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Proposed Care Home on Land North of Hatfield Avenue, Hatfield

Noise Impact Assessment Planning Condition 9

**For:
ADG Architects**

10th December 2021

Ref: NIA/10068/21/10204/v1/Hatfield Avenue, Hatfield
Issue: Draft
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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by ADG Architects (hereafter referred to as 'the client') to undertake a noise impact assessment for a new 81-bed Care Home development on land north of Hatfield Avenue, Hatfield (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 fixed plant items on nearby noise sensitive receptors

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 site is located north of Hatfield Avenue, and south of Manor Road, centred on grid reference: 521858,209510 within Hatfield Business Park in an area of mixed commercial and residential land uses. The site itself is understood to be a brownfield site, having previously been use as surface parking.

Figure 1.1 below indicates the approximate site boundary and surrounding properties.

Figure 1.1: Location of Proposed Development



The site is bounded to the north by Manor Road, with residential dwellings beyond. To the south east, the site is bounded by a car dealership (Porsche Centre Hatfield) whilst the western site boundary is adjoined by One Hatfield Hospital. The southern tip of the site is bounded by a shared access road used by both adjoining properties, and which will be used by the development following completion. Further south, Hatfield Avenue runs east west approximately 35m south.

2 Noise Criteria

2.1 Local Authority Requirements

Planning permission for the development was granted by Welwyn Hatfield Borough Council, subject to a number of conditions (Planning Application reference: 6/2019/2782/VAR). The following Planning Conditions are relevant to this report:

“9 *No development above ground level shall take place until details of noise from plant and equipment to be installed on the premises has been submitted to and approved in writing by the Local Planning Authority. These details must include an acoustic report evidencing that noise emissions from plant and equipment will be 10dB (LAeq) below the background noise level (LA90) at the nearest residential property (using the methodology outlined within BS4142:2014). The development must be carried out in accordance with the approved details unless otherwise agreed in writing by the Local Planning Authority.*”

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

BS 4142¹ presents methods for rating and assessing the potential impact of commercial and industrial sound upon noise sensitive receptors. The Standard is appropriate for the consideration of industrial and manufacturing processes, fixed installations which comprise mechanical and electrical plant and equipment and mobile plant / vehicles that form an intrinsic part of the industrial/commercial including the loading and unloading of goods and materials at the premises.

The noise impact magnitude is derived from the numerical subtraction of the representative² background noise level from the measured or calculated rating level of the specific sound under consideration. Typically, the greater this difference, the greater the magnitude of the impact:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact 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

The ‘rating level’ must be determined considering the need for any ‘character corrections’ to the specific industrial/commercial noise level to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. This can be done using a subjective, objective or reference methods. Where multiple features are present the corrections should be added in a linear fashion to the specific level.

¹ British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. British Standards Institution (2019)

² ‘Representative’ is generally considered to be ‘typical’ (e.g. formed by analysis of modal / mean average values) rather than the lowest measured

The subjective method is based on the corrections presented in Table 2.1.

Table 2.1: BS4142 Subjective Method ‘Acoustic Feature’ / Rating Corrections

Level of Perceptibility	Tonal Correction	Impulsivity Correction	Intermittency Correction	Other
None	0 dB	0 dB	+3 dB Where intermittency is readily identifiable	+3 dB Where neither tonal nor impulsive but clearly identifiable against prevailing soundscape
Just Perceptible	+ 2 dB	+ 3 dB		
Clearly Perceptible	+ 4 dB	+ 6 dB		
Highly Perceptible	+ 6 dB	+ 9 dB		

BS 4142 requires separate analysis for day and night time periods, evaluating the Rating level over an appropriate reference time interval (T_r) of:

- 1 hr during the day (between 07:00 - 23:00 hrs)
- 15 min during the night (between 23:00 - 07:00 hrs)

Section 11 of BS 4142 introduces the concept of ‘context’ to the process of identifying noise impact and explains that:

‘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.’

3 Noise Survey and Results

3.1 Overview

In order to assess external noise levels affecting the site, noise monitoring was carried out between Wednesday 10th and Thursday 11th November 2021. Construction of the development was underway during the survey period, and as a result, it was not possible to undertake noise measurements within the site boundary. Representative noise measurement positions were selected to minimise the influence of on-site activity.

