RS Acoustic Engineering

Proposed Storage Development
Sherborne Street, Manchester

Noise Assessment Report



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1. Introduction

1.1 RS Acoustic Engineering Ltd have been appointed by World Metal Recycling Ltd to undertake a noise impact assessment with regard to a proposed storage development on vacant land to the east of Sherborne Street, Cheetham Hill, Manchester, M8.

1.2 The current proposals are to construct 20 new storage units (Class B8) with associated landscaping and parking.

1.3 There are neighbouring commercial properties to the south, east and west consisting of clothing/retail units, import/export units, wholesale retailers, food/takeaway premises and textile manufacturing.

1.4 The nearest noise-sensitive property to the development site is the Jamia Tul Muntazir mosque to the north. The mosque appears to be closed for renovation and extension related works. There are also a number of residential dwellings further north of the mosque along St. David's Court.

1.5 An environmental noise survey has been conducted over several days to determine the typical background sound levels during the daytime and night-time period.

1.6 The dominant source of noise at the site is road traffic on Sherborne Street. Vehicle movements on Allison Street, Cheetwood Road and Elizabeth Street also contribute to the existing background sound levels.

1.7 Intermittent vehicle and delivery related noise associated with the neighbouring premises and low-level noise from distant plant also contribute to the existing background sound levels.

1.8 Appropriate noise targets for new building services plant have been recommended based on the measured background sound levels.

1.9 Since the plant and tenant details are currently unknown, an indicative plant and operational noise assessment have been undertaken taking 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, noise from forklift truck movements and noise from loading/unloading materials have also been assessed.

1.11 The survey and assessment have been conducted by Mr Ryan Swales ($BSc_{(Hons)}$, MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.

1.12 The assessment has been updated following comments provided by the Environmental Health Department for Manchester City Council.

1.13 This report provides details of the survey methodology, noise survey results, predicted operational sound levels at neighbouring noise sensitive properties, the anticipated impact and recommendations regarding 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 45-hour period at the northern boundary line, directly adjacent to the Jamia Tul Muntazir mosque.

3.2 The measurement microphone was fixed to a boundary post at approximately 2.5 metres from ground level.

3.3 Measurements were performed from 22:00 hours on Thursday 23rd through to 19:00 hours on Saturday 25th October 2025.

3.4 A measurement interval of 15-minutes was used throughout the survey and measurements were subject to free field conditions (away from reflective surfaces). Both one-third octave band and A-weighted broadband sound pressure levels were recorded during the survey.

3.5 Sample measurements were also conducted to the north of the site, directly adjacent to the dwellings on St. David's Court.

3.6 The site location and survey measurement positions are shown in Figure 3.1 and Figure 3.2 overleaf. The proposed site layout, floor layouts and elevations are presented in Appendix A.

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

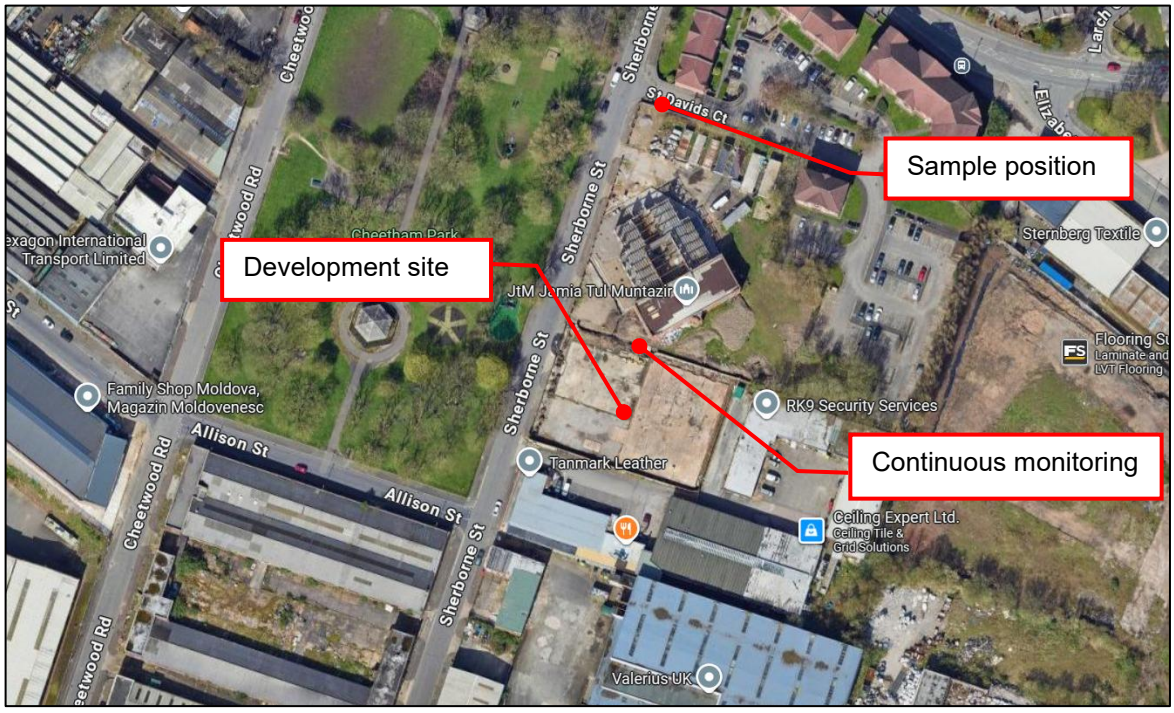
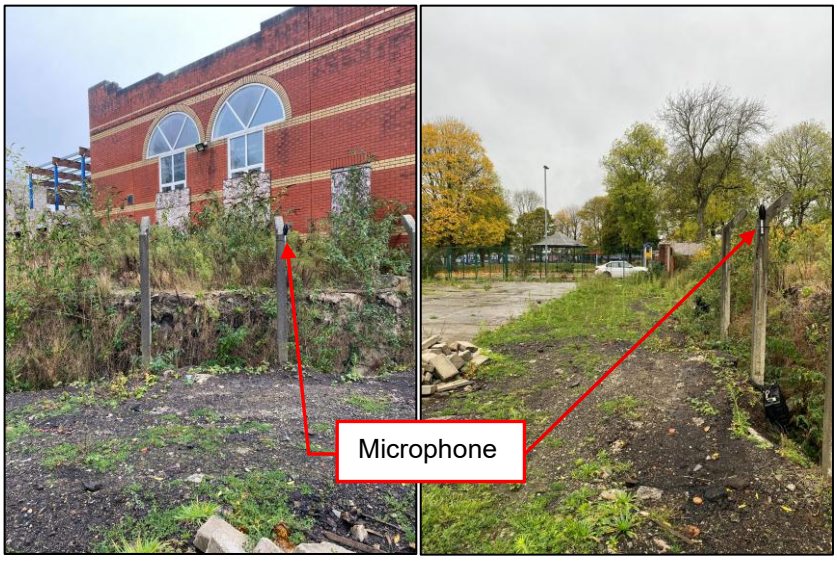


Figure 3.2 - Photographs showing continuous monitoring position



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.
- 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 0.2 and 1.4 m/s^{-1}.

