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CONSULTING

PDS Construction

Land at Spofforth Hill, Wetherby

Discharge of Condition 5

Planning Ref: 21/09621/FU

DC4330-NR1

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Report Version Issue Log

Report Number	Issue Date	Note or Change	Author	Checked By	Approval for Issue
DC4330-NR1v2	16.01.23	Updated Predicted Internal Noise Levels Using MVHR Strategy	FF	-	BH
DC4330-NR1	31.08.23	Report Issue	FF	BH	MAS

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Limitations to this Report

This report entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise affecting the site. The objectives of the investigation have been limited to establishing sources of noise material to carrying out an appropriate assessment.

The number and duration of noise measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of “hotspots” where noise levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise emitters. Furthermore, noise sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.

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1.0 INTRODUCTION

PDS Construction has appointed Dragonfly Consulting to carry out a Noise Impact Assessment to support the discharge of Condition 5 for planning application 21/09621/FU for a proposed residential development on land at Spofforth Hill, Wetherby.

This report describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria and, where applicable, recommendations are made with respect to the design of the development.

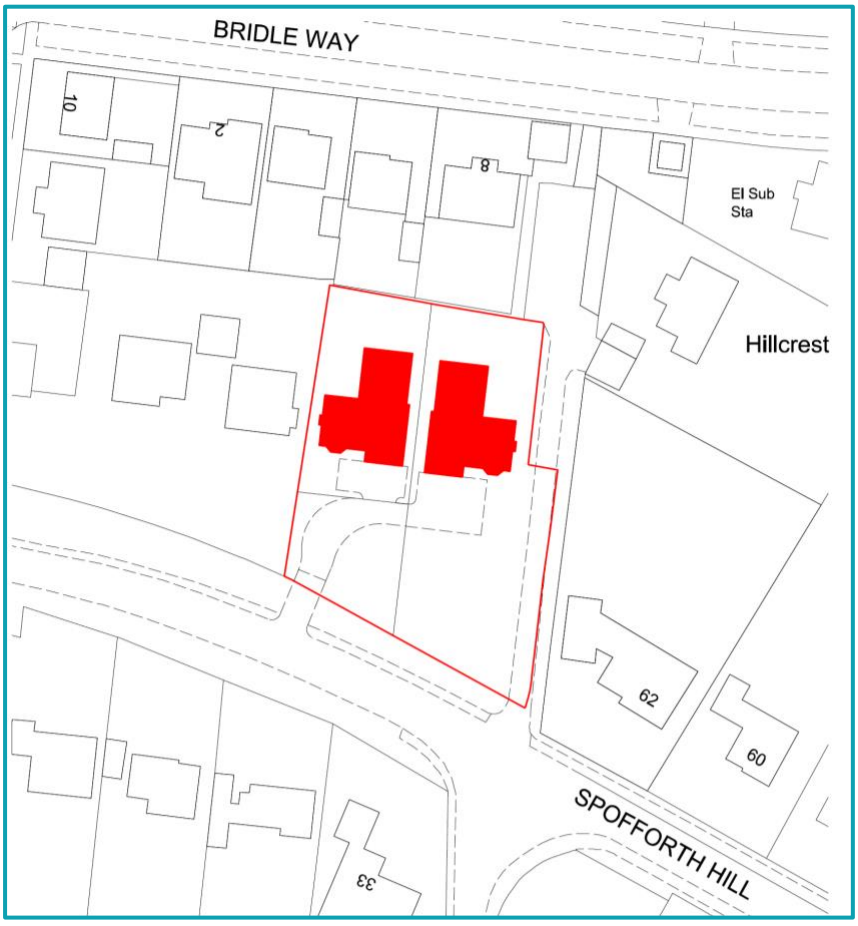
To support this document a glossary of technical terminology is included in Appendix A.

1.1 Site Conditions

The land is presently unoccupied and was previously a set of tennis courts. It is located north of the A661, also known as Spofforth Hill. The site is bound by residential properties both directly and in the surrounding area.

It is proposed to construct two residential dwellings and associated works. The two properties mirror each other and contain a living room, snug, kitchen/dining area, and five bedrooms, including one master bedroom. The proposed location plan is shown at Figure 1.1.