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

- 1 – On Hatfield Avenue, approximately 70m south-east of the site, 4m from the northern kerb;
- 2 – On Manor Road, north-east of the site, approximately 2m from the kerb; and
- 3 – On Manor Road, north west of the site approximately 0.5m from the kerb.

Noise measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. Each meter was connected to a windshield covered microphone. Measurements at all positions were taken at approximately 1.5m 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 throughout the survey period.

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} (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
1	10/11/2021	16:10-16:25	68	-	72	60	Noise climate controlled by local road traffic
	11/11/2021	03:57-04:12	65	78	69	47	Noise climate controlled by local road traffic
		04:53-05:08	66	78	70	50	Noise climate controlled by local road traffic
		05:48-06:05	68	80	72	56	Noise climate controlled by local road traffic
		06:44-06:59	69	87	72	59	Noise climate controlled by local road traffic
		07:40-07:56	67	-	70	61	Noise climate controlled by local road traffic
		08:43-09:00	67	-	70	61	Noise climate controlled by local road traffic
11:23-11:54	64	-	67	58	Noise climate controlled by local road traffic		
2	10/11/2021	16:29-16:44	63	-	65	59	Noise climate controlled by distant and local traffic
	11/11/2021	04:16-04:32	51	71	52	46	Noise climate controlled by distant road traffic
		05:11-05:26	55	76	55	50	Noise climate controlled by distant road traffic
		06:08-06:24	59	75	60	56	Noise climate controlled by distant and local traffic
		07:02-07:17	60	-	62	56	Noise climate controlled by distant and local traffic
		07:58-08:20	61	-	64	55	Noise climate controlled by distant and local traffic
3	10/11/2021	16:45-17:07	61	-	63	51	Noise climate controlled by distant road traffic
	11/11/2021	04:33-04:49	46	61	48	44	Noise climate controlled by distant road traffic
		05:28-05:44	55	80	52	48	Noise climate controlled by distant road traffic
		06:25-06:40	56	78	56	50	Noise climate controlled by distant and local traffic

Position	Date	Time (hh:mm)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
		07:18-07:37	62	-	65	50	Noise climate controlled by distant and local traffic
		08:21-08:40	64	-	68	51	Noise climate controlled by distant and local traffic
		12:34-13:05	58	-	60	47	Noise climate controlled by distant and local traffic

3.3 Noise Sensitive Receptors

The closest noise sensitive receptors to the proposed development are described in Table 3.2 below, and indicated on the site plan presented as Appendix B.

Table 3.2: Noise Sensitive Receptors

NSR	Description	Approximate distance from site boundary (m)
A	One Hatfield Hospital	15
B	Dwellings along Manor Road	20

The above noise sensitive receptors represent the closest identified noise sensitive premises, with any others located further from the site, and in some cases screened by intervening buildings. A satisfactory noise impact at the defined NSA should therefore ensure a satisfactory noise impact at other more distant noise sensitive locations.

3.4 Analysis

Fixed Plant Noise Limits

Fixed plant noise limits have been derived from the lowest 15-minute measured background noise levels presented in Table 3.1. In accordance with the requirements of Planning Condition 9, Rating plant noise limits have been proposed at a level not exceeding 10 dB below the measured background noise level for either the day or night time.

Table 3.3 below presents the proposed fixed plant noise limits.

Table 3.3: Noise Sensitive Receptors

NSR	Period	Representative Background Noise Level (dB $L_{A90,T}$)	Proposed Rating Noise Limit (dB $L_{Ar,Tr}$)
All NSRs	Daytime (07:00-23:00)	47	≤ 37
	Night Time (23:00-07:00)	44	≤ 34

4 Fixed Plant Assessment

4.1 Fixed Plant Items

In addition to the mechanical ventilation plant included for each of the residential bedrooms, a number of additional fixed plant items are proposed. These include a bank of external compressors as well as extract plant associated with the laundry and kitchens.