3.11 The air temperature during the survey ranged between approximately 3°C and 11°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
Thursday 23/10/2025	Daytime (22:00-23:00)	47	47	46	47
	Night-time (23:00-07:00)	44	44	42	49
Friday 24/10/2025	Daytime (07:00-23:00)	49	49	46	51
	Night-time (23:00-07:00)	42	43	41	45
Saturday 25/10/2025	Daytime (07:00-19:00)	46	46	43	48

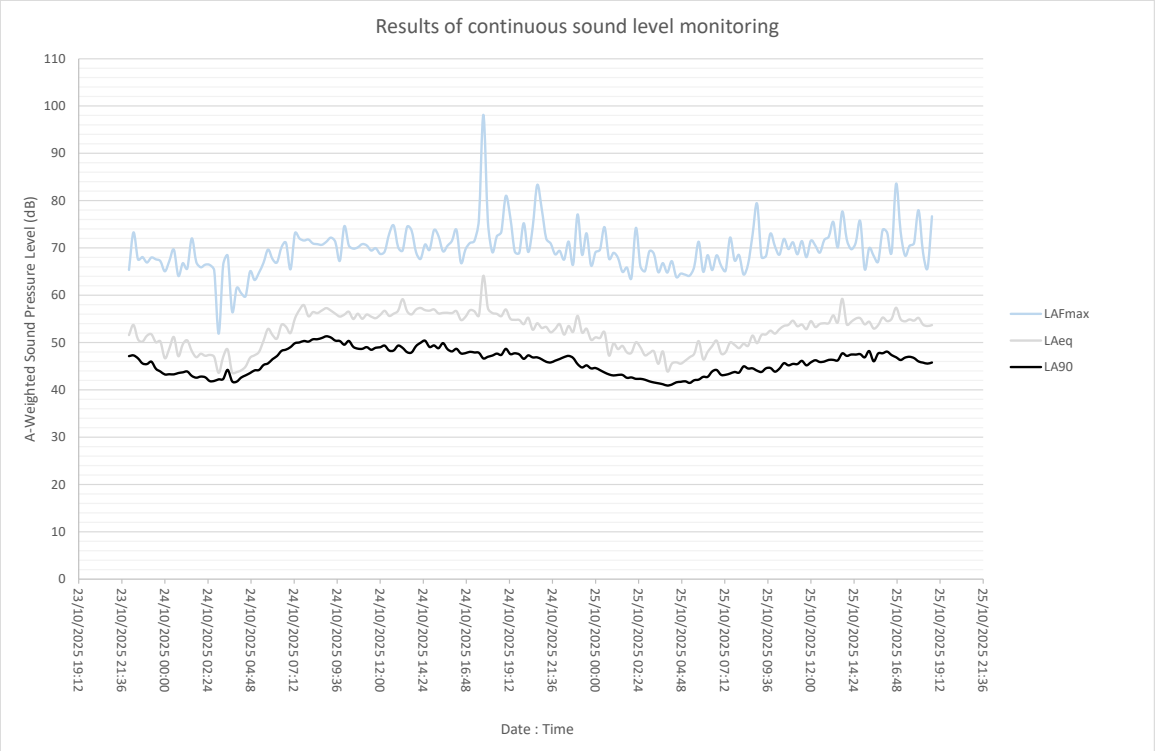
[1]Considered to be the representative background sound level from a statistical analysis (modal value)

3.15 The background sound pressure level ranged between 43 to 51 dB $L_{A90,15min}$ during the daytime and 41 to 49 dB $L_{A90,15min}$ during the night-time.

3.16 The typical background sound pressure level ranged between 46 to 49 dB $L_{A90,15min}$ during the daytime and 42 to 44 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 position, background sound pressure levels ranged between 48 to 52 dB $L_{A90,15min}$.

3.19 The measured sound pressure levels were approximately 1 to 2 dB $L_{A90,15min}$ higher than those measured at the continuous monitoring position.

4. Assessment & Discussion

Nearest noise sensitive receptors

4.1 The nearest noise-sensitive property is the Jamia Tul Muntazir mosque to the north of the site. The mosque appears to be closed for renovation and extension related works. The construction works are currently incomplete and appear to have temporarily ceased.

4.2 There are several residential dwellings further north of the mosque located along St. David's Court. The separation distance between the nearest dwellings and the site boundary is approximately 60 metres.

4.3 All other neighbouring properties in the local area are commercial units, some of which appear to operate during the late evening and night-time period.

Noise criteria for building services plant

4.4 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.*

4.5 Taking into account the guidance given within BS 4142 and Manchester City Council's typical external 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 ($L_{A90,T}$).

4.6 Table 4.1 presents the applicable free field sound level target for new fixed plant. It is prudent to use the lowest 'typical' background sound level when determining appropriate targets.

4.7 Examples of building services plant include wall/floor mounted condenser units for refrigeration and air-conditioning purposes and air intake/extract fans.

4.8 The sound level targets need to be achieved at neighbouring noise sensitive properties.

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)	46	41
Nighttime (23:00-07:00)	42	37

4.9 The recommended noise limits should be confirmed with Manchester City Council prior to the installation of any new building services plant.

4.10 It is recommended that external condenser units and/or ventilation openings are not installed on the north facing elevation of the storage units adjacent to the northern boundary (i.e. facing the mosque).

Noise from external condenser units

4.11 In the absence of detailed external plant and tenant information, it is considered appropriate to use the sound level data for an indicative external condenser unit which is commonly used for air-conditioning and/or refrigeration purposes.

4.12 The example condenser model is a Daikin RX71K with a sound pressure level of 52 dBA at 1 metre.

4.13 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source have been assumed.

4.14 As aforementioned it is recommended that outdoor condenser units and/or ventilation openings are not installed on the north facing elevation of the storage units adjacent to the northern boundary (i.e. facing the mosque).

