Suite 24
Doncaster Business Innovation Centre
Ten Pound Walk
Doncaster
DN4 5HX

86 Park Road, Worsborough, S70 5AD

Noise Impact Assessment

For:
Edge AD Ltd

22nd January 2025

Ref: NIA/11870/25/1xx/v1/86 Park Road, Worsborough
Issue: First
Author: R. Ashby BSc (Hons) MIOA

Contents

1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Edge AD Ltd (hereafter referred to as 'the client') to undertake a noise impact assessment a residential redevelopment of existing care homes at 86 Park Road, Worsborough (hereafter referred to as 'the site').

This report details:

- The methodology and results of a noise survey conducted at the site
- The assessment of potential impact of surrounding noise sources that may affect the proposed residential dwellings
- Recommendations for the building envelope (fenestration and ventilation)
- Assessment of noise levels in external amenity areas.

The report has been prepared on behalf of the client for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult the client and ENS as to the extent to which the findings may be appropriate for their use.

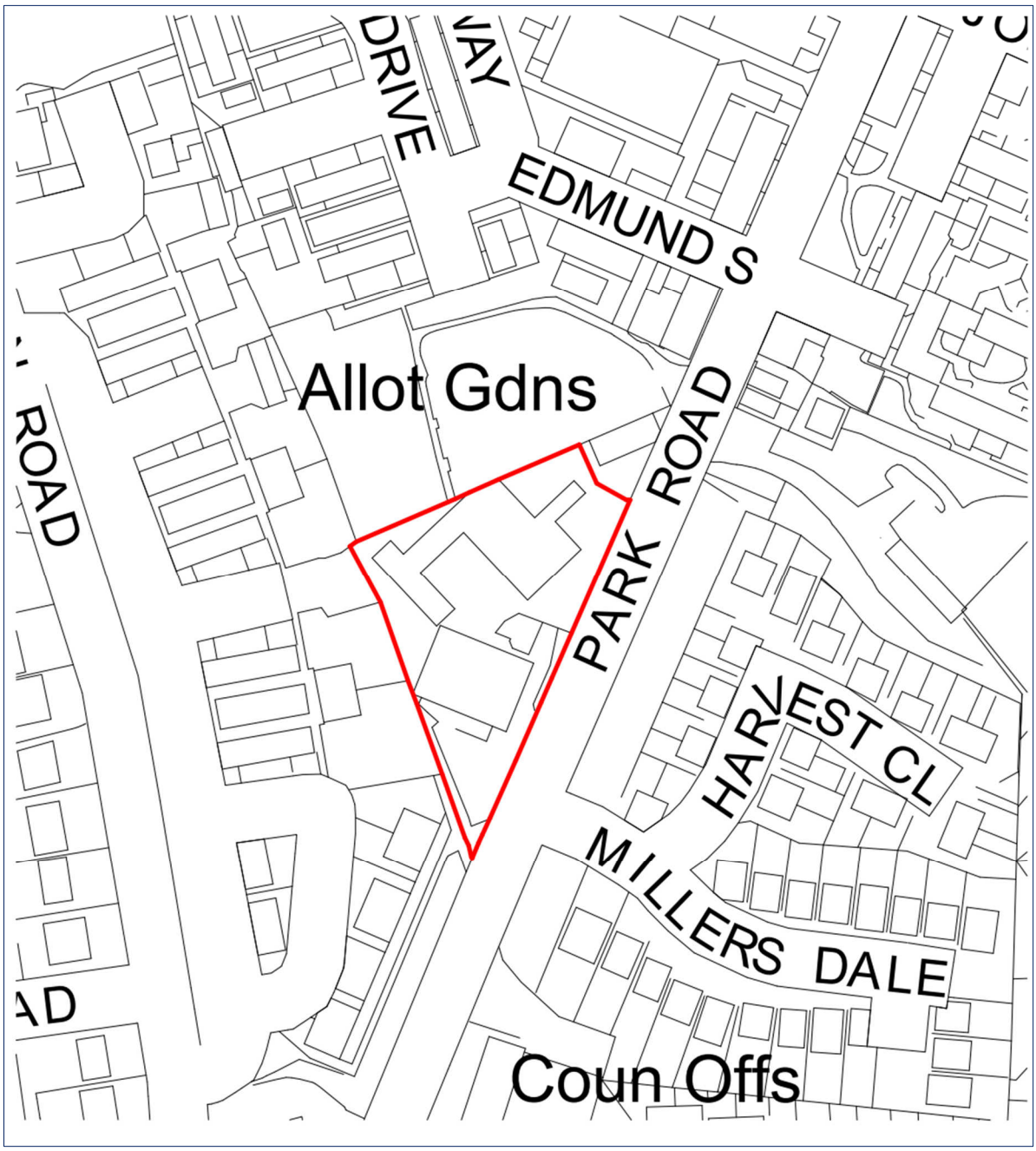
A glossary of acoustic terms used in the main body of the text is contained in Appendix A.