The major items of fixed plant associated with the development is as follows:

- 19 no. UNI-X220 Ventilation and heat recovery units
- 11 no. UNI-X360 Ventilation and heat recovery units
- 6 no. UNI-X580 Ventilation and heat recovery units
- 6 no. Mitsubishi PUZ-ZM35VKA
- 16 no. MEVDC Multi-point extract fans
- 13 no. MEVDC R Multi-point extract fans
- 1 no DS7A-LES kitchen supply fan
- 1 no. Kitchen extract fan
- 2 no. ILMEC315 Extract Fans

The development also includes some small domestic extract fans serving cupboards etc, which have very low noise emission externally. These have not been included in the assessment.

4.2 Propagation

Cumulative plant noise levels have been calculated using a three-dimensional Cadna-A noise model. Noise model geometry is based on Ordnance survey mapping and terrain data. Noise emission from fixed plant is based on the sound power level data presented in Section 4.1.

Noise levels at each of the NSR identified in Section 3.3 have been predicted, assuming that all items of fixed plant are operating concurrently throughout the assessment period. With the exception of the kitchen supply and extract fan which will operate during daytime hours only, fixed plant items are assumed to operate continuously and concurrently throughout the assessment periods. Noise calculations include corrections for silencers and end-reflections for all plant ducted to external areas.

The results are presented in Table 4.2 below. A noise contour plot is presented in Appendix C, illustrating the propagation of noise across the site at 4m above ground level, representative of a first-floor bedroom.

Table 4.2: Calculated Plant Noise Levels at NSRs

Noise Sensitive Receptors	Specific Noise Level at Receptor (dB $L_{Aeq,1hour}$)	
	Daytime (07:00-23:00)	Night Time (23:00-07:00)
A	33	32
B	34	30

4.3 Assessment

With regard to potential ‘acoustic feature’ corrections, the following is considered:

- All items of mechanical extract plant are expected to operate continuously throughout the relevant assessment periods, therefore no corrections are required for intermittent operation. It is possible that the external condensers may operate on-demand, however as noise from these items of plant are predicted to be < 10 dB LAeq,1hour at the façade of the nearest NSR, it is unlikely that these items of plant would be audible, therefore no corrections are required.
- Noise associated with the type of plant proposed is not normally impulsive in nature; therefore, a correction for impulsivity has not been applied.
- Noise generated by plant of this type is generally not tonal, and when coupled with the requirement for plant to be a minimum of 10dB below the background level at the nearest receptors, it is unlikely that tonality would be perceptible against the prevailing noise climate. Therefore no correction has been applied.

The calculated plant noise levels have been assessed in accordance with BS4142. The results of the assessment are presented in Tables 4.3 and 4.4 for day and night, respectively.

The results of the assessment are presented in Table 4.3 and Table 4.4.

Table 4.3: Fixed Plant Noise Assessment – Daytime (07:00-23:00)

Parameter	NSR A	NSR B
Typical background sound level (dB LA90,1hour)	47	47
Specific noise level (dB LAeq,1hr) (See Table 4.2 – plant assumed to operate continuously for 100% of assessment period)	33	34
BS 4142 Acoustic feature correction (dB)	0	0
Rating noise level (dB LAr,1hour)	33	34
Excess over background sound level	-14	-13
Compliant with Planning Condition 9?	Yes	Yes

Table 4.4: Fixed Plant Noise Assessment – Night Time (23:00 – 07:00)

Parameter	NSR A	NSR B
Typical background sound level (dB LA90,1hour)	44	44
Specific noise level (dB LAeq,1hr) (See Table 4.2 – plant assumed to operate continuously for 100% of assessment period)	32	30
BS 4142 Acoustic feature correction (dB)	0	0
Rating noise level (dB LAr,1hour)	32	30
Excess over background sound level	-12	-14
Compliant with Planning Condition 9?	Yes	Yes

The assessment indicates that the measured plant noise levels would satisfy the requirements of Planning Condition 9 without mitigation.

5 Summary and Conclusions

A noise impact assessment has been performed for a new residential development north of Hatfield Avenue, Hatfield.

Planning permission for the development was granted by Welwyn Hatfield Borough Council, subject to a number of conditions including a requirement for an assessment of fixed plant noise emissions from the development.

