

Flaxlands Solar Farm

Noise Impact Assessment

Ampyr Solar Europe

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Prepared for:

Ampyr Solar Europe

Prepared by:

AECOM Limited

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1. Introduction

- 1.1.1 On behalf of Ampyr Solar Europe (the 'Applicant'), AECOM have prepared this Noise Impact Assessment to accompany the Planning application for a new Solar Farm (the 'Proposed Development') near Royal Wootton Bassett, Swindon, Wiltshire (the 'Site'). This report provides information on the noise impact assessment of the Proposed Development.
- 1.1.2 The Proposed Development comprises the following:
- Proposed Development of 49.9 megawatt (MW) of solar photovoltaic (PV) arrays and a 49.9 MW Battery Energy Storage System (BESS); and
 - Other infrastructure includes inverters, transformers, an onsite substation, and cabling.
- 1.1.3 The following are described within this report:
- Site location and description along with nearby noise-sensitive receptors;
 - The methods used to assess significant noise effects associated with the Proposed Development;
 - The current baseline sound environment at receptor locations within the surrounding area based upon measured sound data;
 - Qualitative assessment of the construction works associated with the Proposed Development;
 - Methodology and results obtained from acoustic modelling of the operational sound of the Proposed Development; and
 - The assessment of cumulative effects of the operation of the Proposed Development on nearby noise-sensitive receptors.
- 1.1.4 An Acoustic Glossary can be found in Appendix A.

2. Site Description

- 2.1.1 The Site is approximately 87.09 ha separated into the 'western and 'eastern' and parcels which are joined via by Flaxlands Lane. The Proposed Development is located 1.7 km north of the town of Royal Wootton Bassett and 3.2 km west of Swindon, Wiltshire, centred on National Grid reference (NGR) SU 06910 85466.
- 2.1.2 The Site is bounded to the west and north-west by woodland, to the north by agricultural land and to the east by agricultural land, woodland, highway, commercial and residential properties associated with the village of Hook. To the south the Site is bounded by agricultural land, woodland and beyond, the M4 motorway.
- 2.1.3 The closest noise-sensitive receptor areas to the Site are individual residential properties located to the east in Hook, individual properties in Green Hill to the north, individual properties along Flaxlands Lane and individual properties along the B4696 and Lydiard Plain to the west. A Site location plan illustrating the locations of nearby noise-sensitive receptors is presented in Appendix B with the receptors also described in Table 2.1.

Table 2.1 Sensitive Receptor Locations and Description

Receptor ID	Description	Approx. Coordinates	Receptor type	Representative Monitoring Location
R1	Flaxlands Field Farm	51.568133, -1.906617	Residential	LT4
R2	Church of God in Swindon	51.564231, -1.906039	Place of Worship	LT1
R3	Flaxlands Manor Farm	51.564150, -1.906792	Residential	LT1
R4	Flaxlands Wood Farm	51.563325, -1.906575	Residential	LT1
R5	Flaxlands Cottage	51.561664, -1.909656	Residential	LT1
R6	Cottage Farm	51.561314, -1.915508	Residential	LT1
R7	Koffs Farm	51.571619, -1.904842	Residential	LT2
R8	Flaxlands Farm	51.563433, -1.903775	Residential	LT1
R9	The Bungalow	51.560953, -1.902342	Residential	LT3
R10	Willowacres	51.566683, -1.891722	Residential	LT3
R11	South View	51.565311, -1.890833	Residential	LT3
R12	The Bollingbroke Arms	51.565378, -1.889581	Hotel	LT3
R13	Flaxlands House	51.564422, -1.890900	Residential	LT3
R14	Hook, Greatfield and Greenhill Village Hall	51.562919, -1.889772	Village Hall	LT3
R15	The Old Shop	51.561867, -1.889811	Residential	LT3
R16	Windsor Close	51.561044, -1.890633	Residential	LT3
R17	Downsview	51.560442, -1.889625	Residential	LT3
R18	Dianmer Close	51.559583, -1.889808	Residential	LT3
R19	Dianmer Close	51.558553, -1.890831	Residential	LT3
R20	Driffeld Farm	51.557444, -1.901239	Residential	LT3
R21	Ballards Ash	51.558475, -1.905111	Care Home	LT3

Receptor ID	Description	Approx. Coordinates	Receptor type	Representative Monitoring Location
R22	Brinkworth Road	51.558622, -1.915342	Residential	LT3
R23	B4696	51.565419, -1.921906	Residential	ST1 / LT2
R24	Lydiard Plain	51.567142, -1.920000	Residential	ST1 / LT2
R25	Lydiard Plain	51.570508, -1.919444	Residential	ST1 / LT2
R26	23 Greenhill	51.573836, -1.902747	Residential	LT2
R27	12 Greenhill	51.573297, -1.899300	Residential	LT2

3. Relevant Guidance and Local Authority Requirements

3.1 National Planning Policy

National Planning Policy Framework (2024)

- 3.1.1 The revised National Planning Policy Framework¹ (NPPF) was published in December 2024 and sets out the Government's planning policies for England and how these are expected to be applied. This NPPF supersedes the previous NPPF published in March 2012, revised in July 2018, updated in February 2019 and revised in July 2021 and December 2023.
- 3.1.2 The revised NPPF maintains the presumption in favour of sustainable development, which should be delivered in accordance with three main objective areas: economic, social and environmental (Paragraph 8). The revised NPPF aims to enable local people and their local authorities to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.
- 3.1.3 Section 15 of the NPPF is concerned with conserving and enhancing the natural environment, including the matters that should be considered for planning decisions in relation to ground conditions and pollution.
- 3.1.4 Policies and objectives which are of particular relevance to noise and vibration include:
- Paragraph 187: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."*
 - Paragraph 198: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and quality of life; b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*
- 3.1.5 With regards to 'adverse effects' and 'significant adverse effects', the NPPF refers to the Noise Policy Statement for England (NPSE).

Noise Policy Statement for England (2010)

- 3.1.6 The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise, and neighbourhood noise.
- 3.1.7 The NPSE sets out the long-term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".
- 3.1.8 This long-term vision is supported by three aims:
- "Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life; and

¹ National Planning Policy Framework, Department for Communities and Local Government, 2012 (updated 2024)

- Where possible, contribute to the improvements of health and quality of life.”
- 3.1.9 The ‘Explanatory Note’ within the NPSE provides further guidance on defining ‘significant adverse effects’ and ‘adverse effects’ using the following concepts:
- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
 - Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
 - Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.
- 3.1.10 With reference to the SOAEL, the NPSE states:
- 3.1.11 *“It is recognised that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*
- 3.1.12 For situations where noise levels are between the LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise the adverse effects. However, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance Noise (2019)

- 3.1.13 The Planning Practice Guidance Noise² (PPGN) “*advises on how planning can manage potential noise impacts in new development*” and provides guidelines that are designed to assist with implementation of the NPPF.
- 3.1.14 The PPG states that local planning authorities should take account of the acoustic environment and in doing so should 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.”*
- 3.1.15 Factors to be considered in determining whether noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative effects.
- 3.1.16 Further details on the hierarchy of noise effects are presented in Table 3.1, which has been reproduced from the PPGN.

² Planning Practice Guidance, Department for Communities and Local Government, 2019

Table 3.1 PPGN hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

3.2 Other Relevant Standards and Guidance

BS 4142:2014+A1:2019

3.2.1 BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*'³ can be used for assessing the effect of sound of an industrial nature (such as from electrical equipment) on residential dwellings. The method compares the difference between '*rating level*' of the industrial sound, with the '*background sound level*' at the receptor position. The standard uses the following definitions to describe various aspects of the soundscape of the scenario being assessed:

- **Background sound level**, $L_{AF90,T}$ dB - defined in the Standard as the 'A-weighted sound pressure level that is exceeded by the residual sound for 90% of a given time interval, T , measured using time weighting F and quoted to the nearest whole number of decibels'.
- **Specific sound level**, $L_s = L_{Aeq,T_r}$ dB - the 'sound source at the assessment location over a given reference time interval, T_r '.
- **Rating level**, L_{Ar,T_r} - the 'specific sound level plus any adjustment made for the characteristic features of the sound'.
- **Ambient sound level**, $L_{Aeq,T}$ dB - defined in the standard as 'the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far when present. The ambient sound comprises the residual sound and the specific sound.'
- **Residual sound level**, $L_r = L_{Aeq,T}$ - the 'Ambient Sound remaining at the assessment location when the Specific Sound source is suppressed to such a degree that it does not contribute to the Ambient Sound'.

³ BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*', British Standards Institution, 2019

- 3.2.2 When assessing a sound source such as the plant it is important to consider the context of the Proposed Development Site and the nature of the existing sound sources in the area. However, it is also necessary to consider the risks of new sources causing the ambient sound levels in the area to 'creep' up.
- 3.2.3 Whereas the previous version of BS 4142:1997 allowed for a single correction of +5 dB to be made to the Specific Sound Level if one or more of the distinguishable, impulsive or irregular features were considered to be present, BS 4142:2014+A1:2019 allows for corrections to be applied based upon the presence or expected presence of the following:
- Tonality: up to +6 dB penalty;
 - Impulsivity: up to +9 dB penalty (this can be summed with tonality penalty);
 - Other sound characteristics (neither tonal nor impulsive but still distinctive): + 3 dB penalty; and
 - Intermittency: +3 dB
- 3.2.4 Once any adjustments have been made, the *background sound level* and the *rating level* are compared. The standard states that:
- a. *"Typically, the greater the difference, the greater the magnitude of impact."*
 - b. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context."*
 - c. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending upon the context."*
 - d. *The lower the rating level is to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon the context."*
- 3.2.5 With reference to NPSE, the LOAEL is defined in this assessment as a rating level equal to the measured background sound level, and the SOAEL as a rating level 10 dB greater than the measured background sound level.