1.2 Site Description

The development site is located on land at 86 Park Road, approximately centred on grid reference: 435254,403829. The site presently comprises two former care home buildings plus associated car parking and external amenity areas.

The site is bounded to the north by allotment gardens. The south-eastern site boundary is adjoined by Park Road, with residential dwellings beyond. To the west, the site is bounded by residential dwellings along Vernon Road.

Figure 1.1: Location of Proposed Development



The proposals are for the redevelopment of the former care homes to provide 28 no. new residential dwellings at ground and first floor level, plus associated access and car parking spaces.

2 Noise Criteria

2.1 Assessment Guidance

British Standard 8233:2014 - Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS8233)[1] provides recommendations for the control of noise both in and around buildings and suggests criteria and limits appropriate to their function. For residential dwellings, the main considerations are:

- Bedrooms - the effect of noise upon sleep
- Other habitable rooms - the effect of noise upon resting, listening and communicating

It is desirable that the internal ambient noise level does not exceed the guideline values as replicated in Table 2.1.

Table 2.1: Indoor Ambient Noise Levels for Dwellings - BS8233:2014

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

BS8233 states:

'If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.'

Whilst BS 8233 is primarily concerned with noise within dwellings, the following guidance is also provided for external amenity areas:

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

ProPG Planning and Noise: New Residential Development

ProPG Planning and Noise: New Residential Development (ProPG)[2] recommends compliance with indoor noise level targets in residential dwellings based on the guidance contained in BS8233 (see Table 2.1). Additionally, with regard to individual noise events, ProPG states:

[1] British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI
[2] 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

'Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline, then the judgement of acceptability will depend not only on the maximum noise levels but also factors such as the source, number, distribution, predictability and regularity of the noise events."

ProPG acknowledges that the internal target noise levels may only be practically achieved with windows closed in certain areas (e.g. in urban areas or sites adjacent to transportation noise sources) and states that:

'In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide 'whole dwelling ventilation' in accordance with Building Regulations Approved Document F (e.g. trickle ventilators in the open position).

It should also be noted that the internal noise level guidelines are generally not applicable under 'purge ventilation' conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).'

Approved Document O

Approved Document O, 2021 is written in support of Part O of Schedule 1 to the Building Regulations 2010. The approved document details methods of addressing overheating of residential dwellings and is applicable only across England.

The approved document has the following relevant guidance in Section 3 regarding noise ingress into buildings:

'In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- *40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)*
- *55dB $L_{Amax,F}$ more than 10 times a night (between 11pm and 7am)*

3 Noise Survey and Results

3.1 Overview

To assess external noise levels affecting the site, noise monitoring was undertaken between Thursday 9th and Friday 10th January 2025.

The adopted noise monitoring positions (illustrated in Appendix B) were as follows:

- 1 – approximately 12m from the south-eastern site boundary
- 2 – at the northern site boundary
- 3 – at the western site boundary
- 4 – at the north-eastern site boundary

All noise measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. Each meter was connected to a windshield covered microphone. All measurements were taken in free-field conditions at a height of approximately 4m above ground level.

The calibration of the measurement system was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A–weighted broadband parameters including L_{Aeq}, L_{A10}, L_{A90} and L_{AFmax} together with linear octave band data.

Weather conditions were considered appropriate for noise monitoring.

3.2 Summary of Results

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Position	Date	Time (hh:mm)	$L_{Aeq,T}$ (dB)	L_{AFmax}[1] (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
1	09/01/25	10:56-11:56	66	-	70	53
		11:57-13:57	65	-	69	54
	10/01/25	05:10-07:10	64	79	69	49
2	09/01/25	14:17-14:47	51	-	54	47
3	09/01/25	14:53-15:23	49	-	51	47
4	09/01/25	15:28-15:58	65	-	69	55

Notes: [1] highest individual event level during the measurement period

The noise climate at each of the monitoring positions was controlled by road traffic noise, primarily from Park Road which lies to the south-east of the site boundary.

