

Noise Impact Assessment

Logicor Park Reading, Rose Kiln Court

Presented to: **Redwood (Light Industrial) Propco
Sarl**

Issued: April 2023

Delta-Simons Project No: 91193.557189

Report Details

Client	Redwood (Light Industrial) Propco Sarl
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Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
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Executive Summary

Site and Report Context	Delta-Simons Limited ('Delta-Simons') was instructed by Redwood (Light Industrial) Propco Sarl Limited (the 'Client') to prepare a Noise Impact Assessment to inform a planning application for the demolition of the existing Class E(g)(i) (Office) building and the construction of three buildings for Class E(g)(iii) (Light Industrial) / Class B2 (General Industrial) / Class B8 (Storage or Distribution) uses, including the provision of a new substation, parking, landscaping, and associated works (the 'Proposed Development'), located on land at Logikor Park Reading, Rose Kiln Court, Reading, RG2 0BY (the 'Site'). A Noise Impact Assessment is required to determine the impact of the Proposed Development on existing Noise Sensitive Receptors (NSRs). 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 noise sensitive receptors (NSRs). Accordingly, this assessment has been completed with due regard to: • National Planning Policy Framework (NPPF); • Planning Policy Guidance (PPG); • BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'; and • BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'; • Calculation of Road Traffic Noise (CRTN) 1998; and • Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration revision 2 2020.
Summary	A Noise Impact Assessment was previously undertaken by Anderson Acoustics for the Site in March 2022 with baseline noise surveys undertaken in June 2021 and January 2022. To validate these measurements, Delta-Simons have undertaken a baseline noise survey on Site over a weekday and weekend period. Noise modelling software CadnaA has been used to create a 3D noise model of the Site to undertake operational noise and maximum noise event calculations to inform the assessment. The operational assessment results have shown that the rated level of noise without mitigation could exceed measured background sound levels at night at receptor R3. Internal noise levels from a L_{AFmax} event would not exceed criteria at R1 and R2 but would exceed at R3. Therefore, mitigation has been considered. Restricting external operations at Unit C1 (as per the recommendations noted in this Report) would reduce the site noise levels to below existing background sound levels. With this operational arrangement in place, results from the operational assessment would be below the measured background sound levels at all NSRs during both daytime and night-time periods, indicating a negligible impact. Results show that internal noise levels from L_{AFmax} events would not exceed internal noise level criteria at any NSR indicating a negligible impact. The assessment has set noise limits for fixed plant items at the closest receptors. Provided the noise emission at receptor locations from fixed plant and operations from the Proposed Development does not exceed the levels set out in Table 17, the impacts from fixed plant would be negligible.



	The traffic assessment results have shown that there is no change in Basic Noise Level on surrounding roads due to traffic associated with the Site, which indicates a negligible impact.
Recommendations	Noise levels from fixed plant should not exceed the levels set out in this report. When sound emission and locations of fixed plant are finalised, a detailed assessment should be undertaken to ensure these limits are met. At Unit C1, any night-time loading and unloading activities should take place internally, with doors closed for the duration of the activity.
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 Savills on behalf of Redwood (Light Industrial) Propco Sarl (the 'Client') to prepare a Noise Impact Assessment to inform a planning application for the demolition of the existing Class E(g)(i) (Office) building and the construction of three buildings for Class E(g)(iii) (Light Industrial) / Class B2 (General Industrial) / Class B8 (Storage or Distribution) uses, including the provision of a new substation, parking, landscaping, and associated works (the 'Proposed Development'), located on land at Logicor Park Reading, Rose Kiln Court, Reading, RG2 0BY (the 'Site').
- 1.1.2 A Noise Impact Assessment is required to determine the impact of the Proposed Development on existing Noise Sensitive Receptors (NSRs).

1.2 Site Location and Context

- 1.2.1 The Site is located in an area dominated by road traffic noise. The A33 runs the full length of the eastern boundary and Rose Kiln Lane is located to the west. Existing commercial and industrial units are located to the east and south-west of the Site with residential receptors to the north-west and south.
- 1.2.2 The Site currently consists of a two-story office building and associated car parking. The existing building is due to be demolished as part of the proposal.
- 1.2.3 The closest NSRs are located 18m north along Laud Close, 21m west along Admirals Court and 8m south at Cadogan House, which has recently been converted to residential use.
- 1.2.4 The Proposed Development has the potential to operate during daytime and night-time periods.
- 1.2.5 Reference should be made to **Figure 1** for a map of the Site, surrounding area and NSRs. **Figure 2** shows the proposed Site layout.
- 1.2.6 The standard limitations associated with this assessment are presented in **Appendix A**.
- 1.2.7 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, 2021) and the Planning Practice Guidance (PPG) in July 2019¹. Together, the NPPF and NPPG 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

Reading Borough Local Plan Adopted: November 2019

- 2.2.1 Reading Borough Local Plan adopted in November 2019, sets out policies to help guide the development of Reading, secure sustainable development and provides the basis for determining planning applications.
- 2.2.2 Policy CC8 – Safeguarding Amenity in relation to noise:

“Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

[...]

- Noise and disturbance;”

2.2.3 Policy EN16: Pollution and Water Resources states in relation to noise:

“Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution; where it would result in no deterioration in, or ideally enhance, ground and surface water quality; and where adequate water resources, sewerage and wastewater treatment infrastructure will be in place to support the proposed development prior to occupation. Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.”

2.2.4 Policy EN17: Noise Generating Equipment states:

“Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor.”

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.

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Noise Criteria Limits

- 2.3.12 The scope of this Standard is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.
- 2.3.13 The Standard suggests suitable internal noise levels within different types of buildings, including dwellings, as shown in **Table 3**.

Table 3 - BS 8233:2014 Internal Target Noise Levels

Criterion	Typical Situation	Design $L_{Aeq,T}$ (dB)
Suitable resting/sleeping conditions	Living Room	35
	Bedroom*	30
*For a Reasonable standard in bedrooms at night, individual noise events (measured with fast time weighting) should not exceed 45dB L_{max}		

- 2.3.14 BS 8233 goes on to recommend noise levels for gardens as follows:

'It is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances 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 might be warranted'.

- 2.3.15 BS 8233 goes on to say:

'In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited'.

Ventilation Requirements

- 2.3.16 Where a partially open window cannot be relied upon to provide an adequate level of façade sound insulation performance, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 within BS 8233 states:

'The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used, and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Alternatively, acoustic ventilation units (see 7.7.2 below) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.'

2.3.17 Section 7.7.2 of the Standard states:

'NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.'

