Noise Impact Assessment

Kendray Hospital, Barnsley

Presented to: T.A.D Architects

Issued: December 2023

Delta-Simons Project No: 100023.587208

Protecting people and planet

Report Details

Client	T.A.D Architects
Report Title	Noise Impact Assessment
Site Address	Kendray Hospital, Doncaster Road, Barnsley, S70 3RD
Project No.	100023.587208
Delta-Simons Contact	Dan Pope (dan.pope@deltasimons.com)

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1	Final	7th December 2023	-	C Glenn	D Pope	D Pope
				Chloe Glenn Consultant Acoustician	Dan Pope Acoustic Team Lead	Dan Pope Acoustic Team Lead

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Executive Summary

Site and Report Context	Delta-Simons Limited ('Delta-Simons') was instructed by T.A.D Architects (the 'Client') to undertake a Noise Impact Assessment to inform a planning application for the construction of a HV substation and generator compound (the 'Proposed Development') located at Kendray Hospital, Doncaster Road, Barnsley, S70 3RD (the 'Site'). This assessment has been undertaken to identify the key noise sources associated with the proposal and which may have the potential to impact the closest sensitive receptors. Accordingly, this assessment has been completed with due regard to: • National Planning Policy Framework (NPPF); • Planning Policy Guidance (PPG); and • BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.
Summary	This assessment has been informed by a noise survey, completed over a weekday and weekend period, to quantify the existing background noise environment at the sensitive receptors. At the time of this assessment, details regarding plant selection has not been confirmed. Therefore, the assessment has provided rating noise limits at Noise Sensitive Receptors that should not be exceeded. Provided these rating limits are not exceeded, a **negligible** impact is predicted.
Recommendations	Noise levels from fixed plant should not exceed the levels set out in this report.
This is intended as a summary only. Further detail and limitations of the assessment are provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

1.1.1 Delta-Simons Limited ('Delta-Simons') was instructed by T.A.D Architects (the 'Client') to undertake a Noise Impact Assessment to inform a planning application for the construction of a HV substation and generator compound (the 'Proposed Development') located at Kendray Hospital, Doncaster Road, Barnsley, S70 3RD (the 'Site').

1.1.2 The Proposed Development has the potential to cause noise impacts at sensitive receptors during operation. Therefore, to ensure significant adverse effects are not observed a Noise Impact Assessment is required.

1.2 Site Location and Context

1.2.1 The Site is located in an area mainly influenced by road traffic noise, railway noise and existing operational and plant noise from the surrounding commercial and industrial units and Kendray Hospital.

1.2.2 Doncaster Road (A635) is located along the northern boundary of the Site, Redhill Avenue to the east and Thornton Road to the south. Existing commercial and industrial units are located approximately 40m north in addition to existing Kendray Hospital units to the south and east.

1.2.3 The closest residential Noise Sensitive Receptors (NSRs) are located approximately 40m north along Doncaster Road, 100m north-west off Heathfields, 180m east off Redhill Avenue, 180m south off Thornton Road and 200m west along Applehurst Bank.

1.2.4 The closest existing buildings associated with the Kendray hospital Site, that have been considered as NSRs, are considered to be the Admin Block, 18m south, the Stroke Rehab Unit (SRU), 30m south-west, The Lodge, 70m east, and the Oaks Building, 80m south-east.

1.2.5 The proposal has the potential to operate during daytime and night-time hours.

1.2.6 Reference should be made to **Figure 1** for a map of the Site and surrounding area.

1.2.7 The standard limitations associated with this assessment are presented in **Appendix A**.

1.2.8 A glossary of terms used in this report is provided in **Appendix B**.

2.0 Legislation and Policy

2.1 Planning Policy

2.1.1 A summary of the national and local planning policy relevant to the Proposed Development is provided below.

National Planning Policy Framework and Planning Practice Guidance

2.1.2 The Government published the revised National Planning Policy Framework (NPPF, 2023) and the Planning Practice Guidance (PPG) in November 2023[1]. Together, the NPPF and PPG set out what the Government expects of local authorities. The overall aim is to ensure the planning system allows land to be used for new homes and jobs, while protecting valuable natural and historic environments.