4.15 For this assessment, it is assumed that the condenser unit is installed on the east facing elevation of the end unit. The separation distance between the example condenser unit and the south facing elevation of the nearest dwelling on St. David's Court is assumed to be approximately 60 metres.

4.16 Table 4.2 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.

4.17 It is assumed that the condenser unit will operate continuously over a given assessment period, as opposed to intermittently (which can reduce the overall sound level).

4.18 It is also assumed that there is a direct line-of-sight between the item of plant and the noise sensitive dwelling (i.e. no acoustic screening from adjacent buildings).

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	-36	-36	-36	-36	-36	-36	-36	-36
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level dB	**-5**	**7**	**12**	**15**	**13**	**10**	**6**	**-4**
Specific sound level $L_{Aeq,T}$ = 19 dB								

4.19 The calculation results indicate a specific sound pressure level of approximately 19 dB $L_{Aeq,15min}$ at the nearest dwellings.

4.20 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.

4.21 On this basis, the 'specific' sound level is considered equal to the sound 'rating' level (19 dB $L_{Ar,15min}$).

4.22 Where two condenser units run simultaneously, the rating level could potentially increase to 22 dB $L_{Ar,15min}$ (assuming the condenser units are positioned close to each other).

4.23 Similarly, where four condenser units run simultaneously, the rating level could potentially increase to 25 dB $L_{Ar,15min}$ and where eight condenser units run simultaneously, the rating level could potentially increase to 28 dB $L_{Ar,15min}$.

4.24 The target sound rating level at neighbouring noise sensitive properties is 41 dB $L_{Aeq,15min}$ during daytime hours (07:00 and 23:00 hours) and 37 dB $L_{Aeq,15min}$ during night-time hours (23:00 and 07:00 hours).

4.25 The sound rating level of the example condenser unit therefore easily achieves the daytime and night-time noise targets.

4.26 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.

4.27 Condenser related noise is therefore expected to have a negligible impact at the nearest neighbouring noise sensitive properties.

Noise breakout from the building envelope

4.28 The new units will be constructed from a steel frame with insulated wall and roof panels and masonry gable ends.

4.29 The lightweight insulated metal roof panels are expected to provide a sound insulation performance of approximately 25 to 27 dB R_w.

4.30 There are several roof lights to each unit which are expected to have a similar sound insulation performance as the roof panels.

4.31 The insulated external wall panels are expected to provide a sound insulation performance of approximately 45 to 50 dB R_w.

4.32 The composite sound insulation of the building elevation has been estimated taking into consideration the element surface area and typical sound insulation of each element.

4.33 The results indicate a composite sound insulation performance of approximately 30 dB R_w.

Table 4.3 - Building envelope sound insulation

Title: Sherborne Street **Sound Transmission Loss (ISO 12354-1)**												
Formula/Comment	***Single Value***		***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***	***Rw***	***(C,C$_{tr}$)***
R = -10 log Σ 10^(-$R_{p,i}$ / 10)				19.6	23.4	27.9	26.4	34.5	41.2		**30**	**(-1,-3)**
$R_{Flanking}$	ΔR											
R				19.6	23.4	27.9	26.4	34.5	41.2		**30**	**(-1,-3)**
D_{nT} = R -10 log (S_{tot} / A)												
$D_{nT,flanking}$												
D_{nT}		**Mass**										
Materials with additional layer												
External wall insulated panel		24.5		36.0	37.0	40.0	46.0	54.0	56.0		**45**	**(0,-3)**
Lightweight insulated roof panel		7.6		18.0	20.0	24.0	20.0	29.0	39.0		**25**	**(-2,-3)**
Roof lights		5.8		13.0	18.0	23.0	28.0	32.0	35.0		**27**	**(-1,-4)**

4.34 The sound pressure level at the nearest noise sensitive property has been calculated using the following equation:

- $SPL_2 = SPL_1 – R_w + 10\ Log\ S – 20\ Log\ r - 14\ dB$

4.35 Where SPL2 is the sound pressure level at the receptor; SPL1 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 noise sensitive property.

4.36 Previous measurements conducted within a variety of storage, distribution and warehouse premises indicate a typical reverberant sound pressure level ranging between 55 to 70 dB $L_{Aeq,15min}$.

4.37 For this assessment, it is assumed that the internal activity will be continuous over a 15-minute period (this short time period is commonly used for the assessment of night-time noise).

4.38 The separation distance between the north facing elevation of the nearest new unit and the south facing elevation of the mosque is approximately 5 metres.

4.39 The predicted specific sound level at the neighbouring mosque due to noise breakout from the unit is approximately 13 to 28 dB $L_{Aeq,15min}$. The higher specific sound level of 28 dB $L_{Aeq,15min}$ assumes that the internal reverberant sound level is approximately 70 dB $L_{Aeq,15min}$ within the storage unit.

4.40 At the dwellings along St. David's Court, the resulting specific sound level will be notably lower (i.e. at least 10 dB lower) due to the increase in separation distance.

4.41 The typical background sound pressure level ranged between 46 to 49 dB $L_{A90,15min}$ during the daytime and 42 to 44 dB $L_{A90,15min}$ during the night-time.

4.42 Since the specific sound level is notably below the background sound level, a correction for tonality or other acoustic characteristics is considered unnecessary. In this instance, the sound rating level is therefore equal to the specific sound level (13 to 28 dB $L_{Ar,15min}$).

4.43 The predicted sound rating level is therefore significantly below the daytime and night-time background sound pressure level.

4.44 Should several units simultaneously generate the same internal sound level, the predicted sound rating level at neighbouring properties would still be notably below the background sound pressure level.

4.45 On this basis, a low to negligible impact is anticipated at the neighbouring mosque and nearest dwellings due to noise breakout from the building envelope.

Noise from roller shutter operation

4.46 There is a single roller shutter on the front elevation of each unit. Each shutter is approximately 2.15 metres wide by 2.15 metres high.

4.47 It is assumed 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}.

- 10log (49 sec/900 sec) = -13 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 south facing elevation of the mosque and the nearest roller shutter is assumed to be approximately 14 metres.

4.53 Taking into consideration the attenuation of sound with distance alone, the specific sound level reduces to approximately 29 dB $L_{Aeq,15min}$ at the neighbouring mosque.

- 20log (1 metre / 14 metres) = -23 dB
- 52 dB $L_{Aeq,15min}$ - 23 dB = 29 dB $L_{Aeq,15min}$

4.54 However, it should be noted that due to the site layout design and orientation of the storage units, each roller shutter will be visually and acoustically screened from the mosque and nearby dwellings.

