NOISE ASSESSMENT FOR
M1 DEVELOPMENTS LTD
TO
ACCOMPANY
A
FULL PLANNING APPLICATION
FOR THE
PROPOSED DEVELOPMENT
OF
1, 2 & 3 BEDROOM APARTMENTS
ON
VACANT LAND
ADJACENT TO
STORE STREET,
MANCHESTER, M1 2WD.

DOCUMENT 001

BY

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EXECUTIVE SUMMARY

Sanctuary Acoustics Ltd has been instructed by M1 Developments Ltd to assess the noise environment in the vicinity of land adjacent to Store Street, Manchester, M1 2WD. To accompany the submission of the full application a noise assessment has been conducted due to the presence of road traffic noise impacting onto the site from Store Street plus any other noise sources such as commercial noise in the vicinity. This area in the centre of Manchester and near to Picadilly was once a largely commercial area but now has a mixture of commercial premises with new apartment buildings and public car parking.

The proposed development plot which is square in shape is accessed off Store Street along the sites northern site boundary. On the opposing side of Store Street are apartments with additional apartments to the rear and east of the site. Further to the east of the site is the Ashton Canal while in the opposite direction to the west of the site and also with access off Store Street, is a commercial building which appears to be vacant. The primary noise source impacting onto the site is therefore road traffic noise from Store Street with the rumble of traffic from further afield also being perceptible, particularly during lulls in Store Street traffic. At the time of the noise survey, construction works further along Store Street where also taking place on the opposing side of the aqueduct. This resulted in vehicles at the temporary traffic lights backing up outside the site at intervals. This included an increase in idling engines and occasionally car audio. Secondary noise sources perceptible on site were noted in the form of birdsong, residents and pedestrians raised voices, cyclists, occasional aircraft overhead and the rumble of trains, particularly at night. There was no perception of fixed mechanical plant noise at the measurement location from existing sources off site.

To summarise:

1. Noise measurements were undertaken on the proposed development site which is located on land adjacent to Store Street, Manchester, M1 2WD.
2. Noise measurements were taken at one external location to assess noise currently impinging onto the site. The noise at Location 1 at the northeastern elevation was defined primarily as road traffic noise from Store Street with some birdsong, residents activity, pedestrians, joggers, cyclists, overhead aircraft and occasional trains perceptible, particularly at night. The underlying noise levels were fairly static over the 48-hour period but on some occasions would be raised with passing large vehicles such as HGV's and cars & motorbikes with low frequency exhausts or music playing while outside the site being held at the temporary traffic lights. There was also the occasional bang during the daytime from the construction site, which is naturally a temporary noise source at the construction site further along Store Street on the opposing side of the aqueduct.
3. The noise assessment was conducted with measurements commencing at Location 1 from 13:30 on Wednesday 9th July to 13:00 on Friday 11th July which were for a continuous period and in a secure location. The measurements at the location were for a continuous logging period and were set to record at 15-minute intervals which were later extrapolated to obtain the 1-hour L_{Aeq} and L_{A90}.
4. The noise measurements were referenced to the *National Planning Policy Framework (NPPF)*. Further reference was also made to *BS*

8233:2014 Guidance on sound insulation and noise reduction for buildings, *BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and BS 4142:2014 Methods for rating and assessing industrial and commercial sound*. Additional reference was made to the *WHO Guidelines* and *Manchester City Council's Planning & Noise Technical Guidance.* This also states maximum noise levels from individual noise events in habitable rooms ≥45dB(A) L_{Amax} should occur no more than 15 times in any one night-time period (23:00 to 07:00).

5. BS 8233:2014 recommends a 30dB L_{Aeq} in Bedrooms at night for Sleeping and 35dB L_{Aeq} in Living Rooms for daytime Resting and 40dB L_{Aeq} within Dining Rooms.
6. The Location 1 measurement as a 16-hour daytime $L_{Aeq\ 16\text{-}hour}$ taken from 07:00 to 23:00 on the 10th July is 53.7dB(A). The night-time 8-hour $L_{Aeq\ 8\text{-}hour}$ from 23:00 on the 9th July to 07:00 on the 10th July is 51.0dB(A) $L_{Aeq\ 8\text{-}hour}$ and from 23:00 on the 10th July to 07:00 on the 11th July is 50.8dB(A) $L_{Aeq\ 8\text{-}hour}$. This shows continuity in noise levels between the day and night-time periods. The most significant daytime ambient noise measurement as a 15-minute interval was 60.6dB(A) L_{Aeq} measured between 20:45 to 21:00 on 9th July while the logarithmically averaged 1-hour ambient noise measurement was 56.4dB(A) from 20:00 to 21:00 on the 9th July. The most significant 15-minute night-time measurement was 55.6dB(A) from 06:45 to 07:00 on 11th July. The lowest measured background noise level was 33.4dB(A) L_{A90} from 02:30 to 02:15 and 02:15 to 02:30 on the 10th July 2025.
7. Maximum noise events $L_{AFmax,outside}$ are above the 55dB(A) level between 23:00 and 07:00 at Location 1 averaging 63dB(A) to 75dB(A) L_{Amax}.Typically as a rule of thumb, 55.0dB(A) outside an open window will produce 45.0dB(A) inside the room.
8. Suitable glazing types, including laminated or partially laminated glazed units would reduce noise ingress. Example double glazing types are given in section 4 from pages 34 to 38 although Pilkington Glass produce standard units as depicted in figure 26 on page 39. The glazing types on pages 34 to 38 have been modelled using the *Marshall Day Acoustics Sound Insulation Prediction Software, Insul.* With reference to the glazing criteria table in the *Birmingham City Council PCGN* planning document which provides a useful comparison between measured external ambient noise levels and the noise criteria required for façade glazing and ventilators in order to achieve internal noise levels in line with *BS 8233,* it is recommended that the glazed units for habitable rooms to all elevations for the dwellings on the development should meet a minimum noise criteria of 29dB $R_w + C_{tr}$. The *WHO* guidance also states that internal maximum noise events greater than 45dB(A) L_{Amax} should be restricted to occurring no more than on 10-15 occasions during any one night-time period. This is also reiterated in *Manchester City Council's Planning & Noise Technical Guidance* with more than 15 occurrences as detailed in item *3.6.1.1 Residential Developments*.
9. If ventilation to the new dwellings is to be provided by façade ventilators then any such ventilators should achieve a minimum noise rating of 35dB $D_{n,e,w,} + C_{tr}$ for all dwellings across the development. If ventilation is to be provided alternatively by a mechanical whole building system such as an MVHR type ventilation system then any mechanical system or similar would need to be assessed against *BS 4142* and take into consideration existing background noise levels,

(L_{A90}) at the façade of the nearest residential dwelling. The rating level of the plant should also take into consideration any acoustic features such a new system may contain for example discrete tones or impulses. Any new mechanical system should not exceed the background noise level. Therefore, on considering the lowest measured existing background noise level (L_{A90}) at location 1 of 33.4dB(A) L_{A90} which was measured on Friday 11th July from 02:30 to 03:00, the rating of any mechanical system when also taking into consideration any acoustic features the system may have such as tones and impulsive sounds, should be rated at least 5dB below with an L_{Ar} 28dB(A) or less at the nearest residential facade.

10. Provision has been made for designated amenity spaces and therefore, *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* states a lower limit of 50dB(A) L_{Aeq} and an upper limit for ambient noise level in external amenity spaces of 55dB(A) L_{Aeq} which should not be exceeded. During the noise survey it was noted that the ambient noise level during the daytime remained below the 55dB(A) L_{Aeq} upper limit as a 16-hour L_{Aeq} with only four occasions as an hourly average out of thirty one which did measure above the SOAEL but still within 2dB(A) of the SOAEL upper limit which is negligible in acoustic terms at Location 1. Some of the maximum noise events on site where due to the construction site further along Store Street and from vehicles backed up outside the site due to the temporary traffic lights which have been installed as a consequence of the construction site and therefore not a permanent fixture. Therefore the amenity spaces proposed for this site such as balconies or terraces, should not be subject to raised ambient noise levels. There are currently apartment blocks in the vicinity many of which have balconies (amenity spaces) overlooking Store Street. *BS 8233:2014* does state in *7.7.3.2 Design criteria for external noise; "…However, it is also recognised that these guideline values are not achievable in all circumstances were development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between the elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*
11. With satisfactory glazing and ventilation measures in place against noise primarily from the rumble of road traffic, the proposed development of residential dwellings would make sufficient use of the prime location.

1. INTRODUCTION

Sanctuary Acoustics Ltd has been instructed by M1 Developments Ltd to assess the noise environment in the vicinity of land located off Store Street, Manchester. Planning approval is being sought for the erection of a sixteen storey building with 73 x proposed apartments comprising of 1-Bedroom, 2-Bedroom and a selection of 3-Bedroom apartments on this current disused piece of vacant land. It is anticipated that any planning submission should be accompanied with an up to date noise assessment for the site due to the potential impact of road traffic noise onto the site from Store Street which abuts the northern site boundary plus any other noise sources from the immediate vicinity.

This plot of land is situated off Store Street with apartment blocks and commercial premises in the vicinity plus the Ashton Canal running nearby. Consequently road traffic noise is the primary noise source in the vicinity with some secondary intermittent noise generated by residents including activity from the gardens, birdsong, aircraft overhead, pedestrians, joggers & cyclists on Store Street. Construction works were underway further along Store Street on the opposing side of the aqueduct. Subsequently during the daytime there were occasional bangs, clatters etc over distance from the site but the more immediate impact were vehicles engines idling and occasional car audio from vehicles backed up to in front of the applicant site from the temporary traffic lights.

It should also be noted there was no perception of fixed mechanical plant noise such as air handling units etc., onto the applicant site.

Figure 1 depicts the sites location with the proposed building plot in a red hashed outline on land adjacent to Store Street, Manchester M1 2WD.

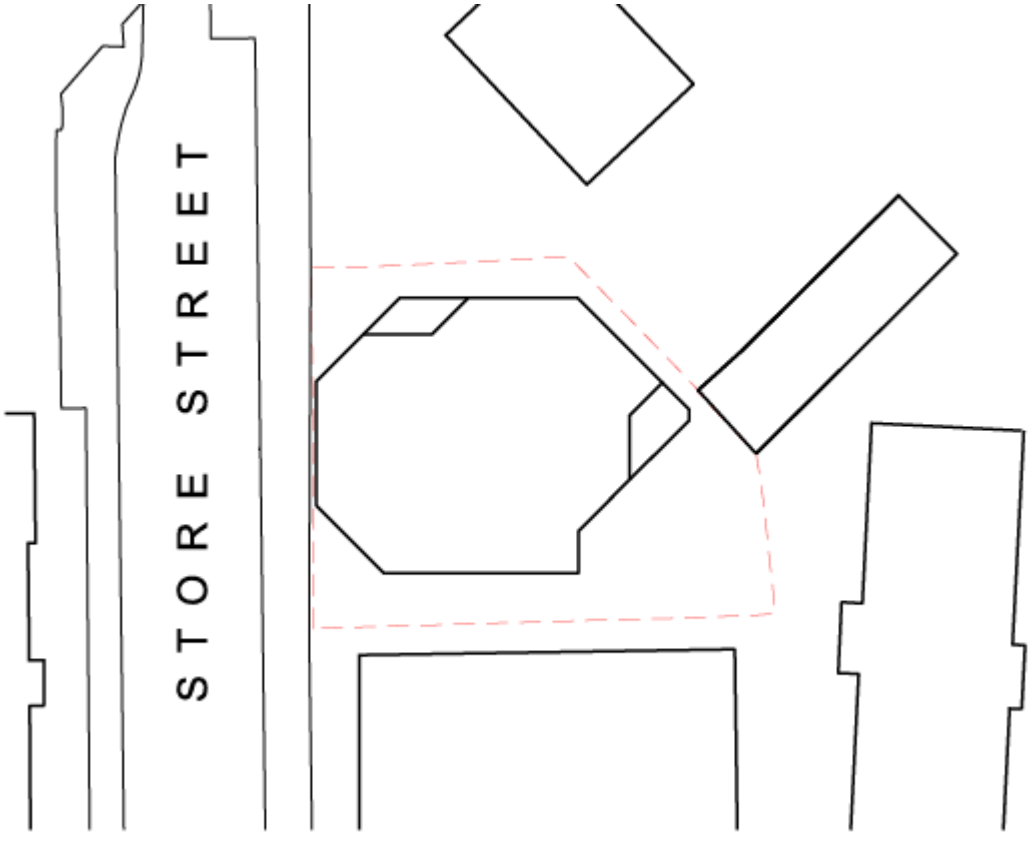


Figure 1: This depicts the location plan with the building plot in a red hashed outline.

Figure 2 depicts the site layout with the currently proposed ground floor plan.



Figure 2: This depicts the proposed ground floor plan.

Figure 3 depicts the proposed first floor plan.



Figure 3: This depicts the proposed first floor plan.

Figure 4 depicts the proposed second floor plan.



Figure 4: This depicts the proposed second floor plan.

Figure 5 depicts the proposed plan for the third through to fifth floors.



Figure 5: This depicts the proposed plan for the third, fourth and fifth floors.

Figure 6 depicts the proposed plan for the sixth through to the eleventh floors.