British Standard 5228:2009+A1:2014

- 3.2.6 BS 5228-1 'Code of practice for noise and vibration control on construction and open sites'⁴ provides a 'best practice' guide for noise control and includes Sound Power Level (L_w) data for individual plant as well as a calculation method for noise from construction activities. BS 5228-2 'Code of practice for noise and vibration control on construction and open sites. Vibration' (BSI, 2014) provides comparable 'best practice' for vibration control, including guidance on the human response to vibration.
- 3.2.7 BS 5228-1 Part 1: Noise, Annex E.3.2 'Example method 1 The ABC Method' presents an example method for the assessment of construction noise. The ABC Method, shown in Table 3.2, shows an example of the threshold of potential significant effect at dwellings when the site noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated.

⁴ BS 5228:2009 + A1:2014 'Code of practice for noise and vibration control on construction and open sites', British Standards Institution, 2014

Table 3.2 BS5228 ABC Method - Example Threshold of Potential Significant Effect at Dwellings

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq, T}$)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00–07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise.

NOTE 3 Applied to residential receptors only.

^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

^{C)} Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

^{D)} 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

3.2.8 BS 5228-2 provides guidance on the perception of vibration within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with construction and decommissioning induced vibration. BS 5228-2 Annex B Significance of vibration effects presents guidance on effects of details Peak Particle Velocity (PPV) levels (a standard measure of vibration effects) and their potential effect on humans in Table B.1 which is reproduced in Table 3.3.

Table 3.3 BS 5228 Guidance on Effects of Vibration Levels

Vibration Level ^{A), B), C)}	Effect
0.14 mm.s ⁻¹	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm.s ⁻¹	Vibration might be just perceptible in residential environments.
1.0 mm.s ⁻¹	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm.s ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments. .

^{A)} The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

^{B)} A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

^{C)} Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

British Standard 7445-1:2003

3.2.9 BS: 7445 'Description and Measurement of Environmental Noise. Part 1 – Guide to Quantities and Procedures'⁵ defines the parameters, procedures and instrumentation requirements for noise measurement and analysis.

⁵ BS 7445-1:2003 'Description and environment of environmental noise – Part 1', British Standards Institution, 2003

3.3 Local Policy

Wiltshire Core Strategy

- 3.3.1 The Wiltshire Core Strategy⁶ was adopted in January 2015 by Wiltshire Council and provides up-to-date strategic planning policy for Wiltshire and covers the period up to 2026.

- 3.3.2 Noise is considered within the following sections:

Core Policy 42 Standalone renewable energy installations

Proposals for standalone renewable energy schemes will be supported subject to satisfactory resolution of all site specific constraints. In particular, proposals will need to demonstrate how impacts on the following factors have been satisfactorily assessed, including any cumulative effects, and taking into account:

- i. The landscape, particularly in and around AONBs*
- ii. The Western Wiltshire Green Belt...*
- ...*
- vii. Residential amenity, including noise, odour, visual amenity and safety*

Core Policy 51 Landscape

Development should protect, conserve and where possible enhance landscape character and must not have a harmful impact upon landscape character, while any negative impacts must be mitigated as far as possible through sensitive design and landscape measures. Proposals should be informed by and sympathetic to the distinctive character areas identified in the relevant Landscape Character Assessment(s) and any other relevant assessments and studies. In particular, proposals will need to demonstrate that the following aspects of landscape character have been conserved and where possible enhanced through sensitive design, landscape mitigation and enhancement measures:

- i. The locally distinctive pattern and species composition of natural features such as trees, hedgerows, woodland, field boundaries, watercourses and waterbodies.*
- ii. The locally distinctive character of settlements and their landscape settings...*
- ...*
- vii. Tranquillity and the need to protect against intrusion from light pollution, noise, and motion.*

North Wiltshire Local Plan 2011

- 3.3.3 The North Wiltshire Local plan⁷ was adopted in June 2006 with the vision of planning to improve North Wiltshire through sustainable development.

- 3.3.4 Whilst the Wiltshire Core Strategy superseded the North Wiltshire Local Plan, a number of saved policies were not replaced including Policy NE18 Noise and Pollution which states:

NE18 Noise and Pollution

Development will only be permitted where it would not generate, or itself be subject to, harm upon public health or cause pollution to the environment by the emission of excessive noise, light intrusion, smoke, fumes, other forms of air pollution, heat, radiation, effluent or vibration.

6.50 The control of pollution is governed by the Environmental Protection Act (1990) and related legislation. Planning, however, has a role to play in separating potentially polluting land uses. New development should be designed to ensure that it does not cause environmental pollution, which then has to be controlled by other agencies. Appropriate mitigation measures will be expected to be

⁶ Wiltshire Core Strategy, Wiltshire Council, 2015

⁷ North Wiltshire Local Plan 2011, North Wiltshire District Council. 2011

incorporated into development proposals with a potential to pollute. Where measures cannot be achieved planning permission will be refused.

Wiltshire Council Planning Consultation Guidance Note Noise and Vibration

- 3.3.5 The Wiltshire Council Planning Consultation Guidance Note Noise and Vibration⁸ was last updated in October 2023 and provides guidance to the Council, protection officers and those seeking planning permission on matters relating to noise and vibration.
- 3.3.6 Noise and vibration guidance relevant to the Proposed Development is considered within the following sections:

6.6 Introduction of a new Industrial or Commercial Noise Source

New developments should contribute and enhance the area in which they are located and where possible. Therefore, the design objective should be:

'The development should be designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.'

Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, restriction of the hours of operation) and the achievable noise level should be identified. This information will allow a judgement to be made concerning the application and its likely impact on the surrounding area. In addition to the above, maximum noise levels should also be adequately controlled.

Background and ambient noise levels shall be representative of the existing noise levels at the most sensitive time during the proposed period(s) of operation. Where different operating regimes are proposed (for example daytime, evening and night-time), background and ambient noise levels shall be determined for each operating period.

In addition to the above assessment, the applicant should assess the maximum noise levels (L_{AFmax}) from the development that are expected to occur between the hours of 19:00 and 07:00. Overnight monitoring will be necessary where the external L_{AFmax} sound levels are likely to exceed 60 dB during the night period at the façade of the nearest noise sensitive dwelling.

7. Demolition and Construction Noise

When assessing an application consideration shall also be given to possible noise and vibration impacts during demolition, site preparation and construction. The need for controls will be based on the location, proximity of noise-sensitive receptors and the proposed works. Whilst there are powers to control construction noise under section 61 of the Control of Pollution Act 1974 through a prior consent process, and section 60 through an enforcement notice to control noise and vibration, it is likely we will also seek controls through the planning process, particularly for very sensitive locations or extended construction periods.

The following provides guidance on the issues that should be considered and the type of controls that may be appropriate in respect of noise and vibration management:

- 1. Hours of use – works that may be audible at the site boundary shall not take place outside the hours of Monday to Friday 8am to 6pm, Saturday 8am to 1pm and no work on Sunday and Bank Holidays,*
- 2. The parking of vehicles of site operatives and visitors,*
- 3. Loading, unloading and storage of plant and materials – consideration shall be given to the type of reversing alarms on delivery vehicles and associated impacts, location of off-loading and storage areas, avoidance of materials being dropped should be considered,*
- 4. Piling - carry out piling operations using the quietest methods available,*

⁸ Wiltshire Council Planning Consultation Guidance Note Noise and Vibration, Wiltshire Council. 2023

5. *Noise and vibration control methodologies - there should be a clear statement that the principles of BS5228:2009 will be followed in terms of noise and vibration control and effective site management as outlined below,*

6. *Mobile plant and machinery - all such plant used on site shall be fitted with white noise reversing alarms,*

7. *Delivery routing,*

8. *Working outside the standard hours of work - certain operations (such as concrete power floating, erection and dismantling of towers cranes, work on the highway) cannot always be undertaken within preferred hours of operation for noisy activities. We would seek to avoid such noisy works being carried out whilst residents are sleeping, if however there is no other option, ECP must be notified and local residents informed in writing and provided with a contact telephone number for them to call should they have any queries or problems.*

Any mitigation for reducing impacts of construction noise should apply effective site management.

3.4 Consultation

3.4.1 Consultation responses to the pre-application screening response for the proposed solar array, battery energy storage system, associated infrastructure and ancillary works (ref. ENQ/2024/01008) relevant to this noise assessment have been summarised below in Table 3.3.

Table 3.4 Consultation Summary

Stakeholder	Consultation Summary	Response Provided in Impact Assessment / Planning Application
Public Protection Officer at Wiltshire Council on proposed development	Additionally, proposed solar panels themselves are unlikely to generate discernible levels of noise once in place but associated plant and machinery such as transformers and substations can generate some noise against existing background noise levels. The Public Protection officer has advised that a noise impact assessment should be provided with any application.	Operational noise and mitigation of associated plant and machinery has been assessed within Section 7 and Section 8

3.4.2 In addition to the formally submitted pre-application response letter, the principal planning officer and case officer at Wiltshire Council provided email correspondence⁹ sharing the Wiltshire Council Noise and Planning Technical Guidance, which has been taken into consideration for this assessment.