Calculation of Road Traffic Noise (CRTN) & Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration

2.3.18 The 'Calculation of Road Traffic Noise' (CRTN), produced by the Department of Transport / Welsh Office, provides a method for the prediction of noise from road traffic. DMRB LA 111, provides guidance on the assessment of noise impacts from roads and contains guidance for assessing the likely impact of noise generated by road traffic. The criteria from DMRB for short-term impact (at year of opening) and long-term impacts (by a future year) are presented in **Table 4**.

Table 4 - DMRB criteria for determining magnitude of Impact

Magnitude of impact	Change in noise level $LA_{10,18hr}$	
	Short-term	Long-term
No change	0 dB	0 dB
Negligible	0.1 – 0.9 dB	0.1 – 2.9 dB
Minor	1 – 2.9 dB	3 – 4.9dB
Moderate	3 – 4.9 dB	5 – 9.9 dB
Major	5 dB or more	10 dB or more

3.0 Scope and Methodology

3.1 Local Authority Consultation

- 3.1.1 A consultation exercise was undertaken with the Reading Borough Council (RBC) on the 26th January 2023 to discuss noise monitoring locations and assessment methodology. The email sent is provided below:

"Delta-Simons have been instructed to undertake a Noise Impact Assessment to support a planning application for the demolition of the existing office asset and the construction of approx. 12 No light industrial units located on land at Rose Kiln Court, Reading (the 'Site').

From reviewing online mapping and previous application data, the dominant noise sources on Site are understood to be from the existing commercial/industrial premises surrounding the Site and road traffic noise from the A33. We are seeking Reading Borough Council's (RBC) comments regarding our methodology.

Existing residential Noise Sensitive Receptors (NSRs) are located 13m north along Laud Close Dwellings and 17m west along Admirals Court. It is understood that Cadogan House, 8m to the south of the Site, has had permission granted in January 2019 (planning application number: 182166) for conversion to residential use and therefore shall be included as a residential NSR within the Noise Impact Assessment (NIA).

It is understood that a previous NIA was undertaken by Anderson Acoustics at the Site in March 2022 as part of planning application 220255, with the baseline noise survey undertaken in June 2021 and January 2022. Delta-Simons are proposing to undertake a baseline noise survey at the Site to validate the measurements previously undertaken by Anderson Acoustics. Currently it is anticipated this will involve one fixed long-term noise measurement (L1) adjacent to the A33, covering a weekday day and night period, in addition to a short-term 3-hour daytime noise measurement (S1) representative of Rose Kiln Lane. Sound levels obtained from the survey will be compared to levels recorded by Anderson Acoustics to establish any difference.

The Site red line boundary, NSRs and proposed Measurement Locations can be seen in Figure 1.

Baseline background sound levels obtained from Anderson Acoustics survey in June 2021 and January 2022 will be used to assess the noise impacts generated by the operation of the Site, correcting the measured data in line with the results from Delta-Simons survey. This will be completed in line with the 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 details regarding proposed plant are available, then the assessment will provide plant noise limits that should not be exceeded to avoid adverse impacts at the NSRs. From reviewing RBC's Local Plan, it is currently understood that rating levels from the Site should be 10dB below existing background sound levels to avoid adverse impacts at NSRs; do RBC agree with this approach?

Delta-Simons will assess the potential road traffic noise impacts at NSRs from the surrounding road network by predicting noise levels both with and without the development in place. This will be completed in-line with guidance presented in Calculation of Road Traffic Noise.

Where necessary, mitigation measures will be recommended to reduce noise impacts to acceptable levels.

Would Reading Borough Council be happy with the above approach? If you have any further input, I look forward to your response!"

- 3.1.2 Figure 1 above relates to **Figure 1** within this report.

- 3.1.3 On 14th February 2023 a response was received from RBC. The response received is provided below:

"Your methodology sounds reasonable to me, and nothing jumps out as being missing. Obviously when we come to review the full assessment then further comments might come to light!

Our mechanical plant policy allows for the rating level to be 0 dB above background, as long as the specific sound level is 10 dB below background as it is to prevent background creep and nuisance – although there are not usually that many corrections to lead to that situation. Hope this makes sense."

3.1.4 Following this email, our methodology was updated to incorporate RBC's comments regarding the specific sound level being 10dB below background.

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;
- Undertake a Baseline Noise Survey to establish the existing background sound environment on Site and validate previous measurements undertaken at the Site in June 2021 and January 2022;
- Noise modelling software CadnaA has been used to create a 3D noise model of the Site to undertake operational noise and maximum noise event calculations to inform the assessment;
- Provide plant noise limits for any proposed fixed plant associated with the development in line with BS 4142:2014+A1:2019, whereby the rated level of noise is below the background sound level at NSRs;
- Assess any likely traffic noise impacts as a result of the Proposed Development; 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 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 The location of these receptors is shown in **Figure 1**.

Table 5 - Sensitivity of Receptors

ID	Receptor	Direction and Distance from Site Boundary	Sensitive Time Period
R1	Laud Close	18m North	Daytime and Night-time
R2	Admirals Court	21m West	Daytime and Night-time
R3	Cadogan House (recently converted to residential)	8m South	Daytime and Night-time

3.4 Operational Noise

3.4.1 A 3D noise model has been built to calculate the noise levels associated with operational Van movements and deliveries on the Site at the closest NSRs.

- 3.4.2 Given the size and format of the units and the service yards, it is understood that HGVs would not routinely access the site, and that deliveries would primarily be made using vans.
- 3.4.3 The assessment has considered noise impacts during daytime and night-time periods. This has been undertaken to demonstrate a worst-case assessment where only external noise sources are assessed (i.e. Van movements and external loading/unloading).
- 3.4.4 To determine the impact as noise levels that could be produced from the proposed operations on the Site, the assessment has been undertaken using methods from BS 4142:2014+A1:2019. The rating levels of the operational processes are assessed against the background sound level at the identified receptors.
- 3.4.5 The operational assessment has assumed all 8 loading bays would be active in a single 1-hour daytime and 15-minute night-time assessment period.

3.5 Night-Time L_{AFmax} Event

- 3.5.1 Maximum noise events associated with deliveries during the night-time period attributable to doors shutting, clicks, and bangs are also considered within the assessment.
- 3.5.2 The following table details the L_{AFmax} noise level associated with vehicle door slams as measured set out in Bayerisches Landesamt für Umwelt Parking Area Noise (2007):

Table 6 - Door Slam Source Noise Level

Event	Measurement Distance, m	Measured dB L_{AFmax}
Vehicle door slam	7.5	72.1

- 3.5.3 BS 8233 notes that, individual noise events should not exceed 45dB L_{AFmax} internally.
- 3.5.4 It is widely accepted that a partially open window will provide 13dB noise attenuation and therefore internal noise levels have been calculated and assessed against a limit of 45dB L_{AFmax} .