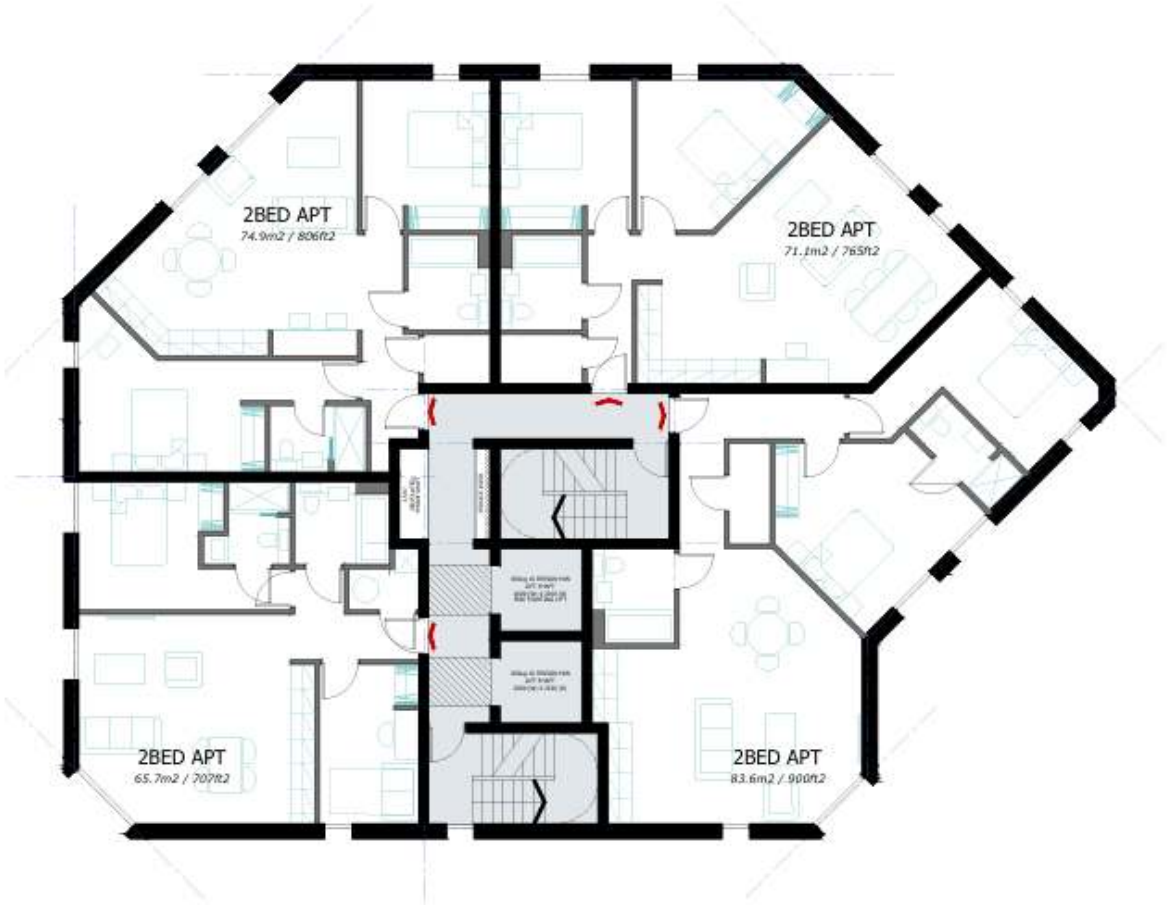


Figure 6: This depicts the proposed plan for the sixth, seventh, eight, nineth, tenth & eleventh floors.

Figure 7 depicts the proposed plan for the twelfth floor.

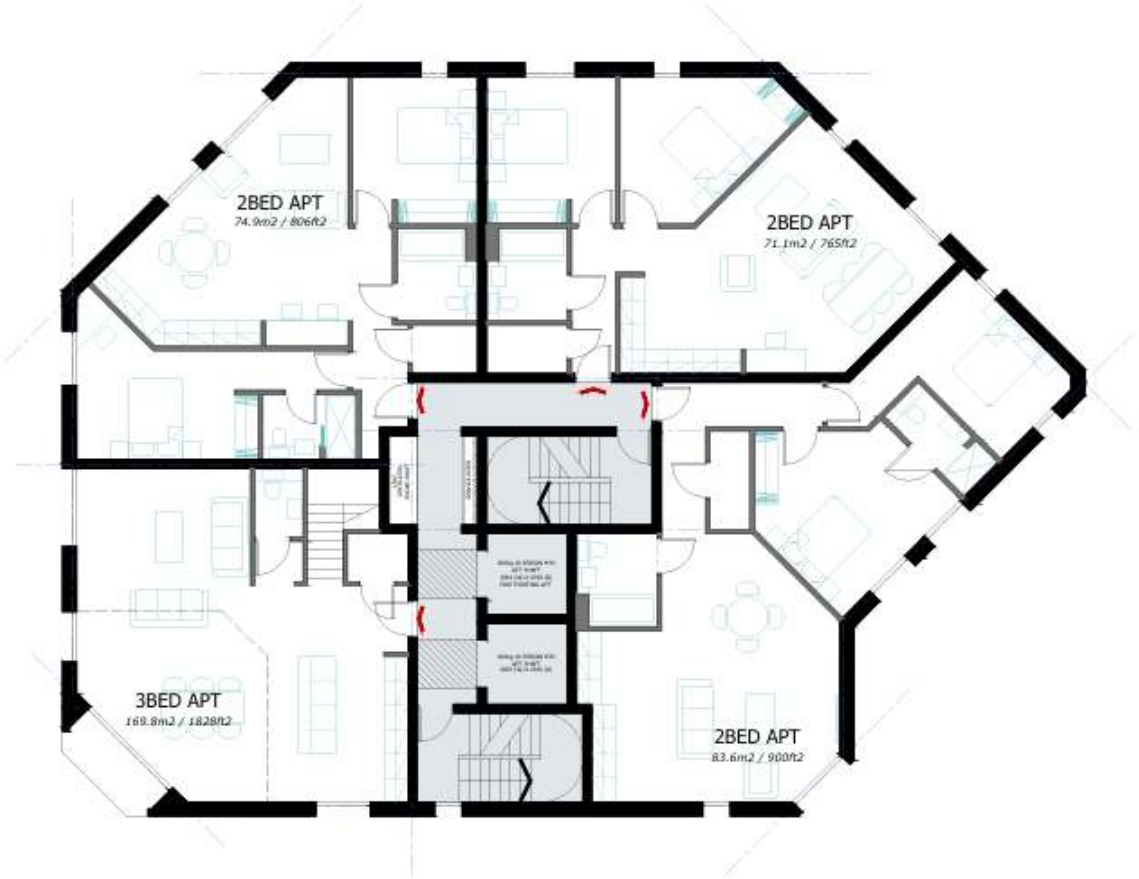


Figure 7: This depicts the proposed plan for the twelfth floor.

Figure 8 depicts the proposed plan for the thirteenth floor.

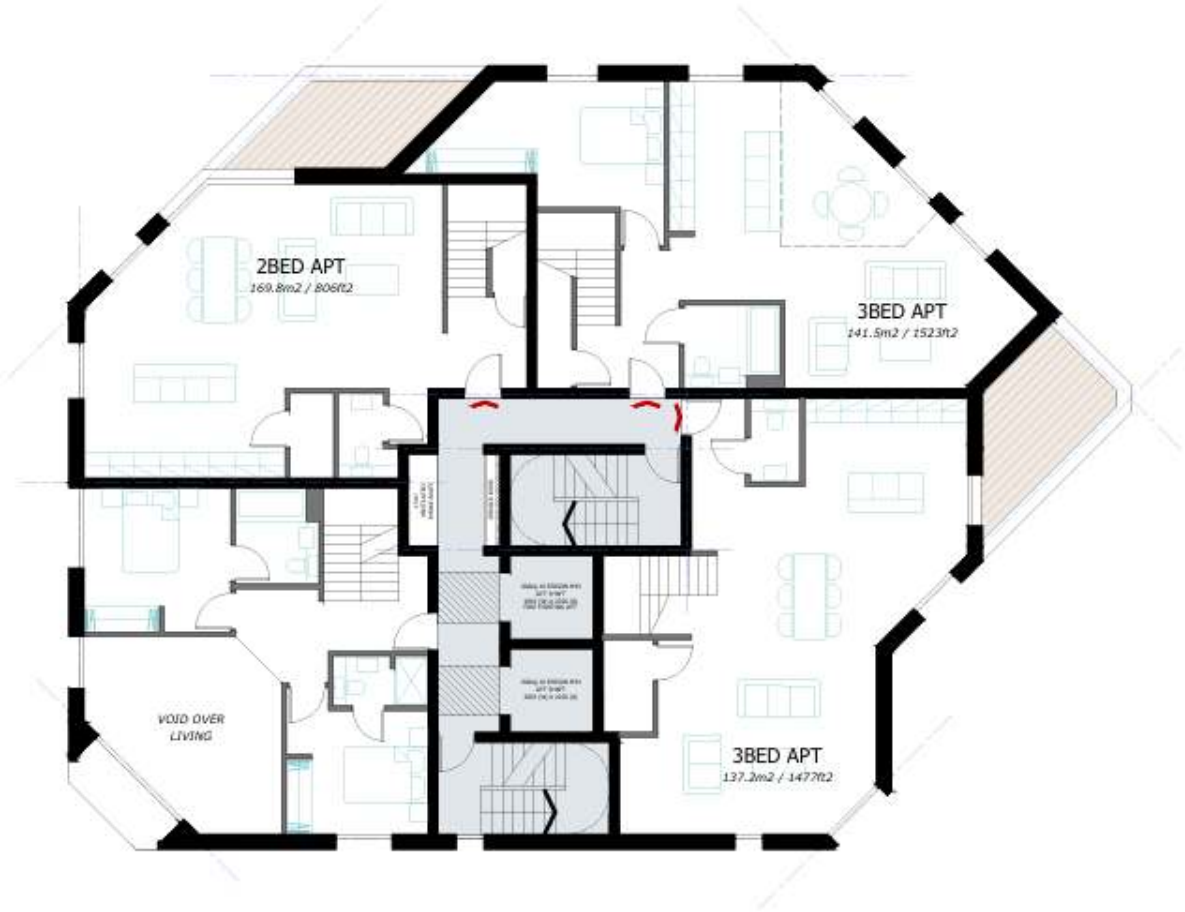


Figure 8: This depicts the proposed plan for the thirteenth floor.

Figure 9 depicts the proposed plan for the fourteenth floor.

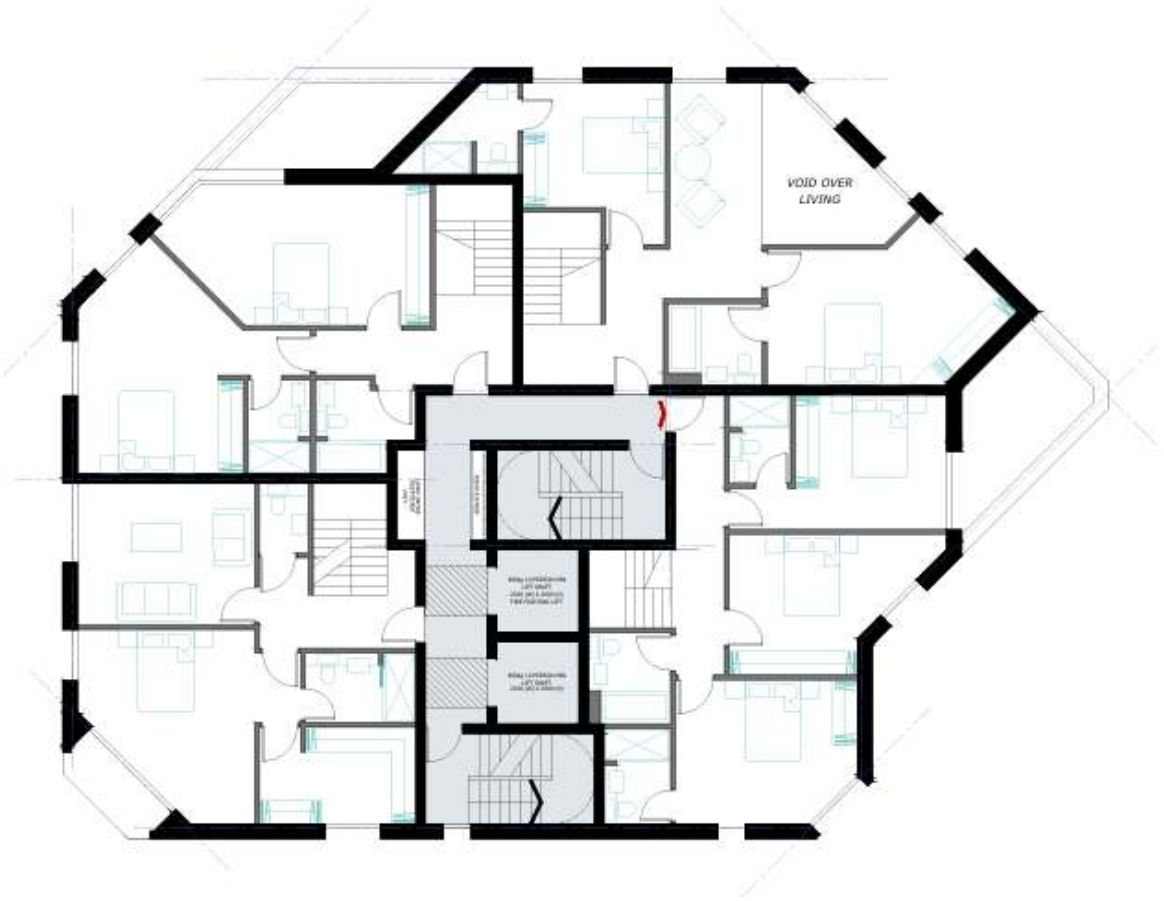


Figure 9: This depicts the proposed plan for the fourteenth floor.

Figure 10 depicts the proposed plan for the fifteenth floor.

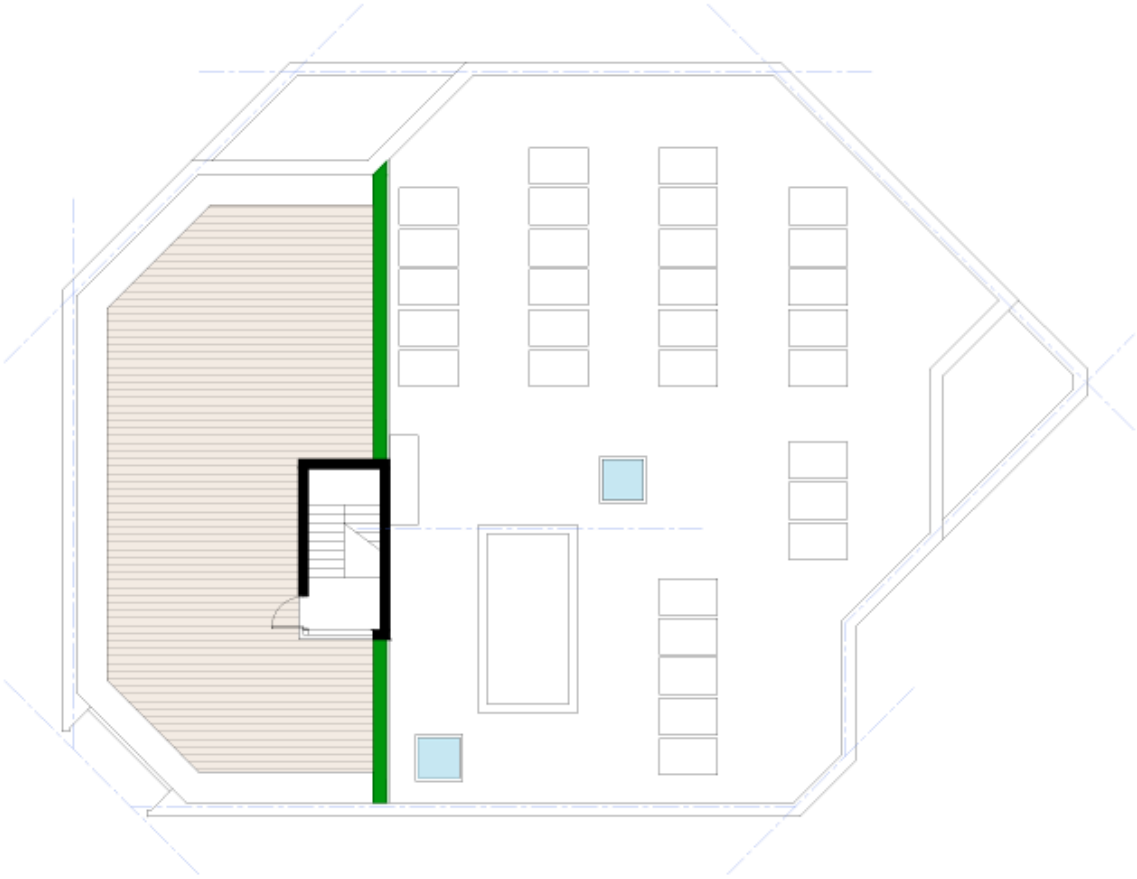


Figure 10: This depicts the proposed plan for the fifteenth floor.