⁹ E-mail correspondence with Gen Collins dated 16th September 2024

4. Establishment of Background Sound Levels

- 4.1.1 The sound climate in the vicinity of the Proposed Development has been established by undertaking unattended long-term monitoring at four locations on private land deemed to be representative of the main noise sensitive areas around the Site as marked on the Site location plan in Appendix B.
- 4.1.2 Additional attended short-term measurements were carried out at one further location to the west of the Proposed Development along Lydiard Plain.
- 4.1.3 Table 4.1 provides a description of the monitoring locations.

Table 4.1 Description of Monitoring Locations

Monitoring location	Description	GPS coordinates DD
LT1	South Site boundary, between Cottage Farm near Flaxlands Lane and Wood Farm near Flaxlands Lane	51.564672, -1.907422
LT2	West of North Site boundary, between Lydiard Plain and Koffs Farm near Greenhill	51.569564, -1.910860
LT3	East Site boundary, between Flaxlands House near Flaxlands Lane and Hook near Dianmer Close	51.562933, -1.889926
LT4	Central western Site boundary, Flaxlands Field Farm	51.568253, -1.906507
ST1	West of Site boundary, Lydiard Plain	51.570653, -1.919069

- 4.1.4 The dominant sound source at LT1 was road traffic noise from Flaxlands Lane with natural sounds such as vegetation moving in the wind and bird song also being audible. Upon collection of the equipment, gardening activities were audible from Flaxlands Wood Farm.
- 4.1.5 At LT2 and LT4, the noise environment was noted as being very quiet with natural sounds such as livestock and vegetation moving in the wind being the dominant noise sources. Distant road traffic was also audible at times.
- 4.1.6 The dominant sound source at LT3 was road traffic noise from Hook Street with some construction noise from a site on the opposite side of the road also audible.
- 4.1.7 At ST1, road traffic from Lydiard Plain was dominant with the traffic flow described as fairly steady throughout the measurement period.

4.2 Monitoring Equipment

- 4.2.1 The sound level monitor was field calibrated with an acoustic calibrator both prior to commencement and after completion of the sound measurements. Details of the monitoring equipment are given in Table 4.2. Sound level meters with Class 1 specification were used as set out in BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications. All sound level meters are calibrated every two years by a UKAS Accredited Calibration Laboratory to BS EN 61672-3:2013 Electroacoustics. Sound level meters. Periodic tests. UKAS calibration certificates are available on request.

Table 4.2 Monitoring Equipment

Monitoring location	Equipment	Manufacturer	Model	Serial number	Laboratory calibration date
LT1	Type 1 Sound level meter	Rion	NL-52	809413	06/03/2023
LT2	Type 1 Sound level meter	Rion	NL-52	909493	02/03/2023

LT3	Type 1 Sound level meter	Rion	NL-52	743082	05/01/2023
LT4	Type 1 Sound level meter	Rion	NL-52	809414	06/03/2023
ST1	Type 1 Sound level meter	Rion	NL-52	12081	04/04/2024
All	Sound level meter calibrator	Rion	NC-74	34963231	23/05/2024

4.3 Monitoring Results

4.3.1 Sound monitoring results are summarised in Appendix C. Justifications and analysis of background sound levels can be found in Appendix D, while overview time history graphs of the measurements can be found in Appendix E. After a detailed review of the measured data and observations during measurements, and considering the sound sources in this area, the typical background sound levels for the assessment have been derived through statistical analysis. These are shown below in Table 4.3 to Table 4.6.

Table 4.3 Typical Background Sound Levels for LT1

Measurement Location	Ambient Sound Level $L_{Aeq,T}$ dB	Typical Background Sound Level, $L_{A90,15min}$, dB
Daytime	49	40
Evening	45	38
Night-time	46	35

Table 4.4 Typical Background Sound Levels for LT2

Measurement Location	Ambient Sound Level $L_{Aeq,T}$ dB	Typical Background Sound Level, $L_{A90,15min}$, dB
Daytime	48	39
Evening	44	36
Night-time	42	32

Table 4.5 Typical Background Sound Levels for LT3

Measurement Location	Ambient Sound Level $L_{Aeq,T}$ dB	Typical Background Sound Level, $L_{A90,15min}$, dB
Daytime	53	48
Evening	51	43
Night-time	47	38

Table 4.6 Typical Background Sound Levels for LT4

Measurement Location	Ambient Sound Level $L_{Aeq,T}$ dB	Typical Background Sound Level, $L_{A90,15min}$, dB
Daytime	51	39
Evening	45	33
Night-time	39	28

5. Construction Phase

5.1 Construction Noise Assessment

Construction Activities

- 5.1.1 It is currently anticipated that the construction period for the Proposed Development will be up to 24 weeks.

Assessment Methodology

- 5.1.2 Specific details of the construction works associated with the Proposed Development will be available once the detailed design has been completed and a construction methodology has been prepared. Therefore, at this stage, representative construction activities and 'worst-case' assumptions (presented in Table 5.1), including the likely type and number of construction plant, have been assumed based on the information provided by the Applicant and from previous noise assessments undertaken on similar types of developments.
- 5.1.3 Sound Power Level (Lw) values for equipment to be used during construction activities have been sourced from BS 5228-1 with the items of plant in Table 5.1 being considered.

Table 5.1 Construction Plant Sound Power Levels

Activity	Item of Plant	Number of Plant	BS 5228-Reference	Overall Sound Power Level (LwA dB)
Construction of BESS, Inverters and Transformers	Tracked excavator	1	BS 5228: Tab C.2 #14	107
	Wheeled Loader	1	BS 5228: Tab C.2 #27	108
	Wheeled mobile telescopic crane	1	BS 5228: Tab C.4 #38	106
	Dump Truck (tipping fill)	2	BS 5228: Tab C.2 #30	107
	Telescopic Handler	1	BS 5228: Tab C.2 #35	99
	Piling rig	1	BS 5228: Tab C.3 #8	116
	Cement mixer truck (discharging)	1	BS 5228: Tab C.4 #18	103
PV Module Construction	Articulated dump truck	1	BS 5228: Tab C.5 #16	109
	Wheeled mobile telescopic crane	1	BS 5228: Tab C.4 #38	106
	Diesel generator	1	BS 5228: Tab C.4 #85	94
	Continuous flight auger piling	1	BS 5228: Tab C.3 #17	104
	Cement mixer truck (discharging)	1	BS 5228: Tab C.4 #18	103
	Dumper	1	BS 5228: Tab C.4 #9	105
Construction of Main Substation	Tracked excavator	2	BS 5228: Tab C.2 #14	107
	Lorry	4	BS 5228: Tab C.2 #34	108

Activity	Item of Plant	Number of Plant	BS 5228-Reference	Overall Sound Power Level (LwA dB)
	Telescopic handler	2	BS 5228: Tab C.2 #35	99
	Continuous flight auger piling	1	BS 5228: Tab C.3 #17	104
	Wheeled mobile crane	4	BS 5228: Tab C.3 #30	98
	Hand-held welder (welding piles)	4	BS 5228: Tab C.3 #31	101
	Generator for welding	4	BS 5228: Tab C.3 #32	101
	Gas cutter (cutting top of pile)	4	BS 5228: Tab C.3 #34	96
	Mobile telescopic crane	2	BS 5228: Tab C.4 #41	99
	Lifting platform	4	BS 5228: Tab C.4 #57	95
	Site lift for workers	4	BS 5228: Tab C.4 #62	94
	Diesel generator	2	BS 5228: Tab C.4 #85	94

Construction Noise Limits

5.1.4 Based on the sound levels given in Appendix C and using the ABC method as provided by BS5228 which is given in Table 3.2, the following construction noise thresholds can be provided.

Table 5.2 Construction Noise Thresholds

Receptor	Threshold of Significant Effect Level dB L _{Aeq,T}		
	Day (0700 – 1900)	Evening (1900 – 2300)	Night (2300 – 0700)
All Receptors near LT1 (R2, R3, R4, R5, R6, R8, R9, R22)	65	55	45
All Receptors near LT2 (R7, R23, R24, R25, R26, R27)	65	55	45
All Receptors near LT3 (R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21)	70	60	50
All Receptors near LT4 (R1)	65	55	45

5.1.5 Based on measured levels in the vicinity of the Site, noise sensitive receptor areas around LT1, LT2 and LT4 have been classified in Category A, with those around LT3 classified as Category B of the ABC method for all time periods. Therefore, any construction noise emitted from Site should not exceed the levels at the receptors as stated above in Table 5.2.

5.2 Assessment

5.2.1 SoundPLAN® acoustic modelling software (version 9.1) implementing the calculation procedures of BS 5228-1 has been employed to predict the propagation of sound from the Site in all directions and to quantify resultant noise levels at the identified noise-sensitive receptor locations.

5.2.2 The following assumptions and parameters were used to prepare the acoustic model:

- The ground absorption has been set to 0 (i.e. assumed hard ground conditions), except where identifiable ground features are present where acoustically soft ground (such as fields) is set to 1 or;

- Topography obtained from DEFRA LIDAR¹⁰ data has been used;
- Building footprints in the surrounding area have been sourced from Ordnance Survey Open Map data¹¹;
- Residential building heights outside of the Site boundary have been modelled with a standard height of 7.0 m and two storeys;
- Receiver points have been modelled as 1.5 m above local ground level (representative of ground-floor windows during the day and evening) and 4 m above local ground level (representative of first-floor bedroom windows during the night); and
- The maximum order of reflections was 3.

