
Proposed Storage Units
Mauldeth Road West, Manchester

Noise Assessment Report



Project: Storage Units, Mauldeth Road West, Withington, Manchester

Client: Agha Group

Project Reference: RSA502/2025

Report Date: 16 April 2025

Document History

Version	Date	Comments	Initials
1	31 March 2025	Draft for comment	RS / LT
2	16 April 2025	Issue for planning	RS

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Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd have been appointed by Agha Group to undertake a noise impact assessment with regard to proposed storage units on vacant land to the north of Mauldeth Road West, Withington, Manchester, M20.
- 1.2 The current proposals are to construct two detached stand-alone units with associated parking area.
- 1.3 Manchester City Council has previously granted permission for the yard to be used as a temporary storage compound.
- 1.4 Existing neighbouring commercial properties include a dental surgery, hair salon, Nisa local, vehicle paint supplier and several restaurants/takeaways.
- 1.5 The nearest noise-sensitive properties to the site are dwellings along Limehurst Avenue to the east, first floor flats along Mauldeth Road West to the south and flats along Princess Road to the west.
- 1.6 The dominant source of noise at the site is road traffic on Princess Road and Mauldeth Road West. Intermittent noise from the commercial properties and high-altitude aircraft also contribute to the existing noise climate at the site.
- 1.7 An environmental noise survey has been conducted over several days to determine the existing background sound levels during the daytime and night-time period.
- 1.8 Appropriate noise targets for building services plant have been recommended based on the measured background sound levels.
- 1.9 Since the plant details are currently unknown, an assessment has been conducted based on an example outdoor condenser unit. The plant noise assessment has taken into consideration the guidance given within BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.
- 1.10 Noise breakout from the building envelope, noise from roller shutter operation and noise from loading/unloading goods has also been assessed.
- 1.11 The survey and assessment were conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.
- 1.12 This report provides the survey results, predicted sound levels at neighbouring dwellings, the anticipated impact and recommendations regarding appropriate noise mitigation measures.

2. Assessment Guidance & Acoustic Criteria

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 2.1 BS 4142 (amended June 2019) describes methods for rating and assessing sound of an industrial and/or commercial nature, such as sound from manufacturing processes and fixed mechanical plant/machinery.
- 2.2 Outdoor sound levels are used to assess the likely effect on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.3 BS 4142 is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.4 The standard has three different methods (subjective, objective and reference) of applying a penalty to tonal, impulsive and intermittent noises, as separate entities.
- 2.5 The current standard no longer indicates significance of noise impacts as giving rise to a '*likelihood of complaint*' but rather as an '*indication*' of varying degrees of '*adverse impact*'.
- 2.6 BS 4142:2014 states that a difference of around +10 dB or more (excess of rating level above the background sound level) is likely to be an indication of a significant adverse impact, depending on the context.
- 2.7 A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 2.8 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.
- 2.9 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.
- 2.10 With regard to determining the background sound level at the site, the standard provides the following guidance:

Where possible, measure the background sound level at the assessment location(s). If this is not possible measure at an alternative location where the residual sound is comparable to the assessment location(s). A detailed justification for considering this should be reported.

Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.

- 2.11 The standard also provides the following general commentary on background sound level:

The background sound level is an underlying level of sound over a period, T, and might in part be an indication of relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.

Among other considerations, diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser

importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

3. Environmental Noise Survey

Survey methodology

- 3.1 Continuous sound level monitoring was conducted over a 47-hour period at the western boundary line, in the north west corner of the site.
- 3.2 The microphone was mounted at approximately 3 metres from ground level and fixed to boundary fencing.
- 3.3 Measurements were performed from 11:30 hours on Wednesday 12th through to 10:30 hours on Friday 14th March 2025.
- 3.4 A measurement interval of 15-minutes was used throughout the survey and measurements were subject to sound reflections from an adjacent structure. Both one-third octave band and A-weighted broadband sound pressure levels were recorded during the survey.
- 3.5 Several sample measurements were also conducted at the southern boundary line, adjacent to the site entrance.
- 3.6 The site location and survey measurement positions are shown in Figure 3.1 and Figure 3.2. The proposed site plan and elevations are presented in Appendix A.

Figure 3.1 - Site location and survey measurement positions (Source: Google Earth)