Figure 1.1
Proposed Location Plan



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2.0 GUIDANCE

2.1 Planning Condition 5

This assessment has been conducted in accordance with Planning Condition 5 (application ref. 21/09621/FU) as replicated below:

"*5) Prior to the commencement of construction, details of a noise and ventilation package to protect future occupiers of the properties from the harmful effects of noise, whilst maintaining a satisfactory internal air quality, shall be submitted and approved inwriting by the Local Planning Authority. Once approved, the noise and ventilation measures shall be implemented in full prior to occupation of the dwellings.*

In the interests of residential amenity of future occupiers given the proximity of the site to the A661."

In order to meet the requirements of the condition, Dragonfly Consulting has deferred to the guidance within British Standard 8233:2014, which provides a methodology to calculate the noise levels entering through the façades and façade elements in order to recommend a glazing and ventilation package.

2.2 Local Policy

2.2.1 Leeds City Council (LCC)

The Leeds City Council (LCC) Local Plan (adopted 2014 and amended 2019) core strategy document sets out how design for new buildings or alterations to existing buildings should protect amenity in Policy P10:

"POLICY P10: DESIGN

New development for buildings and spaces, and alterations to existing, should be based on a thorough contextual analysis and provide good design that is appropriate to its location, scale and function.

New development will be expected to deliver high quality inclusive design that has evolved, where appropriate, through community consultation and thorough analysis and understanding of an area. Developments should respect and enhance existing landscapes, waterscapes, streets, spaces and buildings according to the particular local distinctiveness and wider setting of the place with the intention of contributing positively to place making, quality of life and wellbeing.

Proposals will be supported where they accord with the following key principles;

1. *(i) The size, scale, design and layout of the development is appropriate to its context and respects the character and quality of surrounding buildings; the streets and spaces that make up the public realm and the wider locality.*
2. *(ii) The development protects and enhances the district's existing, historic and natural assets, in particular, historic and natural site features and locally important buildings, spaces, skylines and views,*
3. *(iii) The development protects the visual, residential and general amenity of the area through high quality design that protects and enhances surrounding routes, useable space, privacy, air quality and satisfactory penetration of sunlight and daylight,*

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4. *(iv) Car parking, cycle, waste and recycling storage should be designed in a positive manner and be integral to the development,*
5. *(v) The development creates a safe and secure environment that reduces the opportunities for crime without compromising community cohesion,*
6. *(vi) The development is accessible to all users."*

It is the understanding of Dragonfly Consulting that LCC have published quantitative guidance relating to noise titled *Leeds City Council Planning Consultation Guidance - Noise & Vibration*, published in December 2019.

Given the lack of guidance within local planning policy, Dragonfly Consulting has deferred to the guidance detailed in the National Planning Policy Framework and the Noise Policy Statement for England for guidance on assessment of acceptable impact in terms of noise. In addition to this, Dragonfly Consulting has assessed the site with reference relevant British Standards and ProPG: *Planning and Noise* and in particular with reference to the nationally accepted guidance documents detailed above, in order to provide an objective and reasonable measure of noise impact.

Where the LCC non-policy guidance can reasonably referenced in addition to national guidance and British Standards, it has been included.

2.3 Best Practice and Other Relevant Guidance

2.3.1 Approved Document F1 – Means of Ventilation

Whilst not directly related to the acoustic performance and noise impact assessment covered within this report, Table 1.7 of the approved document provides the following guidance with respect to minimum passive ventilator space installed within the external façade of spaces:

Table 2.1
Minimum Passive Ventilator Space within External Facades

Room	Minimum equivalent area of background ventilators for dwellings with multiple floors	Minimum equivalent area of background ventilators for single-storey dwellings
Habitable rooms	8000mm^2	10,000mm^2
Kitchen	8000mm^2	10,000mm^2
Utility room	No minimum	No minimum
Bathroom	4000mm^2	4000mm^2
Sanitary accommodation	No minimum	No minimum

2.3.2 ANC Green Book: Environmental Noise Measurement Guide

The ANC Green Book provides practical guidance around the measurement and analysis of environmental sound. Areas which are covered include the preparation, execution and reporting of site survey work. It also outlines a number of industry standard practices for the determination of L_{Amax} as a design case.