5.2.3 Construction noise predictions are considered to represent a worst-case scenario in which all plant has been assumed to be in use for 60% of the daytime period (07:00 – 19:00) and in operation simultaneously therefore, these predictions may overestimate actual construction noise levels.

5.2.4 Additionally, it is likely that construction will only be taking place during set construction core hours and not for the full 12-hour daytime period.

5.2.5 Table 5.3 summarises the predicted noise levels at the nearest sensitive receptors within 600 m of the Site boundary relative to the Site during construction. Daytime predicted noise levels are at a height of 1.5 m.

Table 5.3 Predicted Construction Noise Levels at Sensitive Receptors

Receptor	Daytime Predicted Noise Level (Free-field), dB L _{Aeq,T}	Construction Noise threshold, dB L _{Aeq,T}	Compliance with Noise Criteria
R1	60	65	Y
R2	58	65	Y
R3	57	65	Y
R4	54	65	Y
R5	49	65	Y
R6	51	65	Y
R7	54	65	Y
R8	57	65	Y
R9	52	65	Y
R10	57	70	Y
R11	52	70	Y
R12	53	70	Y
R13	52	70	Y
R14	55	70	Y
R15	55	70	Y
R16	57	70	Y
R17	53	70	Y
R18	54	70	Y
R19	52	70	Y
R20	51	70	Y
R21	51	70	Y
R22	50	65	Y

¹⁰National LIDAR Programme © Environment Agency copyright and/or database right 2022. All rights reserved

¹¹ Ordnance Survey Open Data Publication © Ordnance Survey copyright. Contains Ordnance Survey data © Crown copyright and database right 2025

R23	52	65	Y
R24	53	65	Y
R25	52	65	Y
R26	55	65	Y
R27	55	65	Y

5.2.6 No exceedances of the construction noise thresholds have been predicted and therefore no significant effects are expected.

5.2.7 It should be noted that construction noise predictions have been based on worst-case months that are representative of working days where all plant is operational over all areas of the Site. In reality, it is likely that the worst-case noise levels predicted will only occur for limited periods of time where items of plant are operational in close proximity to sensitive receptors and will only be temporary in nature.

5.3 Construction Traffic Noise Assessment

Assessment Methodology

5.3.1 Construction traffic movements on public roads have the potential to cause temporary disturbance while it is passing by. It is therefore important that the routing and timing of vehicle movements is carefully managed. However, any increases in road traffic noise levels during works will be temporary, short term, and although the effect will be dependent on the actual number of traffic movements, it is considered that adverse effects can be managed and avoided. Further information regarding construction traffic including construction traffic routes is available in the Outline Construction Traffic Management Plan¹² submitted with the planning application.

5.3.2 The temporary changes in road traffic noise levels along the local road network due to construction traffic have been assessed based on short-term changes in noise from Table 3.54a of DMRB LA111¹³. Assessment criteria are presented in Table 5.4.

Table 5.4 Construction Traffic Assessment Criteria

Magnitude of Impact	Magnitude criteria
Negligible	≥ 0 dB and < 1 dB
Minor	≥ 1 dB and < 3 dB
Moderate	≥ 3 dB and < 5 dB
Major	≥ 5 dB

5.3.3 Negligible and minor changes are not expected to cause any changes to behaviour or response to noise and as such will not give rise to significant adverse effects. A 3 dB change or more leads to a perceptible change in noise levels at noise sensitive receptors therefore, moderate and major impacts will be classified as significant adverse effects.

Assessment

5.3.4 The main impact from construction traffic will be from the movement of Heavy Goods Vehicles (HGVs) as it is generally expected that light vehicles will not have a material influence on the existing noise climate. During the peak phase of construction (assuming a 24-week construction programme), the expected daily number of HGV arrivals and departures to the Site is 10 movements per day (5 deliveries) over a 10-hour workday; no deliveries have been assumed during peak hours (8-hour delivery window) and from this a worst-case of 2 hourly HGV movements has been derived.

¹² Flaxlands Solar Farm Outline Construction Traffic Management Plan, 2025

¹³ Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 111: Noise and Vibration. Revision 2, National Highways, 2020

- 5.3.5 Noise emissions from HGV movements have been calculated using HGV Sound Exposure Level (SEL) data from the AECOM sound power library. Should construction programme be longer than 24-weeks, the hourly number of HGV movements will likely be lower resulting in lower noise emissions; therefore, the assessment presented below assumes a reasonable worst-case scenario.
- 5.3.6 Calculated construction traffic noise levels have been compared to the measured levels at noise monitoring location LT1 and LT3 to assess the change in noise levels that may be experienced at noise sensitive receptors along the proposed construction access route from the M4, along the A3102 and Flaxlands Lane to the Site. The results of calculations are presented Table 5.5 below.

Table 5.5 Construction Traffic Noise Predictions Worst-Case

Measurement Location	LT1	LT3
	Daytime	
SEL dB	91	91
Distance to Middle of Carriageway	175	45
Hourly Number of HGV Movements	2	2
HGV Noise Level $L_{Aeq,1h}$ dB	33.6	45.4
Measured $L_{Aeq,T}$ dB	51	53
Cumulative Noise Level $L_{Aeq,1h}$ dB	51.1	53.7
Difference Cumulative and Measured dB	+0.1 (Negligible)	+0.7 (Negligible)

- 5.3.7 At measurement locations LT1 and LT3, HGV movements due to construction of the Proposed Development are calculated to result in a negligible impact which is classified as not significant.

5.4 Construction Vibration Assessment

Assessment Methodology

- 5.4.1 When defining assessment criteria, reference has been made to BS 5228-2, which provides descriptions of the impact of vibration in terms PPV on human receptors. For residential receptors, the LOAEL has been defined as a vibration dose value of 0.3 mm/s (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL has been defined as a vibration dose value of 1.0 mm/s, this being the level at which construction vibration can be tolerated with prior warning. A summary of construction vibration criteria is presented in Table 5.6.

Table 5.6 Criteria for Construction Vibration

Magnitude of Impact	PPV Vibration Level	BS 5228-2 Description of Impact
LOAEL	0.3 mm/s	Vibration might just be perceptible in a residential environment
SOAEL	1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but it can be tolerated if prior warning and explanation have been given to residents

- 5.4.2 At receptors where vibrations levels above the SOAEL are predicted, further consideration of whether an effect is significant is undertaken using professional judgement, taking account of the duration and frequency of the effect, as well as the time of day that the effect would be experienced.
- 5.4.3 In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage (as set out in Annex B of BS 5228-2) are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those specified by annoyance, then it is highly unlikely that buildings will be damaged by demolition and construction vibration.

Assessment

- 5.4.4 It is assumed that the highest level of vibration will be generated from impact piling, which may be used during installation of the PV solar panel structures. As vibration transmission through the ground is dependent on ground conditions, activity duration, receptor building floor type and pile toe depth, standard values have been assumed with the closest distance between receptor buildings and PV solar panel locations to provide a worst-case assessment.

Piling source data from BS 5228-2 (

- 5.4.5 Table 5.7) has been used to estimate the likely PPV levels at nearby sensitive receptors within 100 m of the Proposed Development PV panels (R1, R3) presented in Table 5.8 to Table 5.9.

Table 5.7 Vibration Prediction Input Data

Global Variable	Value
Activity	Impact Piling
R1 Distance (m)	40
R3 Distance (m)	90
Building Type	Residential
Working Hours, day (07:00-23:00)	1
Working Hours, night (23:00-07:00)	0
Prediction location	Ground floor
Receptor building floor type	Slab construction
Pile toe depth (L), m	2
Nominal hammer energy (W), kJ	1.5
Slope distance from pile toe (r), m	75

Table 5.8 Predicted Vibration Levels R1

Activity	Peak Particle Velocity (V_{res}), mm/s
Impact Piling	1.6
Effect Level	Above SOAEL

Table 5.9 Predicted Vibration Levels R3

Activity	Peak Particle Velocity (V_{res}), mm/s
Impact Piling	0.6
Effect Level	Between LOAEL and SOAEL

- 5.4.6 At receptor R1, vibration levels are calculated at worst to temporarily exceed the SOAEL, which is classified as significant; whilst at receptors R3, they are calculated as, at worst, temporarily exceeding the LOAEL, but below the SOAEL and therefore not significant.
- 5.4.7 Mitigation measures covering Best Practicable Means (BPM) will be put into place to ensure that vibration is minimised at all times throughout the construction programme and a communication strategy is recommended as outlined in the next section. BS 5228-2 states that vibration levels of around 1.0 mm/s can be tolerated if prior warning and explanation has been given to residents therefore, with the implementation of BPM and the proposed communication strategy, construction vibration is considered to be not significant.

- 5.4.8 It should be noted that the assessment of construction vibration is conservative and actual levels of vibration produced during piling are likely to be lower due to the ground conditions of the Site, which is agricultural land with soft ground and would not require substantial amounts of energy to drive piles into.