In terms of individual events during the night time, noise levels at MP1 were typically ≤ 78 dB $L_{Amax,F}$.

3.3 Prediction of Road Traffic Noise

For the prediction of road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of $L_{A10,1hr}$ are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10,\,3hr}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10,\,18hr}$ can be calculated from the equation:

$$L_{A10,18hr} = L_{A10,3hr} - 1dB$$

Further to the above, a study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10,\,18hr}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ ambient noise levels based on the $L_{A10,18hr}$ noise levels, as follows:

$$L_{Aeq,16hr} = 10 \times log_{10}\left(\frac{\left(\left(10\text{^}\left(\frac{(0.95 \times L_{A10,18hr} + 1.44)}{10}\right) \times 12\right) + \left(10\text{^}\left(\frac{(0.97 \times L_{A10,18hr} - 2.87)}{10}\right) \times 4\right)\right)}{16}\right)$$

$$L_{Aeq,8hr} = 0.9 \times L_{A10,18hr} - 3.77$$

Based on the noise levels summarised in Table 3.1 above, noise levels at MP1 are calculated to be 66 dB $L_{Aeq,16hr}$ during the day, and 58 dB $L_{Aeq,8hr}$ during the night time.

4 Assessment

4.1 Site Noise Levels

To assess noise levels across the site, a three-dimensional noise model has been developed based on the noise levels summarised in Section 3. Noise model geometry is based on ordnance survey mapping and terrain data, and drawings and information provided by the client.

Noise emission from transport noise sources has been calculated in octave bands according to ISO 9613:1996, assuming soft ground. All buildings are assumed to be reflective, and second order reflections are considered.

Day and night-time noise façade noise levels are presented as Figures C1-C3 in Appendix C.

4.2 Internal Noise Levels

Feasibility of Open Windows

With regard to internal noise levels when windows are open, the World Health Organisation (WHO) Guidelines for Community Noise (1999) states:

'the noise reduction from outside to inside with the window partly open is 15 decibels'.

With reference to the results of the noise model presented in Appendix C, the majority of façades across the development will be exposed to noise levels ≥ 55 dB $L_{Aeq,16hr,}$ during the daytime and ≥ 45 dB $L_{Aeq,8h}$ during the night time. The most noise exposed façades are predicted to be exposed to typical maximum noise levels of 68 – 78 dB $L_{Amax,F}$.

Based on the above, noise levels for the most exposed façades are likely to be above the level at which ventilation via partially open windows would be suitable. On this basis, it is not recommended that permanently open windows are relied upon as the primary means of ventilation for proposed habitable rooms in these areas.

A scheme of sound insulation will be required with acoustically attenuated ventilation such that the minimum ventilation rates specified in Approved Document Part F can be achieved with windows closed. Typically, this would take the form of acoustic trickle ventilators in window frames.

The assessment has therefore assumed that windows on façades exposed to noise levels > 50 dB $L_{Aeq,16hr}$ and/or 45 dB $L_{Aeq,8hr}$ / 60 dB $L_{Amax,F}$ will be closed, as part of the noise mitigation strategy for the site. Windows can be opened for temporary purge ventilation (to enable discretionary rapid air changing) with resultant internal levels exceeding the noise criteria; however, this would be on a temporary basis.

Scheme of Mitigation

Calculations have been performed to determine the configuration of glazing and ventilation required to satisfy the internal noise criteria with closed windows for the most noise affected areas of the site. The calculations have incorporated the measured external noise level data and the noise ingress calculation methodology outlined in Annex G.2 of BS8233:2014. Building footprints are based on the current planning layouts, drawing reference: (A24-17-012 Proposed GA Plans (Building 1) and A24-17-013 Proposed GA Plans (Building 2)).

In addition to satisfying the requirements of BS 8233, the scheme of sound insulation presented below is expected to control individual noise events in line with the ProPG requirement to not exceed 45 dB $L_{Amax,F}$ internally more than 10 to 15 times per night, as set out in Section 2.