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2.3.3 British Standard (BS) 7445:2003 Parts 1 and 2 – Description and Measurement of Environmental Noise

The assessment of noise impact for this development has been undertaken by measuring external noise levels in accordance with the guidance detailed in BS 7445-1:2003 *Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures*.

This document defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site. This British Standard does not specify limits for environmental noise.

2.3.4 BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction in Buildings

BS 8233:2014 provides a methodology to calculate the noise levels entering a building through facades and façade elements. It also provides details of appropriate measures for sound insulation between dwellings and recommended internal noise levels which are provided for a variety of situations.

2.3.5 ISO 9613 Attenuation of Sound during Propagation Outdoors

IS0 9613 presents a calculation methodology for the determination of the attenuation of sound outdoors. The methodology enables the prediction the levels of environmental noise at a distance from a variety of sources.

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3.0 ASSESSMENT METHODOLOGY

3.1 Potential Sources of Environmental Noise

The following sources of noise are considered in the context this site:

Table 3.1
Assessment Methodology

Planning Objective	Relevant Assessment Methodology
Condition 5 – "*Prior to the commencement of construction, details of a noise and ventilation package to protect future occupiers of the properties from the harmful effects of noise*"	BS 8233:2014 ANC Green Book

3.2 Selection of Noise Criteria

With reference to the guidance detailed in Section 2, the following criteria have been selected after guidance from LCC.

Table 3.2
Assessment Criteria: BS 8233:2014

Criteria	Justification
Internal Noise Levels at adjacent sensitive receptor locations below 35 dB $L_{Aeq,\ 16hr}$ / 30 dB $L_{Aeq,\ 8hr}$ / 45 dB L_{AfMax}	Noise Levels within BS 8233:2014 target criteria and compliant with Planning Condition 5.
Internal Noise Levels at adjacent sensitive receptor locations exceed 40 dB $L_{Aeq,\ 16hr}$ / 35 dB $L_{Aeq,\ 8hr}$ / 50 dB L_{AfMax}	None – Not compliant with Planning Condition 5

With regard to the determination of the L_{Amax} design case, the ANC Green Book Notes:

"*Only in the most extreme situations would it be appropriate to adopt the highest measured L_{Amax} value... as a descriptor of an appropriate design case. In most situations, an average, typical or modal value, specific to the time period in question, needs to be selected or derived from the survey data. The frequency of occurrence of specific L_{Amax} events is critical in determining their typicality (hence the importance of sample period selection during scoping) ... Some common approaches to selecting the Design Case L_{Amax}, for instance, include ranking events during an assessment period and selecting the nth value (NB sample period is critical), taking a 10th percentile 'high average' level or simply selecting an appropriate looking value 'by eye'.*"

As can be seen above, the approach adopted within the assessment is slightly more onerous than recommended within the ANC Green Book. By adopting the 95th percentile as the design case it is considered that the assessment presents a reasonable worst-case approach.

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4.0 ENVIRONMENTAL NOISE SURVEY

External daytime and night-time measurements were undertaken from 17th to 22nd August 2023. The noise measurements established typical external ambient and background noise levels at the site.

4.1 Survey Methodology

The equipment used during the survey is detailed in Appendix B. The sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). All of the noise monitoring equipment had been calibrated to a traceable standard within the twenty-four months preceding the survey. Calibration certificates are available on request.

One measurement location was surveyed in order to establish the typical ambient and background noise levels at the proposed development site. The measurement location is hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned 1.5m above ground on the southern boundary of the site, in line with the proposed façade of the building.

The measurement locations are shown in Appendix C.

4.2 Survey Results

Continuous weather monitoring was undertaken alongside noise monitoring. All monitored noise data has been screened to remove samples influenced by adverse conditions. Table 4.1 provides a summary of periods excluded from the results due to adverse weather conditions; all other periods not excluded were considered suitable for noise monitoring.