5.5 Best Practice

- 5.5.1 All reasonable steps should be taken to mitigate and minimise adverse noise effects through adoption of 'Best Practicable Means' as defined in section 72 of the Control of Pollution Act 1974. Noise and vibration mitigation measures and management plans covering BPM should be put into place to ensure that noise and vibration is minimised at all times throughout the construction programme.
- 5.5.2 Works will be carried out following the good practice guidelines detailed in BS 5228-1 Annex B 'Noise Sources, Remedies, and their Effectiveness'. General measures should include the following as appropriate:
- Careful selection of plant, construction methods, and programming will be undertaken. Only plant that complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701 will be used;
 - Except in case of emergency, operations should not take place on Site other than between the hours of 08:00 - 18:00 Monday to Friday and between 08:00 - 13:00 on Saturdays. There should be no working on Sundays or Public Holidays. At times when operations are not permitted work shall be limited to maintenance and servicing of plant or other work of an essential or emergency nature. The Local Planning Authority should be notified at the earliest opportunity of the occurrence of any such emergency and a schedule of essential work shall be provided;
 - Heavy goods vehicles should only enter or leave the Site between the hours of 08:00 - 18:00 on weekdays and 09:00 - 13:00 Saturdays and no such movements should take place on or off the Site on Sundays or Public Holidays (this excludes the movement of private vehicles for personal transport).
 - Shrouding around noisy plant in fixed locations, for example Heras fencing and acoustic blankets around generators;
 - Daily plant and equipment inspections to identify any maintenance requirements;
 - Careful planning of the sequence of work in order to minimise the transfer of noise/vibration to neighbouring receptors;
 - Careful handling of materials and waste, such as lowering rather than dropping items;
 - Avoidance of unnecessary noise (such as engines idling between operations, shouting, loud radios or excessive revving of engines) by effective site management;
 - Where control at source is not practicable or adequate, the distance between noise/vibration sources and sensitive receptors would be maximised and the transmission path interrupted, with options considered in the order of source-pathway-receptor;
 - Methods and programme of work and vehicular routes will be selected with regard to minimising noise and vibration impact;
 - Regular site inspections, specialist BPM checks, random senior management tours and unannounced audits will assess whether noise levels are acceptable and take steps to reduce them and all BPM mitigation measures have been implemented if required;
 - Site personnel will be instructed on BPM to reduce noise and vibration as part of their induction training and as required prior to specific work activities;
 - Careful handling of tools, placement, and shouting on the Site will be covered in activity plans and/or briefings as appropriate; and
 - Training and briefings will be delivered to the Site team to inform them of noise and vibration issues and the location of nearby receptors.
- 5.5.3 The effect of noise on nearby sensitive receptors can be minimised through a good communication strategy. Prior to works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration. Providing information of construction

works and notice of when high noise and/or vibration generating activities are taking place can reduce adverse effects. All communications will contain contact details to direct any questions or complaints to. The extent of communications will be agreed with the Local Authority.

6. Decommissioning Noise and Vibration Assessment

- 6.1.1 The Proposed Development Site is intended to be decommissioned after 40 years. It is expected that the noise impacts resulting from the decommissioning of the Site will be equivalent to but no worse than the impacts arising from construction and construction traffic noise outlined in the previous section. As such, noise effects identified in the assessment of construction noise are applicable to the decommissioning phase, so no significant effects are identified.
- 6.1.2 Additionally, no piling will be required during decommissioning of the Proposed Development and as such, no significant effects are identified as a result of construction vibration during decommissioning.

7. Operational Noise Assessment

7.1 Operational Noise Assessment Methodology

- 7.1.1 BS 4142 advises that, where rating levels and background levels are low, which is the case in rural areas surrounding the Site, the assessment of operational noise should take into context the absolute noise level. The Association of Noise Consultants (ANC) Guide to BS 4142¹⁴ provides context to this by stating:

“BS 4142 does not define ‘low’ in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB LA90, and low rating levels as being less than about 35 dB LA_{r,Tr}”.

- 7.1.2 The ANC Guide suggests that:

“...similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate”.

- 7.1.3 A minimum rating level of 35 dB LA_{r,Tr} for the LOAEL would align with guidance in PPGN, which defines noise below the LOAEL as follows:

“Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life”.

- 7.1.4 Considering the above, alongside the design objective for new Industrial or Commercial noise sources set by Wiltshire Council, it is proposed to set the LOAEL at 5 dB (LA_{eq}) below the typical background (LA₉₀) with a minimum rating level of 35 dB LA_{r,Tr}.

- 7.1.5 BS 8233:2014 Guidance on sound insulation and noise reduction for buildings and the World Health Organization (WHO) ‘Guidelines for Community Noise’ provide guidance levels for internal noise within dwellings of 30 dB LA_{eq,T} for good sleeping conditions at night. In accordance with examples in Annex A of BS 4142, it is assumed that building envelope attenuation would be reduced to approximately 10 dB by a partially open window. Consequently, an external SOAEL of 40 dB LA_{r,Tr} has been adopted for the night-time.

- 7.1.6 The assessment criteria for noise from fixed plant installations is summarised in Table 7.1.

Table 7.1 Operational Noise Assessment Criteria

Effect Level	Rating Level (External) at Receptor, LA _{r,Tr}	
	Daytime (07:00-19:00) and Evening (19:00-23:00)	Night-time (23:00-07:00)
LOAEL	Less than or equal to 5 dB below the typical background level (LA _{90,T}) – minimum of 35 dB LA _{r,Tr}	Less than or equal to 5 dB below the typical background level (LA _{90,T}) – minimum of 30 dB LA _{r,Tr}
SOAEL	Greater than 10 dB above the background noise level – minimum of 45 dB LA _{r,Tr}	Greater than 10 dB above the background noise level – minimum of 40 dB LA _{r,Tr}

- 7.1.7 Predicted rating levels have been compared against representative background levels (as set out in Section 4) at each receptor to assess impacts as per BS 4142 guidance and the NPSE LOAEL/SOAEL thresholds.

¹⁴ BS 4142:2014+A1:2019 Technical Note, Association of Noise Consultants Good Practice Working Group, 2020

7.2 Operational Noise Modelling

- 7.2.1 SoundPLAN® acoustic modelling software (version 9.1) implementing the calculation procedures of ISO 9613¹⁵ has been employed to predict the propagation of sound from the Proposed Development in all directions and to quantify resultant sound levels at the identified noise-sensitive receptor locations.
- 7.2.2 The same assumptions and parameters from the construction noise model have been used within the operational model.
- 7.2.3 Modelling assumes continuous operation throughout the day and night. Daytime and evening predictions have been calculated at ground floor level with night-time levels at first floor level.
- 7.2.4 The MV power stations have been assumed to only operate during the daytime and evening periods as their operation is only required during daylight hours.
- 7.2.5 The plant comprising the Proposed Development has been derived from the Site layout provided by the Applicant. The Site layout plan shows that the Proposed Development is made up of 14 BESS units, 10 MV Power Stations, 14 Inverter units and a substation made up of one transformer. These have all been included within the acoustic modelling with no other sound sources identified as being part of the Proposed Development operation.
- 7.2.6 Operational assumptions, presented in Table 7.2, have been derived from a review by AECOM of vendor specification data sheets and professional experience on similar types of developments.

Table 7.2 Sound Power Levels

Source	Source Type (Sound Power Descriptor)	Number of Plant	Source Height (m)	Total A-Weighted Sound Power Level, dB L _w
BESS – ATL EnerX	Point Source	14	2.0	83
MV Power Station – Sunny Central UP-XT	Point Source	10	2.2	93
Transformer	Horizontal Area Source	1	3.0	95
Inverter – Power Electronics PCSK Gen3	Point Source	14	2.0	84

7.3 Modelling Results

- 7.3.1 Table 7.3 summarises the predicted sound levels at the nearest sensitive receptors relative to the operational site. Daytime predicted sound levels are at a height of 1.5 m, whereas night-time predictions are for a height of 4 m above ground, representative of a first-floor window of a typical residential property.

Table 7.3 Predicted Sound Levels at Sensitive Receptors

Receptor	Daytime / Evening Predicted Sound Level (Free-field), dB L _{Aeq,T}	Night-time Predicted Sound Level (Free-field), dB L _{Aeq,T}
R1	33	25
R2	38	31

¹⁵ ISO 9613, Acoustics – Attenuation of Sound During Propagation Outdoors. Part 1: Calculation of the absorption of sound by the atmosphere (1993) and Part 2: General Method of Calculation (1996, updated 2024).

Receptor	Daytime / Evening Predicted Sound Level (Free-field), dB L _{Aeq,T}	Night-time Predicted Sound Level (Free-field), dB L _{Aeq,T}
R3	40	30
R4	37	27
R5	29	13
R6	28	20
R7	29	29
R8	34	32
R9	28	17
R10	34	29
R11	26	15
R12	29	24
R13	29	25
R14	31	20
R15	30	21
R16	31	21
R17	28	20
R18	29	21
R19	27	19
R20	28	21
R21	30	24
R22	26	19
R23	29	21
R24	31	22
R25	31	22
R26	31	30
R27	34	32

7.4 Noise Assessment

- 7.4.1 In the determination of rating levels (as per guidance from BS 4142 section 9.2 'Subjective method'), a +3 dB acoustic feature correction for 'distinctiveness' has been applied to the predicted levels set out in Table 7.3. No other penalties have been applied as it is expected for operational noise to remain continuous and constant during operation and no tonality correction has been applied due to the distance between the Proposed Development and nearby noise sensitive receptors.
- 7.4.2 Assessments of operational noise are presented in Table 7.4 (daytime), Table 7.5 (evening) and Table 7.6 (night-time).