Noise monitoring was undertaken between Thursday 10th and Friday 11th November 2021 to assess background noise levels in the vicinity of the site.

Noise emission from all items of fixed plant associated with the development has been assessed having regard to the guidance set out in BS 4142 summarised in Section 2, and the results of the noise survey summarised in Section 3 of this report.

The assessment indicates that noise emission from all items of fixed plant operating concurrently would be a minimum of 10dB below the prevailing background noise level at the façade of the closest noise sensitive receptors. On this basis, the requirements of Planning Condition 9 are considered to be satisfied.

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:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = 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.

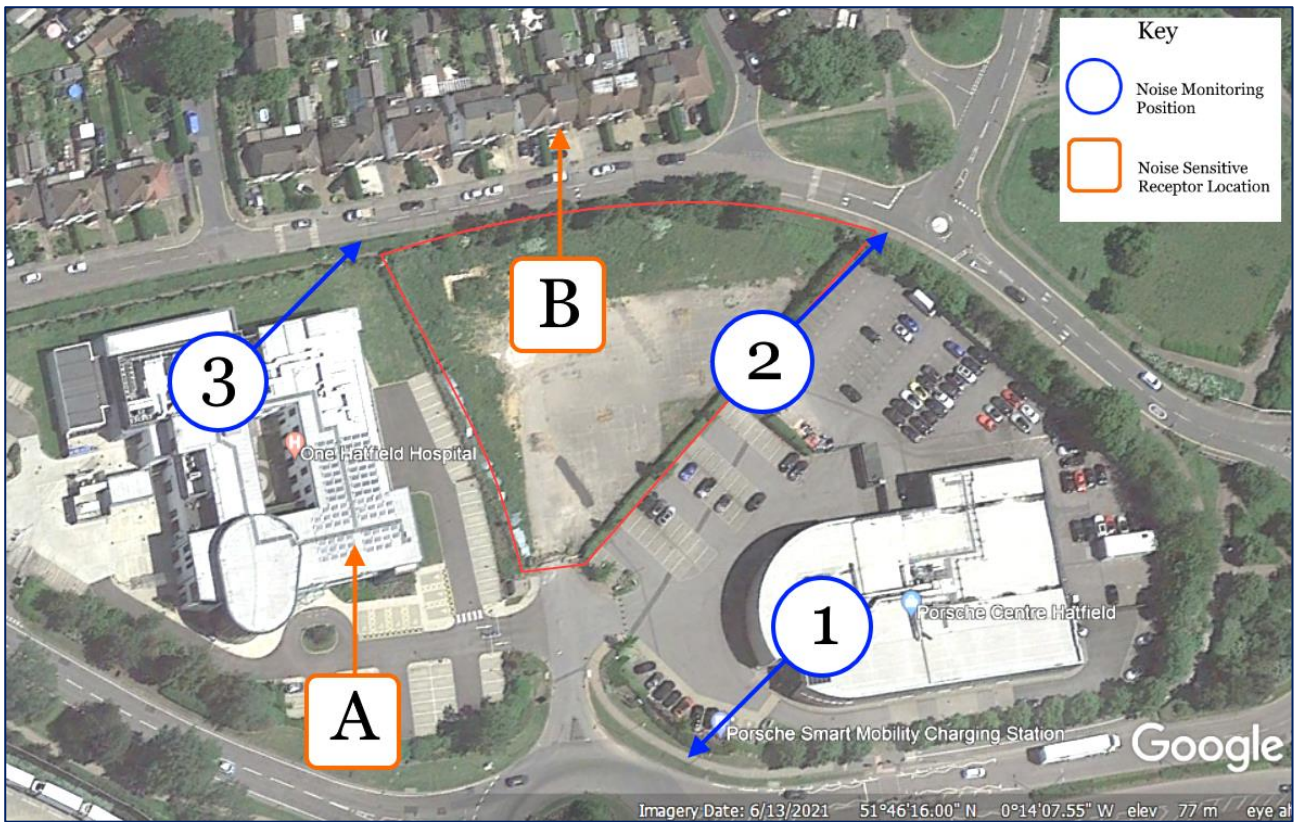
Single Event Level / Sound Exposure Level (SEL or L_{AE})