3.6 Plant Noise Limits

- 3.6.1 At this stage the exact details and location of fixed plant (e.g. air handling units and transformers) to be installed on the proposed units is not known. Therefore, as a conservative approach, a plant noise limit is provided that the development should not exceed when measured in free-field conditions at each NSR, assuming continuous 24-hour operational noise.

3.7 Road Traffic Noise - CRTN and DMRB Assessment

- 3.7.1 Given the location of the Site directly onto an arterial route, it is considered that spreadsheet calculations of basic traffic noise changes would be sufficient to identify the level of impact from the proposed development.
- 3.7.2 Baseline traffic flows and traffic flows with the proposed development have been provided by Mayer Brown Limited and are presented in **Table C 1**, with calculations set out in **Table C 2** in **Appendix C**. Traffic data was provided as 18-Hour Annual Average Weekly Traffic (AAWT).
- 3.7.3 An assessment has been carried out using these traffic flows following the methodology set out in CRTN and assessed using the impact scale set out in DMRB LA 111.

3.8 Significance Criteria

- 3.8.1 Where the rated level of noise exceeds the adopted noise criteria level, as per BS 4142:2014+A1:2019 and local planning guidance, at the residential receptors, a substantial adverse impact will be observed depending on the context and level of exceedance.

4.0 Baseline Survey

4.1 Introduction

- 4.1.1 A previous Noise Impact Assessment was undertaken for a previous proposal at the Site by Anderson Acoustics in March 2022. As part of this, an unattended baseline noise survey was undertaken at the Site between Friday 4th and Thursday 10th June 2021 and an attended survey was undertaken on Friday 13th and Saturday 14th January 2022 to distinguish the acoustic conditions at NSRs. Anderson Acoustics measurement locations are presented in **Figure 1**.
- 4.1.2 Delta-Simons has undertaken a baseline noise survey from Thursday 2nd to Tuesday 7th February 2023 to validate the measurements undertaken by Anderson Acoustics and determine the potential variation.

4.2 Measurement Locations

- 4.2.1 Measurements were undertaken at the following locations.

Table 7 - Measurement Locations

Measurement Location	British National Grid Coordinates		Date and Time	Observations
	X	Y		
L1	172318	172318	12:20 2 nd February 2023 to 11:20 7 th February 2023	On set-up and collection, the dominant noise source was road traffic noise from the A33.
S1	172357	172357	11:27 to 14:27 7 th February 2023	Road traffic noise from Rose Kiln Lane was dominant. Noise from the A33 and birdsong could also be heard.

- 4.2.2 Measurement locations are shown in **Figure 1**.

4.3 Survey Equipment

- 4.3.1 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 8 - Noise Measurement Equipment

Measurement Location	Equipment	Model Type	Serial Number	Date of Last Laboratory Calibration before Survey
L1 and S1	Sound Level Meter	01dB Fusion	14431	7 th March 2022
	Pre-amplifier	01dB PRE22	213148	
	Microphone	GRAS 40CD	470625	
	Calibrator	CR:515	98533	19 th April 2022
	Weather Station	Vaisala	UO410445	N/A

- 4.3.2 The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice. Calibration certificates for which are available on request.

4.4 Weather Conditions

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

Table 9 - Adverse Meteorological Conditions during the Survey

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

4.5 Survey Summary Results

- 4.5.1 For the unattended location, L1, the presented measured data consists of the energetic 1-hour daytime and 15-minute night-time $L_{Aeq,T}$ samples over the stated survey period. A graphical representation of the survey data is shown in **Figure 3**.
- 4.5.2 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 10 - L1 Survey Summary Results

Measurement Location	Period		Measured Levels, dB				
			$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$	Modal $L_{A90,T}$
L1	Weekday	Daytime	70	95	74	56	57
		Night-time	64	88	66	43	40
	Weekend	Daytime	69	90	73	54	58
		Night-time	63	83	67	43	42
	Overall	Daytime	70	95	73	55	57
		Night-time	63	88	68	43	40

- 4.5.3 For the attended measurement location, S1, the presented measured data consists of the energetic 15-minute $L_{Aeq,T}$ samples over the stated measurement period. The results of the attended measurements are shown below.

Table 11 - S1 Survey Summary Results

Measurement Location	Period	Measured Levels, dB				
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$	Modal $L_{A90,T}$
S1	Daytime	65	94	68	57	57

4.6 Baseline Analysis

- 4.6.1 L1 and S1 measurements have been compared against the unattended measurements undertaken by Anderson Acoustics in June 2021 to establish the difference in L_{A90} .

Table 12 - Baseline Noise Survey L_{A90} Analysis

Delta-Simons 2023 Measurement Location	Anderson Acoustics 2021 Measurement Location	Time Period	Delta-Simons 2023 Modal $L_{A90,15min}$	Anderson Acoustics 2021 Modal $L_{A90,15min}$	L_{A90} difference (dB)
L1	UP2	Daytime	57	56	+1
		Night-time	40	38	+2
S1	UP1	Daytime	57	54	+3
		Night-time	-	37	-

- 4.6.2 As can be seen in the table above, the results show that the typical modal L_{A90} varied by +3 dB during the daytime at S1, by +1 dB during the daytime at L1 and +2 dB during the night-time. This indicates that background sound levels on Site have not significantly varied between the two measurements.
- 4.6.3 The table below assigns modal background sound levels to sensitive receptor locations to inform the assessment, based on the most recent Delta Simons survey data.

Table 13 - NSR Background Sound Levels

Receptor Location	Period	Modal Background Sound Level ($L_{A90,T}$)
R1	Daytime	57
	Night-time	40
R2	Daytime	57
	Night-time	40
R3	Daytime	57
	Night-time	40

5.0 Assessment

5.1 Operational Noise

- 5.1.1 A 3D noise model has been used to calculate the propagation of noise from van operations and vehicle movements associated with the Proposed Development to each receptor location.
- 5.1.2 Predicted noise levels at receptor points within the noise model are taken 1.5m in height for the ground floor and 4m for the first floor. For daytime periods at residential dwellings, the receptor points are located within garden areas if these are closer than the building.
- 5.1.3 **Figure 4** and **Figure 5** show the sound propagation of the Site upon the receptor locations for the day and night periods, respectively.
- 5.1.4 To provide a worst-case assessment the closest receptors to the Site are chosen, identified in **Table 5**.
- 5.1.5 An acoustic character correction of +3dB for intermittency has been allocated to the specific noise sources.
- 5.1.6 **Table 14** completes the BS 4142 Assessment for both the daytime and night-time periods.