2.1.3 The PPG adds further context to the NPPF and it is intended that the two documents should be read together.

2.1.4 Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

2.1.5 Local planning authorities' plan-making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.1.6 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

2.1.7 The Observed Effect Levels are as follows:

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest observed adverse effect level: This is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No observed effect level: This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

2.1.8 **Table 1** summarises the noise exposure hierarchy, based on the likely average response.

[1] Parts of PPG were updated in June 2021, however, the Noise section was updated in July 2019.

Table 1 - Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.2 Local Planning Policy

Barnsley Local Plan – Adopted January 2019

Policy Poll1 – Pollution Control and Protection

2.2.1 This policy states:

> "Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.
>
> We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are

unacceptable and there is no reasonable prospect that these can be mitigated against. Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

2.3 Guidance

BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

2.3.1 This Standard (hereafter referred to as 'BS 4142') describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

2.3.2 The procedure detailed in the Standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is 'typical'.

2.3.3 The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 - 23:00): 1 hour; and
- Night-time (23:00 - 07:00): 15 minutes.

2.3.4 There are a number of 'character corrections' which can be attributed to the specific sound level, either subjectively or objectively, depending upon the 'acoustic features' of the sound level under investigation. These character corrections vary in their weighting depending upon the severity of the acoustic feature, as follows (with regards to the subjective method):

Table 2 - BS 4142 Subjective Character Correction

Acoustic Feature	Correction (dB)	Comments
Tonality	+2	Where the tonality is just perceptible
	+4	Where the tonality is clearly perceptible
	+6	Where the tonality is highly perceptible
Impulsivity	+3	Where the impulsivity is just perceptible
	+6	Where the impulsivity is clearly perceptible
	+9	Where the impulsivity is highly perceptible
Intermittency	+3	Where the intermittency is readily distinctive against the acoustic environment
Other sound characteristics	+3	Where a sound exhibits characteristics that are neither tonal nor impulsive, though is readily distinctive against the acoustic environment at the receptor

2.3.5 Where the assessment is carried out using the objective method, the tonality character correction is either 0dB or 6dB and the impulsivity character correction can range from 0dB up to 9dB in increments of 1dB, depending on the level of impulsivity identified.

2.3.6 BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

2.3.7 Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- 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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

2.3.8 Whilst the Standard does make various references to it not being intended to assess noise impacts at indoor locations, Section 1.1 of the Standard does state:

> 'The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident'.

2.3.9 Example 6 in the Standard states:

> 'In addition to the rating/background sound level comparison shown in Table A.6, the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows. Other guidance, such as BS 8233, might also be applicable in this instance'.

2.3.10 Furthermore, Example 8, which considers night-time commercial noise impacts at a dwelling, states:

'BS 8233 indicates that 40 dBA sound level from the plant, equating to an internal level of around 30 dBA or possibly lower, but with some acoustically distinguishing characteristics, may not be suitable for a bedroom.'

2.3.11 With the above in mind, and for a clear need to ensure that any potential commercial or industrial noise impacts do not give rise to sleep disturbance in bedrooms, this assessment will ensure that the predicted rating level (specific sound level including any character corrections) does not exceed 30dB in bedrooms.

3.0 Scope and Methodology

3.1 Local Authority Consultation

3.1.1 A consultation exercise was undertaken with Barnsley Metropolitan Borough Council on the 20th November 2023 to discuss noise monitoring locations and assessment methodology. The email sent is provided below:

> "Delta-Simons has been instructed to undertake a Noise Impact Assessment to support a planning application for the construction of a HV substation and generator compound (the 'Proposed Development') located at Kendray Hospital, Doncaster Road, Barnsley, S70 3RD (the 'Site').
>
> From reviewing online mapping, it is anticipated that the dominant noise sources within the area is road traffic noise from surrounding arterial and local road networks, existing plant noise from Kendray Hospital, and commercial and industrial units to the west and north of the Site.
>
> The closest existing Noise Sensitive Receptors (NSRs) are Kendray Hospital and residential receptors located to the north off Old Oaks View and Doncaster Road, to the east off Redhill Avenue, to the north-west off Barberry Court, and to the west off Applehurst Bank.
>
> Delta-Simons are proposing to undertake a baseline noise survey to establish existing background and ambient noise levels on and around the Site. Currently it is anticipated this will involve one unattended measurement location to the north of the Site covering weekday and weekend periods, and on attended measurement to the west of the Site. Do BMBC approve this approach?
>
> Baseline background sound levels obtained from the survey will be used to assess the noise impacts generated by the operation of the Site. This will be completed in line with guidance presented in BS 4142:2014+A1:2019. If details regarding proposed plant are available, an assessment will be undertaken to calculate the noise impact at nearby NSRs. If no detail regarding proposed plant is available, then the assessment will provide plant noise limits that should not be exceeded to avoid adverse impacts at the NSRs. It is understood that rating levels from the Site should be below existing background sound levels to avoid adverse impacts at NSRs; do BMBC agree with this approach?
>
> Where necessary, mitigation measures will be recommended to reduce noise impacts to acceptable levels.
>
> Would the above methodology be viewed as acceptable in relation to the proposed development at this Site? If you have any further input, I look forward to your response!"

3.1.2 A response was received from the Environmental Health Officer on the 20th November 2023 stating:

> "I agree with your approach, using BS4141:2014+A1:2019, however, due to the potential negative effects of Low Frequency Noise from this development I would recommend that this is also assessed."

3.1.3 At the time of this assessment, details regarding the proposed plant are not available and therefore an assessment of Low Frequency Noise cannot be undertaken at this time. An assessment of Low Frequency Noise can be assessed once these details are available.

3.2 Scope

3.2.1 The scope of the assessment has been determined in the following way:

- Analysis of the Site and the surrounding area was completed using available aerial photography in order to identify the location of the closest existing noise sensitive receptors to the Site;

- A Baseline Noise Survey was undertaken in November 2023 to establish the existing background sound environment at the closest Noise Sensitive Receptors (NSRs);
- Measured sound levels have informed and assessment in line with BS 4142 whereby the rated level of noise is compared against the background sound level at the closest noise sensitive receptor to the Site; and
- Provide advice for suitable mitigation for the Proposed Development.

3.3 Identification of Sensitive Receptors

3.3.1 Using online mapping services, the following noise sensitive receptors have been identified and subsequently assessed. The table below also states the time periods where each receptor is sensitive to noise.

3.3.2 For the closest buildings associated with the Kendray hospital Site, it is unknown whether these are operational at night or have overnight ward facilities and therefore to provide a thorough assessment the night-time period has been included within the assessment.

3.3.3 The location of these receptors is shown in **Figure 1**.

Table 3 – Noise Sensitive Receptors

ID	Receptor	Direction and Distance from Site	Sensitive Time Period
R1	Doncaster Road	40m north	Daytime and Night-time
R2	Heathfields	100m north-west	Daytime and Night-time
R3	Redhill Avenue	180m east	Daytime and Night-time
R4	Thornton Road	180m south	Daytime and Night-time
R5	Applehurst Bank	200m west	Daytime and Night-time
R6	Kendray Hospital – Admin Block	18m south	Daytime and Night-time
R7	Kendray Hospital – Stroke Rehab Unit (SRU)	30m south-west	Daytime and Night-time
R8	Kendray Hospital – The Lodge	70m east	Daytime and Night-time
R9	Kendray Hospital – Oaks Building	80m south-east	Daytime and Night-time

3.4 Rating Noise Limits

3.4.1 At this stage the exact details and location of the HV substation and generator compound to be installed on the Site is not known Therefore, as a conservative approach, a rating noise limit is provided that the development should not exceed when measured in free-field conditions at NSRs, assuming continuous 24-hour operational noise.