Noise is covered, although briefly, in the *National Planning Policy Framework (NPPF)* which states that the planning system should contribute to and enhance the natural and local environment.

Planning policies and decisions should;

- aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from the new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The *Department for the Environment, Food and Rural Affairs (Defra)* have issued an explanatory note to the *Noise Policy Statement for England (NPSE)* which states that the long term vision of Government noise policy is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*

The *NPPF* guidance however gives no objective, tangible standards or criteria to inform planning decisions in respect to noise. The framework does quote existing

guidance to make reference to including *WHO* guidelines and *BS 8233. BS 8233* currently in its fifth imprint; *BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings* was issued in 2014.

Furthermore, when the primary noise source is road traffic derived, a shortened method inline with the *Calculation of Road Traffic Noise (CRTN)* is also deemed acceptable to quantify noise and is referred to within the auspices of both *BS 8233* and *PPG24* and its measurement criteria. This method proves valuable as it is often difficult to find a secure location in which to leave noise monitoring equipment unmanned over a continuous 24-hour period or enable identification of specific noise sources. The site is impacted by road traffic as a primary noise source but with other intermittent noise sources, particularly activity from nearby residents and pedestrians etc., the use of CRTN was not considered in this instance.

Applicable guidance divides the 24 hour period into daytime and night-time segments with the daytime period from 07:00 to 23:00 hours and night-time from 23:00 to 07:00. The noise survey was conducted between 13:30 on Wednesday 9th July 2025 to 13:00 on Friday 11th July 2025.

2. MEASUREMENTS AND OBSERVATIONS

One noise measurement location was used to assess noise currently impinging onto the site. Location 1 was situated close to the northeastern boundary at ground level to assess the noise impact, particularly from road traffic along Store Street while also being able to measure the impact from nearby dwellings. On arrival at the site it was discovered that the land was raised above street level with soil and some rubble which will be excavated away down to street level with development of the site. The daytime and night-time measurements both appear to be fairly consistent and shows the dominance of road traffic and the times of the day when commuter traffic during the morning and evening along with other vehicles increase and decrease over the course of 24-hours. Some of the average or typical steady state traffic noise levels have been peppered occasionally by significant noise events from larger passing vehicles such as HGV's, vans/light goods vehicles, motorbikes, refuse lorries or people passing the site. Birdsong from a variety of birds such as seagulls, crows etc., was also perceptible in the area and occasional raised voices.

The sound level meter was setup for various intervals during the day and night where it could measure noise levels from multiple noise sources currently impacting onto the site.

The sound level meter at Location 1 was setup in a secure location and left to log noise at 15-minute intervals with each measurement period being over a near 48-hour period ($47^1/_2$-hours). The daytime ambient noise level (L_{Aeq}) and background noise level (L_{A90}) measurements were later logarithmically averaged to provide the extrapolated 1-hour results at Location 1 for daytime measurements between 07:00 and 23:00. Overall, the measurement intervals were taken inline with *BS 4142* which states measurement intervals during the daytime should be for a duration of 1-hour between 07:00 and 23:00 and at 15-minute intervals between 23:00 and 07:00. These measurement durations also comply with *BS 8233*. To avoid stopping and starting the measurements as well as giving an indication of the occurrence of significant maximum noise events the sound level meter was set up to monitor at 15-minutes intervals.

The measurements at Location 1 were conducted from Wednesday 9th July 2025 to Friday 11th July 2025. The measurements were continuous and were taken from 13:30 on the 9th to 13:00 on the 11th.

Figure 11 depicts the measurement location on the site which is adjacent to Store Street.

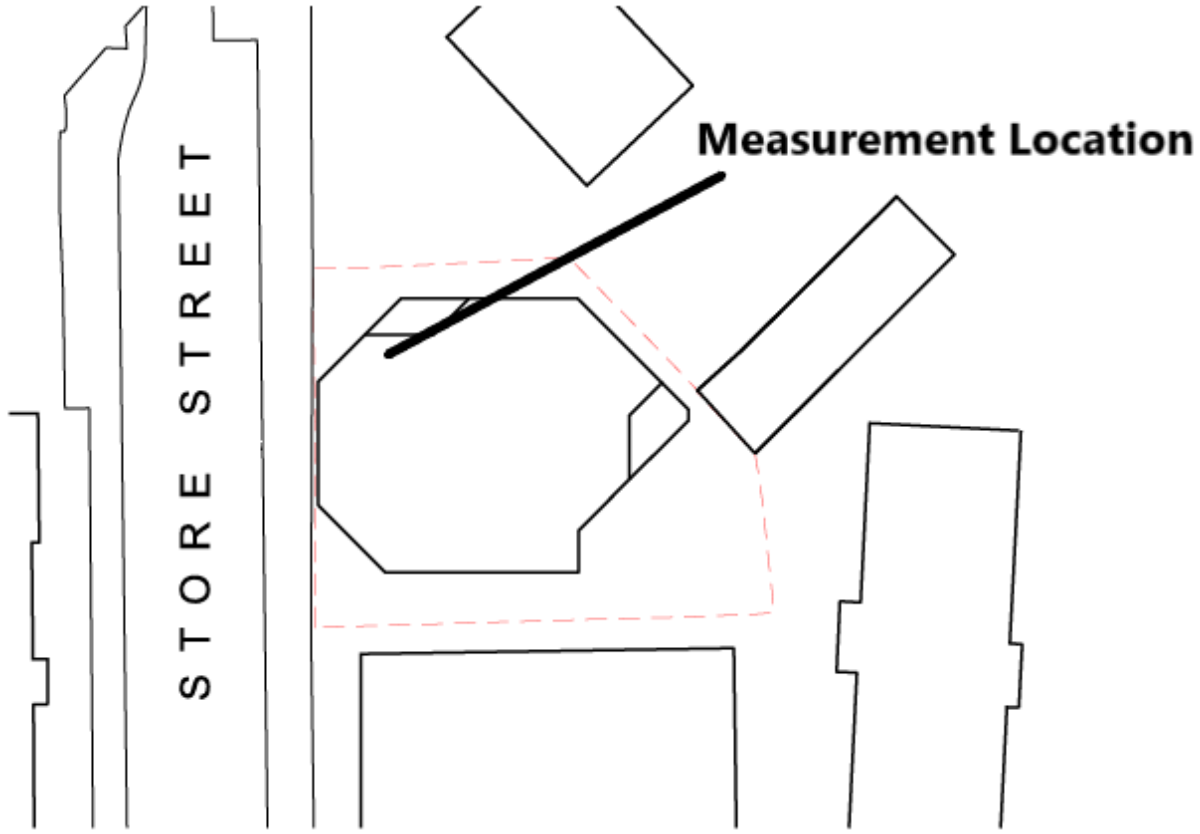


Figure 11: This depicts the positioning of the measurement location.

The noise measurement location was chosen to assess noise currently impinging onto the proposed development site and within those rooms being most prone to road traffic and residents & pedestrians noise and any other noise ingress to the site.

In order to assess the existing noise environment, the following were considered:

- Vehicle activity and associated vehicle traffic noise directly from Store Street and indirectly through the rumble of road traffic over distance from surrounding roads. This also includes some noise derived from residents' activity from dwellings along the eastern and southern site boundaries. Birdsong, occasional aircraft overhead and occasional trains in the distance, particularly at night during lulls in localised road traffic were also perceptible.
- Noise from any other external sources including residential and commercial premises with and without fixed mechanical plant.
- The glazing and overall façade construction, ventilation methods and room layout most susceptible to noise ingress, in particular from road traffic which was noted as the primary noise source.
- There was no fixed plant noise perceptible on site or within the vicinity that was perceptible on site. With planning approval for the new development, any new fixed mechanical plant proposed for the new dwellings will have to reflect background noise levels (L_{A90}) which should not be exceeded.

The Location 1 measurements at the northeastern elevation of the site used a Norsonic 131 Sound Level Meter (Serial Number 1313597) which was calibrated before and after the noise measurements were taken using a Norsonic 1251 Acoustic Calibrator (Serial Number 34822). These items of equipment have traceable calibration certificates with these two items of Norsonic equipment being designated as Type 1 instruments inline with IEC 61672 & 61260 and IEC 60942 respectively.

The Sound Level Meter was mounted on a tri-pod 1.35m above ground level with the sound level meter positioned at least 3.5m from any solid boundary fencing to avoid/reduce specula reflections. The Norsonic 131 sound level meters were calibrated to 114dB at 1kHz before and after the noise survey. *BS 4142: 2014 Method for rating industrial and commercial sound* states caution should be exercised when wind speeds are greater than 5m/s. The wind speeds in the vicinity were checked using a Proster Digital Anemometer model MS6252A.

At the commencement of the noise survey on Wednesday 9th, it was 21^0C with a partially cloudy sky with sunny intervals through the afternoon and into the evening with the sky clearing into the night-time with temperatures dropping to 13^0C through into the Thursday morning and the afternoon of the 10th July with the sky clearing and temperatures increasing to 26^0C and with the sky remaining clear as the day progressed into the night-time period with temperatures dropping to 15^0C. The sky remained clear with sunny skies as Friday 11th progressed with the temperature rising to 27^0C by 13:00 at the end of the survey. There were minimally perceived occasional gusts registering on the Anemometer at the start of the noise survey on Wednesday 9th up to 1.2m/s with occasional gusts decreasing to 0.5m/s at the end of the survey on Friday 11th.

A glossary of the acoustic parameters/terms used can be found in Appendix A.

BS 7445-1:2003 Description and measurement of environmental noise – Part 1:

Guide to quantities and procedures states in sections:

5.2.2 Outdoor measurements;

When it is desired to minimise the influence of reflections then measurements should, whenever possible, be carried out at least 3.5m from any reflecting structure other than the ground. When not otherwise specified, the preferred measurement height is 1.2m to 1.5m above the ground. Other measurement heights may be specified in pertinent standards.

5.2.3 *Outdoor measurements near buildings;*

"These measurements shall be carried out at places where the noise to which a building is exposed is of interest. If not otherwise specified, the preferred measurement positions are 1m to 2m from the façade and 1.2m to 1.5m above each floor level of interest".

The noise results obtained at Location 1 near to the northeastern site boundary was subjected primarily to road traffic and pedestrians, cyclists and joggers. Birdsong during the daytime was also occasionally perceptible along with occasional aircraft overhead or nearby, trains, intermittent daytime construction noise from further along Store Street and car radios.

Figure 12 depicts the view of Store Street below the measurement location.



Figure 12: This depicts the view northwards from measurement Location 1.

Figure 13 depicts the view from in front of the sound level meter southwards with the adjoining existing dwellings abutting the southern site boundary.



Figure 13: This depicts the view south from measurement Location 1.

Figure 14 depicts the view of the southwestern site boundary with the dwellings beyond plus the beige façade of the adjoining vacant commercial building to the west whose site footprint runs parallel with the applicant site at full length from rear to Store Street.



Figure 14: This depicts measurement Location 1 and the view to the southwest.

The noise results obtained for the first day of measurements on Wednesday 9th July at Location 1 commencing at 13:30 through to 23:00 are detailed in table 1.

Time Period 09/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
13:30 to 13:45	53.9dB(A)	44.7dB(A)	70.5dB(A)	57.2dB(A)	47.1dB(A)
13:45 to 14:00	53.0dB(A)	42.7dB(A)	65.5dB(A)	57.1dB(A)	45.3dB(A)
14:00 to 14:15	54.3dB(A)	42.9dB(A)	70.3dB(A)	58.1dB(A)	45.2dB(A)
14:15 to 14:30	53.6dB(A)	43.4dB(A)	67.6dB(A)	57.4dB(A)	46.5dB(A)
14:30 to 14:45	53.0dB(A)	42.1dB(A)	64.4dB(A)	56.9dB(A)	45.1dB(A)
14:45 to 15:00	54.4dB(A)	44.3dB(A)	64.6dB(A)	57.9dB(A)	47.3dB(A)
15:00 to 15:15	54.1dB(A)	42.6dB(A)	67.8dB(A)	57.7dB(A)	45.8dB(A)
15:15 to 15:30	54.4dB(A)	43.4dB(A)	65.4dB(A)	58.0dB(A)	46.2dB(A)
15:30 to 15:45	55.1dB(A)	41.9dB(A)	73.9dB(A)	57.4dB(A)	45.0dB(A)
15:45 to 16:00	54.2dB(A)	42.7dB(A)	65.8dB(A)	57.9dB(A)	45.5dB(A)
16:00 to 16:15	54.0dB(A)	43.1dB(A)	66.1dB(A)	57.7dB(A)	46.2dB(A)
16:15 to 16:30	54.7dB(A)	43.4dB(A)	71.3dB(A)	58.3dB(A)	46.5dB(A)
16:30 to 16:45	54.9dB(A)	43.6dB(A)	68.3dB(A)	58.1dB(A)	46.0dB(A)
16:45 to 17:00	54.8dB(A)	42.7dB(A)	66.1dB(A)	58.1dB(A)	47.4dB(A)
17:00 to 17:15	54.2dB(A)	40.7dB(A)	63.5dB(A)	58.1dB(A)	45.2dB(A)
17:15 to 17:30	55.2dB(A)	41.0dB(A)	66.8dB(A)	58.7dB(A)	45.4dB(A)
17:30 to 17:45	53.4dB(A)	43.0dB(A)	68.6dB(A)	56.8dB(A)	45.8dB(A)
17:45 to 18:00	55.0dB(A)	43.5dB(A)	65.5dB(A)	58.5dB(A)	47.1dB(A)
18:00 to 18:15	55.7dB(A)	41.2dB(A)	77.2dB(A)	58.1dB(A)	45.6dB(A)
18:15 to 18:30	55.2dB(A)	42.1dB(A)	68.6dB(A)	58.4dB(A)	46.1dB(A)
18:30 to 18:45	58.8dB(A)	43.2dB(A)	89.9dB(A)	57.7dB(A)	46.8dB(A)
18:45 to 19:00	54.1dB(A)	42.6dB(A)	67.4dB(A)	57.9dB(A)	45.1dB(A)
19:00 to 19:15	55.0dB(A)	42.5dB(A)	67.1dB(A)	58.5dB(A)	45.5dB(A)
19:15 to 19:30	54.4dB(A)	41.2dB(A)	67.4dB(A)	58.0dB(A)	45.3dB(A)
19:30 to 19:45	54.4dB(A)	41.2dB(A)	66.1dB(A)	58.3dB(A)	44.4dB(A)
19:45 to 20:00	53.6dB(A)	41.1dB(A)	70.3dB(A)	57.6dB(A)	43.8dB(A)
20:00 to 20:15	52.5dB(A)	41.7dB(A)	63.2dB(A)	56.6dB(A)	44.3dB(A)
20:15 to 20:30	53.9dB(A)	41.2dB(A)	71.6dB(A)	57.0dB(A)	43.4dB(A)
20:30 to 20:45	52.4dB(A)	40.3dB(A)	67.2dB(A)	56.9dB(A)	43.3dB(A)
20:45 to 21:00	60.6dB(A)	40.0dB(A)	88.9dB(A)	58.3dB(A)	42.5dB(A)
21:00 to 21:15	52.2dB(A)	39.5dB(A)	66.0dB(A)	56.4dB(A)	42.8dB(A)
21:15 to 21:30	51.8dB(A)	39.3dB(A)	65.7dB(A)	55.9dB(A)	42.0dB(A)
21:30 to 21:45	52.2dB(A)	39.0dB(A)	64.9dB(A)	57.0dB(A)	41.8dB(A)
21:45 to 22:00	52.9dB(A)	40.3dB(A)	68.2dB(A)	56.7dB(A)	42.3dB(A)
22:00 to 22:15	50.5dB(A)	38.6dB(A)	65.6dB(A)	54.8dB(A)	41.7dB(A)
22:15 to 22:30	51.6dB(A)	37.5dB(A)	65.7dB(A)	56.2dB(A)	39.4dB(A)
22:30 to 22:45	51.3dB(A)	37.9dB(A)	65.5dB(A)	55.6dB(A)	41.3dB(A)
22:45 to 23:00	53.8dB(A)	37.2dB(A)	77.8dB(A)	56.2dB(A)	40.5dB(A)