4.55 On this basis, it is reasonable to assume that roller shutter related noise will be further reduced by approximately 15 dB due to acoustic screening.

4.56 The specific sound level therefore reduces to approximately 14 dB $L_{Aeq,15min}$ at the neighbouring mosque.

4.57 Since the specific sound level is notably below the background sound level, a correction for tonality or other acoustic characteristics is considered unnecessary.

4.58 In this instance, the 'specific' sound level is equal to the sound 'rating' level (14 dB $L_{Ar,15min}$).

4.59 The typical background sound pressure level ranged between 46 to 49 dB $L_{A90,15min}$ during the daytime and 42 to 44 dB $L_{A90,15min}$ during the night-time.

4.60 The sound rating level of the shutter operation is therefore significantly below the typical daytime and night-time background sound level (at least 28 dB below). A negligible impact is therefore anticipated at the neighbouring mosque and residential dwellings.

4.61 Should several shutters operate simultaneously, the total combined sound level would still be notably below the background sound level.

Practical noise mitigation measures

4.62 To help attenuate noise from the roller 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 related noise.

4.63 The photograph below shows a modern electrically operated roller shutter with a soft closing rubber threshold seal.

Figure 4.1 - Photograph showing roller shutter threshold seal



Noise from loading/unloading goods

4.64 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.

4.65 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 movement, unloading, engine start, reversing and departure).

4.66 It should be noted that due to the site layout design and orientation of the storage units, the parking area and turning area will be visually and acoustically screened from the mosque and nearby dwellings.

4.67 On this basis, it is reasonable to assume that vehicle related noise will be reduced by approximately 15 dB due to acoustic screening.

4.68 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source are considered appropriate.

4.69 A separation distance of approximately 16 metres between the nearest parking bay and the south facing elevation of the neighbouring mosque has been assumed.

4.70 The level of sound attenuation due to distance separation has therefore been estimated using the following equation:

- 20log (2 metres/16 metres) = -18 dB

4.71 Taking into consideration the reduction of sound due to screening and distance separation, the specific sound level reduces to approximately 32 to 39 dB $L_{Aeq,60sec}$ at the neighbouring mosque.

- 72 dB $L_{Aeq,60sec}$ - 15 dB - 18 dB = 39 dB $L_{Aeq,60sec}$
- 65 dB $L_{Aeq,60sec}$ - 15 dB - 18 dB = 32 dB $L_{Aeq,60sec}$

4.72 It is assumed that the vehicle and activity may generate noise continuously over a 10-minute period.

4.73 An appropriate acoustic ‘on-time’ correction therefore needs to be applied to the source sound level to represent a 15-minute assessment period.

4.74 The on-time correction in this case is approximately -2 dB L_{Aeq}.

- 10log (600 sec/900 sec) = -2 dB

4.75 On this basis, the specific sound level is approximately 30 to 37 dB $L_{Aeq,15min}$.

4.76 Since the specific sound level is notably below the background sound level, a correction for tonality or other acoustic characteristics is considered unnecessary.

4.77 On this basis, the sound rating level is 30 to 37 dB $L_{Ar,15min}$.

4.78 Should two vehicles load/unload at the same time, the cumulative sound rating level would range from 33 to 40 dB $L_{Ar,15min}$.

4.79 The typical background sound pressure level ranged between 46 to 49 dB $L_{A90,15min}$ during the daytime and 42 to 44 dB $L_{A90,15min}$ during the night-time.

4.80 The predicted sound rating level is therefore notably below the daytime and night-time background sound level.

4.81 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.

4.82 On this basis, a low to negligible impact is anticipated at the neighbouring mosque and nearby dwellings.

Noise from forklift truck movements

Diesel powered forklift truck

4.83 It is possible that either diesel powered or electric powered forklift trucks will be used to move products/materials on-site and to load and unload from a vehicle.

4.84 Sample measurements previously conducted for a range of diesel powered forklift trucks indicate an equivalent continuous sound pressure level ranging between 70 to 73 dB $L_{Aeq,60sec}$ at a distance of approximately 2 metres.

4.85 The photograph below shows a Linde H25D forklift truck which generates an equivalent continuous sound pressure level of 73 dB $L_{Aeq,60sec}$ at approximately 2 metres.

Figure 4.2 - Photograph of Linde H25D forklift truck



4.86 Table 4.4 presents the measured octave band sound pressure levels for two different diesel powered forklift trucks (Hyster H3.0FT and Linde H25D).

4.87 The measured sound levels include an engine start, manoeuvring, lifting/lowering pallets and reversing alarm (moving away from the pallets). Measured values have been rounded to the nearest whole number.

Table 4.4 - Measured octave band sound pressure levels of two diesel powered forklift trucks

Forklift Type	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	$L_{Aeq,T}$
Hyster H3.0FT (dB)	77	73	67	64	69	61	58	50	**71**
Linde H25D (dB)	74	68	66	68	65	65	68	52	**73**

4.88 Due to the site layout design and orientation of the storage units, the parking area and loading bays will be visually and acoustically screened from the mosque and nearby dwellings.

4.89 On this basis, it is reasonable to assume that forklift truck related noise will be reduced by approximately 15 dB due to acoustic screening.

4.90 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source are considered appropriate. Forklift trucks are a moving noise source and therefore the distance from the source to the receptor will vary.

4.91 A separation distance of approximately 15 metres between the nearest loading area and the south facing elevation of the neighbouring mosque has been assumed in this instance.

4.92 The level of sound attenuation due to distance separation has therefore been estimated using the following equation:

- 20log (2 metres/15 metres) = -18 dB

4.93 Taking into consideration the reduction of sound due to screening and distance separation, the specific sound level reduces to approximately 37 to 40 dB $L_{Aeq,60sec}$ at the neighbouring mosque.

4.94 It is assumed that the forklift truck will operate continuously over a given 15-minute period.

4.95 It is prudent to assume that an impulsive sound component could be perceptible at the mosque and therefore a correction (penalty) of +3 dB to the specific sound level is appropriate in this instance (e.g. due to a material drop or reverse beep from the forklift truck).

4.96 On this basis, the sound rating level is 40 to 43 dB $L_{Ar,15min}$.

4.97 The typical background sound pressure level ranged between 46 to 49 dB $L_{A90,15min}$ during the daytime and 42 to 44 dB $L_{A90,15min}$ during the night-time.