Table 4.1
Excluded Periods

Excluded Monitoring Periods
17/08/2023 1645h to 17/08/2023 1745h
18/08/2023 0815h to 18/08/2023 0845h
18/08/2023 2115h to 18/08/2023 2359h
19/08/2023 0000h to 19/08/2023 0215h

Summaries of the measured noise levels are given in Table 4.2, overleaf. Full survey results are available upon request.

Table 4.2
Location 1 - Summary of Measured Noise Levels 17/08/2023 to 22/08/2023 – free-field, dB

Date	Period	Time (h)	$L_{Aeq,\ T}$	L_{A10}	L_{A90}	L_{AFMax}
17/08/2023	Daytime	1500 - 2300	57.1	59.8	47.0	84.5
17/08/2023-18/08/2023	Night-time	2300 - 0700	50.8	50.2	38.1	73.5
18/08/2023	Daytime	0700 - 2300	58.0	60.7	49.7	85.8
18/08/2023-19/08/2023	Night-time	2300 - 0700	50.4	51.4	38.7	69.7
19/08/2023	Daytime	0700 - 2300	57.5	60.4	47.5	85.5
19/08/2023-20/08/2023	Night-time	2300 - 0700	48.0	48.1	25.1	70.4
20/08/2023	Daytime	0700 - 2300	56.1	59.5	44.0	83.5

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Date	Period	Time (h)	$L_{Aeq, T}$	L_{A10}	L_{A90}	L_{AFMax}
20/08/2023-21/08/2023	Night-time	2300 - 0700	49.8	45.3	25.0	70.3
21/08/2023	Daytime	0700 - 2300	57.1	59.9	46.9	82.6
21/08/2023-22/08/2023	Night-time	2300 - 0700	50.2	49.2	35.9	70.4
22/08/2023	Daytime	0700 - 0900	58.9	61.8	50.6	72.0

4.3 Observations and Comments

The noise environment at the development site is dominated by existing road traffic from the A661.

4.4 Uncertainty

4.4.1 Survey

Given the duration of the survey and the use of the highest measured daytime and night-night noise levels to ascertain noise propagation across the site, it is considered that the limits of Class 1 sound level meters are the only limiting factor when considering survey uncertainty.

Standard equipment uncertainties have been considered by applying allowable tolerances minus the maximum allowable test laboratory uncertainties given in IEC 61672-1, as defined by Narang and Bell (*Narang, P. and Bell, T., 2008. New IEC standards and periodic testing of sound level meters. Proceedings of the Internoise, Shanghai, China, pp.26-29*).

The following table provides an overview of standard equipment uncertainties relevant to the SLM class utilised within the survey.

Table 4.3
Standard uncertainties using allowable tolerances minus test laboratory tolerances given in IEC 61672-1 (source: Narang and Bell, Table 14)

SLM Class	Frequency Weighting	Directional Response	Level Linearity	Toneburst Response	Calibrator (IEC 61672)	Supply Voltage	Combined Standard Uncertainty +/- dB
Class 1	0.5	0.5	0.4	0.25	0.125	0.05	0.9

4.4.2 Design Calculations

Where design calculations have been utilised to determine the required performance of the glazing and ventilation strategy for the scheme, the method outlined within Annex G of BS 8233 (which is based on the BS EN 12354-3 calculation methodology) has been followed. The expected precision of this calculation methodology is quoted as +/- 2dB.

4.4.3 Combined Uncertainty

Based on the information provided above, the combined Root Sum Squared (RSS) uncertainty for the assessment has been calculated as +/- 2.2dB.

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5.0 ASSESSMENT

5.1 Predicted Internal Noise Levels within Dwellings

Calculations of internal noise levels have been completed for the proposed development to demonstrate that suitable internal noise levels can be achieved within the most noise exposed rooms.

The calculations, for the windows closed scenarios, are based on the room dimensions and façade profiles obtained from technical drawings provided by PDS Construction.

5.1.1 Predicted Internal Noise Levels – Open Windows

Internal ambient and maximum noise levels within all habitable rooms have been assessed with open windows. To account for the attenuation afforded by a partially open window, a nominal correction of 15dB has been applied. The results of the assessment are presented in Table 5.1.