Table 7.4 BS4142 Assessment – Daytime (07:00-19:00)

Receptor	Predicted Rating Level, dB L _{Af,T}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R1	36	39	35 / 49	Between LOAEL and SOAEL
R2	41	40	35 / 50	Between LOAEL and SOAEL
R3	43	40	35 / 50	Between LOAEL and SOAEL
R4	40	40	35 / 50	Between LOAEL and SOAEL
R5	32	40	35 / 50	Below LOAEL
R6	31	40	35 / 50	Below LOAEL
R7	32	39	35 / 49	Below LOAEL
R8	37	40	35 / 50	Between LOAEL and SOAEL
R9	31	48	43 / 58	Below LOAEL
R10	37	48	43 / 58	Below LOAEL
R11	29	48	43 / 58	Below LOAEL
R12	32	48	43 / 58	Below LOAEL
R13	32	48	43 / 58	Below LOAEL
R14	34	48	43 / 58	Below LOAEL
R15	33	48	43 / 58	Below LOAEL
R16	34	48	43 / 58	Below LOAEL
R17	31	48	43 / 58	Below LOAEL
R18	32	48	43 / 58	Below LOAEL
R19	30	48	43 / 58	Below LOAEL
R20	31	48	43 / 58	Below LOAEL
R21	33	48	43 / 58	Below LOAEL
R22	29	48	43 / 58	Below LOAEL
R23	32	39	35 / 49	Below LOAEL
R24	34	39	35 / 49	Below LOAEL
R25	34	39	35 / 49	Below LOAEL
R26	34	39	35 / 49	Below LOAEL
R27	37	39	35 / 49	Between LOAEL and SOAEL

Table 7.5 BS4142 Assessment – Evening (19:00-23:00)

Receptor	Predicted Rating Level, dB L _{Ar,T}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R1	36	33	35 / 45	Between LOAEL and SOAEL
R2	41	38	35 / 48	Between LOAEL and SOAEL
R3	43	38	35 / 48	Between LOAEL and SOAEL
R4	40	38	35 / 48	Between LOAEL and SOAEL
R5	32	38	35 / 48	Below LOAEL
R6	31	38	35 / 48	Below LOAEL
R7	32	36	35 / 46	Below LOAEL
R8	37	38	35 / 48	Between LOAEL and SOAEL
R9	31	43	38 / 53	Below LOAEL
R10	37	43	38 / 53	Between LOAEL and SOAEL
R11	29	43	38 / 53	Below LOAEL
R12	32	43	38 / 53	Below LOAEL
R13	32	43	38 / 53	Below LOAEL
R14	34	43	38 / 53	Below LOAEL
R15	33	43	38 / 53	Below LOAEL
R16	34	43	38 / 53	Below LOAEL
R17	31	43	38 / 53	Below LOAEL
R18	32	43	38 / 53	Below LOAEL
R19	30	43	38 / 53	Below LOAEL
R20	31	43	38 / 53	Below LOAEL
R21	33	43	38 / 53	Below LOAEL
R22	29	43	38 / 53	Below LOAEL
R23	32	36	35 / 46	Below LOAEL
R24	34	36	35 / 46	Below LOAEL
R25	34	36	35 / 46	Below LOAEL
R26	34	36	35 / 46	Below LOAEL
R27	37	36	35 / 46	Between LOAEL and SOAEL

Table 7.6 BS4142 Assessment – Night-time (23:00-07:00)

Receptor	Predicted Rating Level, dB L _{Ar,T}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R1	28	28	30 / 40	Below LOAEL
R2	34	35	30 / 45	Between LOAEL and SOAEL
R3	33	35	30 / 45	Between LOAEL and SOAEL
R4	30	35	30 / 45	LOAEL

Receptor	Predicted Rating Level, dB L _{Ar,Tr}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R5	16	35	30 / 45	Below LOAEL
R6	23	35	30 / 45	Below LOAEL
R7	32	32	30 / 42	Between LOAEL and SOAEL
R8	35	35	30 / 45	Between LOAEL and SOAEL
R9	20	38	33 / 48	Below LOAEL
R10	32	38	33 / 48	Below LOAEL
R11	18	38	33 / 48	Below LOAEL
R12	27	38	33 / 48	Below LOAEL
R13	28	38	33 / 48	Below LOAEL
R14	23	38	33 / 48	Below LOAEL
R15	24	38	33 / 48	Below LOAEL
R16	24	38	33 / 48	Below LOAEL
R17	23	38	33 / 48	Below LOAEL
R18	24	38	33 / 48	Below LOAEL
R19	22	38	33 / 48	Below LOAEL
R20	24	38	33 / 48	Below LOAEL
R21	27	38	33 / 48	Below LOAEL
R22	22	38	33 / 48	Below LOAEL
R23	24	32	30 / 42	Below LOAEL
R24	25	32	30 / 42	Below LOAEL
R25	25	32	30 / 42	Below LOAEL
R26	33	32	30 / 42	Between LOAEL and SOAEL
R27	35	32	30 / 42	Between LOAEL and SOAEL

- 7.4.3 During the daytime period, the operational rating noise level has been assessed as being between the LOAEL and SOAEL for six receptors (R1, R2, R3, R4, R8, R27) with all remaining receptors below the LOAEL.
- 7.4.4 During the evening, seven receptors (R1, R2, R3, R4, R8, R10, R27) have been assessed as between the LOAEL and SOAEL with all remaining receptors below the LOAEL.
- 7.4.5 During the night-time, six receptors (R2, R3, R7, R8, R26, R27) have been assessed as between the LOAEL and SOAEL, with all remaining receptors either equal to or below the LOAEL.
- 7.4.6 As stated in NPSE, noise levels between the LOAEL and SOAEL require for all reasonable measures to be applied to mitigate and minimise adverse effects on health and quality of life while also considering the principles of sustainable development. However, this does not mean that such adverse effects cannot occur. Taking the above into context, mitigation has been considered and is outlined in the following section.

7.5 Mitigation

- 7.5.1 Due to potential operational adverse noise effects at noise-sensitive receptors, additional mitigation has been considered in the form of silencers, attenuation kits and enclosures from manufacturer specification sheets and information on similar types of development. The following reductions have been assumed within the model:

- MV Station SWL has been reduced to 87 dB(A) from 93 dB(A);
- BESS unit SWL has been reduced to 73 dB(A) from 83 dB(A); and
- Substation Transformer SWL has been reduced to 85 dB(A) from 95 dB(A).

7.5.2 No reductions have been applied to the inverters as specific attenuation information is not readily available.

7.5.3 Additional mitigation in the form of introducing noise barriers within the Site boundary in key locations has been tested in the noise model. However, the attenuation offered from these is negligible and as such these options have been ruled out in favour of focusing on attenuating plant directly.

7.5.4 The with mitigation modelled results are presented below in Table 7.7.

Table 7.7 With Mitigation Predicted Sound Levels at Sensitive Receptors

Receptor	Daytime / Evening Predicted Sound Level (Free-field), dB L _{Aeq,T}	Night-time Predicted Sound Level (Free-field), dB L _{Aeq,T}
R1	27	20
R2	33	27
R3	34	25
R4	31	23
R5	23	8
R6	23	16
R7	24	26
R8	29	28
R9	22	11
R10	29	25
R11	20	10
R12	24	21
R13	24	21
R14	25	15
R15	24	18
R16	25	17
R17	22	16
R18	23	17
R19	21	16
R20	22	17
R21	25	20
R22	21	15
R23	23	17
R24	25	18
R25	25	18
R26	27	26
R27	30	29

7.5.5 The noise impact of the Proposed Development with mitigation has been assessed using the methodology derived in BS 4142 with the same acoustic feature correction applied to rating levels (+3 dB for “distinctiveness”).

Table 7.8 BS4142 Assessment – Daytime (07:00-19:00)

Receptor	Predicted Rating Level, dB $L_{A_{r,T}}$	Background Level, dB $L_{A_{90,T}}$	LOAEL/SOAEL dB	Effect Level
R1	30	39	35 / 49	Below LOAEL
R2	36	40	35 / 50	Between LOAEL and SOAEL
R3	37	40	35 / 50	Between LOAEL and SOAEL
R4	34	40	35 / 50	Below LOAEL
R5	26	40	35 / 50	Below LOAEL
R6	26	40	35 / 50	Below LOAEL
R7	27	39	35 / 49	Below LOAEL
R8	32	40	35 / 50	Below LOAEL
R9	25	48	43 / 58	Below LOAEL
R10	32	48	43 / 58	Below LOAEL
R11	23	48	43 / 58	Below LOAEL
R12	27	48	43 / 58	Below LOAEL
R13	27	48	43 / 58	Below LOAEL
R14	28	48	43 / 58	Below LOAEL
R15	27	48	43 / 58	Below LOAEL
R16	28	48	43 / 58	Below LOAEL
R17	25	48	43 / 58	Below LOAEL
R18	26	48	43 / 58	Below LOAEL
R19	24	48	43 / 58	Below LOAEL
R20	25	48	43 / 58	Below LOAEL
R21	28	48	43 / 58	Below LOAEL
R22	24	48	43 / 58	Below LOAEL
R23	26	39	35 / 49	Below LOAEL
R24	28	39	35 / 49	Below LOAEL
R25	28	39	35 / 49	Below LOAEL
R26	30	39	35 / 49	Below LOAEL
R27	33	39	35 / 49	Below LOAEL

