.

APPENDICES

APPENDIX A: Glossary of Acoustic 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 (2x10 ⁻⁵ 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.
Sound Power Level, L _w	logarithm of the ratio of a given sound power to the reference sound power. Such power level in decibels is ten times the logarithm to the base ten of the ratio. unless otherwise specified, the reference sound power is 1 pW. Sound power is the total sound energy radiated by a sound source and measured in watts (W). Sound power level
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.
R/R _w	R is the laboratory measurement of the sound insulating properties of a material or building element in a stated frequency band R _w is the weighted Sound Reduction Index a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
D _{ne} /D _{ne,w}	D _{ne} is the laboratory measured level difference of a building element which has been normalised to a referenced absorption of 10m ² . D _{ne,w} is the weighted Sound Reduction Index a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
C _{tr}	Spectrum Adaptation Terms (C and C _{tr}) the single number rating method defined in BS EN ISO 717 uses a standard reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation term C _{tr} is used to take into urban traffic noise.

APPENDIX B: Noise Survey Data