Table 14 - External Operational Noise Impacts with No Mitigation

Receptor	Period	Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Total Acoustic Character Correction (dB)	Calculated Rating Level $L_{Ar,T}$ (dB)	Measured Modal Background Sound Level, $L_{A90,T}$ (dB)	Rating Level Difference +/- (dB)
R1	Daytime	30	+3	33	57	-24
	Night-time	31	+3	34	40	-6
R2	Daytime	24	+3	27	57	-30
	Night-time	25	+3	28	40	-12
R3	Daytime	39	+3	42	57	-15
	Night-time	39	+3	42	40	+2

- 5.1.7 The assessment indicates that during the daytime period, rated levels of noise will be below background at R1 and R2 but exceeded at R3. During the night-time period, levels are below background at R2 but exceeded at R1 and R3.
- 5.1.8 RBC's criteria of the specific noise level being 10dB below the background sound level is achieved during the daytime period at all receptors.
- 5.1.9 For the night-time period it is not reasonably expected that the occupiers of the dwelling will use their garden area and so it is necessary to consider sound levels within bedrooms. **Table 15** calculates the specific level of sound in a bedroom of the NSRs.

Table 15 - Internal Noise Impacts with No Mitigation

Receptor	Period	Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Sound Reduction of a Partially Open Window (dB)	Calculated Internal Level $L_{Aeq,T}$ (dB)	Internal Criteria $L_{Aeq,T}$ (dB)	Difference +/- (dB)
R1	Night-time	31	-13	18	30	-12
R2	Night-time	25	-13	12	30	-18
R3	Night-time	39	-13	26	30	-4

5.1.10 As shown in the table above, internal noise level criteria would not be exceeded during night-time hours.

5.2 Night-Time L_{AFmax} Event

5.2.1 A typical L_{AFmax} noise event is assumed to occur when the Site is operational and would typically be attributable to vehicle door slams. The assessment uses the L_{AFmax} noise event level set out in **Table 6** and calculates the internal noise level from this.

5.2.2 **Figure 6** shows the L_{AFmax} sound propagation of the Site upon the receptor locations.

5.2.3 **Table 16** calculates the internal noise level based on the L_{AFmax} noise event level.

Table 16 - Highest Predicted L_{AFmax} Noise Level with No Mitigation

Receptor	External L_{AFmax} noise event level dB	Attenuation for partially open window dB	WHO Internal noise level criteria L_{AFmax}	Calculated internal noise level (dB L_{AFmax})	Difference dB
R1	54	-13	45	41	-4
R2	47	-13	45	34	-11
R3	62	-13	45	49	4

5.2.4 The table above shows that the calculated internal noise level from a L_{AFmax} event would not exceed internal noise level criteria at R1 and R2 but would exceed internal noise level criteria at R3, assuming a partially open window will provide 13dB of attenuation.

5.2.5 Therefore, mitigation is considered in **Section 6.0** to reduce these levels to meet internal noise level criteria.

5.3 Plant Noise Limits

5.3.1 The location and details of the fixed plant associated with the Site were not available at the time of assessment. Therefore, the assessment below determines plant noise limits that the development should not exceed at the NSRs to avoid adverse impacts.

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

Table 17 - Plant Rating Limits

Receptor	Period	Modal Background Sound Level, $L_{A90,T}$ (dB)	Rating Noise Limits $L_{A,r,T}$ at Receptor (dB)	Specific Noise Limits at Receptor (dB)
R1	Daytime	57	57	47
	Night-time	40	40	30
R2	Daytime	57	57	47
	Night-time	40	40	30
R3	Daytime	57	57	47
	Night-time	40	40	30

5.3.3 Provided the Rating Noise Level at the NSRs do not exceed levels shown in the table above, there would be no adverse impact. The rating levels are inclusive of any applicable acoustic feature corrections, dependent on the final selection of plant. Limits for the specific noise level

5.3.4 To comply with RBC requirement for specific noise levels from mechanical plant to be 10dB below background, specific noise limits at the receptor have been set.

5.3.5 When sound emission and locations of fixed plant are finalised, a detailed assessment should be undertaken to ensure these limits are met.

5.4 Road Traffic Noise - CRTN & DMRB Assessment

5.4.1 The existing and predicted traffic flows on roads surrounding the Site have been provided by the project transport consultant. The data provided is shown in **Appendix C Table C 1** with calculations provided in **Table C 2**.

5.4.2 Basic Noise Level (BNL) calculations have been undertaken for the without scheme (Do Minimum) and with Proposed Development (Do Something) scenarios. BNLs have not been corrected for any gradients, barriers, or road surface types.

5.4.3 The results of the Basic Noise Level (BNL) calculations are shown in **Table 18**.

Table 18 - Basic Noise Level, $L_{A10,18hr}$ dB, with and without the development

ID	Road	BNL $L_{A10,18hr}$ dB		Impact $L_{A10,18hr}$ dB
		Do Minimum	Do Something	
1	A33 (North of Rose Kiln Court)	70.7	70.7	0.0
2	A33 (South of Rose Kiln Court)	71.9	71.9	0.0
3	Rose Kiln Lane	66.7	66.7	0.0

5.4.4 It can be seen in the table above that there is up to +0.0 dB $L_{A10,18hr}$ change in basic noise level on surrounding roads due to traffic associated with the Site, which indicates a **negligible** impact.

6.0 Mitigation

6.1 Introduction

- 6.1.1 To reduce operational noise impacts to below background sound levels and internal criteria, mitigation has been considered.
- 6.1.2 Noise from external loading and unloading activities is the dominant noise source. Doors to the units are large enough to allowing vehicles to drive inside to be unloaded, it is considered that undertaking night-time loading and unloading internally at some units would reduce noise levels to below existing background sound levels.
- 6.1.3 Various scenarios have been modelled to determine which units may still operate externally at night without exceeding background levels. Through the modelling, it was found that only Unit C1 needs to operate under an alternative night-time arrangement in order for total Site noise levels to be below background sound levels.
- 6.1.4 The following assessments are based on all units except C1 operating with external loading/unloading. Loading at Unit C1 is undertaken internally, with doors closed.

6.2 Operational Noise

- 6.2.1 The proposed mitigation does not change the noise emitted from the Site during daytime hours. **Figure 7** shows the sound propagation of the Site upon the receptor locations for the night-time period, with mitigation in place.
- 6.2.2 **Table 19** completes the BS 4142 assessment for both daytime and night-time periods with mitigation in place.