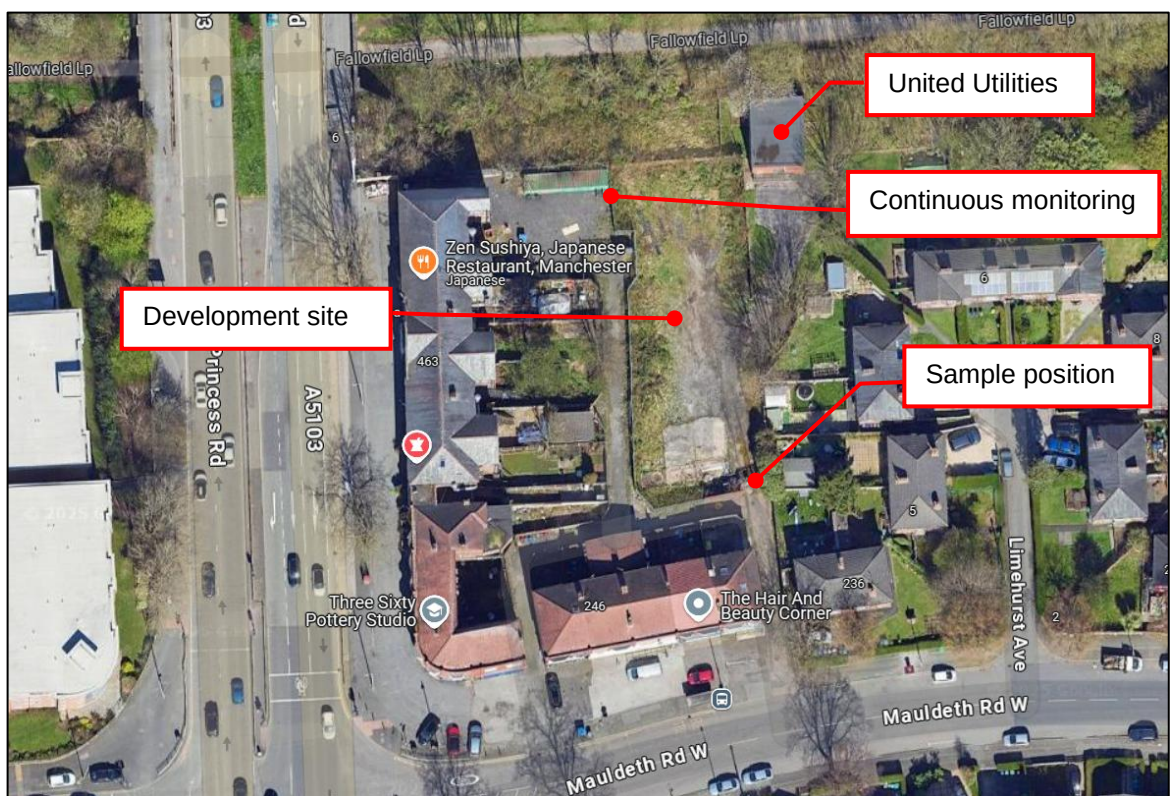


Figure 3.2 - Photographs showing continuous monitoring position



Survey equipment

- 3.7 The survey was performed using the following Class-1 specification equipment:
- Brüel & Kjaer 2250 sound level meter, microphone type 4189, pre-amplifier type ZC0032.
 - Brüel & Kjaer 2260 sound level meter, microphone type 4189, pre-amplifier type ZC0032.
 - CEL-120/1 Acoustic calibrator.
- 3.8 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (calibration certificates can be provided upon request).
- 3.9 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the survey. The drift in calibration was less than 0.1 dB.

Weather conditions

- 3.10 The weather conditions during the survey were generally dry and fine with clear sunny spells. Wind speed measurements taken on site were between 0.1 and 1.6 m/s⁻¹.
- 3.11 The air temperature during the survey ranged between approximately 1°C and 8°C. The overall weather conditions were considered suitable to obtain representative measurements.

Results summary

Continuous noise monitoring

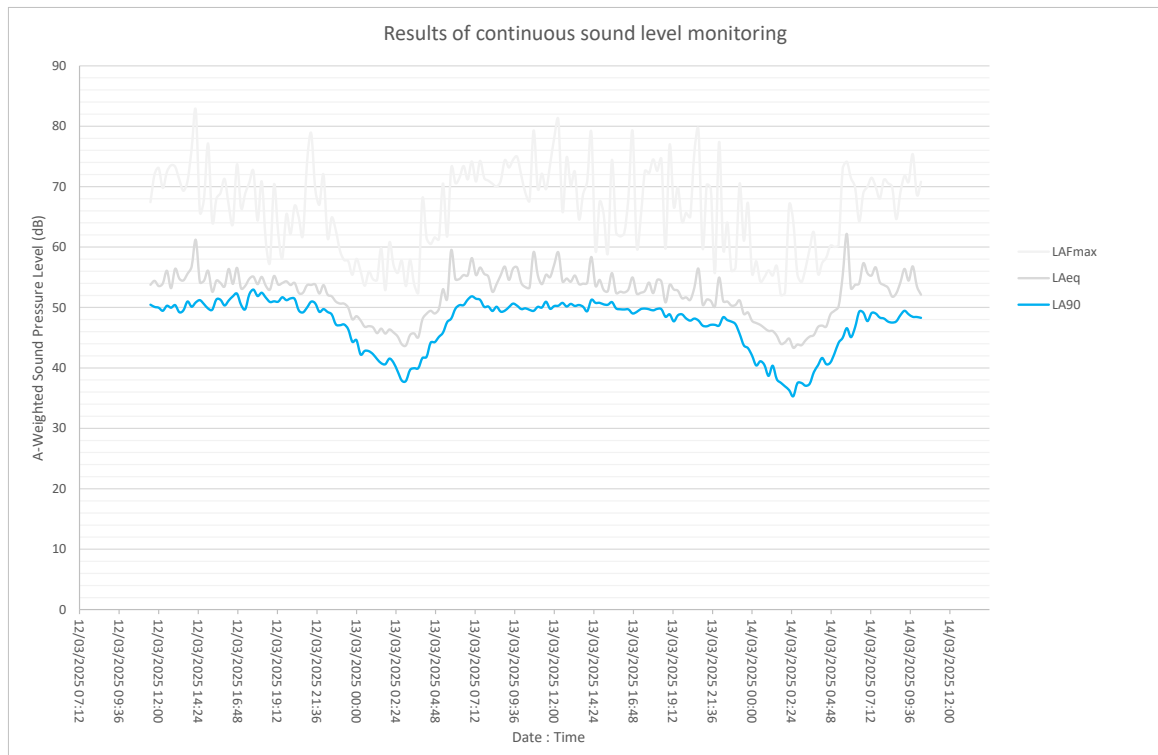
- 3.12 Table 3.1 presents a summary of the measured background L_{A90} sound pressure levels from the continuous monitoring position. Measured values have been rounded to the nearest whole number.
- 3.13 L_{A90} is the sound pressure level that is exceeded for 90% of the measurement time interval, T, and is often used to describe the 'background' sound level.
- 3.14 Sound pressure level measurements are taken with an A-weighting (denoted by a subscript 'A', e.g. L_{A90}) to approximate the frequency response of the human ear.

Table 3.1 - Measured background L_{A90} sound pressure levels

Date	Period, Hours	Typical ¹ $L_{A90,15min}$ dB	Median $L_{A90,15min}$ dB	Lowest $L_{A90,15min}$ dB	Highest $L_{A90,15min}$ dB
Wednesday 12/03/2025	Daytime (11:30-23:00)	50	51	47	53
	Night-time (23:00-07:00)	42	43	38	51
Thursday 13/03/2025	Daytime (07:00-23:00)	50	50	47	52
	Night-time (23:00-07:00)	40	41	35	49
Friday 14/03/2025	Daytime (07:00-10:30)	48	48	48	49
¹ Considered to be the representative background sound level from a statistical analysis (modal value)					

- 3.15 The background sound pressure level ranged between 47 to 53 dB $L_{A90,15min}$ during the daytime and 35 to 51 dB $L_{A90,15min}$ during the night-time.
- 3.16 The typical background sound pressure level ranged between 48 to 50 dB $L_{A90,15min}$ during the daytime and 40 to 42 dB $L_{A90,15min}$ during the night-time.
- 3.17 The results of the sound level monitoring are presented graphically in Figure 3.3 overleaf. Additional tabulated survey data is presented in Appendix B.