Table 1: Noise results for 13:30 to 23:00 at Location 1 on the 9th July 2025.

Table 2 details the night-time measurements at location 1 from 23:00 to 00:00.

Time Period 09/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
23:00 to 23:15	52.1dB(A)	37.4dB(A)	62.5dB(A)	56.4dB(A)	40.1dB(A)
23:15 to 23:30	53.5dB(A)	39.8dB(A)	66.5dB(A)	58.0dB(A)	42.7dB(A)
23:30 to 23:45	52.7dB(A)	39.3dB(A)	62.9dB(A)	57.3dB(A)	41.7dB(A)
23:45 to 00:00	51.3dB(A)	39.2dB(A)	61.7dB(A)	56.1dB(A)	40.8dB(A)

Table 2: Noise results for 23:00 to 00:00 at Location 1 on the 9th July 2025.

Table 3 details the results from 00:00 to 07:00 at Location 1 on the 10th July.

Time Period 10/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
00:00 to 00:15	51.4dB(A)	35.4dB(A)	62.6dB(A)	56.3dB(A)	38.3dB(A)
00:15 to 00:30	50.1dB(A)	36.2dB(A)	64.3dB(A)	54.9dB(A)	38.2dB(A)
00:30 to 00:45	50.5dB(A)	35.0dB(A)	70.0dB(A)	55.5dB(A)	37.0dB(A)
00:45 to 01:00	49.6dB(A)	35.2dB(A)	64.1dB(A)	54.0dB(A)	36.8dB(A)
01:00 to 01:15	48.1dB(A)	33.1dB(A)	67.7dB(A)	52.5dB(A)	34.9dB(A)
01:15 to 01:30	48.5dB(A)	33.2dB(A)	63.6dB(A)	53.5dB(A)	34.6dB(A)
01:30 to 01:45	48.1dB(A)	32.1dB(A)	63.8dB(A)	52.1dB(A)	33.5dB(A)
01:45 to 02:00	46.8dB(A)	32.0dB(A)	66.4dB(A)	49.6dB(A)	33.6dB(A)
02:00 to 02:15	46.8dB(A)	32.1dB(A)	63.5dB(A)	51.2dB(A)	33.9dB(A)
02:15 to 02:30	47.5dB(A)	32.0dB(A)	66.4dB(A)	49.3dB(A)	33.6dB(A)
02:30 to 02:45	46.2dB(A)	32.1dB(A)	61.7dB(A)	49.0dB(A)	33.4dB(A)
02:45 to 03:00	45.1dB(A)	32.4dB(A)	61.2dB(A)	46.3dB(A)	33.4dB(A)
03:00 to 03:15	45.5dB(A)	32.4dB(A)	64.2dB(A)	48.4dB(A)	33.9dB(A)
03:15 to 03:30	48.5dB(A)	32.2dB(A)	66.6dB(A)	51.6dB(A)	33.5dB(A)
03:30 to 03:45	49.3dB(A)	32.3dB(A)	64.5dB(A)	53.2dB(A)	33.8dB(A)
03:45 to 04:00	50.7dB(A)	32.7dB(A)	65.2dB(A)	54.7dB(A)	36.1dB(A)
04:00 to 04:15	49.8dB(A)	32.6dB(A)	64.5dB(A)	53.7dB(A)	36.9dB(A)
04:15 to 04:30	47.5dB(A)	32.8dB(A)	66.3dB(A)	49.9dB(A)	35.0dB(A)
04:30 to 04:45	50.6dB(A)	33.6dB(A)	70.5dB(A)	55.4dB(A)	35.5dB(A)
04:45 to 05:00	49.9dB(A)	34.5dB(A)	68.0dB(A)	54.2dB(A)	36.1dB(A)
05:00 to 05:15	52.0dB(A)	35.8dB(A)	70.3dB(A)	56.7dB(A)	37.5dB(A)
05:15 to 05:30	52.2dB(A)	35.2dB(A)	74.8dB(A)	56.8dB(A)	38.5dB(A)
05:30 to 05:45	53.2dB(A)	36.7dB(A)	71.5dB(A)	57.8dB(A)	38.7dB(A)
05:45 to 06:00	52.4dB(A)	37.0dB(A)	66.7dB(A)	57.4dB(A)	38.7dB(A)
06:00 to 06:15	55.4dB(A)	38.1dB(A)	73.7dB(A)	59.3dB(A)	40.7dB(A)
06:15 to 06:30	52.0dB(A)	37.2dB(A)	68.2dB(A)	56.8dB(A)	39.7dB(A)
06:30 to 06:45	53.7dB(A)	38.0dB(A)	64.7dB(A)	59.4dB(A)	40.4dB(A)
06:45 to 07:00	54.9dB(A)	39.5dB(A)	76.1dB(A)	59.6dB(A)	42.2dB(A)

Table 3: Noise results for 00:00 to 07:00 at Location 1 on the 10th July 2025.

Table 4 details the results from 07:00 to 19:30.

Time Period 10/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
07:00 to 07:15	56.4dB(A)	38.4dB(A)	76.1dB(A)	60.2dB(A)	41.6dB(A)
07:15 to 07:30	55.6dB(A)	39.7dB(A)	65.9dB(A)	60.1dB(A)	42.8dB(A)
07:30 to 07:45	55.4dB(A)	40.1dB(A)	65.5dB(A)	60.1dB(A)	42.9dB(A)
07:45 to 08:00	55.7dB(A)	40.7dB(A)	68.1dB(A)	59.6dB(A)	43.4dB(A)
08:00 to 08:15	55.3dB(A)	42.2dB(A)	71.4dB(A)	59.3dB(A)	45.5dB(A)
08:15 to 08:30	55.0dB(A)	41.7dB(A)	66.8dB(A)	58.9dB(A)	44.7dB(A)
08:30 to 08:45	53.9dB(A)	41.9dB(A)	63.7dB(A)	58.2dB(A)	45.1dB(A)
08:45 to 09:00	54.3dB(A)	41.2dB(A)	66.5dB(A)	58.5dB(A)	44.1dB(A)
09:00 to 09:15	54.2dB(A)	40.2dB(A)	73.5dB(A)	58.2dB(A)	44.0dB(A)
09:15 to 09:30	53.1dB(A)	41.7dB(A)	65.2dB(A)	57.3dB(A)	43.7dB(A)
09:30 to 09:45	53.9dB(A)	42.2dB(A)	70.6dB(A)	57.8dB(A)	44.0dB(A)
09:45 to 10:00	53.3dB(A)	41.0dB(A)	74.4dB(A)	57.3dB(A)	44.3dB(A)
10:00 to 10:15	52.8dB(A)	41.0dB(A)	69.0dB(A)	57.0dB(A)	43.1dB(A)
10:15 to 10:30	51.4dB(A)	41.8dB(A)	63.6dB(A)	55.9dB(A)	43.5dB(A)
10:30 to 10:45	52.5dB(A)	40.4dB(A)	64.8dB(A)	56.8dB(A)	44.1dB(A)
10:45 to 11:00	51.8dB(A)	42.5dB(A)	62.4dB(A)	55.9dB(A)	45.1dB(A)
11:00 to 11:15	52.8dB(A)	41.1dB(A)	66.4dB(A)	56.7dB(A)	43.7dB(A)
11:15 to 11:30	52.4dB(A)	40.6dB(A)	74.1dB(A)	56.3dB(A)	43.5dB(A)
11:30 to 11:45	52.2dB(A)	41.0dB(A)	69.2dB(A)	56.0dB(A)	44.2dB(A)
11:45 to 12:00	51.1dB(A)	39.7dB(A)	68.3dB(A)	55.1dB(A)	43.6dB(A)
12:00 to 12:15	53.6dB(A)	41.4dB(A)	66.7dB(A)	57.4dB(A)	44.0dB(A)
12:15 to 12:30	53.2dB(A)	42.6dB(A)	68.0dB(A)	56.9dB(A)	44.7dB(A)
12:30 to 12:45	51.6dB(A)	42.2dB(A)	62.3dB(A)	55.5dB(A)	44.4dB(A)
12:45 to 13:00	52.3dB(A)	41.5dB(A)	68.3dB(A)	56.1dB(A)	44.4dB(A)
13:00 to 13:15	52.0dB(A)	41.6dB(A)	65.8dB(A)	55.5dB(A)	44.3dB(A)
13:15 to 13:30	53.0dB(A)	40.6dB(A)	73.9dB(A)	56.6dB(A)	43.5dB(A)
13:30 to 13:45	53.7dB(A)	41.5dB(A)	79.3dB(A)	56.4dB(A)	44.2dB(A)
13:45 to 14:00	52.0dB(A)	42.4dB(A)	63.2dB(A)	56.0dB(A)	44.8dB(A)
14:00 to 14:15	56.1dB(A)	42.0dB(A)	77.8dB(A)	57.3dB(A)	44.3dB(A)
14:15 to 14:30	52.9dB(A)	41.5dB(A)	63.6dB(A)	56.8dB(A)	44.7dB(A)
14:30 to 14:45	53.0dB(A)	41.5dB(A)	66.6dB(A)	57.1dB(A)	44.2dB(A)
14:45 to 15:00	52.6dB(A)	41.8dB(A)	63.6dB(A)	56.8dB(A)	44.2dB(A)
15:00 to 15:15	52.6dB(A)	42.4dB(A)	65.7dB(A)	56.6dB(A)	44.4dB(A)
15:15 to 15:30	53.6dB(A)	43.6dB(A)	66.1dB(A)	57.3dB(A)	45.9dB(A)
15:30 to 15:45	53.3dB(A)	41.1dB(A)	76.7dB(A)	56.5dB(A)	44.6dB(A)
15:45 to 16:00	53.0dB(A)	42.5dB(A)	71.1dB(A)	56.1dB(A)	45.0dB(A)
16:00 to 16:15	53.9dB(A)	41.0dB(A)	72.6dB(A)	56.9dB(A)	43.6dB(A)
16:15 to 16:30	54.5dB(A)	41.8dB(A)	71.1dB(A)	58.3dB(A)	45.4dB(A)
16:30 to 16:45	53.1dB(A)	43.9dB(A)	74.9dB(A)	56.1dB(A)	46.5dB(A)
16:45 to 17:00	53.8dB(A)	42.7dB(A)	70.4dB(A)	57.2dB(A)	45.9dB(A)
17:00 to 17:15	54.2dB(A)	43.2dB(A)	72.4dB(A)	57.8dB(A)	45.7dB(A)
17:15 to 17:30	53.5dB(A)	41.7dB(A)	65.8dB(A)	57.2dB(A)	44.8dB(A)
17:30 to 17:45	53.8dB(A)	42.6dB(A)	69.8dB(A)	57.2dB(A)	46.3dB(A)
17:45 to 18:00	55.1dB(A)	41.6dB(A)	77.9dB(A)	56.9dB(A)	44.8dB(A)
18:00 to 18:15	54.2dB(A)	41.5dB(A)	74.7dB(A)	57.6dB(A)	44.5dB(A)
18:15 to 18:30	54.1dB(A)	40.2dB(A)	75.4dB(A)	57.0dB(A)	44.9dB(A)
18:30 to 18:45	53.5dB(A)	41.0dB(A)	68.7dB(A)	57.0dB(A)	44.3dB(A)
18:45 to 19:00	53.9dB(A)	41.1dB(A)	76.1dB(A)	57.1dB(A)	45.1dB(A)
19:00 to 19:15	52.7dB(A)	42.2dB(A)	65.2dB(A)	56.9dB(A)	44.5dB(A)
19:15 to 19:30	54.5dB(A)	41.7dB(A)	74.0dB(A)	58.0dB(A)	46.1dB(A)

Table 4: Noise results for 07:00 to 19:30 at Location 1 on the 10th Juy 2025.

Table 5 details the results from 19:30 to 23:00.