The following has been assumed for assessment purposes:

- Room and glazing dimensions are based on general arrangement drawings
- Reverberation time of 0.5 seconds for habitable areas
- Typical masonry external wall construction (e.g. 100mm brick / 100mm cavity / 100mm block)

Minimum sound reduction values for the glazing and ventilation elements are presented in Table 4.1, based on commonly available ventilation and glazing products. The calculations assume one ventilator per bedroom, and two for all other habitable rooms. Table 4.1 should be read in conjunction with the façade noise plots presented as Figure C1 to C3 in Appendix C.

Table 4.1: Required Sound Reduction of Façade Elements

Element	Required Sound Reduction (dB)						Indicative Specification
	125 Hz	250 Hz	500 Hz	1kHz	2kHz	Weighted R_w ($R_w + C_{tr}$) / $D_{n,e,w}$ ($D_{n,e,w} + C_{tr}$)	
All façades exposed to noise levels > 60 dB $L_{Aeq,16hr}$ or >55 dB $L_{Aeq,8hr}$ and/or 70 dB $L_{Amax,F}$							
Glazing	22	25	38	41	36	**37 (32)**	8/18/6 acoustic double glazing
Ventilation	37	35	32	33	37	**43 (41)**	Ryton AAC125HP through wall vent
All façades exposed to noise levels > 50 dB $L_{Aeq,16hr}$ or >45 dB $L_{Aeq,8hr}$ and/or > 60 dB $L_{Amax,F}$							
Glazing	21	20	26	38	37	**30 (28)**	6/6-20/4 Thermal double glazing
Ventilation	37	35	32	33	37	**34 (33)**	Ryton AAC125HP through wall vent

Alternative solutions to the indicative specifications shown in Table 4.1 may be considered if sound reduction performances are equivalent to (or greater than) those stipulated.

The glazing recommendations apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing. Calculations assume one trickle vent for bedrooms and two for all other habitable rooms.

The opening and free area of the proposed ventilation units should be checked by a mechanical services engineer before designs are finalised. Should the equivalent open area be insufficient to meet the minimum requirements of Part F of the Building Regulations, it may be necessary to increase the number of units per habitable room. Where this applies, the required sound reduction of the ventilation units should be increased accordingly (3 dB per doubling of required no. of vent units). Calculations assume one ventilator for bedrooms and two ventilators for all other habitable rooms.

4.3 Mitigation of Overheating

ADO states that for moderate risk locations (i.e. outside of London) the minimum free area of the open window should be at least 4% of the floor area of the room.Building in some allowance, this equates to an assumed window opening (S_{open}) area of at least 5% of the floor area. As the open area varies as a function of the floor area, for a typical floor-to-ceiling height of 2.4m, a window open area of 5% of the floor area equates to an external to internal noise reduction of 10 dB.

With reference to the internal targets contained in ADO, it is assumed that open windows can form the overheating mitigation strategy with no additional ventilation or cooling, providing the external noise levels outside bedrooms at night do not exceed **50 dB $L_{Aeq,8hr}$** and **65 dB $L_{Amax,F}$** (more than 10 times).

Figures C4 and C5 in Appendix C indicate in green the façade areas where mitigation of overheating via partially open windows would be suitable. For façades marked in red, mitigation of overheating should be achieved without reliance on partially open windows in bedrooms.

5 Summary and Conclusions

A noise impact assessment has been performed for a new residential redevelopment of existing care homes at 86 Park Road, Worsborough.

A noise survey was undertaken at the site, to assess noise levels from existing noise sources. The noise climate was found to be controlled by a combination of noise from local and distant road traffic.

Section 4 of this report sets out proposals for a scheme of sound insulation which is considered to achieve suitable residential amenity for the proposed new dwellings.

Site noise levels are considered suitable for the majority of external amenity areas, with mitigation proposed in the form of close boarded timber fences to gardens in the most noise affected areas.

Appendix A – Abbreviations and Definitions

Sound Pressure Level (L_p)
The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_o)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_o = reference sound pressure (20 μPa).