Figure 3.3 - Graph showing results of continuous sound level monitoring



Sample measurements

- 3.18 At the sample measurement position, the background sound pressure levels were within 1.5 dB $LA_{90,15min}$ of the sound levels measured simultaneously at the continuous monitoring position (negligible difference).

4. Assessment & Discussion

Nearest noise sensitive receptors

- 4.1 The nearest noise-sensitive properties are first-floor flats to the south along Mauldeth Road West and also to the west along Princess Road. The flats are above existing commercial units at ground floor level.
- 4.2 There are also a number of semi-detached dwellings along Limehurst Avenue to the east.

Noise criterion for building services plant

- 4.3 BS 4142 states *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.*
- 4.4 Taking into account the guidance given within BS 4142 and Manchester City Council's typical noise targets, it is recommended that the sound rating level ($L_{Aeq,T}$) from all new building services is at least 5 dB below the typical background sound level ($L_{A90,T}$).
- 4.5 Table 4.1 presents the applicable sound level target for new fixed plant. It is prudent to use the lowest typical background sound level when determining appropriate targets.
- 4.6 The sound level target should be achieved at the neighbouring residential elevations/windows.

Table 4.1 - Sound level targets for new building services plant

Period, Hours	Typical Background Sound Level $L_{A90,15min}$ dB	Target Rating Level $L_{Aeq,15min}$ dB
Daytime (07:00-23:00)	50	45
Nighttime (23:00-07:00)	40	35

- 4.7 The recommended noise limits should be confirmed with Manchester City Council prior to the installation of new plant.

Noise from external condenser units

- 4.8 In the absence of detailed plant information, it is considered appropriate to use the sound level data for an indicative external condenser unit which is commonly used for air-conditioning purposes.
- 4.9 The example condenser model is a Daikin RX71K with a sound pressure level of 52 dBA at 1 metre.
- 4.10 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source have been assumed.
- 4.11 The separation distance between the condenser unit and the nearest dwelling is assumed to be approximately 12 metres. This distance represents the south facing elevation of unit no.1 and the north facing elevations of the first-floor flats along Mauldeth Road West.
- 4.12 The shortest separation distance between the unit and the rear elevations of the dwellings along Limehurst Avenue is approximately 19 metres. In this instance, the resulting sound pressure level would be lower due to the increased separation distance.
- 4.13 Table 4.2 overleaf presents the calculation details for the condenser unit taking into consideration the octave band sound pressure spectrum, directivity factor (wall reflection) and sound attenuation due to distance separation.

Table 4.2 - Condenser sound pressure levels at the nearest dwellings

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Daikin RX71K - L_{eq} dB	54	56	54	51	46	42	38	30
Directivity factor dB	+3	+3	+3	+3	+3	+3	+3	+3
Distance attenuation dB	-22	-22	-22	-22	-22	-22	-22	-22
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level dB	9	21	26	29	27	24	20	10
Specific sound level $L_{Aeq,T} = 33$ dB								

- 4.14 The calculation results indicate a specific sound pressure level of approximately 33 dB $L_{Aeq,15min}$ at the nearest dwellings.
- 4.15 Taking into consideration the tonal characteristics and overall sound level emitted by the unit, it is unnecessary to apply a correction, or penalty, to the predicted 'specific' sound level.
- 4.16 On this basis, the specific sound level is considered equal to the sound 'rating' level (33 dB $L_{Ar,15min}$).
- 4.17 Where two condenser units run simultaneously, the rating level could increase to 36 dB $L_{Ar,15min}$, depending on the separation distance.
- 4.18 The target sound rating level at neighbouring dwellings is 45 dB $L_{Aeq,15min}$ during daytime hours (07:00 and 23:00 hours).
- 4.19 The sound rating level of the units easily achieves the daytime noise target (by at least 9 dB).
- 4.20 Regarding an assessment of the likely impacts, BS 4142 states:
The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs...
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.
- 4.21 Condenser related noise is therefore expected to have a negligible impact at the neighbouring dwellings.
- Potential noise mitigation measures*
- 4.22 Since there are no dwellings adjacent to the northern boundary, installing condenser units on the north facing elevation of unit 02 would help to reduce the noise level experienced at the nearest dwellings.

Noise breakout from the building envelope

- 4.23 The building envelope construction consists of brickwork/blockwork external walls, lightweight cladding at high level and a lightweight metal profiled roof.
- 4.24 The sound insulation performance of the walls is expected to be approximately 45 to 50 dB R_w .
- 4.25 The sound insulation performance of the KS1000RW roof panels is expected to be approximately 25 to 27 dB R_w .
- 4.26 There is a single shutter to the front of each unit. The sound insulation performance of the shutter is expected to be approximately 24 to 25 dB R_w .
- 4.27 The composite sound insulation of the building envelope has been estimated taking into consideration the dimensions of the unit, surface area and typical sound insulation of each element.

Shutter closed

- 4.28 The calculation results in Table 4.3 indicate a composite sound insulation performance of approximately 29 dB R_w with the shutter closed.

Table 4.3 - Building envelope sound insulation with shutter closed

Title: Mauldeth Road West Sound Transmission Loss (ISO 12354-1)											
Formula/Comment	Single Value	63	125	250	500	1000	2000	4000	8000	R_w	(C, C_{tr})
$R = -10 \log \sum 10^{-(R_{p,i} / 10)}$	ΔR		20.3	23.6	27.9	24.9	33.7	43.1		29	(-1,-3)
$R_{flanking}$											
R			20.3	23.6	27.9	24.9	33.7	43.1		29	(-1,-3)
$D_{nT} = R - 10 \log (S_{tot} / A)$											
$D_{nT, flanking}$											
D_{nT}	Mass										
Materials with additional layer											
External wall	287.5		36.0	37.0	40.0	46.0	54.0	56.0		45	(0,-3)
Roller shutter (closed) 3mx3.5m	10.5		8.0	14.0	20.0	26.0	32.0	38.0		24	(-1,-5)
Lightweight aluminium roof	140.7		18.0	20.0	24.0	20.0	29.0	39.0		25	(-2,-3)
Steel Door	2.0		21.0	27.0	32.0	34.0	36.0	36.0		34	(-1,-3)
Roof light (1.44m ² each)	4.3		13.0	18.0	23.0	28.0	32.0	35.0		27	(-1,-4)