Time Period 10/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
19:30 to 19:45	54.0dB(A)	43.9dB(A)	62.9dB(A)	57.7dB(A)	46.9dB(A)
19:45 to 20:00	53.1dB(A)	42.6dB(A)	66.9dB(A)	56.9dB(A)	45.3dB(A)
20:00 to 20:15	53.0dB(A)	41.9dB(A)	66.3dB(A)	57.0dB(A)	44.7dB(A)
20:15 to 20:30	53.2dB(A)	41.2dB(A)	71.4dB(A)	56.5dB(A)	43.9dB(A)
20:30 to 20:45	52.7dB(A)	41.3dB(A)	64.8dB(A)	56.5dB(A)	44.7dB(A)
20:45 to 21:00	57.9dB(A)	41.3dB(A)	84.2dB(A)	56.8dB(A)	44.1dB(A)
21:00 to 21:15	54.3dB(A)	41.4dB(A)	66.5dB(A)	58.3dB(A)	44.7dB(A)
21:15 to 21:30	54.2dB(A)	41.1dB(A)	74.4dB(A)	57.7dB(A)	44.6dB(A)
21:30 to 21:45	53.5dB(A)	41.8dB(A)	73.3dB(A)	56.9dB(A)	44.0dB(A)
21:45 to 22:00	52.3dB(A)	41.5dB(A)	65.2dB(A)	56.6dB(A)	43.5dB(A)
22:00 to 22:15	52.5dB(A)	38.8dB(A)	63.6dB(A)	56.5dB(A)	42.5dB(A)
22:15 to 22:30	51.3dB(A)	38.0dB(A)	63.9dB(A)	55.8dB(A)	40.7dB(A)
22:30 to 22:45	51.2dB(A)	37.8dB(A)	65.3dB(A)	55.5dB(A)	39.9dB(A)
22:45 to 23:00	50.9dB(A)	37.5dB(A)	63.4dB(A)	55.6dB(A)	39.8dB(A)

Table 5: Noise results for 19:30 to 23:00 at Location 1 on the 10th July 2025.

Table 6 details the results from 23:00 to 00:00.

Time Period 10/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
23:00 to 23:15	51.1dB(A)	36.9dB(A)	66.2dB(A)	55.7dB(A)	39.1dB(A)
23:15 to 23:30	50.0dB(A)	36.1dB(A)	61.1dB(A)	54.3dB(A)	39.1dB(A)
23:30 to 23:45	50.9dB(A)	37.1dB(A)	61.9dB(A)	55.6dB(A)	39.9dB(A)
23:45 to 00:00	50.0dB(A)	34.6dB(A)	75.1dB(A)	54.4dB(A)	38.4dB(A)

Table 6: Noise results for 23:00 to 00:00 at Location 1 on the 10th July 2025.

Table 7 details the results from 00:00 to 07:00 on the 11th July 2025.

Time Period 11/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
00:00 to 00:15	50.0dB(A)	37.6dB(A)	63.6dB(A)	54.5dB(A)	39.7dB(A)
00:15 to 00:30	50.9dB(A)	35.3dB(A)	65.6dB(A)	55.5dB(A)	37.3dB(A)
00:30 to 00:45	50.5dB(A)	36.0dB(A)	74.4dB(A)	53.6dB(A)	37.8dB(A)
00:45 to 01:00	51.1dB(A)	35.3dB(A)	78.0dB(A)	53.7dB(A)	37.2dB(A)
01:00 to 01:15	48.5dB(A)	33.2dB(A)	62.2dB(A)	53.4dB(A)	34.9dB(A)
01:15 to 01:30	47.2dB(A)	32.5dB(A)	61.3dB(A)	52.4dB(A)	34.2dB(A)
01:30 to 01:45	46.3dB(A)	32.9dB(A)	60.5dB(A)	51.1dB(A)	34.4dB(A)
01:45 to 02:00	46.8dB(A)	33.2dB(A)	66.5dB(A)	50.5dB(A)	34.7dB(A)
02:00 to 02:15	48.9dB(A)	33.0dB(A)	64.8dB(A)	52.9dB(A)	35.2dB(A)
02:15 to 02:30	48.0dB(A)	33.4dB(A)	69.5dB(A)	50.1dB(A)	35.3dB(A)
02:30 to 02:45	46.0dB(A)	32.5dB(A)	64.8dB(A)	51.0dB(A)	33.9dB(A)
02:45 to 03:00	49.2dB(A)	32.6dB(A)	68.6dB(A)	50.4dB(A)	33.8dB(A)
03:00 to 03:15	46.9dB(A)	32.3dB(A)	64.7dB(A)	49.3dB(A)	33.7dB(A)
03:15 to 03:30	47.5dB(A)	32.1dB(A)	63.3dB(A)	51.0dB(A)	34.2dB(A)
03:30 to 03:45	47.7dB(A)	32.7dB(A)	61.3dB(A)	52.3dB(A)	34.9dB(A)
03:45 to 04:00	51.2dB(A)	33.4dB(A)	65.0dB(A)	55.2dB(A)	37.3dB(A)
04:00 to 04:15	50.4dB(A)	33.5dB(A)	63.1dB(A)	54.8dB(A)	38.0dB(A)
04:15 to 04:30	50.7dB(A)	33.4dB(A)	64.7dB(A)	54.6dB(A)	36.0dB(A)
04:30 to 04:45	49.5dB(A)	34.3dB(A)	67.3dB(A)	53.7dB(A)	36.1dB(A)
04:45 to 05:00	51.6dB(A)	35.4dB(A)	73.1dB(A)	55.6dB(A)	37.1dB(A)
05:00 to 05:15	48.8dB(A)	35.9dB(A)	65.1dB(A)	53.2dB(A)	37.7dB(A)
05:15 to 05:30	54.6dB(A)	38.6dB(A)	73.8dB(A)	58.8dB(A)	40.0dB(A)
05:30 to 05:45	52.9dB(A)	39.6dB(A)	76.3dB(A)	57.2dB(A)	41.1dB(A)
05:45 to 06:00	52.6dB(A)	39.8dB(A)	69.7dB(A)	57.1dB(A)	41.5dB(A)
06:00 to 06:15	50.8dB(A)	40.3dB(A)	67.8dB(A)	55.6dB(A)	42.3dB(A)
06:15 to 06:30	53.9dB(A)	38.6dB(A)	67.9dB(A)	58.8dB(A)	42.4dB(A)
06:30 to 06:45	53.7dB(A)	37.4dB(A)	66.0dB(A)	58.7dB(A)	40.1dB(A)
06:45 to 07:00	55.6dB(A)	38.7dB(A)	68.4dB(A)	60.6dB(A)	41.2dB(A)

Table 7: Noise results for 00:00 to 07:00 at Location 1 on the 11th July 2025.

Table 8 details the results from 07:00 to 13:00 on the 11th July 2025.

Time Period 11/07/2025	Measurement Parameters				
	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A10}	L_{A90}
07:00 to 07:15	55.2dB(A)	38.8dB(A)	75.3dB(A)	59.3dB(A)	41.5dB(A)
07:15 to 07:30	55.6dB(A)	41.4dB(A)	82.2dB(A)	59.0dB(A)	44.0dB(A)
07:30 to 07:45	56.1dB(A)	40.7dB(A)	75.2dB(A)	60.1dB(A)	43.8dB(A)
07:45 to 08:00	55.8dB(A)	42.3dB(A)	70.7dB(A)	59.8dB(A)	44.8dB(A)
08:00 to 08:15	54.4dB(A)	41.0dB(A)	68.7dB(A)	58.6dB(A)	43.5dB(A)
08:15 to 08:30	54.3dB(A)	42.8dB(A)	70.2dB(A)	58.0dB(A)	45.5dB(A)
08:30 to 08:45	53.9dB(A)	42.3dB(A)	68.7dB(A)	58.0dB(A)	44.7dB(A)
08:45 to 09:00	54.3dB(A)	42.9dB(A)	67.8dB(A)	58.3dB(A)	45.5dB(A)
09:00 to 09:15	54.9dB(A)	41.4dB(A)	74.2dB(A)	58.5dB(A)	44.7dB(A)
09:15 to 09:30	52.9dB(A)	41.6dB(A)	74.2dB(A)	57.1dB(A)	44.0dB(A)
09:30 to 09:45	52.8dB(A)	41.6dB(A)	64.2dB(A)	56.6dB(A)	44.6dB(A)
09:45 to 10:00	53.0dB(A)	42.0dB(A)	69.1dB(A)	56.6dB(A)	44.7dB(A)
10:00 to 10:15	53.7dB(A)	42.1dB(A)	72.3dB(A)	57.1dB(A)	45.7dB(A)
10:15 to 10:30	55.9dB(A)	43.4dB(A)	76.9dB(A)	56.8dB(A)	45.8dB(A)
10:30 to 10:45	54.3dB(A)	41.7dB(A)	70.3dB(A)	57.5dB(A)	45.1dB(A)
10:45 to 11:00	53.9dB(A)	42.6dB(A)	65.7dB(A)	57.7dB(A)	45.2dB(A)
11:00 to 11:15	56.1dB(A)	42.8dB(A)	68.9dB(A)	59.7dB(A)	46.8dB(A)
11:15 to 11:30	55.4dB(A)	42.7dB(A)	74.5dB(A)	58.9dB(A)	45.8dB(A)
11:30 to 11:45	53.6dB(A)	42.1dB(A)	65.8dB(A)	57.8dB(A)	44.4dB(A)
11:45 to 12:00	53.1dB(A)	42.2dB(A)	66.5dB(A)	57.0dB(A)	45.3dB(A)
12:00 to 12:15	52.1dB(A)	41.8dB(A)	65.5dB(A)	56.4dB(A)	44.7dB(A)
12:15 to 12:30	53.1dB(A)	43.2dB(A)	67.2dB(A)	56.8dB(A)	45.6dB(A)
12:30 to 12:45	53.6dB(A)	42.9dB(A)	65.2dB(A)	57.4dB(A)	45.3dB(A)
12:45 to 13:00	54.4dB(A)	42.8dB(A)	66.4dB(A)	58.0dB(A)	44.9dB(A)

Table 8: Noise results for 07:00 to 13:00 at Location 1 on the 11th July 2025.

Table 9 details the calculated hourly averages for ambient noise level (L_{Aeq}) and background noise level (L_{A90}) from 14:00 and 23:00 at Location 1 on 9th July.

Time Period 09/07/2025	Measurement Parameters	
	$L_{Aeq\ 1\text{-}hour}$	$L_{A90\ 1\text{-}hour}$
14:00 to 15:00	53.9dB(A)	46.1dB(A)
15:00 to 16:00	54.5dB(A)	45.6dB(A)
16:00 to 17:00	54.6dB(A)	46.6dB(A)
17:00 to 18:00	54.5dB(A)	45.9dB(A)
18:00 to 19:00	56.3dB(A)	45.9dB(A)
19:00 to 20:00	54.4dB(A)	44.8dB(A)
20:00 to 21:00	56.4dB(A)	43.4dB(A)
21:00 to 22:00	52.3dB(A)	42.2dB(A)
22:00 to 23:00	52.0dB(A)	40.8dB(A)

Table 9: Hourly noise results from 14:00 to 23:00 at Location 1 on Wednesday 9th July.

Table 10 details the calculated hourly averages for ambient noise level (L_{Aeq}) and background noise level (L_{A90}) from 07:00 and 23:00 at Location 1 on 10th July.

Time Period 10/07/2025	Measurement Parameters	
	$L_{Aeq\ 1\text{-}hour}$	$L_{A90\ 1\text{-}hour}$
07:00 to 08:00	55.8dB(A)	42.7dB(A)
08:00 to 09:00	54.7dB(A)	44.9dB(A)
09:00 to 10:00	53.6dB(A)	44.0dB(A)
10:00 to 11:00	52.2dB(A)	44.0dB(A)
11:00 to 12:00	52.2dB(A)	43.8dB(A)
12:00 to 13:00	52.7dB(A)	44.4dB(A)
13:00 to 14:00	52.7dB(A)	44.2dB(A)
14:00 to 15:00	53.9dB(A)	44.4dB(A)
15:00 to 16:00	53.1dB(A)	45.0dB(A)
16:00 to 17:00	53.9dB(A)	45.5dB(A)
17:00 to 18:00	54.2dB(A)	45.4dB(A)
18:00 to 19:00	53.9dB(A)	44.7dB(A)
19:00 to 20:00	53.6dB(A)	45.8dB(A)
20:00 to 21:00	54.8dB(A)	44.4dB(A)
21:00 to 22:00	53.6dB(A)	44.2dB(A)
22:00 to 23:00	51.5dB(A)	40.9dB(A)

Table 10: Hourly noise results from 07:00 to 23:00 at Location 1 on Thursday 10th July.

Table 11 details the calculated hourly averages for ambient noise level (L_{Aeq}) and background noise level (L_{A90}) between 07:00 and 13:00 at Location 1 on 11th July.

Time Period 11/07/2025	Measurement Parameters	
	$L_{Aeq\ 1\text{-}hour}$	$L_{A90\ 1\text{-}hour}$
07:00 to 08:00	55.7dB(A)	43.7dB(A)
08:00 to 09:00	54.2dB(A)	44.9dB(A)
09:00 to 10:00	53.5dB(A)	44.5dB(A)
10:00 to 11:00	54.5dB(A)	45.5dB(A)
11:00 to 12:00	54.7dB(A)	45.7dB(A)
12:00 to 13:00	53.4dB(A)	45.1dB(A)

Table 11: Hourly noise results from 07:00 to 13:00 at Location 1 on Friday 11th July.

The results from the measurement location reflects the dominance of road traffic onto the site from Store Street and the wider central location, particularly at night. The results show how static the ambient noise measurements are during the day and through into the night-time period at the measurement location. The night-time ambient noise levels (L_{Aeq}) only decreases minimally during the middle of the night approximately between 01:00 and 03:30 with occasional increases due to random events. The Location 1 measurements then start to show an increase from around 04:00 as the new working day approaches with an uptick in road traffic.

Both sets of results show the impact of a traffic noise dominated site.

The daytime ambient noise levels (L_{Aeq}) are generally in the low to mid-50dB's at Location 1 with ambient levels (L_{Aeq}) typically 52dB(A) to 56dB(A) L_{Aeq} from 07:00 to 23:00. The daytime background noise levels (L_{A90}) are also typically over a narrow range from 40dB(A) to 46dB(A) L_{A90}. The night-time ambient levels are typically 45dB(A) to 55dB(A) L_{Aeq} between 23:00 and 07:00 with the dip coming in the early hours. The night-time background noise levels are typically 33dB(A) to 42dB(A) L_{A90}. This shows that over the 24-hour period the ambient noise levels change more significantly over the 8-hour night-time period compared to the 16-hour daytime period.

All measurements were taken at 15-minute intervals.

At Location 1 the night-time 8-hour L_{Aeq} from 23:00 on the 9th July to 07:00 on 10th July was 51.0dB(A) $L_{Aeq\ 8\text{-}hour}$ and from 23:00 on the 9th July to 07:00 on 10th July it was 50.8dB(A) $L_{Aeq\ 8\text{-}hour}$. This shows continuity between the two night-time levels. The daytime 16-hour L_{Aeq} from 07:00 to 23:00 on the 10th July was 53.7dB(A) $L_{Aeq\ 16\text{-}hour}$. The lowest background noise level (L_{A90}) measured on site was 33.4dB(A) taken between 02:30 to 03:00 on 10th July. The most significant daytime ambient noise measurement as a 15-minute measurement was 60.6dB(A) L_{Aeq} from 20:45 to 21:00 on the 9th July and as a logarithmically averaged 1-hour measurement it was 56.4dB(A) L_{Aeq} from 20:00 to 21:00 on 9th July. The most significant night-time ambient noise measurement as a 15-minute measurement was 55.6dB(A) L_{Aeq} from 06:45 to 07:00 on 11th July.