4.98 The predicted sound rating level is therefore notably below the daytime background sound level.

4.99 The sound rating level is of a similar magnitude to the night-time background sound level. However, it is anticipated that the neighbouring mosque will not operate during the night-time period and therefore only the nearest dwellings need to be considered.

4.100 The separation distance from the loading area to the nearest dwellings is assumed to be approximately 70 metres. Sound attenuation due to distance separation is therefore much greater in this instance.

- 20log (2 metres/70 metres) = -31 dB

4.101 Taking into account acoustic screening and the greater distance separation, the sound rating level reduces to approximately 27 to 30 dB $L_{Ar,15min}$ at the nearest dwellings. The sound rating level is therefore significantly below the night-time background sound level.

4.102 On the basis of this assessment, a low to negligible impact is anticipated at the neighbouring mosque and nearby dwellings due to noise from forklift truck movements.

Electrically powered forklift truck

4.103 Electrically powered forklift trucks typically generate a sound pressure level of approximately 60 to 65 dB $L_{Aeq,T}$ and are therefore notably quieter. As an example, Mitsubishi's literature states that the FB50 generates a sound pressure level of approximately 65 dB $L_{Aeq,T}$.

4.104 The corresponding sound rating level for an electrically powered forklift truck would also therefore be significantly below the daytime and night-time background sound level.

4.105 The use of electrically powered forklift trucks as opposed to diesel powered forklift trucks is therefore a simple and effective form of noise mitigation.

5. Conclusion

5.1 Suitable noise targets have been determined for new building services plant based on the measured background sound levels.

5.2 It is recommended that outdoor condenser units and/or ventilation openings are not installed on the north facing elevation of the storage units adjacent to the northern boundary (i.e. facing the mosque).

5.3 The sound rating level of the indicative outdoor condenser unit easily achieves the recommended daytime and night-time noise targets. Condenser related noise is predicted to have a negligible impact at the neighbouring mosque and nearest dwellings.

5.4 Noise breakout from the building envelope and roller shutter related noise is predicted to be notably below the daytime and night-time background sound level.

5.5 Noise from forklift truck movements, the loading/unloading of materials and the corresponding sound rating level are predicted to be notably below the daytime and night-time background sound level.

5.6 BS 4142 states: "*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*."

5.7 On this basis, a low to negligible impact is anticipated at the neighbouring mosque and nearest dwellings.

5.8 Site context is also an important consideration. The land has been previously used for commercial purposes and there are several neighbouring commercial units to the south, east and west that are well established. Vehicle movements and the loading/unloading of goods is a typical feature of the existing acoustic environment and the new storage units are not expected to change the acoustic characteristics of the local area.

5.9 Simple mitigation measures that could be easily implemented on-site include installing soft rubber threshold seals at the base of roller shutter doors, keeping shutter doors closed during noisy operations (with appropriate signage to remind employees), using electrically powered forklift trucks for loading/unloading materials and using thick rubber matting within loading bays to reduce impact related noise.

Appendix A
Site layout, floor layouts and elevations

Figure A.1 - Proposed site layout (Rev.E)