- 4.29 The sound pressure level at the nearest dwelling has been calculated using the following equation:
- $SPL_2 = SPL_1 - R_w + 10 \log S - 20 \log r - 14 \text{ dB}$
- 4.30 Where SPL_2 is the sound pressure level at the dwelling; SPL_1 is the internal sound pressure level adjacent to the wall where sound breakout will occur; R_w is the weighted sound reduction index; S is the surface area of the wall/roof; r is the separation distance to the dwelling.
- 4.31 Based on previous measurements conducted within a variety of storage and retail units, a typical reverberant sound pressure level ranging between 55 to 70 dB $L_{Aeq,15min}$ can be expected within the new units.
- 4.32 With the shutter closed, the predicted specific sound level at the neighbouring dwellings due to noise breakout is approximately 17 to 32 dB $L_{Aeq,15min}$.
- 4.33 Since the specific sound level is relatively low, a correction for tonality or other acoustic characteristics is considered unnecessary. In this instance, the specific sound level is equal to the sound rating level (17 to 32 dB $L_{Ar,15min}$).
- 4.34 The typical background sound pressure level ranged between 48 to 50 dB $L_{A90,15min}$ during the daytime period.
- 4.35 The sound rating level is therefore notably below the background sound level at the neighbouring dwellings (at least 16 dB below).
- 4.36 On this basis, a negligible impact is anticipated at the neighbouring dwellings due to noise breakout from the building envelope.

- 4.37 It is worth noting that a higher internal sound level of approximately 70 to 75 dB $L_{Aeq,15min}$ can occur within light engineering and manufacturing workshops.
- 4.38 In this instance, the sound rating level at the neighbouring dwellings would be approximately 32 to 37 dB $L_{Ar,15min}$.
- 4.39 However, the sound rating level is still below the background sound level at the neighbouring dwellings with the shutter closed.

Shutter open

- 4.40 With the shutter open, the composite sound insulation of the building envelope reduces from approximately 29 dB R_w to 16 dB R_w .

Table 4.4 - Building envelope sound insulation with shutter open

Title: Mauldeth Road West Sound Transmission Loss (ISO 12354-1)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	R_w	(C, C_{tr})
$R = -10 \log \sum 10^{(R_{p,i}/10)}$				15.3	15.7	16.0	15.7	16.2	16.3		16	(0,0)
$R_{flanking}$	ΔR											
R				15.3	15.7	16.0	15.7	16.2	16.3		16	(0,0)
$D_{nT} = R - 10 \log (S_{tot} / A)$												
$D_{nT, flanking}$												
D_{nT}	Mass											
Materials with additional layer												
External wall	287.5			36.0	37.0	40.0	46.0	54.0	56.0		45	(0,-3)
Roller shutter (closed) 3mx3.5m	10.5			0.0	0.0	0.0	0.0	0.0	0.0		1	(-1,-1)
Lightweight aluminium roof	140.7			18.0	20.0	24.0	20.0	29.0	39.0		25	(-2,-3)
Steel Door	2.0			21.0	27.0	32.0	34.0	36.0	36.0		34	(-1,-3)
Roof light (1.44m ² each)	4.3			13.0	18.0	23.0	28.0	32.0	35.0		27	(-1,-4)

- 4.41 Assuming a typical sound level within a storage/retail unit, the sound rating level is 30 to 45 dB $L_{Ar,15min}$ at the neighbouring dwellings.
- 4.42 The typical background sound pressure level ranged between 48 to 50 dB $L_{A90,15min}$ during the daytime period. The sound rating level is therefore notably below the background sound level.
- 4.43 A negligible impact is therefore anticipated at the neighbouring dwellings due to noise breakout from the building envelope.
- 4.44 Should higher noise levels be generated internally (e.g. workshop), the rating level could potentially match the daytime background sound level.

Potential noise mitigation measures

- 4.45 Effective noise mitigation includes keeping the shutter closed during noisy activities and during the early morning/late evening period where possible. This simple measure will help to maximise on the possible sound attenuation provided by the building envelope. Appropriate signage could be installed adjacent to the shutter to remind staff members.

Noise from roller shutter operation

- 4.46 There is a single roller shutter on the front elevation of each unit. Each shutter is approximately 3 metres wide by 3.5 metres high.
- 4.47 It is anticipated that the new roller shutters will be electronically controlled, as opposed to manually operated.
- 4.48 Sample measurements conducted of a similar sized roller shutter completing one full cycle (fully opening and closing) indicate a specific sound pressure level of 65 dB $L_{Aeq,49sec}$ at a separation distance of approximately 1 metre.
- 4.49 The roller shutter took approximately 49 seconds to fully open and then immediately close.
- 4.50 The on-time correction over a 15-minute assessment period is approximately -13 dB L_{Aeq} .
- $10\log (49 \text{ sec}/900 \text{ sec}) = -13 \text{ dB}$
- 4.51 The specific sound level from the roller shutter is approximately 52 dB $L_{Aeq,15min}$ at a separation distance of 1 metre.
- 4.52 The separation distance between the roller shutter and the rear elevation of the nearest dwelling is approximately 27 metres.
- 4.53 Taking into consideration the attenuation of sound with distance, the specific sound level reduces to approximately 23 dB $L_{Aeq,15min}$ at the neighbouring dwellings.
- $20\log (1 \text{ metre} / 27 \text{ metres}) = -29 \text{ dB}$
 - $52 \text{ dB } L_{Aeq,15min} - 29 \text{ dB} = 23 \text{ dB } L_{Aeq,15min}$
- 4.54 Since the specific sound level is below the background sound level, a correction for tonality or other acoustic characteristics is considered unnecessary.
- 4.55 In this instance, the specific sound level is equal to the sound rating level (23 dB $L_{Ar,15min}$).
- 4.56 The typical background sound pressure level ranged between 48 to 50 dB $L_{A90,15min}$ during the daytime period.
- 4.57 The sound rating level of the shutter operation is therefore notably below the typical daytime background sound level (circa 25 dB below). A negligible impact is therefore anticipated at the neighbouring dwellings.
- 4.58 Should both shutters operate simultaneously, the total combined specific sound level would still be notably below the background sound level.

Potential noise mitigation measures

- 4.59 To help attenuate noise from the shutters, a modern rigid plastic construction could be installed, as opposed to steel, with a soft rubber threshold seal installed at the base of the door to reduce impact noise.