Based upon the daytime and night-time higher ambient noise results, this will be used to determine the minimum noise criteria for façade glazing and ventilators.

Any planned new fixed mechanical plant for the development will need to adhere to criteria found in *BS 4142:2014 – Methods for rating and assessing industrial and commercial sound.* It is recommended that any proposed fixed plant for the new development should be housed at the rear or on the roof of the building and the rating level, (L_{Ar}), for noise produced by such plant should be at least 5dB below the lowest measured background noise level when measured at the nearest residential receptor.

3. REFERENCE TO GUIDANCE

Direct road traffic from Store Street was the underlying noise source with other localised noise being birdsong and residential activity including pedestrians on Store Street talking, some with raised voices and other intermittent noises such as music from cars, trains and aircraft overhead plus some temporary construction noise from the other side of the aqueduct further along Store Street.

The previous guidance repealed in March 2012, Planning Policy Guidance 24 (PPG24), did contain useful noise criteria which is absent from the NPPF, although PPG24 did also make reference to other guidance such as BS 8233, CRTN and WHO guidance on sleep disturbance and community noise levels. *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* which was revised in 2014 is now a far more robust standard.

The revised *BS 8233:2014* states suitable indoor ambient noise levels for dwellings which are detailed in table 12;

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35dB $L_{Aeq,\ 16hour}$	-
Dining	Dining room/area	40dB $L_{Aeq,\ 16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,\ 16hour}$	30dB $L_{Aeq,\ 8hour}$

Table 12: BS 8233:2014 Indoor ambient noise levels for dwellings

The *Manchester City Council Planning & Noise Technical Guidance* document supports this *BS 8233* criteria which it has adopted in item ***3.6.1.1 Residential Developments***

Manchester City Council has adopted the following internal noise limits for residential properties:

- ***Bedrooms (night time – 23.00 – 07.00) 30dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 15 times)***
- ***Living Rooms (daytime – 07.00 – 23.00) 35 dB L_{Aeq}***
- ***Gardens and terraces (daytime) 55 dB L_{Aeq}***

The *Noise Policy Statement for England (NPSE)* has stated the following criteria;

NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected. The NPSE expands these terms leading to the concept of a Significant Adverse Effect Level.

SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

Table 13 details the applicable LOAEL and SOAEL.

Noise Source	**Assessment Location**	**LOAEL**	**SOAEL**	**Times**
General Environmental Noise and Road Traffic	Outdoor living space	50dB $L_{Aeq, 1hour}$	55dB $L_{Aeq, 1hour}$	Day 07:00 – 23:00
	Facade	50dB $L_{Aeq, 16hour}$	72dB $L_{Aeq, 16hour}$	Day 07:00 – 23:00
	Facade	45dB $L_{Aeq, 8hour}$	67dB $L_{Aeq, 8hour}$	Night 23:00 – 07:00
	Habitable Room	30dB $L_{Aeq, 8hour}$	40dB $L_{Aeq,}$ 45dB L_{AFMax} 8hour	Night 23:00 – 07:00 *(No more than 10-15 occurrences >45dB L_{AFMax} – WHO)*
	Habitable Room	35dB $L_{Aeq, 16hour}$	45dB $L_{Aeq, 16hour}$	Day 07:00 – 23:00
Commercial noise or noise of industrial nature (not anonymous)	Façade	b/g – 10dB	b/g + 10dB	09:00 – 17:00 (approximate as work dependent up to 21:00)
	Façade	No change to ambient	Ambient 5dB L_{Aeq} increase	09:00 – 17:00 (approximate as work dependent up to 21:00)
	Outdoor living space	45dB $L_{Aeq, 1hour}$	50dB $L_{Aeq, 1hour}$	Day 07:00 – 23:00
	Habitable Room	35dB $L_{Aeq, 16hour}$	40dB $L_{Aeq, 16hour}$	Day 07:00 – 23:00

Table 13: NPSE and WHO Criteria

From the results obtained from the noise survey the following conclusions have been drawn and referenced to guidance on their analysis;

- The daytime L_{Aeq} noise levels measured are between the LOAEL and SOAEL for Location 1 with the $L_{Aeq\ 16\text{-}hour}$ at 53.7dB(A).
- The night-time L_{Aeq} noise levels at Location 1 when measured at the proposed façades are in between the LOAEL and SOAEL two nights in a row at 51.0dB(A) and 50.8dB(A).
- The proposed outdoor living spaces are ***below*** the SOAEL which is the upper limit at 55dB(A) when assessed against 27 x 1-hour ambient noise L_{Aeq} measurements at Location 1, with just 4 x 1-hour ambient noise L_{Aeq} measurements being within 2dB(A) of the SOAEL limit which is acoustically negligible. As a 16-hour L_{Aeq} it is below the SOAEL 55dB(A) upper limit.
- The Location 1 measurement as a 16-hour daytime $L_{Aeq\ 16\text{-}hour}$ taken from 07:00 to 23:00 on the 10th July is 53.7dB(A). The night-time 8-hour $L_{Aeq\ 8\text{-}hour}$ from 23:00 on the 9th July to 07:00 on the 10th July is 51.0dB(A) $L_{Aeq\ 8\text{-}hour}$ and from 23:00 on the 10th July to 07:00 on the 11th July is 50.8dB(A) $L_{Aeq\ 8\text{-}hour}$. This shows continuity in noise levels between the day and night-time periods. The most significant daytime ambient noise measurement as a 15-minute interval was 60.6dB(A) L_{Aeq} measured between 20:45 to 21:00 on 9th July while the logarithmically averaged 1-hour ambient noise measurement was 56.4dB(A) from 20:00 to 21:00 on the 9th July. The most significant 15-minute night-time measurement was 55.6dB(A) from 06:45 to 07:00 on 11th July. The lowest measured background noise level was 33.4dB(A) L_{A90} from 02:30 to 02:15 and 02:15 to 02:30 on the 10th July 2025.
- Maximum noise events $L_{AFmax,outside}$ are above the 55dB(A) level between 23:00 and 07:00 at Location 1 averaging 63dB(A) to 75dB(A) L_{Amax}.Typically as a rule of thumb, 55.0dB(A) outside an open window will produce 45.0dB(A) inside the room.

From the analysis of the noise survey results the following recommendations have been suggested;

- Location 1 was dominated by the rumble of road traffic primarily from Store Street with intermittent secondary noise from birdsong, some residents' activity from nearby dwellings and pedestrians plus some temporary noise associated with constrictions works further along Store Street on the opposing side of the aqueduct and associated idling vehicles backed up outside the site due to the temporary in-situ traffic lights. There was no perception of fixed plant noise at the measurement location from surrounding premises.
- Suitable double glazing should be fitted to the habitable rooms (living room and bedrooms) at all elevations based upon the Location 1 measurements. This means that only double glazing with a minimum noise criterion should be fitted.
- Methods for providing ventilation for the apartments will also be required. Façade ventilators such as acoustic trickle vents, acoustic airbricks, through wall attenuated vents could be fitted to allow an exchange of airflow. If façade ventilators are not to be installed then mechanical ventilation could be installed that will allow an exchange of airflow such as an MVHR system. If any through wall vents, acoustic airbricks, attenuated window vents etc., are also to be fitted into the façade, they would need to be acoustically rated. However, with an MVHR or a mechanical whole building system then this system in itself should not elevate existing noise levels. Any such system is likely to be housed at the rear or on the roof of the dwellings where it can also take-in fresh air and extract stale air out. Noise produced by such a ventilation system should be at least 5dB below existing background noise levels at the nearest residential façade and this should also factor in acoustic features that

such a system may contain. An overall building ventilation system would or should also prevent overheating as stated in Building Regulations Part O – Overheating as well as also complying with Part F – Ventilation.

The recommendation for a 5dB reduction on existing background noise levels is further referenced in *Manchester City Council Planning & Noise Technical Guidance* document which has stated in item ***3.6.1.5.1 Noise and Vibration from Fixed Plant / Equipment;***

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

This item further states;

"Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install fixed plant or equipment on the roof of a residential apartment block."

The proposal is to install a plant room, sub-station and sprinkler tank on the ground floor. The installation of such plant where able to do so, should incorporate vibration mounts or vibration isolators to reduce structure borne noise in the building. Pipe work should be properly encased where necessary and steel joists encased with insulation and plasterboard/plywood with an appropriately designed suspended ceiling below the first floor where there is an apartment directly above such ancillary spaces as those detailed here.

Any proposed new mechanical plant to provide an exchange of airflow for the development should also be considered first for its suitability with appropriate design and specification by the appointed M&E or HVAC Engineers.

The assessment of mechanical noise with acoustic characteristics such as tones and impulses is represented against criteria under clause 11 in *BS 4142:2014 – Methods for rating and assessing industrial and commercial sound*.

The commentary on clause 11 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. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

The excess or deficit of the rating level over the background noise level is assessed against the following assessments.

a) *Typically, the greater this difference, the greater the magnitude of the impact.*
b) *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

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

In addition to the specific noise level such as the noise produced from an air condenser, a correction factor may also be applied if such a noise also has certain acoustic features. Within *BS 4142* section 9.2 Subjective Method, the Joint Nordic Method is quoted which provides a sliding scale for acoustic features which are tonal or impulsive based upon being just perceptible, clearly perceptible and highly perceptible. For Tones it is +2dB, +4dB and +6dB and for Impulses +3dB, +6dB and +9dB.

The noise from the rumble of road traffic is the primary underlying noise source in the vicinity at the measurement location.

Manchester City Council Planning & Noise Technical Guidance document states in item ***5.3 Noise control;***

"Any proposals to reduce noise at source, by the design and layout of a development, or by building treatments such as acoustic glazing or ventilation should be supported by full calculations to indicate the likely level of noise reduction.

Where it is necessary to keep windows closed to achieve the required internal noise levels it may be a requirement to provide additional ventilation to ensure that residential properties can be adequately ventilated if residents choose to keep their windows closed for noise reasons."

5.3.1.3.1 Sound insulation schemes;

"The required sound insulation should be determined on the basis of the assessment of:

1. *The level and characteristics of the noise outside the building.*
2. *The design criteria noise levels in the rooms and other spaces of the building.*

A suitable sound insulation scheme should be suggested which meets the required Council internal noise criteria."

Birmingham City Council has also produced a similar noise and vibration document titled *Planning Consultation Guidance Note - Noise & Vibration* which is also known as *PCGN*.

The document provides recommended criteria to be achieved for glazing and ventilation based upon daytime and night-time L_{Aeq} and has been adopted by other local authorities such as *Worcestershire Regulatory Services* and *Lichfield District Council*.

Figure 15 depicts their criterion in a table which in the absence of other national or local criteria on façade detailing has been referenced here. In simply subtracting the external noise levels measured with the required internal noise levels, can be open to interpretation by some and so in highlighting this table from another EHO's

document, which in essence does do that, it should remove any further queries as it explains the reasoning behind the choice of appropriately selected glazed units and façade ventilators based upon noise attenuation criteria.

It should be considered that glazed units and ventilators can be the weak link in a façade when compared to a brick & block construction.

Section 6 – Proposed Developments Containing Noise Sensitive Uses

Road and rail Traffic

External noise level Not exceeding		Acoustic Performance requirement	
Day (dB L_{Aeq})	Night (dB L_{Aeq})	Windows	Ventilators
		All windows and doors to habitable rooms to provide a sound reduction index (dB $R_w + C_{tr}$) of not less than	Ventilation to habitable rooms to provide a sound reduction index (dB $D_{n,e,W}+C_{tr}$) of not less than
< 50	< 45	No requirement See **Note 1** below	
57	52	25	31
60	55	26	32
63	58	29	35
66	61	32	38
69	64	35	41
72	67	38	44
≥ 72	≥ 67	See **Note 2** below	
Noise levels shall be rounded up to a whole dB when determining the external noise exposure			

Note 1: Research provided by the World Health Organisation suggests that "general daytime outdoor noise levels of less than 50 dB L_{Aeq} are desirable to prevent any significant community annoyance". Where noise exposure is below this level no specific building envelope sound insulation is required.

Note 2: The EPU will not support approval. If consent is granted by Planning Committee then EPU will recommend standards unique to each application upon the request of Planning.

Figure 15: *Birmingham City Council's PCGN* criterion for specifying glazing and ventilators based upon measured external L_{Aeq} noise levels.

Under the currently proposed scheme, provision has been made for creating balconies/terraces for some apartments. With these amenity spaces in place then daytime lower and upper ambient noise levels would apply as detailed in the following paragraph, it should be noted that the measured noise levels exceed this criteria.

The 2014 edition of *BS 8233* states on page 25 section *7.7.3.2 Design criteria for external noise;*

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$, which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances were development might be desirable. In higher

noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between the elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The 2014 edition of the standard does bear an element of pragmatism when considering proposed residential amenity spaces for use in city and town centre developments when a balanced approach may be required for land use in such prime locations with protection of amenity. The daytime hourly ambient noise levels predominantly below the upper limit (SOAEL) 55dB(A) L_{Aeq} at each of the hourly intervals at Location 1 with only 4 x hourly intervals being above 55dB(A) and then within +2dB which is acoustically negligible. The daytime 16-hour L_{Aeq} was below the upper limit (SOAEL) 55dB(A). Due to the height of the proposed development and location of the balconies and terraces, with height and therefore distance from street level, this should create some distance attenuation.

4. GLAZING, VENTILATION & INSULATION.

The results obtained from the noise survey indicate that the most significant daytime site result at Location 1 was 60.6dB(A) L_{Aeq} from 20:45 to 21:00 on the 9th July and the night-time was 55.6dB(A) L_{Aeq} from 06:45 to 07:00 on the 11th July. The 16-hour L_{Aeq}, the single value average over the 16-hour period from 07:00 to 23:00 on the 10th July was lower at 53.7dB(A) $L_{Aeq\ 16\text{-}hour}$ but the most significant night-time L_{Aeq} was 2dB(A) higher. The $L_{Aeq\ 8\text{-}hour}$ results from 23:00 on the 9th July to 07:00 on 10th July was 51.0dB(A) L_{Aeq} and from 23:00 on the 10th July to 07:00 on 11th July was 50.8dB(A) L_{Aeq}. This shows consistency between night and day when considering the 16-hour and 8-hour L_{Aeq}.

The minimum glazing and ventilation sound insulation criteria specified for this development has been based upon criterion detailed in *Birmingham City Council's PCGN* in order to provide a more precise recommendation to comply with in the absence of any similar national sound insulation criteria tables for façade elements.