Table 19 - External Operational Noise Impacts with Mitigation

Receptor	Period	Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Total Acoustic Character Correction (dB)	Calculated Rating Level $L_{Ar,T}$ (dB)	Measured Modal Background Sound Level, $L_{A90,T}$ (dB)	Rating Level Difference +/- (dB)
R1	Daytime	30	+3	33	57	-24
	Night-time	30	+3	33	40	-7
R2	Daytime	24	+3	27	57	-30
	Night-time	25	+3	28	40	-12
R3	Daytime	39	+3	42	57	-15
	Night-time	36	+3	39	40	-1

- 6.2.3 The assessment indicates that during daytime and night-time periods the rated level of noise will be below the measured background sound level at all NSRs, indicating a **negligible** impact.
- 6.2.4 RBC's criteria of the specific noise level being 10dB below the background sound level is achieved during the daytime periods at all receptors but exceeded during the night-time period at all receptors. However, it is believed that due to the context of the Site it would be difficult to achieve a specific noise level that is 10dB below the background sound level at night-time. Therefore, it is important to note that occupiers of the dwellings will be unlikely to use garden areas at night and therefore sound levels within bedrooms with mitigation in place are considered below.

Table 20 - Internal Noise Operational Noise Impacts

Receptor	Period	Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Sound Reduction of a Partially Open Window (dB)	Calculated Internal Level $L_{Aeq,T}$ (dB)	Internal Criteria $L_{Aeq,T}$ (dB)	Difference +/- (dB)
R1	Night-time	30	-13	17	30	-13
R2	Night-time	25	-13	12	30	-18
R3	Night-time	36	-13	23	30	-7

6.2.5 As shown in the table above, internal noise level criteria would not be exceeded during night-time hours at all receptors, indicating a **negligible** impact.

6.3 Night-Time L_{AFmax} Event

6.3.1 **Table 21** calculates the internal noise level based on the L_{AFmax} noise event level, with the noise barrier mitigation in place.

6.3.2 **Figure 8** shows the L_{AFmax} sound propagation from the Site upon the receptor locations, with mitigation in place.

Table 21 - Highest Predicted L_{AFmax} Noise Level

Receptor	External L_{AFmax} noise event level dB	Attenuation for partially open window dB	WHO Internal noise level criteria L_{AFmax}	Calculated internal noise level (dB L_{AFmax})	Difference dB
R1	54	-13	45	41	-4
R2	46	-13	45	33	-12
R3	58	-13	45	45	0

6.3.3 The table above shows that the calculated internal noise level from a L_{AFmax} event would not exceed internal noise level criteria at any NSR, assuming a partially open window will provide 13dB of attenuation. Therefore, a **negligible** impact is predicted.

7.0 Summary and Conclusions

- 7.1.1 Delta-Simons was instructed by Redwood (Light Industrial) Propco Sarl (the 'Client') to prepare a Noise Impact Assessment to inform a planning application for the demolition of the existing Class E(g)(i) (Office) building and the construction of three buildings for Class E(g)(iii) (Light Industrial) / Class B2 (General Industrial) / Class B8 (Storage or Distribution) uses, including the provision of a new substation, parking, landscaping, and associated works (the 'Proposed Development'), located on land at Logisor Park Reading, Rose Kiln Court, Reading, RG2 0BY (the 'Site').
- 7.1.2 A Noise Impact Assessment is required to determine the impact of the Proposed Development on existing Noise Sensitive Receptors (NSRs).
- 7.1.3 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 noise sensitive receptors (NSRs). Accordingly, this assessment has been completed with due regard to:
- National Planning Policy Framework (NPPF);
 - Planning Policy Guidance (PPG);
 - BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
 - BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings';
 - Calculation of Road Traffic Noise (CRTN) 1988; and
 - Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration revision 2 2020.
- 7.1.4 A previous Noise Impact Assessment was undertaken by Anderson Acoustics at the Site in March 2022 with the baseline noise survey undertaken in June 2021 and January 2022. To validate these measurements, Delta-Simons have undertaken a baseline noise survey on Site over a weekday and weekend period.
- 7.1.5 This assessment has been informed by the background sound levels obtained by Anderson Acoustics in January 2022 and additional monitoring undertaken by Delta-Simons in February 2023.
- 7.1.6 Noise modelling software CadnaA has been used to create a 3D noise model of the Site to undertake operational noise and maximum noise event calculations to inform the assessment.
- 7.1.7 The assessment indicates that during daytime periods noise from the Site would be below existing background sound levels at all NSRs. At night, the only potential exceedance of background sound levels would be at Cadogan House (recently converted to residential), and so mitigation measures have been recommended in this Report to reduce impacts at this receptor.
- 7.1.8 As external loading and unloading activities are the dominant noise source on the Site, operating Unit C1 with no external loading/unloading during night-time hours would be sufficient to reduce noise emissions from the Site to below existing background sound levels at Cadogan House. The doors to Unit C1 should remain closed during the loading/unloading activities take place internally. With this operating arrangement in place, noise emission from the Site would be below the measured background sound levels at all NSRs during both daytime and night-time periods, indicating a **negligible** impact.
- 7.1.9 With the above operating arrangement in place, results show that internal noise levels from $L_{A_{Fmax}}$ events would not exceed internal noise level criteria at any NSR indicating a **negligible** impact.
- 7.1.10 The assessment has set noise limits for fixed plant items at the closest receptors. Provided the noise emission at receptor locations from fixed plant and operations from the Proposed Development does not exceed the levels set out in **Table 17**, the impacts from fixed plant would be **negligible**.

- 7.1.11 The traffic assessment results have shown that there is no change in basic noise level on surrounding roads due to traffic associated with the Site, which indicates a **negligible** impact.