Noise from loading/unloading goods

- 4.60 It is reasonable to assume that a delivery vehicle may arrive, manoeuvre or depart within a given 15-minute period. A pallet truck may also be used for loading/unloading goods.
- 4.61 Sample measurements previously conducted of a transit van and flatbed truck indicate equivalent continuous sound pressure levels in the region of 65 to 72 dB $L_{Aeq,60sec}$ at approximately 2 metres (door closing, pallet truck, engine start, reversing and departure).
- 4.62 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source are considered appropriate (6 dB of attenuation per doubling of distance).
- 4.63 It is assumed that there will be a line-of-sight between the loading bay and neighbouring window.
- 4.64 A separation distance of approximately 25 metres between the loading bay and the nearest dwelling has been assumed.
- 4.65 The level of sound attenuation due to distance separation has therefore been estimated using the following equation:
- $20\log(2 \text{ metres}/25 \text{ metres}) = -22 \text{ dB}$
- 4.66 On this basis, the specific sound level reduces to approximately 43 to 50 dB $L_{Aeq,60sec}$.
- 4.67 It is assumed that the vehicle may generate noise continuously over a 5-minute period. An appropriate acoustic 'on-time' correction therefore needs to be applied to the source sound level to represent a 15-minute assessment period.
- 4.68 The on-time correction in this case is approximately -5 dB L_{Aeq} .
- $10\log(300 \text{ sec}/900 \text{ sec}) = -5 \text{ dB}$
- 4.69 On this basis, the specific sound level from the vehicle is approximately 38 to 45 dB $L_{Aeq,15min}$.
- 4.70 For this example, it is assumed that a tonal sound component may be just perceptible at the nearest dwellings and therefore a correction of +2 dB to the specific sound level is considered appropriate.
- 4.71 On this basis, the sound rating level ranges from 40 to 47 dB $L_{Ar,15min}$.
- 4.72 The typical background sound pressure level ranged between 48 to 50 dB $L_{A90,15min}$ during the daytime period.
- 4.73 The predicted sound rating level is therefore below the background sound level.
- 4.74 BS 4142 states 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.
- 4.75 On this basis, a low to negligible impact is anticipated at the neighbouring dwellings.

5. Conclusion

- 5.1 Suitable noise targets have been determined for new building services plant based on the measured background sound levels.
- 5.2 The sound rating level of the outdoor condenser unit easily achieves the recommended daytime noise target. Condenser related noise is predicted to have a negligible impact at the neighbouring dwellings.
- 5.3 Noise breakout from the building envelope and roller shutter related noise is predicted to be below the daytime background sound level.
- 5.4 Noise from the loading and unloading of materials and the corresponding sound rating level is predicted to be below the daytime background sound level.
- 5.5 BS 4142 states 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.
- 5.6 On this basis, a low to negligible impact is anticipated at the neighbouring dwellings.
- 5.7 Site context is also an important consideration. The land has been previously used for temporary storage purposes, with vehicles accessing and departing the site during the daytime period. The noise associated with the new units is unlikely to change the acoustic characteristics of the local area or cause undue disturbance.