4.0 Baseline Survey

4.1 Measurement Locations

4.1.1 Measurements were undertaken at the following locations.

Table 4 - Measurement Locations

Measurement Location	British National Grid Coordinates		Date and Time	Observations
	X	Y		
L1	436129	405700	11:40 24th November 2023 to 02:20 27th November 2023	Dominant road traffic noise from Doncaster Road. Birdsong could be heard in addition to distant plant noise from existing Kendray Hospital facility.
S1	435966	405612	10:07-11:07 24th November 2023	Dominant plant noise from existing Kendray Hospital facility and birdsong. Distant road traffic noise. Occasional car pass by from Kendray Hospital car park.

4.1.2 Measurement locations are shown in **Figure 1**.

4.2 Survey Equipment

4.2.1 The following noise monitoring equipment was used throughout the survey. Measurements were taken in general accordance with BS 7445-1:2003 'The Description and Measurement of Environmental Noise: Guide to quantities and procedures.

Table 5 – Noise Measurement Equipment

Measurement Location	Equipment	Model Type	Serial Number	Date of Last Laboratory Calibration Prior to Survey
L1 and S1	Sound Level Meter	01dB Fusion	14431	26th July 2023
	Pre-amplifier	01dB PRE22	2135148	
	Microphone	GRAS 40CD	556112	
	Calibrator	01dB CAL-31	84086	2nd December 2022

4.2.2 The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, and no significant drift was noted. Calibration certificates for which are available on request.

4.3 Weather Conditions

4.3.1 The table below summarises the periods of adverse metrological conditions during the survey.

Table 6 - Adverse Meteorological Conditions during the Survey

Adverse Condition	Time period
Wind Speeds >5ms^{-1}	None
Precipitation	None

4.4 Survey Summary Results

4.4.1 A summary of measured data at L1 is presented in the table below. A graphical representation of the survey data is shown in **Figure 2**.

4.4.2 The L_{Aeq} levels presented in the tables below are the logarithmic average of each measurement period. The L_{A90} and L_{A10} are the arithmetic average for each measurement period. The modal average $L_{A90,1h}$ and $L_{A90,15min}$ have also been calculated for the daytime and night-time periods respectively.

Table 7 – L1 Survey Summary Results

Measurement Location	Period		Measured Levels, dB				
			$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}	Modal $L_{A90,T}$
L1	Weekday	Day	64	55	67	92	58
	Weekday	Night	58	37	60	77	40
	Weekend	Day	64	53	67	94	56
	Weekend	Night	59	42	42	50	40
	Overall	Day	64	54	67	94	56
	Overall	Night	59	40	40	50	40

4.4.3 A summary of measured data at S1 is presented in the table below. The survey data is presented in **Figure 3**.

Table 8 – S1 Survey Summary Results

Measurement Location	Period		Measured Levels, dB				
			$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}	Modal $L_{A90,T}$
S1	Weekday	Day	50	47	52	68	46

4.5 Background Sound Level Allocations

4.5.1 The attended measurement has been compared against the relevant time periods from L1 data to determine the difference in modal L_{A90} between the locations. This difference has been used to correct measured L1 night-time data to each sample location for use in the assessment. The table below details the baseline night-time levels used in the assessment.

Table 9 – Night-time Noise Corrections

Measurement Location	Modal L_{A90} Difference (dB)	Assessment Period	Assessment Modal L_{A90}
S1	-10	Night-time	30

4.5.2 The table below assigns measurement locations to sensitive receptor locations.

Table 10 – NSR Allocation of Background Sound Levels

Receptor	Representative Measurement Location	Period	Modal Background Sound Level ($L_{A90,T}$) dB
R1	L1	Daytime	56
		Night-time	40
R2	L1	Daytime	56
		Night-time	40
R3	L1	Daytime	56
		Night-time	40
R4	S1	Daytime	46
		Night-time	30
R5	S1	Daytime	46
		Night-time	30
R6	L1	Daytime	56
		Night-time	40
R7	L1	Daytime	56
		Night-time	40
R8	L1	Daytime	56
		Night-time	40
R9	L1	Daytime	56
		Night-time	40

5.0 Assessment

5.1 Plant Noise Limits

5.1.1 The positioning and details of the fixed plant associated with the Proposed Development were not available at the time of this assessment. Therefore, the assessment below determines plant noise limits that the development must not exceed at the NSRs to avoid adverse impacts.