Figure 1 – Site Location, Measurement Locations and NSRs

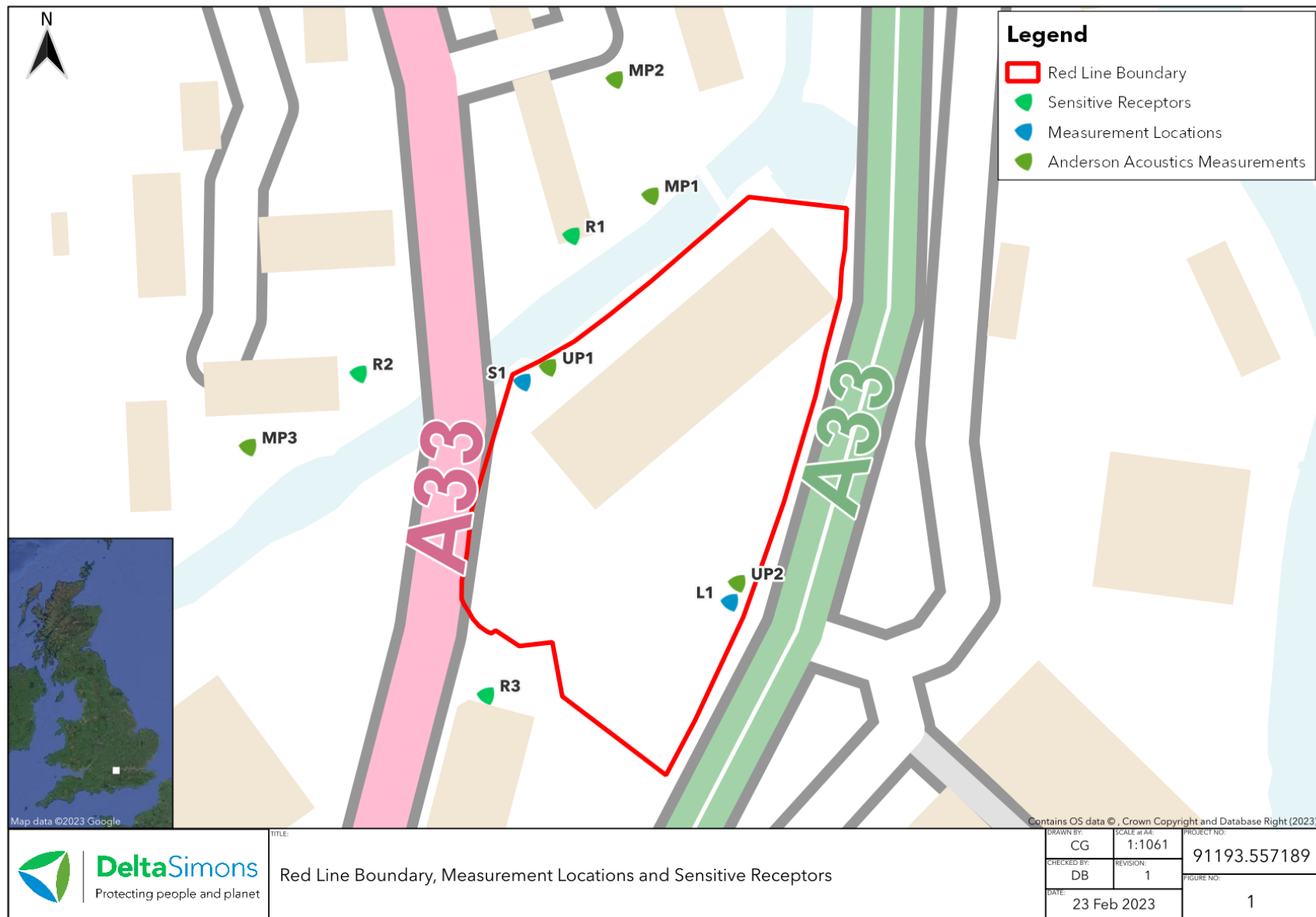


Figure 2 - Proposed Site Layout

Figure 3 - Measured Time History: L1

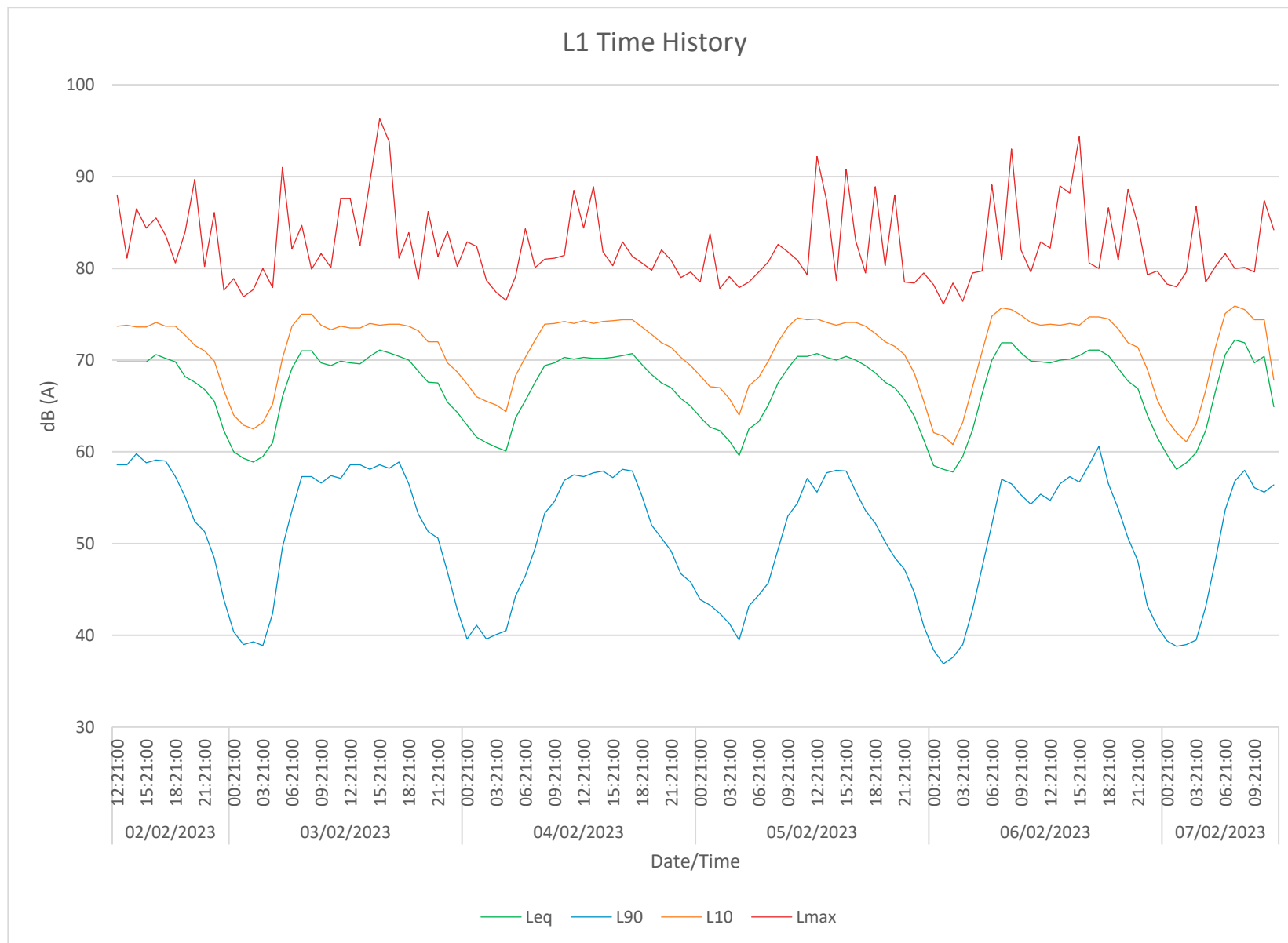


Figure 4 - Noise Contour: Daytime

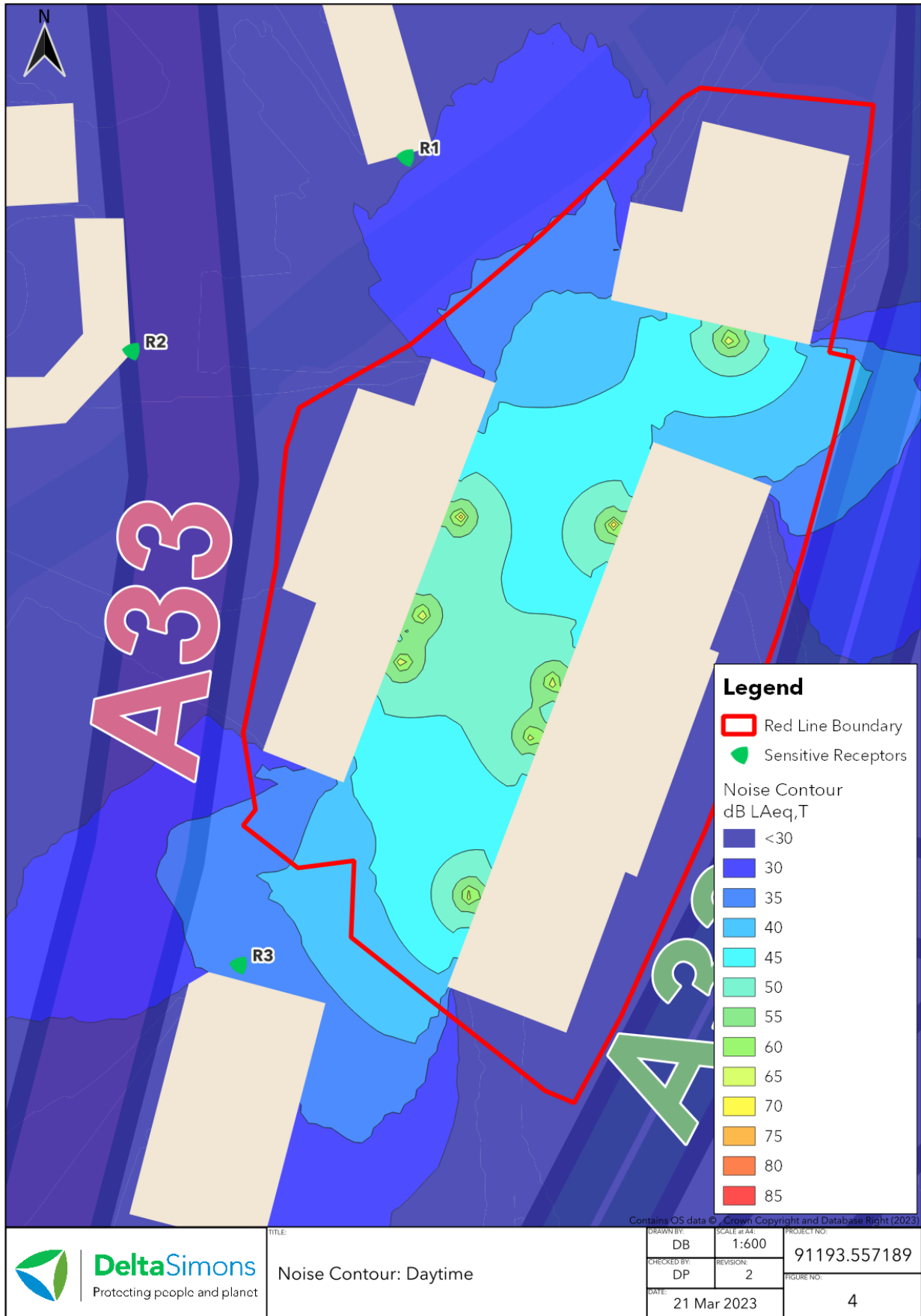


Figure 5 - Noise Contour: Unmitigated Night-time

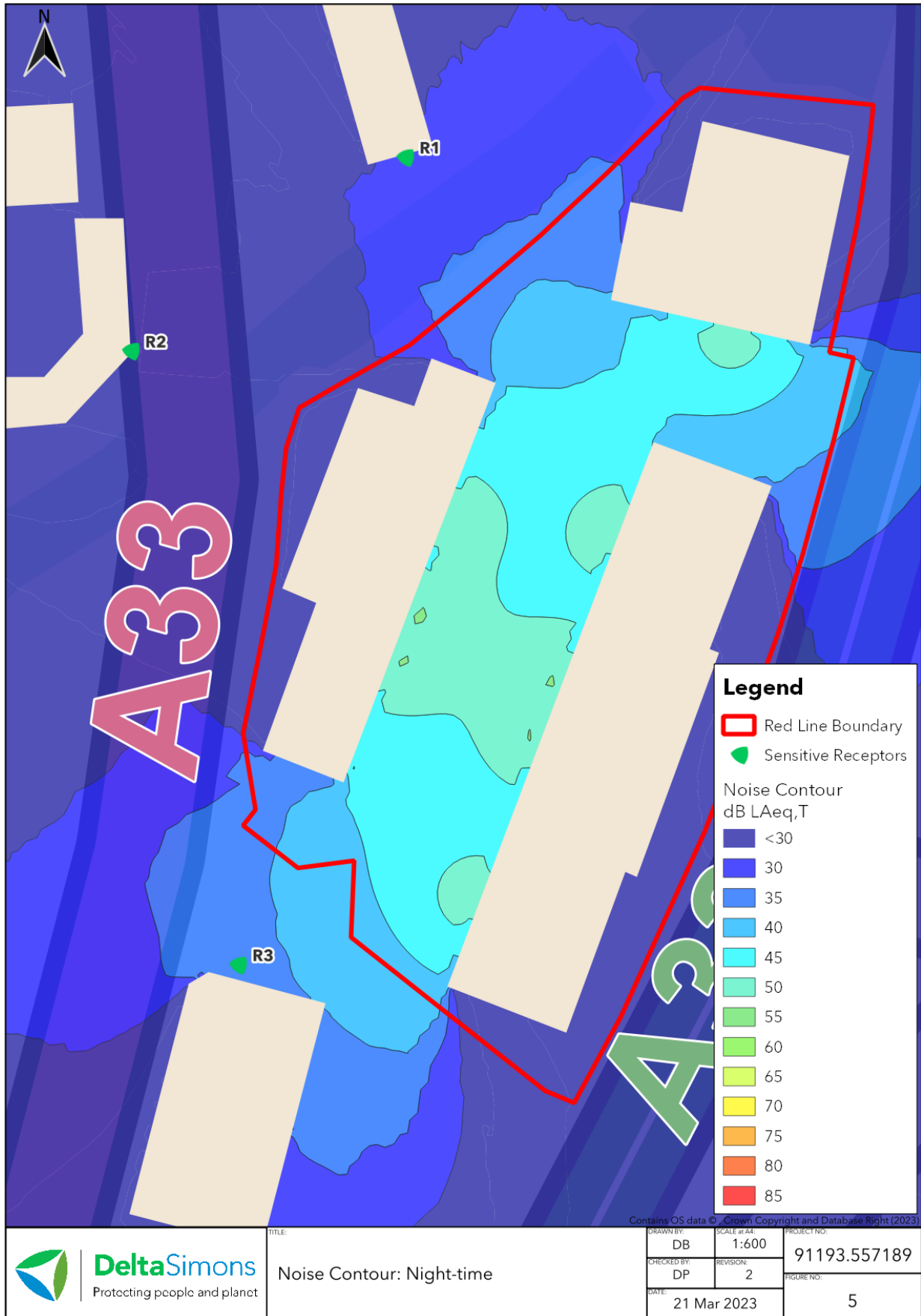


Figure 6 – Noise Contour: Unmitigated L_{AFmax}



Figure 7 - Noise Contour: Mitigated Night-time

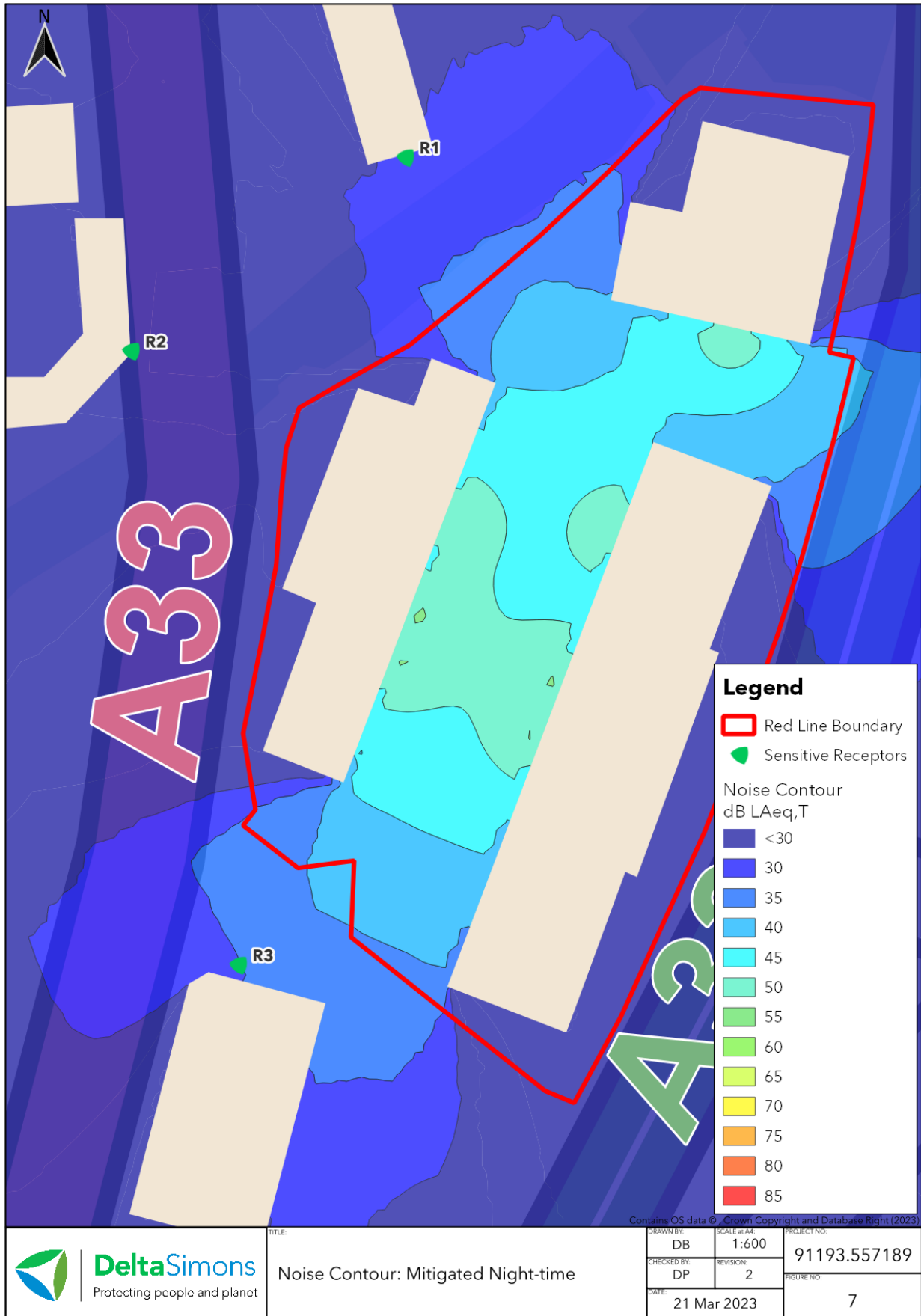


Figure 8 – Noise Contour: Mitigated L_{AFmax}