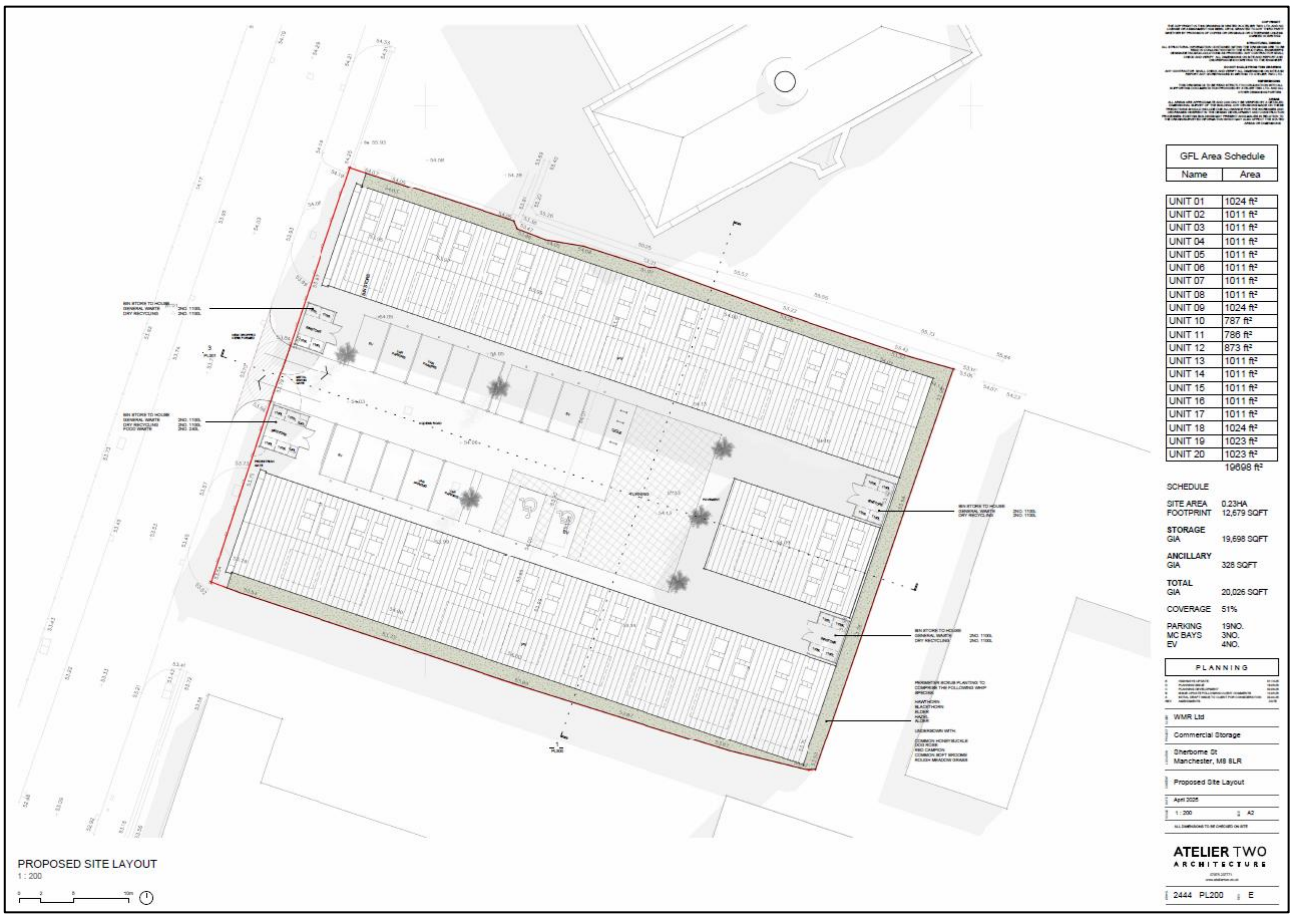


Figure A.2 - Proposed ground floor layout



Figure A.3 - Proposed first floor layout



Figure A.4 - Proposed elevations 01

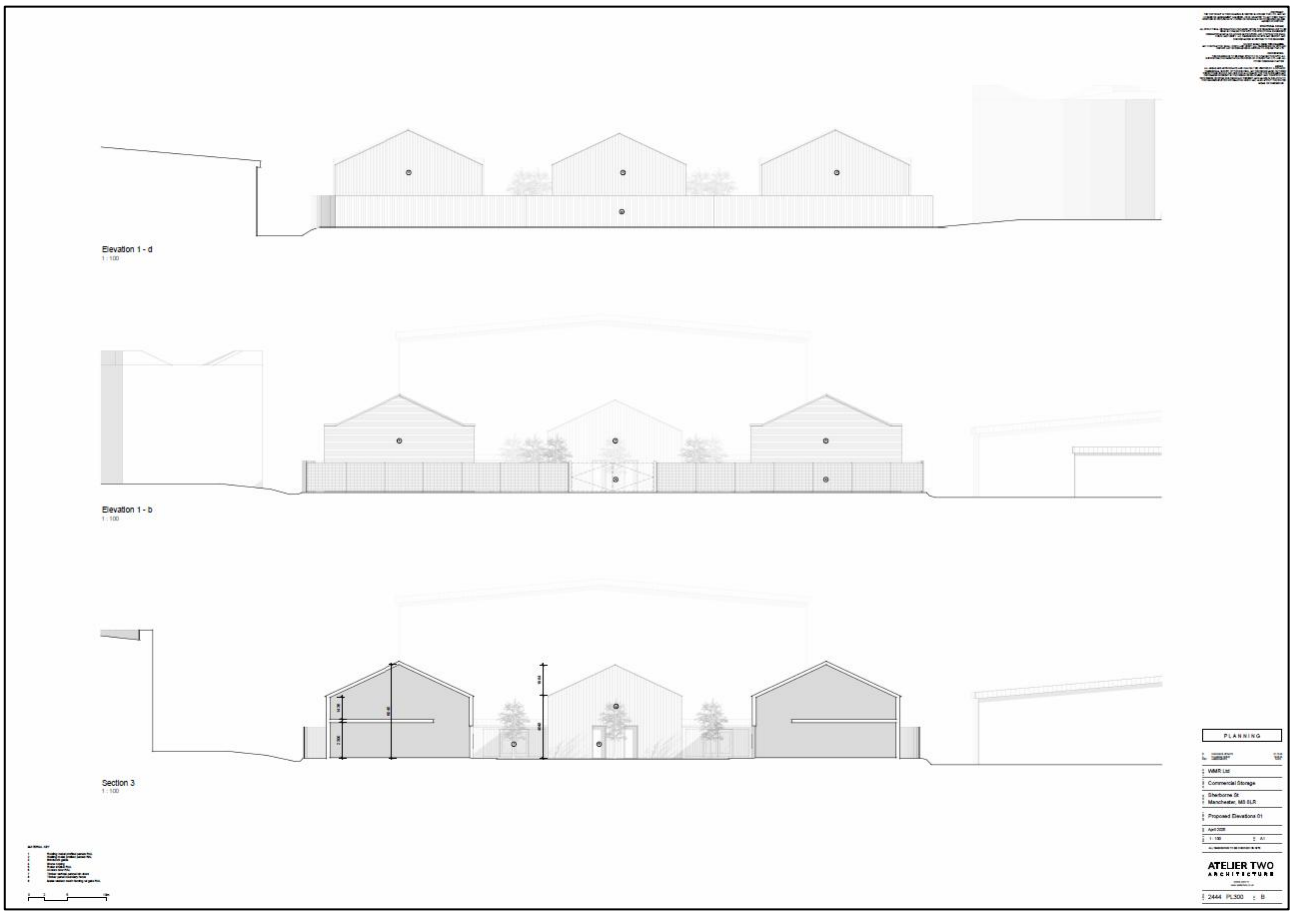
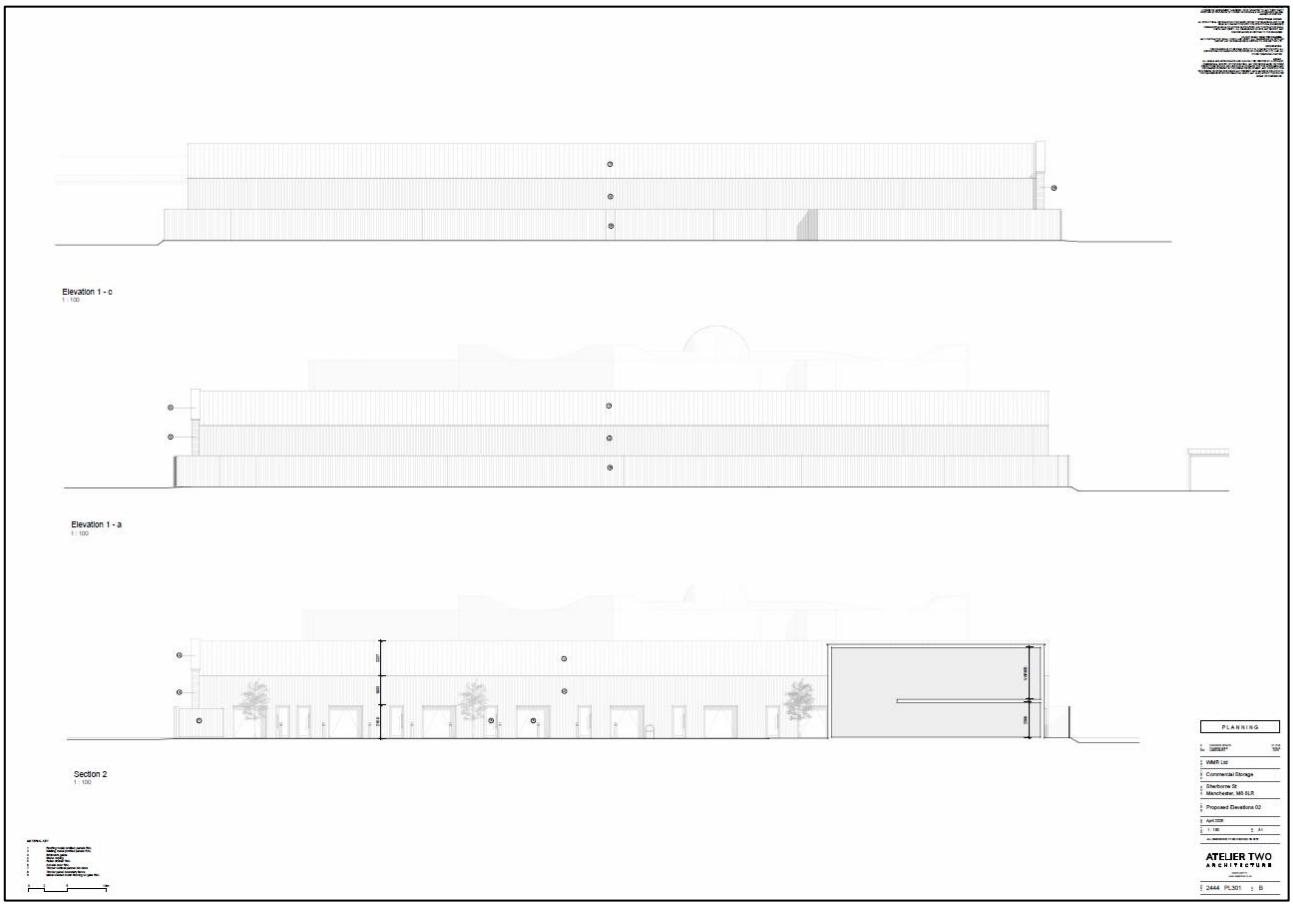