Therefore for the proposed dwellings across the whole development based upon a Location 1 night-time high between 06:45 to 07:00 on the 11th July of 55.6dB(A) L_{Aeq} and a daytime high between 20:45 to 21:00 on the 9th July of 60.6dB(A) L_{Aeq}, the glazing to all elevations for all proposed habitable rooms should seek to achieve a minimum noise criteria of 29dB $R_w + C_{tr}$ while any façade ventilators mounted in the window frames or attenuated wall vents, acoustic air bricks etc., penetrating through the external walls should seek to achieve a minimum 35dB $D_{n,e,w} + C_{tr.}$ This is based upon L_{Aeq} daytime noise levels not exceeding 63dB(A) and night-time noise levels not exceeding 58dB(A).

Figure 16 depicts the elevations of the development and the recommended glazing and façade ventilator criteria.

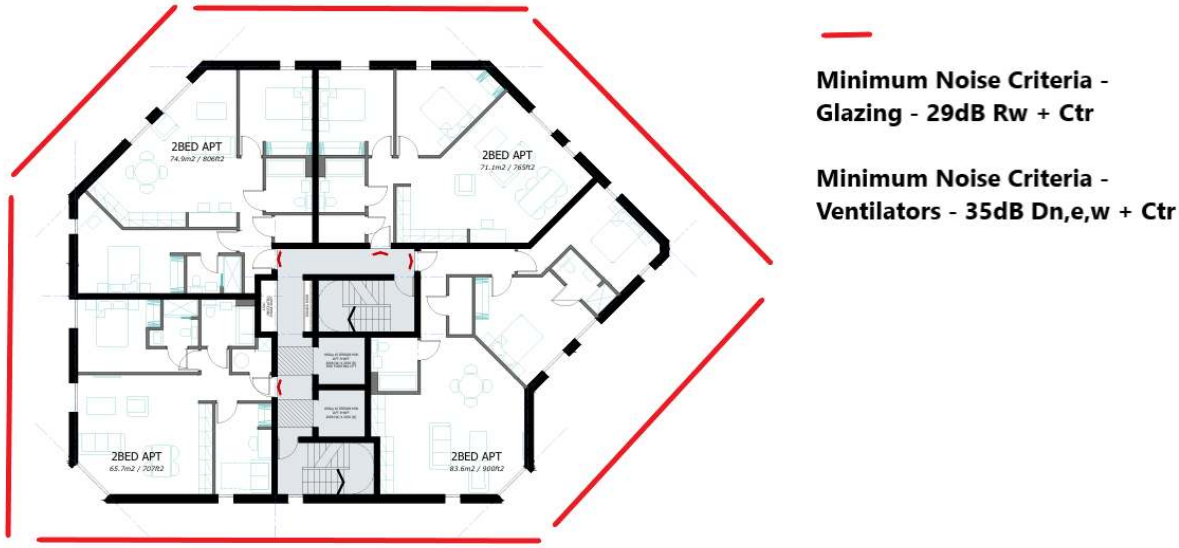


Figure 16: Recommended glazing and ventilation criteria for the exposed elevations.

The following eight example glazing types will achieve alternately rated R_w + C_{tr} criteria. An analysis of these glazing types is detailed below using the commercially available *Marshall Day Acoustics Sound Insulation Prediction Software, Insul*.

These are provided as examples only and the appointed glazing contractor should be able to confirm glazing specifications they can source that will achieve a minimum 29dB R_w + C_{tr} for the glazed units. The examples here will achieve either 29dB R_w + C_{tr} or better and are merely provided here as an indication of typical constructions.

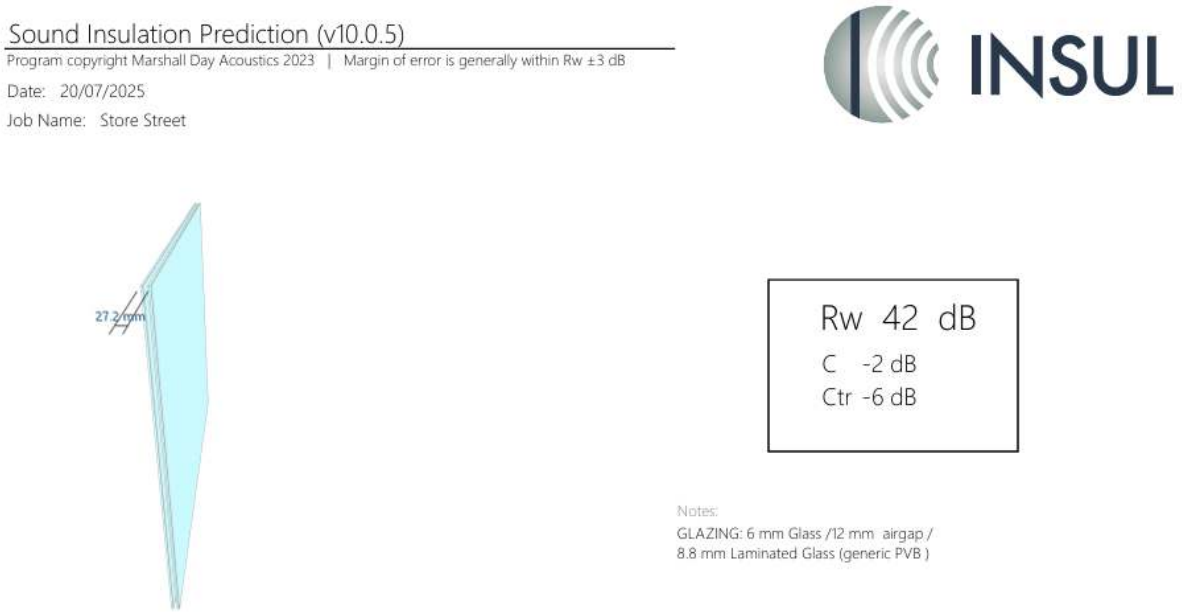


Figure 17: 6/12/8.8lam glazing. R_w + C_{tr} 36dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



Rw 42 dB
C -2 dB
Ctr -6 dB

Notes:
GLAZING: 6.8 mm Laminated Glass (generic PVB) /12 mm airgap / 6.8mm Laminated Glass (generic PVB)

Figure 18: 6.8lam/12/6.8lam glazing. $R_w + C_{tr}$ 36dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



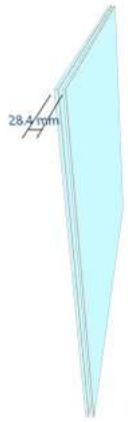
Rw 40 dB
C -2 dB
Ctr -5 dB

Notes:
GLAZING: 6 mm Laminated Glass (generic PVB) /10 mm airgap / 6 mm Laminated Glass (generic PVB)

Figure 19: 6lam/10/6lam glazing. $R_w + C_{tr}$ 35dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



Rw 41 dB
C -1 dB
Ctr -5 dB

Notes:
GLAZING: 10 mm Glass /12 mm airgap / 6 mm Laminated Glass (generic PVB)

Figure 20: 10/12/6lam glazing. $R_w + C_{tr}$ 36dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



Rw 44 dB
C -1 dB
Ctr -6 dB

Notes:
GLAZING: 10 mm Glass /20 mm airgap / 12 mm Laminated Glass (generic PVB)

Figure 21: 10/20/12lam glazing. $R_w + C_{tr}$ 38dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



Rw 47 dB
C -2 dB
Ctr -7 dB

Notes:
GLAZING: 6 mm Laminated Glass (generic PVB) /20 mm airgap / 16 mm Laminated Glass (generic PVB)

Figure 22: 6lam/20/16lam glazing. R_w + C_{tr} 40dB

Sound Insulation Prediction (v10.0.5)
Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB
Date: 20/07/2025
Job Name: Store Street

INSUL



Rw 45 dB
C -2 dB
Ctr -7 dB

Notes:
GLAZING: 6.8 mm Laminated Glass (generic PVB) /20 mm airgap / 10 mm Laminated Glass (generic PVB)

Figure 23: 6.8lam/20/10lam glazing. R_w + C_{tr} 38dB

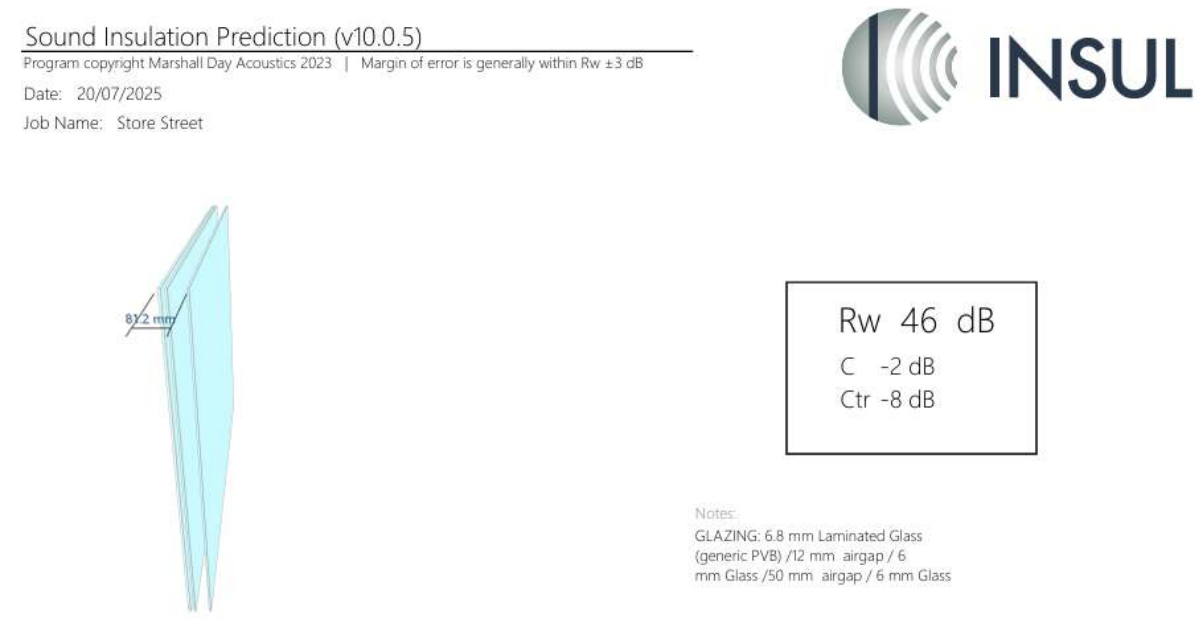


Figure 24: 6.8lam/12/6/50/6 glazing. $R_w + C_{tr}$ 38dB

Ventilation to the habitable rooms should be provided by means of either façade ventilators & openable windows or a whole building mechanical system such as an MVHR system. Any mechanical ventilation system should not increase background noise levels. The appointed HVAC or M&E Engineers should be able to produce a suitable ventilation scheme that will take into consideration the existing measured background noise levels, L_{A90}. With the lowest measured background noise level being 33.4dB(A) L_{A90} at Location 1, it is recommended that the noise from such a system when measured at the nearest residential façade should be no greater than 28.4dB(A) or rounded down to 28dB(A) L_{Ar}.

The external wall is likely to be a brick and block cavity construction. Figure 25 depicts the analysis of the cavity construction which would give a prediction of approximately 55dB $R_w + C_{tr}$.

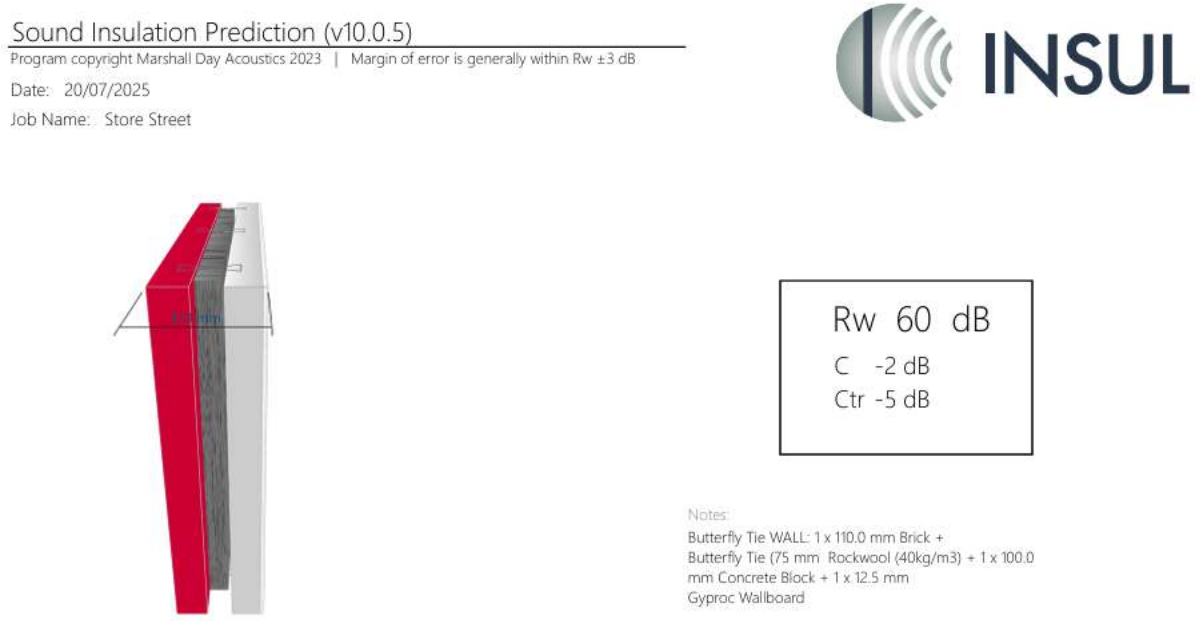


Figure 25: External cavity wall with internal plasterboard finish.

5. RECOMMENDATIONS

The proposed residential development on land adjacent to Store Street, Manchester has been assessed with recommendations for;

- Glazed units for the habitable room's to all elevations of the proposed dwellings on the development should achieve a minimum 29dB $R_w + C_{tr}$ such as certain glazing specifications detailed in section 4.
- Any façade ventilators mounted in the façade or within the frames of the glazed units to allow air flow into the dwelling without the need to open the windows or in conjunction with openable windows will also need to be acoustic rated with a minimum criteria of 35dB $D_{n,e,w} + C_{tr}$ to all elevations of habitable rooms to dwellings on the development. Mechanical ventilation such as an MVHR ventilation system could be considered as an alternative to provide an exchange of airflow but such a system or anything similar should not raise existing background noise levels.
- An MVHR system in itself along with any other fixed plant should not raise existing background noise levels. Based upon the lowest background noise level at location 1 of 33.4dB(A) from 02:30 to 03:00 on 10th July, the rating level of any new fixed plant should be 5dB below existing background noise levels and therefore the rating level, L_{Ar} should be no greater than 28dB(A) at the nearest residential facade. A mechanical whole building system could be used to provide an exchange of airflow without the need to open windows and trickle vents.
- Standard insulated roof construction.