Appendix A
Site plan, elevations and sections

Figure A.1 - Existing site plan

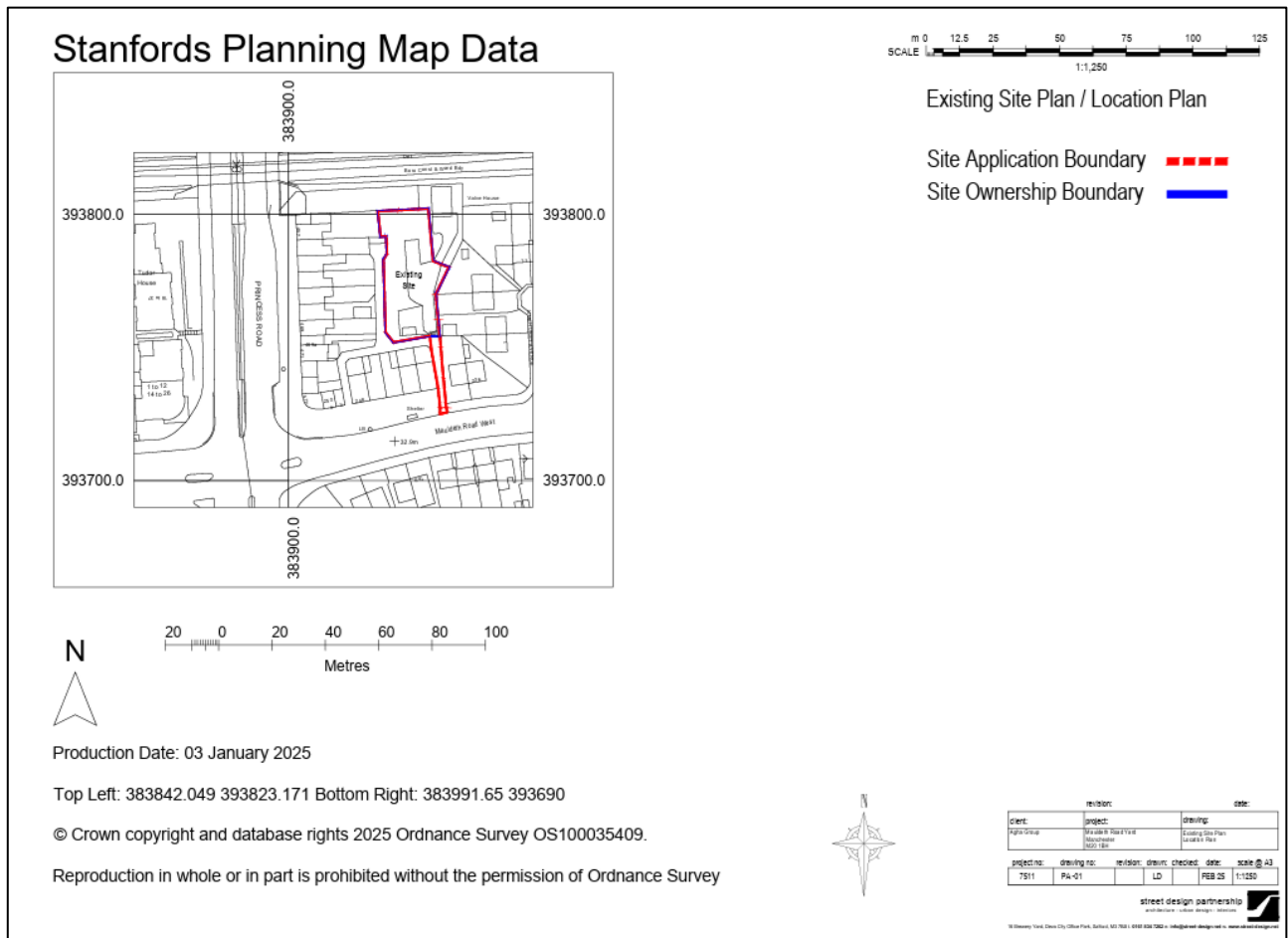


Figure A.2 - Proposed site plan



Figure A.3 - Proposed elevations

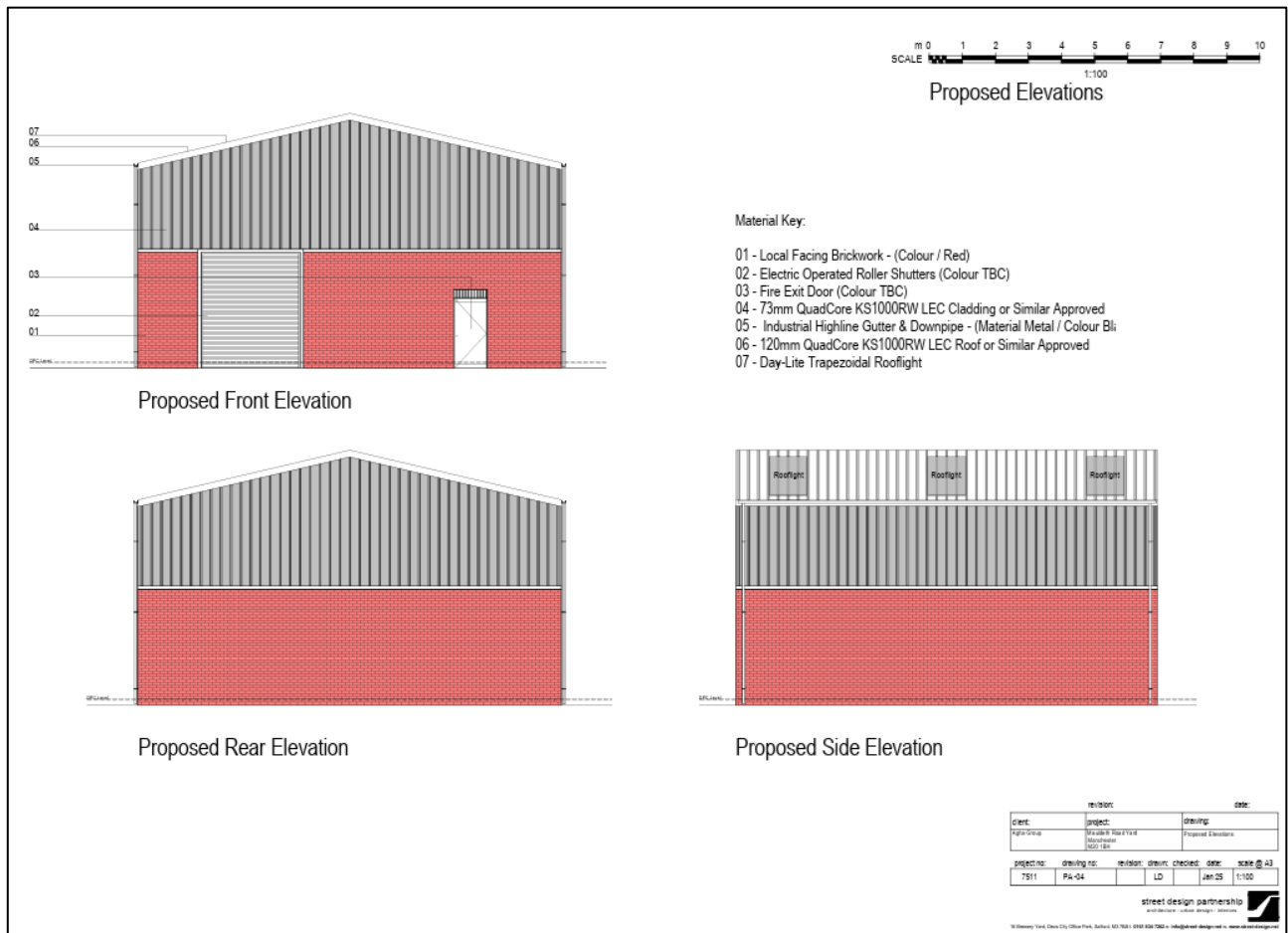
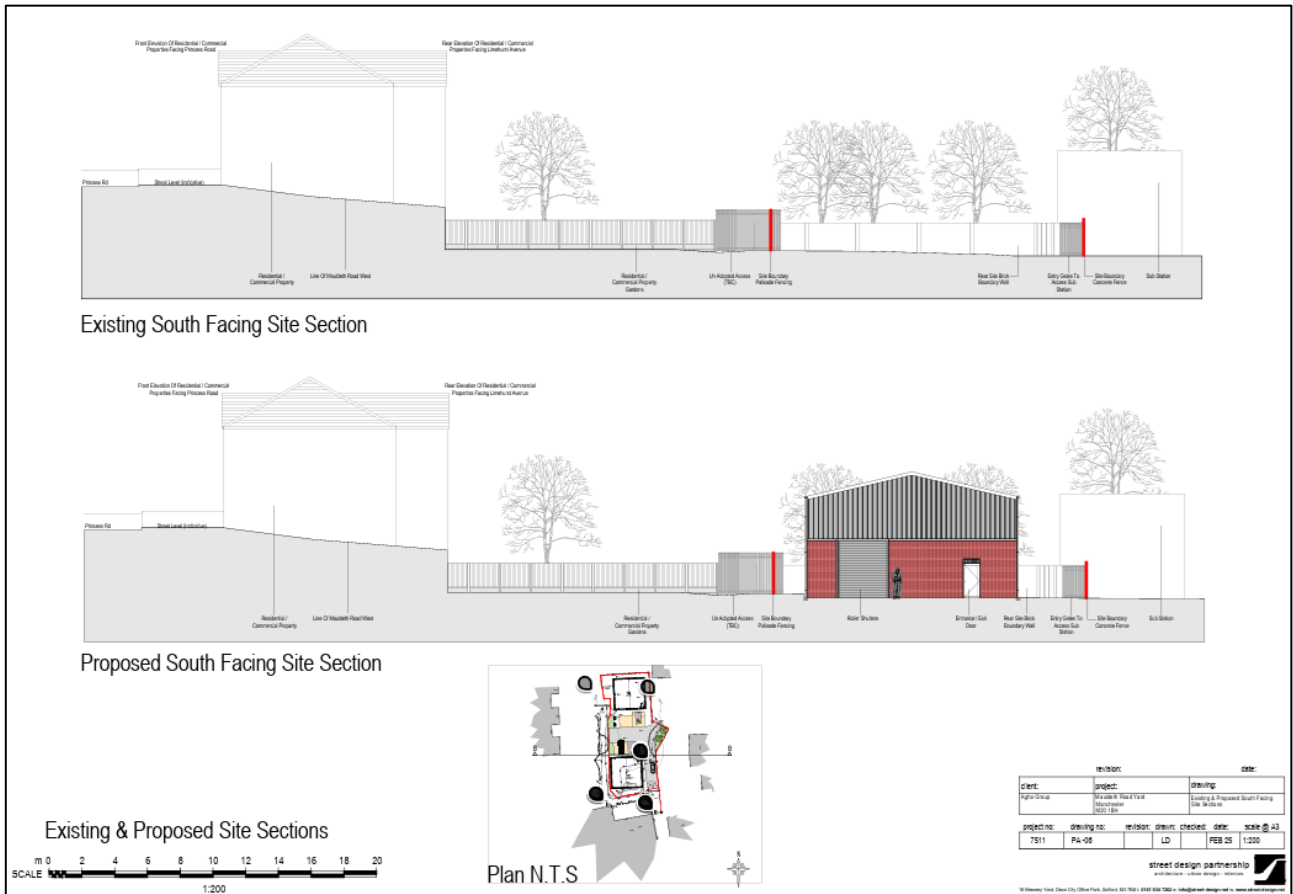