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 – Measurement Positions



Appendix C – Site Noise Emission

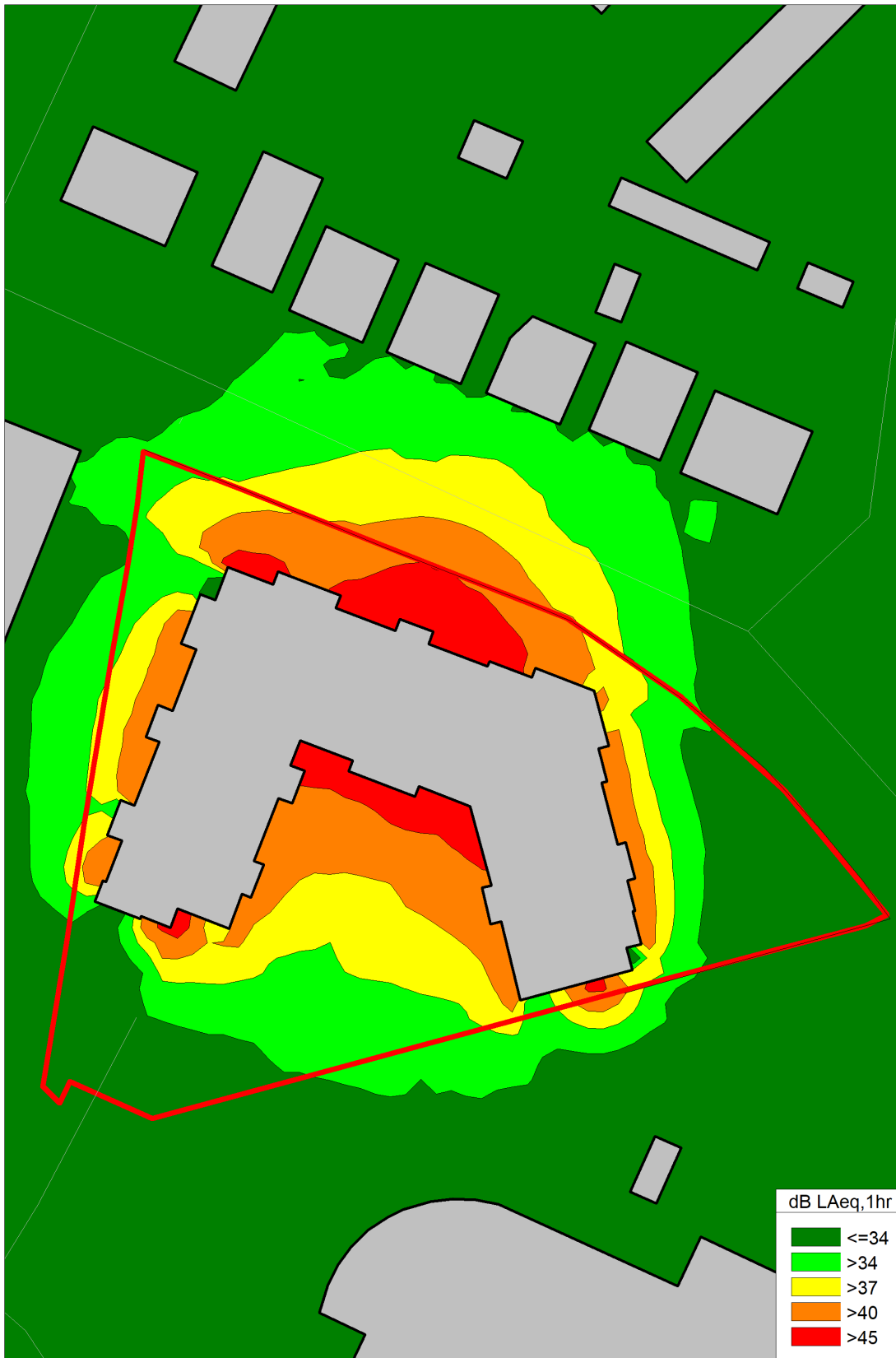


Figure A1: Daytime Noise Contour Plot (dB $L_{Aeq,1hr}$) at 4m above ground level