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 ($2 \times 10^{-5} \text{Pa}$).
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 L_n 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.

Appendix C - Traffic Data

Table C 1 - Traffic Data, AAWT,18hour*

ID	Road	Speed (km/h)	Do Minimum			Do Something		
			Flow	HGV Flow	% HGV	Flow	HGV Flow	% HGV
1	A33 (North of Rose Kiln Court)	50	25531	897	3.5	25406	914	3.6
2	A33 (South of Rose Kiln Court)	50	35621	1034	2.9	35496	1051	3.0
3	Rose Kiln Lane	50	12225	165	1.3	12100	182	1.5

Table C 2 - Traffic Calculations

ID	Road	Scenario	Flow (vehicles)	Vehicle speed (km/h)	HGVs	% HGV	Gradient Correction (dB)	Texture Depth (mm)	Surface Correction (dB)	Basic value	BNL (dB)	Change (dB)
1	A33 (North of Rose Kiln Court)	Do Minimum	25531	43	897	1.1	0	2	0	29.1	70.7	-
		Do Something	25406		914	3.6	0	2	0	29.1	70.7	0.0
2	A33 (South of Rose Kiln Court)	Do Minimum	35621	43	1034	1.1	0	2	0	29.1	71.9	-
		Do Something	35496		1051	3.0	0	2	0	29.1	71.9	0.0
3	Rose Kiln Lane	Do Minimum	12225	112	165	8.5	0	2	0	29.1	66.7	-
		Do Something	12100		182	1.5	0	2	0	29.1	66.7	0.0