Figure A.5 - Proposed elevations 02



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
23/10/2025 22:00	65.34	51.57	47.14
23/10/2025 22:15	73.27	53.72	47.3
23/10/2025 22:30	67.59	50.68	46.68
23/10/2025 22:45	68.07	50.18	45.61
23/10/2025 23:00	66.91	51.43	45.46
23/10/2025 23:15	67.97	51.74	45.97
23/10/2025 23:30	67.58	50.04	44.47
23/10/2025 23:45	67.2	50.23	43.89
24/10/2025 00:00	65.05	46.68	43.27
24/10/2025 00:15	67.24	48.74	43.32
24/10/2025 00:30	69.64	51.16	43.29
24/10/2025 00:45	64.09	47.11	43.57
24/10/2025 01:00	66.77	49.63	43.72
24/10/2025 01:15	65.66	50.44	43.89
24/10/2025 01:30	72.01	48.21	42.97
24/10/2025 01:45	67.02	46.9	42.59
24/10/2025 02:00	65.91	47.63	42.82
24/10/2025 02:15	66.45	47.19	42.67
24/10/2025 02:30	66.39	47.38	41.87
24/10/2025 02:45	65.23	46.96	41.9
24/10/2025 03:00	51.85	43.58	42.24
24/10/2025 03:15	66.41	46.95	42.31
24/10/2025 03:30	68.35	48.52	44.24
24/10/2025 03:45	56.51	43.66	41.82
24/10/2025 04:00	61.5	43.75	41.75
24/10/2025 04:15	60.44	44.11	42.61
24/10/2025 04:30	59.8	44.93	43.08
24/10/2025 04:45	65.03	46.78	43.57
24/10/2025 05:00	63.21	47.31	44.13
24/10/2025 05:15	64.8	48.04	44.23
24/10/2025 05:30	66.88	50.39	45.27
24/10/2025 05:45	69.65	52.88	45.61
24/10/2025 06:00	67.64	51.57	46.5
24/10/2025 06:15	66.95	50.85	47.16
24/10/2025 06:30	70.13	53.74	48.24
24/10/2025 06:45	71.06	53.32	48.52
24/10/2025 07:00	65.47	52	49.04
24/10/2025 07:15	73.11	55.08	49.87
24/10/2025 07:30	71.99	56.89	50.03
24/10/2025 07:45	71.56	57.9	50.34
24/10/2025 08:00	71.77	55.55	50.2
24/10/2025 08:15	70.94	56.42	50.69
24/10/2025 08:30	70.79	56.22	50.71
24/10/2025 08:45	70.65	56.77	50.97

Start Time	$L_{AFmax,15min}$ dB	$L_{Aeq,15min}$ dB	$L_{A90,15min}$ dB
24/10/2025 09:00	71.3	57.27	51.33
24/10/2025 09:15	72.17	56.75	51.07
24/10/2025 09:30	71.26	56.08	50.41
24/10/2025 09:45	67.27	55.48	50.33
24/10/2025 10:00	74.59	55.89	49.55
24/10/2025 10:15	70.53	56.51	50.35
24/10/2025 10:30	69.85	54.97	49.1
24/10/2025 10:45	70.11	56.08	48.72
24/10/2025 11:00	70.8	55.01	48.68
24/10/2025 11:15	70.52	55.91	49.04
24/10/2025 11:30	69.44	55.46	48.48
24/10/2025 11:45	69.94	55.14	48.91
24/10/2025 12:00	68.72	55.82	49.01
24/10/2025 12:15	69.23	56.7	49.36
24/10/2025 12:30	72.95	55.62	48.32
24/10/2025 12:45	74.74	56.09	48.33
24/10/2025 13:00	70.14	56.73	49.36
24/10/2025 13:15	69.46	59.16	48.88
24/10/2025 13:30	74.46	56.59	47.97
24/10/2025 13:45	73.66	55.94	47.92
24/10/2025 14:00	69.06	56.98	49.27
24/10/2025 14:15	67.67	57.3	49.96
24/10/2025 14:30	70.72	56.84	50.4
24/10/2025 14:45	69.58	56.73	49.07
24/10/2025 15:00	73.76	57	49.4
24/10/2025 15:15	72.49	56.14	48.81
24/10/2025 15:30	69.28	56.26	49.89
24/10/2025 15:45	70.46	56.28	48.61
24/10/2025 16:00	71.5	56.21	48.14
24/10/2025 16:15	73.82	56.63	48.68
24/10/2025 16:30	66.84	54.76	47.71
24/10/2025 16:45	69.66	55.42	47.77
24/10/2025 17:00	71.04	56.81	48.05
24/10/2025 17:15	71.49	56.61	47.91
24/10/2025 17:30	75.93	55.7	47.84
24/10/2025 17:45	98.13	64.11	46.65
24/10/2025 18:00	75.59	57.27	47
24/10/2025 18:15	69.09	56.24	47.26
24/10/2025 18:30	72.47	56.05	47.67
24/10/2025 18:45	73.38	55.57	47.4
24/10/2025 19:00	80.98	56.99	48.68
24/10/2025 19:15	76.45	55.03	47.57
24/10/2025 19:30	69.23	54.79	47.74
24/10/2025 19:45	68.95	54.76	47.5
24/10/2025 20:00	75.22	53.88	46.57