Figure A.4 - Existing and proposed site sections (east facing)



Figure A.5 - Existing and proposed site sections (south facing)



Appendix B

Full tabulated survey results

Figure B.1 - Full tabulated survey results

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
12/03/2025 11:30	67.44	53.76	50.47
12/03/2025 11:45	72.05	54.41	50.1
12/03/2025 12:00	73.09	53.55	49.97
12/03/2025 12:15	69.78	53.97	49.46
12/03/2025 12:30	72.45	56.08	50.29
12/03/2025 12:45	73.54	53.19	49.97
12/03/2025 13:00	73.3	56.41	50.4
12/03/2025 13:15	71.17	54.79	49.23
12/03/2025 13:30	69.31	54.48	49.53
12/03/2025 13:45	70.92	55.59	51
12/03/2025 14:00	76.27	56.77	50.13
12/03/2025 14:15	82.66	61.19	50.85
12/03/2025 14:30	65.8	54.18	51.22
12/03/2025 14:45	67.98	54.42	50.56
12/03/2025 15:00	77.13	56.07	49.83
12/03/2025 15:15	64.17	52.61	49.64
12/03/2025 15:30	68.01	54.44	51.33
12/03/2025 15:45	68.93	54.06	51.28
12/03/2025 16:00	71.27	53.5	50.34
12/03/2025 16:15	66.91	56.38	51.17
12/03/2025 16:30	63.83	53.9	51.86
12/03/2025 16:45	73.71	56.57	52.3
12/03/2025 17:00	66.44	53.17	50.44
12/03/2025 17:15	68.88	53.58	49.72
12/03/2025 17:30	70.68	54.75	52.19
12/03/2025 17:45	72.56	55.1	52.97
12/03/2025 18:00	64.39	53.86	51.9
12/03/2025 18:15	70.87	55.07	52.45
12/03/2025 18:30	60.9	53.59	51.64
12/03/2025 18:45	57.48	52.96	50.92
12/03/2025 19:00	70.39	55.22	51.03
12/03/2025 19:15	62.35	53.8	50.97
12/03/2025 19:30	58.18	54.05	51.7
12/03/2025 19:45	65.46	54.33	51.22
12/03/2025 20:00	62.17	53.72	51.51
12/03/2025 20:15	66.86	54.06	51.43
12/03/2025 20:30	64.88	52.41	49.52
12/03/2025 20:45	61.98	52.43	49.19
12/03/2025 21:00	74	53.68	49.99
12/03/2025 21:15	78.89	53.73	50.97
12/03/2025 21:30	69.58	53.8	50.68
12/03/2025 21:45	67.02	52.31	49.28
12/03/2025 22:00	72.01	53.71	49.74
12/03/2025 22:15	61.48	52.13	49.26

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
12/03/2025 22:30	64.93	51.85	48.85
12/03/2025 22:45	62.71	50.98	47.2
12/03/2025 23:00	59.4	50.65	47.07
12/03/2025 23:15	57.86	50.64	47.19
12/03/2025 23:30	57.7	49.96	46.39
12/03/2025 23:45	55.41	48.05	44.32
13/03/2025 00:00	58.05	48.57	44.6
13/03/2025 00:15	56.04	47.86	42.22
13/03/2025 00:30	53.6	46.82	42.82
13/03/2025 00:45	55.92	46.92	42.77
13/03/2025 01:00	54.68	46.73	42.28
13/03/2025 01:15	54.57	45.76	41.46
13/03/2025 01:30	59.83	46.51	40.78
13/03/2025 01:45	52.87	45.69	40.61
13/03/2025 02:00	60.76	46.37	41.54
13/03/2025 02:15	57	45.87	40.86
13/03/2025 02:30	55.72	45.21	39.42
13/03/2025 02:45	57.74	43.92	37.9
13/03/2025 03:00	53.55	43.73	37.84
13/03/2025 03:15	57.9	45.45	39.66
13/03/2025 03:30	53.83	45.71	39.95
13/03/2025 03:45	52.5	45.08	39.96
13/03/2025 04:00	68.03	48.04	41.64
13/03/2025 04:15	61.55	48.96	41.82
13/03/2025 04:30	60.5	49.46	44.18
13/03/2025 04:45	61.63	49.01	44.26
13/03/2025 05:00	61.29	49.75	45.13
13/03/2025 05:15	70.53	53.03	45.85
13/03/2025 05:30	61.74	51.39	47.58
13/03/2025 05:45	73.14	59.5	48.18
13/03/2025 06:00	70.61	54.7	49.79
13/03/2025 06:15	71.49	54.73	50.39
13/03/2025 06:30	73.42	55.38	50.41
13/03/2025 06:45	71.2	55.33	51.31
13/03/2025 07:00	74.18	58.18	51.86
13/03/2025 07:15	70.85	55.37	51.46
13/03/2025 07:30	74.27	56.61	51.27
13/03/2025 07:45	71.43	55.56	50.11
13/03/2025 08:00	71	55.12	50.17
13/03/2025 08:15	70.49	52.59	49.43
13/03/2025 08:30	70.02	53.88	50.13
13/03/2025 08:45	70.93	55.34	49.32
13/03/2025 09:00	74.38	56.77	49.48
13/03/2025 09:15	73.17	54.56	50.07
13/03/2025 09:30	74.44	56.44	50.65