Table 5.1
Assessment of Noise Intrusion Levels – Open Windows (Natural Ventilation)

Location	External Noise Level			Internal Noise Level		
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AfMax}	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AfMax}
1	58.0	50.8	66.1	43.0	35.8	51.1

The internal noise level criteria, as set out in Table 3.2 is 35 dB $L_{Aeq,\ 16hr}$ / 30 dB $L_{Aeq,\ 8hr}$ / 45 dB $L_{AfMax.}$ As shown in the table above, the attenuation afforded by a partially open window is not sufficient to meet the requirements of BS 8233:2014 and therefore Planning Condition 5.

5.1.2 In-Façade Noise Mitigation

Based on the results of the assessment outlined above, an alternative glazing and ventilation strategy will be required to ensure noise levels within the proposed dwellings fall within BS 8233:2014 criteria.

Detailed calculations have been undertaken in accordance with Annex G of BS 8233:2014 to determine appropriate solutions for the site.

At the current design stage, it has been decided that a continuous mechanical supply and extract with heat recovery (MVHR) system is to be used at the request of Leeds City Council in response to the first issued version of this report. As such, considering the requirements of Part F of the Building Regulations, there is no requirement for passive ventilation within the habitable spaces.

Please note, consideration for the requirements of Part F of the Building Regulations has been given to support the assessment of acoustic suitability only. Part F compliance should be determined through consultation with a qualified ventilation specialist.

Table 5.2, overleaf, presents a summary of the proposed specifications. Please note, the below does not provide an exhaustive list of suitable options, but care should be taken to ensure the selected product meets the octave band performance requirements set out below.

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Table 5.2
Example Glazing & Ventilation Strategy

Building Element	Example Unit	Minimum Recommended Sound Reduction Performance						$R_w + C_{tr}$	$D_{ne,w}$
		125	*250*	*500*	*1000*	*2000*	*4000*		
Glazing	Pilkington 4mm / (6 – 16mm) / 4mm	21	17	25	35	37	31	29 (-1; -4)	-
Ventilation	MVHR	*No Requirement*							

5.1.3 Predicted Internal Levels – Closed Windows

It has been calculated that, given the proposed development façade constructions and internal layouts with the stated specifications of double glazing and ventilation system, the internal noise levels in each of the two dwellings would be as follows:

Table 5.3
Assessment of Noise Intrusion Levels (dBA) – Closed Windows

Room Type	Internal Noise Level		
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AfMax}
Living Room	27.8	--	--
Snug	22.0	--	--
Kitchen/Dining	28.6	--	--
Master Bedroom	26.1	19.0	35.7
Bedroom 2	24.7	17.6	34.3
Bedroom 3	25.9	18.8	35.5
Bedroom 4	27.5	20.4	37.1
Bedroom 5	25.4	18.2	35.0

The internal noise level criteria, as set out in Table 3.2, is 35 dB $L_{Aeq,\ 16hr}$ / 30 dB $L_{Aeq,\ 8hr}$ / 45 dB $L_{AfMax.}$ As shown in the table above, the attenuation afforded by the proposed glazing and ventilation strategy (Table 5.2) is sufficient to meet the requirements of BS 8233:2014 and therefore Planning Condition 5.

5.2 Assertion of Competence

This assessment has been completed by Feargus Flanagan, Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Dragonfly Consulting. I hold a Bachelor of Science in Music Technology from Birmingham City University.

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6.0 CONCLUSIONS

PDS Construction has appointed Dragonfly Consulting to carry out a Noise Impact Assessment to support the discharge of Condition 5 for planning application 21/09621/FU for a proposed residential development on land at Spofforth Hill, Wetherby.

This report describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria. Recommendations are also made with respect to the design of the development.

6.1 Internal Noise Assessment

The assessment identifies that, with a suitable glazing and ventilation specification, internal noise levels are predicted to be compliant with the internal ambient noise level criteria set out in BS 8233:2014 and therefore Planning Condition 5.

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Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$ Pa).

dB(A) A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} This is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L_{10} & L_{90} If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. L_{10} is the level exceeded for 10% of the time and is often used as a descriptor for road traffic noise. Similarly, L_{90} is the level exceeded for 90% of the time and is often used to describe the background level. It is common practice to use the L_{10} index to describe traffic noise.

L_{AMax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{AMax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.