Table 7.9 BS4142 Assessment – Evening (19:00-23:00)

Receptor	Predicted Rating Level, dB L _{Ar,Tr}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R1	30	33	35 / 45	Below LOAEL
R2	36	38	35 / 48	Between LOAEL and SOAEL
R3	37	38	35 / 48	Between LOAEL and SOAEL
R4	34	38	35 / 48	Below LOAEL
R5	26	38	35 / 48	Below LOAEL
R6	26	38	35 / 48	Below LOAEL
R7	27	36	35 / 46	Below LOAEL
R8	32	38	35 / 48	Below LOAEL
R9	25	43	38 / 53	Below LOAEL
R10	32	43	38 / 53	Below LOAEL
R11	23	43	38 / 53	Below LOAEL
R12	27	43	38 / 53	Below LOAEL
R13	27	43	38 / 53	Below LOAEL
R14	28	43	38 / 53	Below LOAEL
R15	27	43	38 / 53	Below LOAEL
R16	28	43	38 / 53	Below LOAEL
R17	25	43	38 / 53	Below LOAEL
R18	26	43	38 / 53	Below LOAEL
R19	24	43	38 / 53	Below LOAEL
R20	25	43	38 / 53	Below LOAEL
R21	28	43	38 / 53	Below LOAEL
R22	24	43	38 / 53	Below LOAEL
R23	26	36	35 / 46	Below LOAEL
R24	28	36	35 / 46	Below LOAEL
R25	28	36	35 / 46	Below LOAEL
R26	30	36	35 / 46	Below LOAEL
R27	33	36	35 / 46	Below LOAEL

Table 7.10 BS4142 Assessment – Night-time (23:00-07:00)

Receptor	Predicted Rating Level, dB L _{Ar,Tr}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R1	23	28	30 / 40	Below LOAEL
R2	30	35	30 / 45	LOAEL
R3	28	35	30 / 45	Below LOAEL
R4	26	35	30 / 45	Below LOAEL
R5	11	35	30 / 45	Below LOAEL
R6	19	35	30 / 45	Below LOAEL
R7	29	32	30 / 42	Below LOAEL
R8	31	35	30 / 45	Between LOAEL and SOAEL
R9	14	38	33 / 48	Below LOAEL

Receptor	Predicted Rating Level, dB L _{Ar,Tr}	Background Level, dB L _{A90,T}	LOAEL/SOAEL dB	Effect Level
R10	28	38	33 / 48	Below LOAEL
R11	13	38	33 / 48	Below LOAEL
R12	24	38	33 / 48	Below LOAEL
R13	24	38	33 / 48	Below LOAEL
R14	18	38	33 / 48	Below LOAEL
R15	21	38	33 / 48	Below LOAEL
R16	20	38	33 / 48	Below LOAEL
R17	19	38	33 / 48	Below LOAEL
R18	20	38	33 / 48	Below LOAEL
R19	19	38	33 / 48	Below LOAEL
R20	20	38	33 / 48	Below LOAEL
R21	23	38	33 / 48	Below LOAEL
R22	18	38	33 / 48	Below LOAEL
R23	20	32	30 / 42	Below LOAEL
R24	21	32	30 / 42	Below LOAEL
R25	21	32	30 / 42	Below LOAEL
R26	29	32	30 / 42	Below LOAEL
R27	32	32	30 / 42	Between LOAEL and SOAEL

7.5.6 With the implementation of the proposed mitigation measures, all but two receptors are expected to be below the LOAEL during the daytime and evening periods. Receptors R2 and R3 have been assessed as between the LOAEL and SOAEL however, their rating levels remain below the typical measured background levels.

7.5.7 During night-time operation with mitigation, the following decreases at receptors are predicted:

- 6 dB reduction at R9;
- 5 dB reduction at R1, R3, R5, R11, R14;
- 4 dB reduction at R2, R4, R6, R8, R10, R13, R16, R17, R18, R20, R21, R22, R23, R24, R25, R2; and
- 3 dB reduction at all other receptors.

7.5.8 With the proposed mitigation, noise predictions at receptors R2, R3, R7 and R26 change from between the LOAEL and SOAEL to equal to or below the LOAEL. In addition, the classification of R4 changes from equal to the LOAEL to below the LOAEL.

7.5.9 Whilst the design objective rating level of 5 dB below the typical background level from the Wiltshire Council Planning guidance has not been met at all noise sensitive receptors, with two receptors between the LOAEL and SOAEL in each assessed period (R2 & R3 day-time & evening, R8 & R27 night-time only), with the implementation of the proposed mitigation, all noise sensitive receptors are predicted to be below or equal to the typical measured background levels.

7.5.10 As stated in NPSE, noise levels between the LOAEL and SOAEL require for all reasonable measures to be applied to mitigate and minimise adverse effects on health and quality of life while also considering the principles of sustainable development. However, this does not mean that such adverse effects cannot occur.

7.5.11 Taking the above into context, it is considered that all reasonable measures have been applied to reduce adverse effects and no significant effects are expected as a result of the Proposed Development operation.

8. Summary

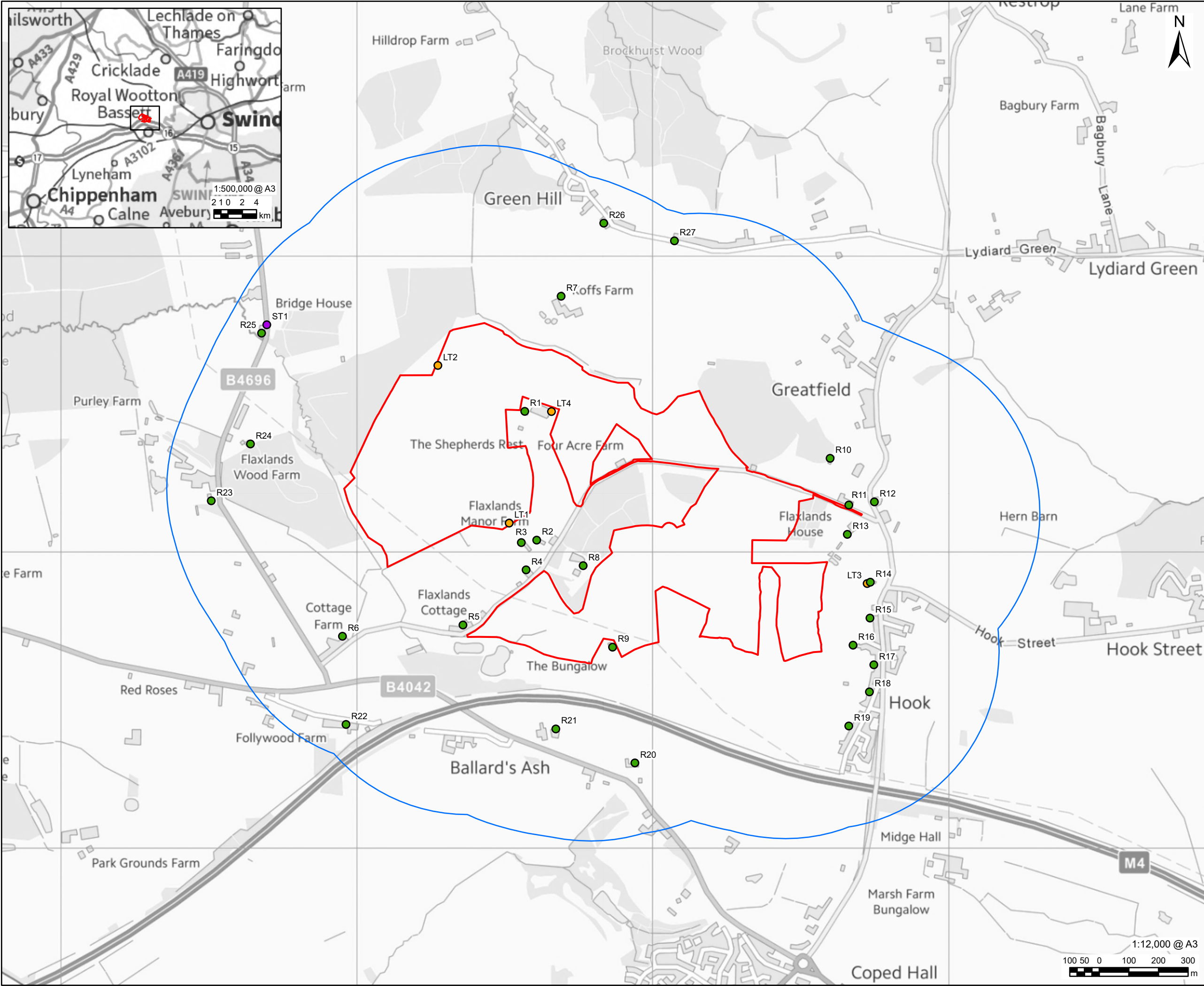
- 8.1.1 AECOM Acoustics has undertaken an environmental noise impact assessment in support of the Proposed Development.
- 8.1.2 A baseline survey was carried out in September to October 2024 to determine the existing sound environment.
- 8.1.3 Construction noise relating to the BESS, inverters, transformers, PV modules and main substation has been predicted at the nearest noise sensitive receptors through acoustic modelling. Predicted construction noise levels are expected to be below the construction noise criteria, as such no significant effects are expected at all receptors during the construction phase.
- 8.1.4 Construction vibration from impact piling during installation of the PV solar panel structures has been predicted for sensitive receptors within 100 m of the Proposed Development PV panels. Predicted construction vibration levels are expected to exceed the SOAEL at R1 which is considered to be significant, and between the LOAEL and SOAEL at R3 which is not significant. A communication strategy is recommended during the construction phase to inform the residents at R1 and R3 when vibration inducing activities will be taking place in close proximity. With the proposed communication strategy and implementation of BPM, construction vibration is considered to be not significant.
- 8.1.5 Peak daily HGV movements during the construction phase have been assessed against measured on Site noise levels and a negligible not significant impact is expected.
- 8.1.6 During the daytime period, the operational rating noise level has been assessed as being between the LOAEL and SOAEL for six receptors (R1, R2, R3, R4, R8, R27) with all remaining receptors below the LOAEL.
- 8.1.7 During the evening, seven receptors (R1, R2, R3, R4, R8, R10, R27) have been assessed as between the LOAEL and SOAEL with all remaining receptors below the LOAEL.
- 8.1.8 During the night-time, six receptors (R2, R3, R7, R8, R26, R27) have been assessed as between the LOAEL and SOAEL, with all remaining receptors either equal to or below the LOAEL.
- 8.1.9 Due to potential operational adverse noise effects at noise-sensitive receptors, additional mitigation has been considered in the form of silencers, attenuation kits and enclosures from manufacturer specification sheets and information on similar types of development. With the proposed mitigation measures in place, the following reductions are predicted during the night-time:
- 6 dB reduction at R9;
 - 5 dB reduction at R1, R3, R5, R11, R14;
 - 4 dB reduction at R2, R4, R6, R8, R10, R13, R16, R17, R18, R20, R21, R22, R23, R24, R25, R2; and
 - 3 dB reduction at all other receptors.
- 8.1.10 Whilst the design objective rating level of 5 dB below the typical background level from the Wiltshire Council Planning guidance has not been met at all noise sensitive receptors, with two receptors between the LOAEL and SOAEL in each assessed period (R2 & R3 day-time & evening, R8 & R27 night-time only), with the implementation of the proposed mitigation, all noise sensitive receptors are predicted to be below or equal to the typical measured background levels.
- 8.1.11 As stated in NPSE, noise levels between the LOAEL and SOAEL require for all reasonable measures to be applied to mitigate and minimise adverse effects on health and quality of life while also considering the principles of sustainable development. However, this does not mean that such adverse effects cannot occur.
- 8.1.12 It is considered that all reasonable measures have been applied to reduce adverse effects and no significant effects are expected as a result of the Proposed Development operation.
- 8.1.13 It is recommended that a planning condition should be applied in relation to maximum permissible noise emissions to secure the mitigated noise levels at receptors.