Start Time	$L_{AFmax,15min}$ dB	$L_{Aeq,15min}$ dB	$L_{A90,15min}$ dB
24/10/2025 20:15	69.13	55.23	47.3
24/10/2025 20:30	74.43	52.7	46.87
24/10/2025 20:45	83.3	54.07	46.88
24/10/2025 21:00	78.28	53.08	46.47
24/10/2025 21:15	72	53.29	45.95
24/10/2025 21:30	70.95	52.16	45.8
24/10/2025 21:45	68.64	52.86	46.18
24/10/2025 22:00	69.38	53.9	46.53
24/10/2025 22:15	67.53	51.67	46.94
24/10/2025 22:30	71.34	53.5	47.19
24/10/2025 22:45	66.48	52.24	46.76
24/10/2025 23:00	77.08	55.64	45.46
24/10/2025 23:15	68.54	52.11	44.75
24/10/2025 23:30	73.08	52.92	45.19
24/10/2025 23:45	66.28	50.58	44.55
25/10/2025 00:00	69.09	51.1	44.63
25/10/2025 00:15	69.65	50.97	44.18
25/10/2025 00:30	74.39	52.18	43.69
25/10/2025 00:45	67.74	47.25	43.28
25/10/2025 01:00	68.96	49.82	43.06
25/10/2025 01:15	67.89	48.61	43.17
25/10/2025 01:30	64.93	49.29	43.17
25/10/2025 01:45	65.85	47.91	42.56
25/10/2025 02:00	63.64	47.85	42.64
25/10/2025 02:15	74.23	50.05	42.34
25/10/2025 02:30	66.15	49	42.35
25/10/2025 02:45	65.06	47.31	42.16
25/10/2025 03:00	69.27	47.76	41.82
25/10/2025 03:15	68.77	48.15	41.58
25/10/2025 03:30	64.85	45.5	41.41
25/10/2025 03:45	66.78	48.13	41.21
25/10/2025 04:00	64.78	43.91	40.93
25/10/2025 04:15	67.21	45.54	41.14
25/10/2025 04:30	63.85	45.81	41.61
25/10/2025 04:45	64.56	45.53	41.71
25/10/2025 05:00	64.33	46.16	41.83
25/10/2025 05:15	64.15	46.91	41.48
25/10/2025 05:30	66	47.62	42.05
25/10/2025 05:45	71.31	50.3	42.18
25/10/2025 06:00	64.95	46.45	42.77
25/10/2025 06:15	68.47	48.02	42.77
25/10/2025 06:30	65.31	49.25	43.9
25/10/2025 06:45	68.44	50.39	44.21
25/10/2025 07:00	66.21	47.69	43.18
25/10/2025 07:15	65.21	47.96	43.2

Start Time	$L_{AFmax,15min}$ dB	$L_{Aeq,15min}$ dB	$L_{A90,15min}$ dB
25/10/2025 07:30	72.19	50.01	43.47
25/10/2025 07:45	67.35	49.49	43.8
25/10/2025 08:00	68.48	48.82	43.67
25/10/2025 08:15	64.37	49.73	44.97
25/10/2025 08:30	66.56	49.3	44.52
25/10/2025 08:45	72.73	51.48	44.56
25/10/2025 09:00	79.39	49.86	44.07
25/10/2025 09:15	68.07	51.6	43.8
25/10/2025 09:30	68.28	51.71	44.57
25/10/2025 09:45	73.04	52.51	44.63
25/10/2025 10:00	70.3	51.88	43.86
25/10/2025 10:15	68.57	52.82	44.51
25/10/2025 10:30	71.89	53.51	45.65
25/10/2025 10:45	69.76	53.73	45.19
25/10/2025 11:00	71.19	54.61	45.5
25/10/2025 11:15	68.65	53.44	45.46
25/10/2025 11:30	71.44	53.81	46.14
25/10/2025 11:45	68.04	52.83	45.2
25/10/2025 12:00	71.53	54.52	45.83
25/10/2025 12:15	70.48	53.27	46.27
25/10/2025 12:30	69	53.93	45.9
25/10/2025 12:45	71.69	54.08	46
25/10/2025 13:00	72.38	54.11	46.35
25/10/2025 13:15	75.5	55.74	46.35
25/10/2025 13:30	70.12	54.25	46.25
25/10/2025 13:45	77.7	59.24	47.72
25/10/2025 14:00	71.77	53.85	47.19
25/10/2025 14:15	69.72	54.38	47.48
25/10/2025 14:30	71.08	55.05	47.46
25/10/2025 14:45	75.67	55.14	47.56
25/10/2025 15:00	65.49	53.84	46.88
25/10/2025 15:15	69.95	54.4	48.21
25/10/2025 15:30	68.32	52.95	46.05
25/10/2025 15:45	67.12	53.67	47.7
25/10/2025 16:00	73.78	55.27	47.74
25/10/2025 16:15	73.23	54.52	48.09
25/10/2025 16:30	69.04	54.99	47.36
25/10/2025 16:45	83.57	57.35	46.9
25/10/2025 17:00	73.5	54.93	46.32
25/10/2025 17:15	68.37	54.47	46.83
25/10/2025 17:30	70.46	54.87	47
25/10/2025 17:45	71	54.62	46.73
25/10/2025 18:00	77.96	55.2	46.02
25/10/2025 18:15	69.04	53.79	45.77
25/10/2025 18:30	65.69	53.49	45.56

Start Time	$L_{AFmax,15min}$ dB	$L_{Aeq,15min}$ dB	$L_{A90,15min}$ dB
25/10/2025 18:45	76.68	53.69	45.79

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 (2x10-5Pa).
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.
Equivalent continuous sound level - $L_{Aeq,T}$	The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period (commonly used to describe the 'ambient' sound level).
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 - $L_{A90,T}$	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 $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.
R_w	The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.