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
13/03/2025 09:45	74.94	56.6	50.29
13/03/2025 10:00	71.85	54.06	49.74
13/03/2025 10:15	68.95	53.38	49.87
13/03/2025 10:30	67.69	53.31	49.61
13/03/2025 10:45	79.31	59.19	49.45
13/03/2025 11:00	69.68	55.34	50.11
13/03/2025 11:15	72.17	53.86	50
13/03/2025 11:30	69.59	55.42	50.96
13/03/2025 11:45	73.71	55.04	49.79
13/03/2025 12:00	78.11	57.13	50.25
13/03/2025 12:15	81.01	59.11	50.3
13/03/2025 12:30	65.83	54.31	50.77
13/03/2025 12:45	74.87	54.8	50.17
13/03/2025 13:00	70.21	54.26	50.6
13/03/2025 13:15	72.44	55.29	50.26
13/03/2025 13:30	64.6	53.88	50.42
13/03/2025 13:45	68.79	53.95	50.13
13/03/2025 14:00	70.92	54.09	49.39
13/03/2025 14:15	78.98	58.36	51.27
13/03/2025 14:30	59.45	53.58	50.77
13/03/2025 14:45	67.46	54.57	50.78
13/03/2025 15:00	65.39	52.89	50.52
13/03/2025 15:15	59.01	52.72	50.46
13/03/2025 15:30	74.42	55.7	50.9
13/03/2025 15:45	62.46	52.43	49.86
13/03/2025 16:00	61.77	52.62	49.71
13/03/2025 16:15	62.36	52.49	49.68
13/03/2025 16:30	68.28	53	49.69
13/03/2025 16:45	79.23	54.98	49.02
13/03/2025 17:00	60.15	52.32	49.27
13/03/2025 17:15	65.07	52.44	49.74
13/03/2025 17:30	72.61	52.75	49.83
13/03/2025 17:45	72.23	54.12	49.71
13/03/2025 18:00	74.52	52.38	49.53
13/03/2025 18:15	72.6	54.56	49.78
13/03/2025 18:30	74.53	54.3	49.72
13/03/2025 18:45	59.71	50.84	48.46
13/03/2025 19:00	76.94	53.74	48.88
13/03/2025 19:15	66.66	52.98	47.71
13/03/2025 19:30	69.91	52.77	48.71
13/03/2025 19:45	64.23	51.54	48.87
13/03/2025 20:00	65.69	51.68	48.19
13/03/2025 20:15	65.02	51.27	47.83
13/03/2025 20:30	75.67	53.27	48.17
13/03/2025 20:45	79.3	56.41	47.84

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
13/03/2025 21:00	59.78	50.49	47.01
13/03/2025 21:15	70.29	51.32	46.89
13/03/2025 21:30	69.61	51.08	47.14
13/03/2025 21:45	55.77	50.19	47.13
13/03/2025 22:00	77.41	54.96	47.02
13/03/2025 22:15	59.62	51.05	48.4
13/03/2025 22:30	64.05	51	47.91
13/03/2025 22:45	56.08	50.31	47.67
13/03/2025 23:00	56.65	50.44	47.22
13/03/2025 23:15	70.53	51.16	45.61
13/03/2025 23:30	61.07	48.94	43.74
13/03/2025 23:45	67.28	49.19	43.28
14/03/2025 00:00	55.59	47.8	42.04
14/03/2025 00:15	57.68	47.44	40.41
14/03/2025 00:30	54.34	47.13	41.1
14/03/2025 00:45	55.03	46.61	40.48
14/03/2025 01:00	56.14	46.13	38.67
14/03/2025 01:15	55.29	46.11	40.37
14/03/2025 01:30	56.87	45.34	38.13
14/03/2025 01:45	52.04	44	37.53
14/03/2025 02:00	52.49	44.25	36.94
14/03/2025 02:15	66.89	44.86	36.32
14/03/2025 02:30	64.21	43.34	35.3
14/03/2025 02:45	55.5	43.88	37.47
14/03/2025 03:00	54.19	43.77	37.5
14/03/2025 03:15	56.54	44.59	37.04
14/03/2025 03:30	59.78	45.2	37.39
14/03/2025 03:45	62.42	45.46	39.3
14/03/2025 04:00	55.6	46.78	40.43
14/03/2025 04:15	57.38	47.01	41.65
14/03/2025 04:30	58.25	46.85	40.62
14/03/2025 04:45	60.22	48.84	40.88
14/03/2025 05:00	60.03	49.47	42.37
14/03/2025 05:15	60.37	50.19	44.16
14/03/2025 05:30	72.99	55.3	44.99
14/03/2025 05:45	74.15	62.17	46.58
14/03/2025 06:00	71.41	53.18	45.09
14/03/2025 06:15	69.89	53.76	46.73
14/03/2025 06:30	64.26	53.99	49.31
14/03/2025 06:45	68.93	57.32	49.16
14/03/2025 07:00	69.99	55.68	47.75
14/03/2025 07:15	71.47	55.3	49.08
14/03/2025 07:30	70	56.65	49.01
14/03/2025 07:45	68.04	54.19	48.34
14/03/2025 08:00	71.14	53.72	48.18

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
14/03/2025 08:15	70.56	53.26	47.67
14/03/2025 08:30	69.95	51.8	47.51
14/03/2025 08:45	64.64	52.35	47.71
14/03/2025 09:00	69.05	54.15	48.73
14/03/2025 09:15	71.8	56.39	49.46
14/03/2025 09:30	70.81	54.44	48.88
14/03/2025 09:45	75.39	56.81	48.46
14/03/2025 10:00	68.66	53.53	48.43
14/03/2025 10:15	70.81	52.12	48.29

Appendix C

Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It 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)	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.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Background sound level	The sound level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured as $L_{A90,T}$.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific sound source	Sound source being assessed.
Specific sound level	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T.
Rating level $L_{A,r,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.