In addition to the glazing examples given from pages 34 to 38, glazed units that will achieve 29dB $R_w + C_{tr}$ can be sourced from Pilkington Glass and examples of these units are detailed in figure 26. The value for $R_w + C_{tr}$ is given in the farthest column on the right.

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						R_w (C; C_{tr})	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Single glazing										
6.8 mm Pilkington **Optiphon™**	22	26	31	37	40	40	36 (-1; -4)	36	35	32
8.8 mm Pilkington **Optiphon™**	27	29	34	38	40	43	37 (0; -2)	37	37	35
10.8 mm Pilkington **Optiphon™**	26	30	35	39	40	46	38 (-1; -3)	38	37	35
12.8 mm Pilkington **Optiphon™**	29	32	36	41	42	51	40 (-1; -3)	40	39	37
16.8 mm Pilkington **Optiphon™**	31	33	38	41	43	54	41 (-1; -3)	41	40	38
Insulating glass units										
6 mm / 16 mm argon / 6.8 mm Pilkington **Optiphon™**	21	28	37	48	48	54	40 (-2; -6)	40	38	34
6 mm / 16 mm argon / 8.8 mm Pilkington **Optiphon™**	25	27	38	48	47	55	41 (-2; -6)	41	39	35
8 mm / 16 mm argon / 8.8 mm Pilkington **Optiphon™**	21	30	39	47	50	55	42 (-3; -8)	42	39	34
10 mm / 16 mm argon / 8.8 mm Pilkington **Optiphon™**	28	31	42	45	50	58	44 (-2; -6)	44	42	38
10 mm / 20 mm argon / 8.8 mm Pilkington **Optiphon™**	28	36	43	47	49	58	46 (-2; -6)	46	44	40
8.8 mm Pilkington **Optiphon™** / 16 mm argon / 12.8 mm Pilkington **Optiphon™**	28	36	45	53	56	64	48 (-2; -7)	48	46	41
10.8 mm Pilkington **Optiphon™** / 24 mm argon / 16.8 mm Pilkington **Optiphon™**	35	41	48	53	55	65	52 (-2; -6)	52	50	46
12.8 mm Pilkington **Optiphon™** / 20 mm argon / 16.8 mm Pilkington **Optiphon™**	35	45	49	50	54	65	51 (-1; -4)	51	50	47

Figure 26: Pilkington Glass glazing specifications that will achieve alternate $R_w + C_{tr}$ criteria.

The glazing detail here is typical of what glazing manufacturer's technical documentation will be represented as. Reputable glazing manufacturers such as Selectaglaze (www.selectaglaze.co.uk) will also be able to quote for glazed units.

6. CONCLUSIONS

Noise measurements have been taken on the adjacent plot of land to Store Street, Manchester. The measurement location was chosen to take a worst case scenario with Location 1 near to the northeastern elevation of the site to ascertain the noise impact from road traffic activity and pedestrians from Store Street as well as other noise sources such as resident's activity, trains, birdsong, aircraft, etc.

To achieve the *BS 8233:2014* criteria for night-time sleeping it is recommended that internal ambient noise levels should achieve 30dB L_{Aeq}. In Living Rooms for daytime resting 35dB L_{Aeq} is sought while Dining Rooms should have a minimum 40dB L_{Aeq}.

Based on the noise levels measured at the site, the *Birmingham City Council PCGN* document which considers *WHO* and *BS 8233* criteria and referenced here in the absence of any national documentation when selecting glazing and ventilator types, it states that minimum sound insulation criteria should also be met.

Based upon the Location 1 night-time ambient noise measurement high of 55.6dB(A) L_{Aeq} on the 11th July and daytime ambient noise measurement high of 60.6dB(A) L_{Aeq} on the 9th July, glazing to facades for all proposed habitable rooms to all elevations of those dwellings should seek to achieve a minimum 29dB $R_w + C_{tr}$.

Should ventilators be fitted to the facades by mounting them in the window frames or attenuated wall vents or acoustic air bricks etc., then they would need to achieve a minimum 35dB $D_{n,e,w} + C_{tr}$ for all dwellings across the development.

If ventilation to the development is to be provided by an alternative mechanical system such as an MVHR system then with a lowest background noise level of 33.4dB(A) measured at Location 1, any mechanical plant across the development should be rated with a noise level no greater than 28dB L_{Ar} at the nearest residential façade.

This glazing and façade ventilator criteria is based upon L_{Aeq} daytime external noise levels at the development not exceeding 63dB(A) and night-time noise levels not exceeding 58dB(A). The current ambient noise levels do not exceed these levels but this glazing and façade rating should also ensure that maximum internal noise levels at night should be no greater than 45dB(A) L_{Amax} on more than 10 – 15 occasions as per *WHO* recommendations in a single night-time period.

The results show that site is dominated by road traffic with some further impact from residents, pedestrians, cyclists, aircraft and birdsong. The noise measurements reflect the road traffic in the area and the absence of industrial or commercial noise sources in the immediate area which is increasingly becoming residential with apartment blocks.

With planning approval, the development would provide occupants with good transport links and close to Manchester City Centre.

7. SUMMARY.

Sanctuary Acoustics Ltd has been instructed by M1 Developments Ltd to assess the noise environment in the vicinity of land adjacent to Store Street, Manchester, M1 2WD. To accompany the submission of the full application a noise assessment has been conducted due to the presence of road traffic noise impacting onto the site from Store Street plus any other noise sources such as commercial noise in the vicinity. This area in the centre of Manchester and near to Picadilly was once a largely commercial area but now has a mixture of commercial premises with new apartment buildings and public car parking.

The proposed development plot which is square in shape is accessed off Store Street along the sites northern site boundary. On the opposing side of Store Street are apartments with additional apartments to the rear and east of the site. Further to the east of the site is the Ashton Canal while in the opposite direction to the west of the site and also with access off Store Street, is a commercial building which appears to be vacant. The primary noise source impacting onto the site is therefore road traffic noise from Store Street with the rumble of traffic from further afield also being perceptible, particularly during lulls in Store Street traffic. At the time of the noise survey, construction works further along Store Street where also taking place on the opposing side of the aqueduct. This resulted in vehicles at the temporary traffic lights backing up outside the site at intervals. This included an increase in idling engines and occasionally car audio. Secondary noise sources perceptible on site were noted in the form of birdsong, residents and pedestrians raised voices, cyclists, occasional aircraft overhead and the rumble of trains, particularly at night. There was no perception of fixed mechanical plant noise at the measurement location from existing sources off site.

To summarise:

1. Noise measurements were undertaken on the proposed development site which is located on land adjacent to Store Street, Manchester, M1 2WD.
2. Noise measurements were taken at one external location to assess noise currently impinging onto the site. The noise at Location 1 at the northeastern elevation was defined primarily as road traffic noise from Store Street with some birdsong, residents activity, pedestrians, joggers, cyclists, overhead aircraft and occasional trains perceptible, particularly at night. The underlying noise levels were fairly static over the 48-hour period but on some occasions would be raised with passing large vehicles such as HGV's and cars & motorbikes with low frequency exhausts or music playing while outside the site being held at the temporary traffic lights. There was also the occasional bang during the daytime from the construction site, which is naturally a temporary noise source at the construction site further along Store Street on the opposing side of the aqueduct.
3. The noise assessment was conducted with measurements commencing at Location 1 from 13:30 on Wednesday 9th July to 13:00 on Friday 11th July which were for a continuous period and in a secure location. The measurements at the location were for a continuous logging period and were set to record at 15-minute intervals which were later extrapolated to obtain the 1-hour L_{Aeq} and L_{A90}.
4. The noise measurements were referenced to the *National Planning Policy Framework (NPPF)*. Further reference was also made to *BS 8233:2014 Guidance on sound insulation and noise reduction for*

buildings, *BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and BS 4142:2014 Methods for rating and assessing industrial and commercial sound*. Additional reference was made to the *WHO Guidelines* and *Manchester City Council's Planning & Noise Technical Guidance.* This also states maximum noise levels from individual noise events in habitable rooms ≥45dB(A) L_{Amax} should occur no more than 15 times in any one night-time period (23:00 to 07:00).

5. BS 8233:2014 recommends a 30dB L_{Aeq} in Bedrooms at night for Sleeping and 35dB L_{Aeq} in Living Rooms for daytime Resting and 40dB L_{Aeq} within Dining Rooms.
6. The Location 1 measurement as a 16-hour daytime $L_{Aeq\ 16\text{-}hour}$ taken from 07:00 to 23:00 on the 10th July is 53.7dB(A). The night-time 8-hour $L_{Aeq\ 8\text{-}hour}$ from 23:00 on the 9th July to 07:00 on the 10th July is 51.0dB(A) $L_{Aeq\ 8\text{-}hour}$ and from 23:00 on the 10th July to 07:00 on the 11th July is 50.8dB(A) $L_{Aeq\ 8\text{-}hour}$. This shows continuity in noise levels between the day and night-time periods. The most significant daytime ambient noise measurement as a 15-minute interval was 60.6dB(A) L_{Aeq} measured between 20:45 to 21:00 on 9th July while the logarithmically averaged 1-hour ambient noise measurement was 56.4dB(A) from 20:00 to 21:00 on the 9th July. The most significant 15-minute night-time measurement was 55.6dB(A) from 06:45 to 07:00 on 11th July. The lowest measured background noise level was 33.4dB(A) L_{A90} from 02:30 to 02:15 and 02:15 to 02:30 on the 10th July 2025.
7. Maximum noise events $L_{AFmax,outside}$ are above the 55dB(A) level between 23:00 and 07:00 at Location 1 averaging 63dB(A) to 75dB(A) L_{Amax}.Typically as a rule of thumb, 55.0dB(A) outside an open window will produce 45.0dB(A) inside the room.
8. Suitable glazing types, including laminated or partially laminated glazed units would reduce noise ingress. Example double glazing types are given in section 4 from pages 34 to 38 although Pilkington Glass produce standard units as depicted in figure 26 on page 39. The glazing types on pages 34 to 38 have been modelled using the *Marshall Day Acoustics Sound Insulation Prediction Software, Insul.* With reference to the glazing criteria table in the *Birmingham City Council PCGN* planning document which provides a useful comparison between measured external ambient noise levels and the noise criteria required for façade glazing and ventilators in order to achieve internal noise levels in line with *BS 8233,* it is recommended that the glazed units for habitable rooms to all elevations for the dwellings on the development should meet a minimum noise criteria of 29dB $R_w + C_{tr}$. The *WHO* guidance also states that internal maximum noise events greater than 45dB(A) L_{Amax} should be restricted to occurring no more than on 10-15 occasions during any one night-time period. This is also reiterated in *Manchester City Council's Planning & Noise Technical Guidance* with more than 15 occurrences as detailed in item *3.6.1.1 Residential Developments*.
9. If ventilation to the new dwellings is to be provided by façade ventilators then any such ventilators should achieve a minimum noise rating of 35dB $D_{n,e,w,}+ C_{tr}$ for all dwellings across the development. If ventilation is to be provided alternatively by a mechanical whole building system such as an MVHR type ventilation system then any mechanical system or similar would need to be assessed against *BS 4142* and take into consideration existing background noise levels, (L_{A90}) at the façade of the nearest residential dwelling. The rating level

of the plant should also take into consideration any acoustic features such a new system may contain for example discrete tones or impulses. Any new mechanical system should not exceed the background noise level. Therefore, on considering the lowest measured existing background noise level (L_{A90}) at location 1 of 33.4dB(A) L_{A90} which was measured on Friday 11th July from 02:30 to 03:00, the rating of any mechanical system when also taking into consideration any acoustic features the system may have such as tones and impulsive sounds, should be rated at least 5dB below with an L_{Ar} 28dB(A) or less at the nearest residential facade.

10. Provision has been made for designated amenity spaces and therefore, *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* states a lower limit of 50dB(A) L_{Aeq} and an upper limit for ambient noise level in external amenity spaces of 55dB(A) L_{Aeq} which should not be exceeded. During the noise survey it was noted that the ambient noise level during the daytime remained below the 55dB(A) L_{Aeq} upper limit as a 16-hour L_{Aeq} with only four occasions as an hourly average out of thirty one which did measure above the SOAEL but still within 2dB(A) of the SOAEL upper limit which is negligible in acoustic terms at Location 1. Some of the maximum noise events on site where due to the construction site further along Store Street and from vehicles backed up outside the site due to the temporary traffic lights which have been installed as a consequence of the construction site and therefore not a permanent fixture. Therefore the amenity spaces proposed for this site such as balconies or terraces, should not be subject to raised ambient noise levels. There are currently apartment blocks in the vicinity many of which have balconies (amenity spaces) overlooking Store Street. *BS 8233:2014* does state in *7.7.3.2 Design criteria for external noise; "…However, it is also recognised that these guideline values are not achievable in all circumstances were development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between the elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*
11. With satisfactory glazing and ventilation measures in place against noise primarily from the rumble of road traffic, the proposed development of residential dwellings would make sufficient use of the prime location.

8. APPENDIX A

Acoustics Glossary of Terms

$L_{Aeq,T}$ – Equivalent continuous sound pressure level. This is the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that within a specified time interval, T, has the same mean squared sound pressure as a sound that varies with time. This parameter is used to refer to the ambient noise level.

L_{A10} – The A-weighted mean square sound pressure level that is exceeded for 10% of the time.

L_{A90} – The A-weighted mean square sound pressure level that is exceeded for 90% of the time. Referred to as the background noise level.

L_{Amin} – The lowest A-weighted noise level recorded during a noise event.

L_{Amax} – The highest A-weighted noise level recorded during a noise event.

L_{day} – is the A-weighted equivalent continuous sound pressure level (L_{Aeq}) over the 12-hour day period of 07:00 tom 19:00 hours.

$L_{evening}$ – is the A-weighted equivalent continuous sound pressure level (L_{Aeq}) over the 4-hour evening period of 19:00 to 23:00 hours.

L_{night} – is the A-weighted continuous sound pressure level (L_{Aeq}) over the 8-hour night period from 23:00 to 07:00 hours.

L_{den} – is the day, evening, night level. L_{den} is a logarithmic composite of the L_{day}, $L_{evening}$ and L_{night} levels, with 5dB(A) added to the $L_{evening}$ value and 10dB(A) added to the L_{night} value.

Specific Noise Source – The noise source under investigation for assessing the likelihood of complaints.

Ambient Noise – Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Residual Noise – The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to such a degree that it does not contribute to the ambient noise.

Residual Noise Level, $L_{Aeq,T}$ – The equivalent continuous A-weighted sound pressure level of the residual noise.

R_w – The weighted sound reduction index is a single number quantity which characterises the airborne sound insulating properties of a material or building element over a range of frequencies.

C_{tr} – The spectrum adaptation term added to a sound insulation quantity such as R_w to compensate for particular sound spectra such as urban road traffic noise.

$D_{n,e,w}$ – The weighted element normalised level difference is a single number quantity which characterises the airborne sound insulating properties of a small building element over a range of frequencies.