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Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
Svantek SV307 Noise Monitoring Station	87841
Svantek ST30 Microphone	113978
O1dB Cal31 Acoustic Calibrator	89089

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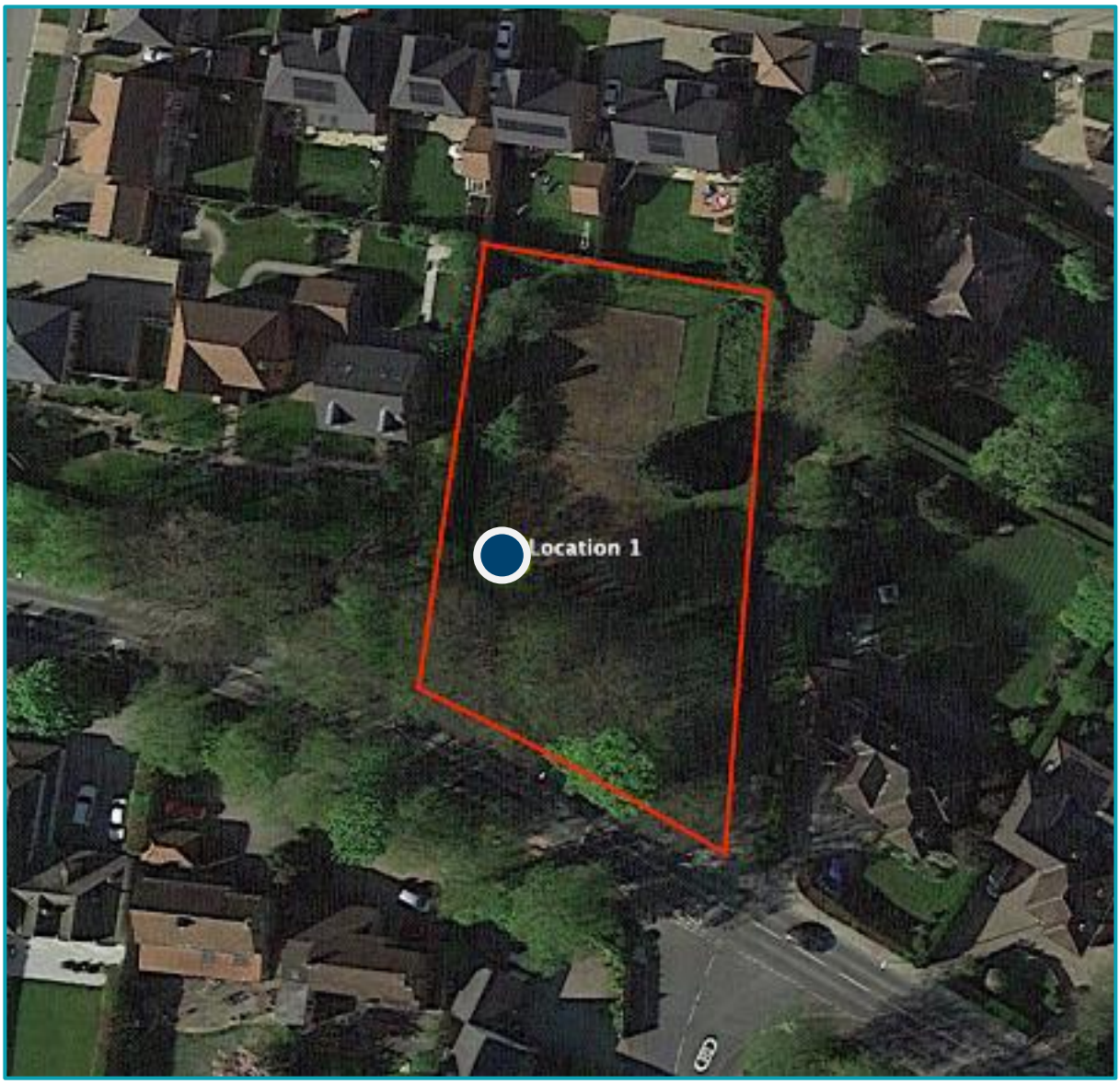
Appendix C – Measurement Locations

Figure C-1
Measurement Location Plan



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