A-weighting
A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,\,T}$
The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, *T*, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq,\,16h}$ (07:00 to 23:00 hours) and $L_{Aeq,\,8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10,\,T}$
The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10,\,18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

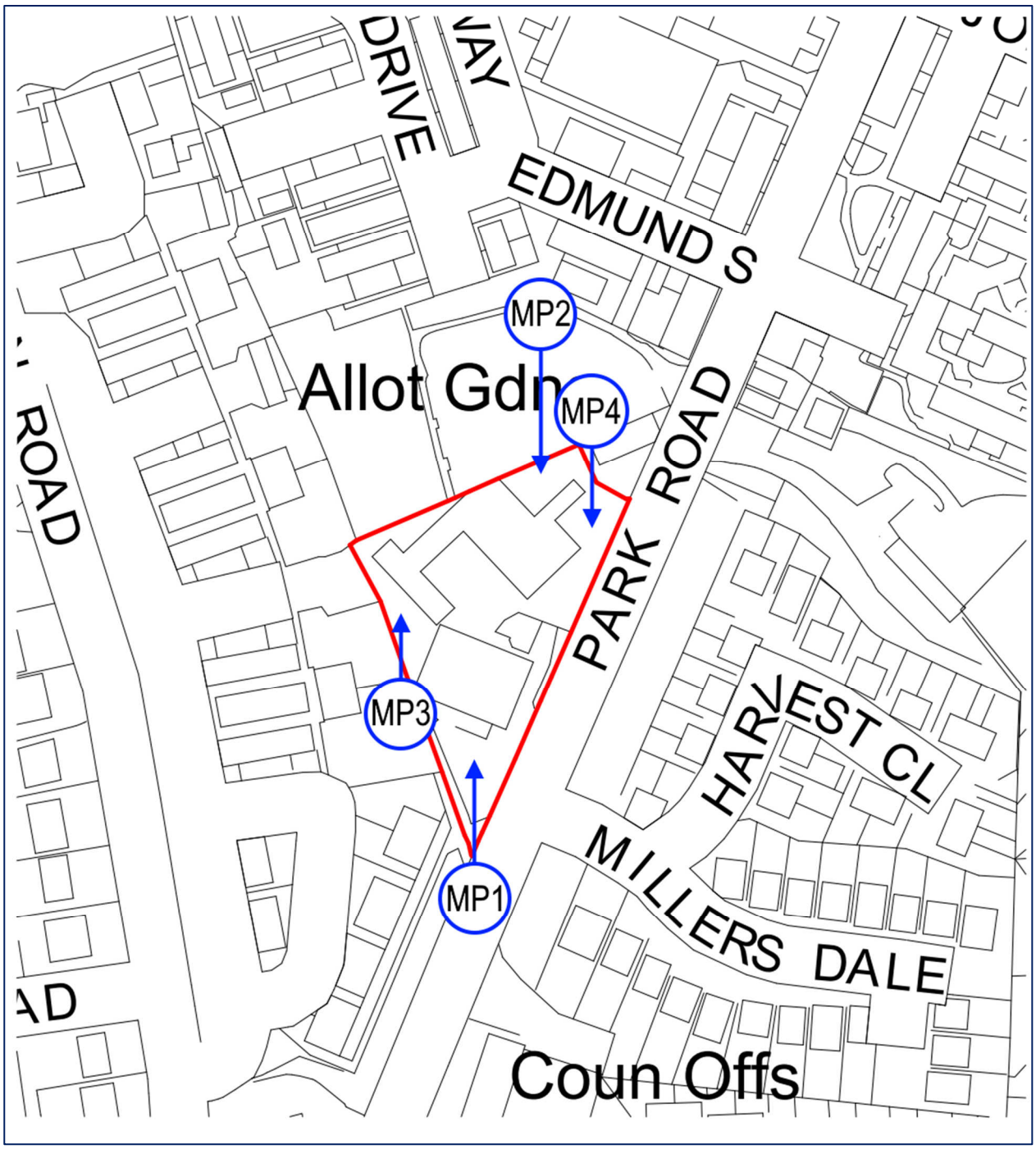
$L_{A90,\,T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\,max}$
The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})
The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)
Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix B – Noise Monitoring Positions



Appendix C – Noise Modelling Results

Figure C1: Daytime Façade Noise Levels (dB $L_{Aeq,16hr}$)

Figure C2: Night-time Façade Noise Levels (dB $L_{Aeq,8hr}$)

Figure C3: Night-time Façade Noise Levels (dB $L_{Amax,F}$)

Figure C4: Night-time Façade Noise Levels (dB $L_{Aeq,8hr}$) - Overheating

Figure C5: Night-time Façade Noise Levels (dB $L_{Amax,F}$) - Overheating