5.1.2 The table below presents the rating limits at NSRs for both daytime and night-time periods, inclusive of ant acoustic character corrections.

Table 11 – Fixed Plant Rating Noise Limits

Receptor	Period	Modal Background Sound Level ($L_{A90,T}$) dB	Rating Noise Limits at Receptor ($L_{AR,T}$) dB
R1	Daytime	56	56
	Night-time	40	40
R2	Daytime	56	56
	Night-time	40	40
R3	Daytime	56	56
	Night-time	40	40
R4	Daytime	46	46
	Night-time	30	30
R5	Daytime	46	46
	Night-time	30	30
R6	Daytime	56	56
	Night-time	40	40
R7	Daytime	56	56
	Night-time	40	40
R8	Daytime	56	56
	Night-time	40	40
R9	Daytime	56	56

Receptor	Period	Modal Background Sound Level ($L_{A90,T}$) dB	Rating Noise Limits at Receptor ($L_{AR,T}$) dB
	Night-time	40	40

5.1.3 Provided the Rating Noise Levels from fixed plant do not exceed levels shown in the table above at any NSR, there would be no adverse impact.

6.0 Summary and Conclusions

6.1.1 Delta-Simons Limited ('Delta-Simons') was instructed by T.A.D Architects (the 'Client') to undertake a Noise Impact Assessment to inform a planning application for the construction of a HV substation and generator compound (the 'Proposed Development') located at Kendray Hospital, Doncaster Road, Barnsley, S70 3RD (the 'Site').

6.1.2 The Proposed Development has the potential to cause noise impacts at sensitive receptors during operation. Therefore, to ensure significant adverse effects are not observed a Noise Impact Assessment is required.

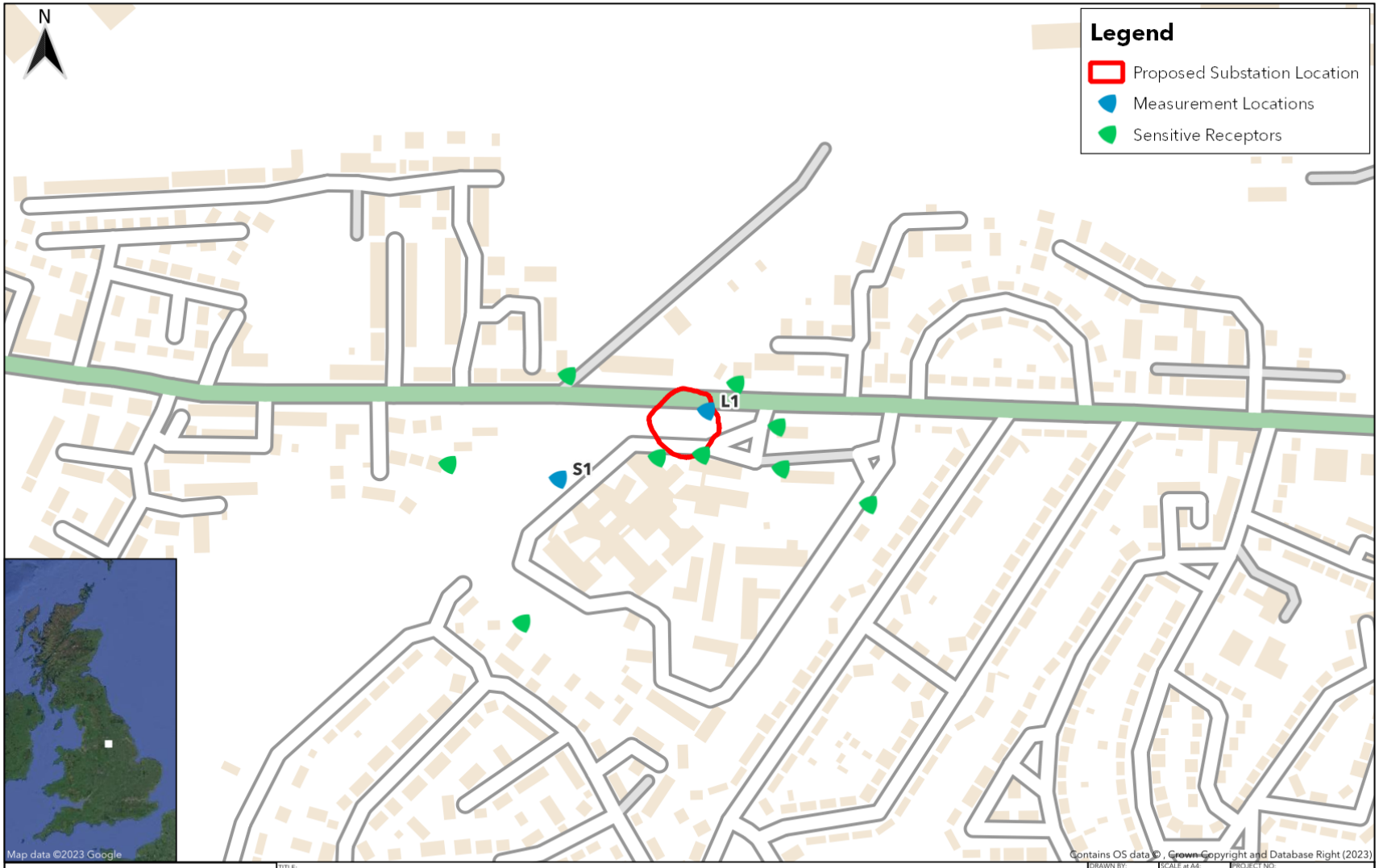
6.1.3 This assessment has been undertaken to identify the key noise and vibration sources associated with the proposal and which may have the potential to impact the closest sensitive receptors. Accordingly, this assessment has been completed with due regard to:

- National Planning Policy Framework (NPPF);
- Planning Policy Guidance (PPG); and
- BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'; and

6.1.4 This assessment has been informed by a noise survey, completed over a weekday and weekend period, to quantify the existing background noise environment at the sensitive receptors.

6.1.5 At the time of this assessment, details regarding plant selection have not been confirmed. Therefore, the assessment has provided Rating Noise Limits at Noise Sensitive Receptors (NSRs) that should not be exceeded. Provided these rating limits are not exceeded, a **negligible** impact is predicted.

Figure 1 – Site Location, Receptor and Measurement Locations



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TITLE: Site Location, Receptor and Measurement Locations

DRAWN BY: CG	SCALE at A4: 1:3798	PROJECT NO: 100023.587208
CHECKED BY: DB	REVISION: 1	FIGURE NO: 1
DATE: 04 Dec 2023		

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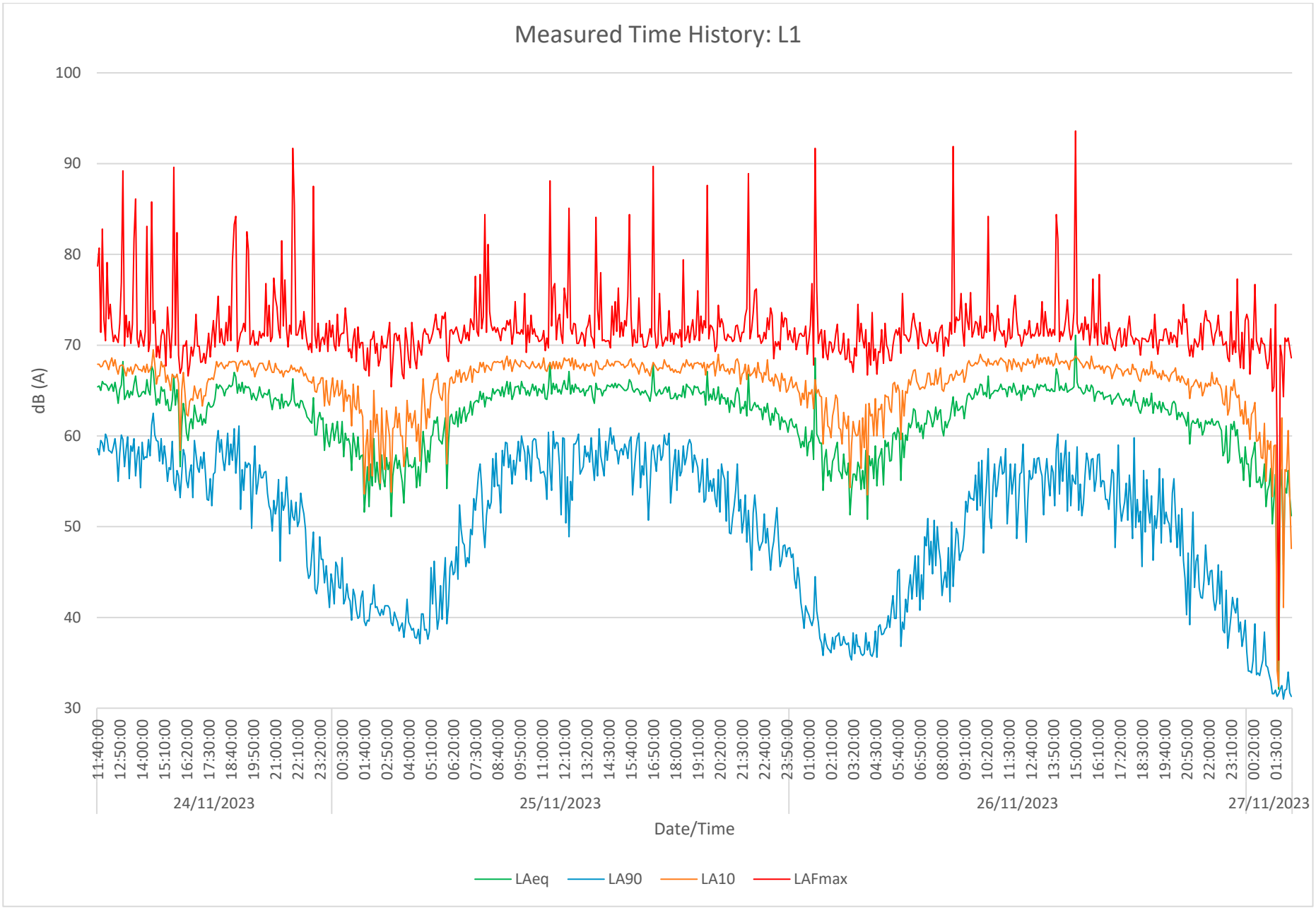
Figure 2 – Measured Time History: L1



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INOGEN ALLIANCE

Figure 3 – Measured Time History: S1

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFmax}
24/11/2023	10:07:00	49.6	47.1	51.8	57.2
24/11/2023	10:12:00	53.4	47.5	56.3	68.0
24/11/2023	10:17:00	48.9	46.1	50.5	63.4
24/11/2023	10:22:00	50.7	46.4	52.2	65.5
24/11/2023	10:27:00	50.2	47.2	52.0	58.6
24/11/2023	10:32:00	50.6	48.1	52.2	65.6
24/11/2023	10:37:00	48.7	46.4	50.2	55.0
24/11/2023	10:42:00	49.5	45.8	50.7	63.5
24/11/2023	10:47:00	49.0	46.7	50.4	58.4
24/11/2023	10:52:00	48.3	45.9	49.6	58.0
24/11/2023	10:57:00	52.3	46.6	53.3	68.4
24/11/2023	11:02:00	51.1	48.6	52.6	60.8
24/11/2023	11:07:00	49.8	45.4	51.8	60.8

Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Glossary

Glossary

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table B1 - Typical Sound Pressure Levels

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

Table B2 - Terminology

Descriptor	Explanation
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.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	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. Unless described otherwise, it is measured using the 'fast' sound level meter response.
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 Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125 millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000 millisecond time constant.