Appendix A Acoustic Glossary

Term	Definition
Noise	Unexpected or unwanted sound.
Decibel (dB)	The range of audible sound pressures is approximately 2×10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0dB to 140dB. Mathematically Sound Pressure level = $20 \log \{p(t)/p_0\}$ Where $P_0 = 2 \times 10^{-5}$ Pa.
A" Weighting (dB(A))	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of risk of damage of hearing due to noise.
Frequency (Hz)	The number of cycles per second, for sound this is subjectively perceived as pitch.
Frequency Spectrum	Analysis of the relative contributions of different frequencies that make up a noise.
Ambient Sound	Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far (<i>The ambient sound comprises the residual sound and the specific sound when present</i>).
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation: $L_{Aeq,T} = 10 \lg_{10} \left\{ \left(\frac{1}{T} \right) \int_{t_1}^{t_2} \left[\frac{p_A(t)^2}{p_0^2} \right] dt \right\}$ Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t
Measurement Time Interval T_m	Total time over which measurements are taken (<i>This may consist of the sum of a number of non-contiguous, short-term measurement time intervals</i>)
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (<i>This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h</i>)
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed
L_{Amax}	The maximum RMS A-weighted sound pressure level occurring within a specified time period. Fast time weighting indicates sound pressure level measurements undertaken using a 125-millisecond moving average time weighting period

Appendix B Site Location Plan and Figures

Filename: \\na.aecomnet.com\fs\EMEA\Bristol\UKBR2\Legacy\UKBR2\PP01\VOL1\BEP\Projects\Environmental\General\GIS\Projects\60727989_Flaxlands Solar\02_Maps\Noise Impact Assessment\NIA_Figure1_SiteLocationPlan_250325_AW.aprx Revision: 0 Drawn: AM Checked: CC Approved: RB Date: 2025-03-25



PROJECT

Flaxlands Solar Farm

CLIENT

Ampyr Solar Europe

CONSULTANT

AECOM Limited
Midpoint, Alençon Link,
Basingstoke
RG21 7PP
www.aecom.com

LEGEND

- Site Boundary
- 600m Study Area
- Receptor
- Short Term Monitoring Location
- Long Term Monitoring Location

NOTES

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ISSUE PURPOSE

NOISE IMPACT ASSESSMENT

PROJECT NUMBER

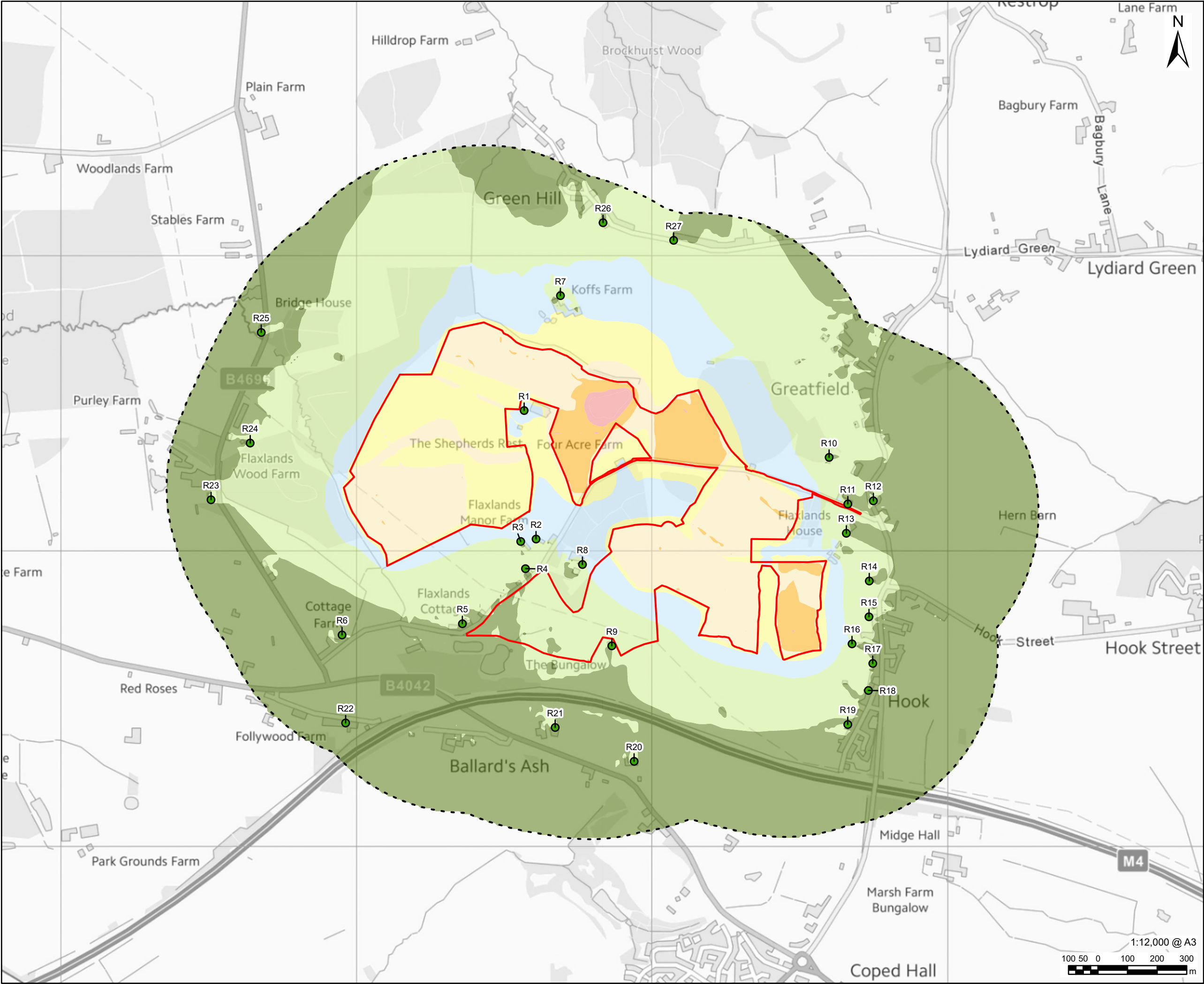
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FIGURE TITLE

Site Location Plan

FIGURE NUMBER

Figure 1



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AECOM

PROJECT

Flaxlands Solar Farm

CLIENT

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LEGEND

- Site Boundary
- Noise Contour 600m Study Area
- Receptor
- Construction Noise Contours L_{Aeq,16h} dB at 1.5m (Free Field)
 - ≤50
 - >50 to ≤55
 - >55 to ≤60
 - >60 to ≤65
 - >65 to ≤70
 - >70 to ≤75
 - >75 to ≤80

NOTES

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ISSUE PURPOSE

NOISE IMPACT ASSESSMENT

PROJECT NUMBER

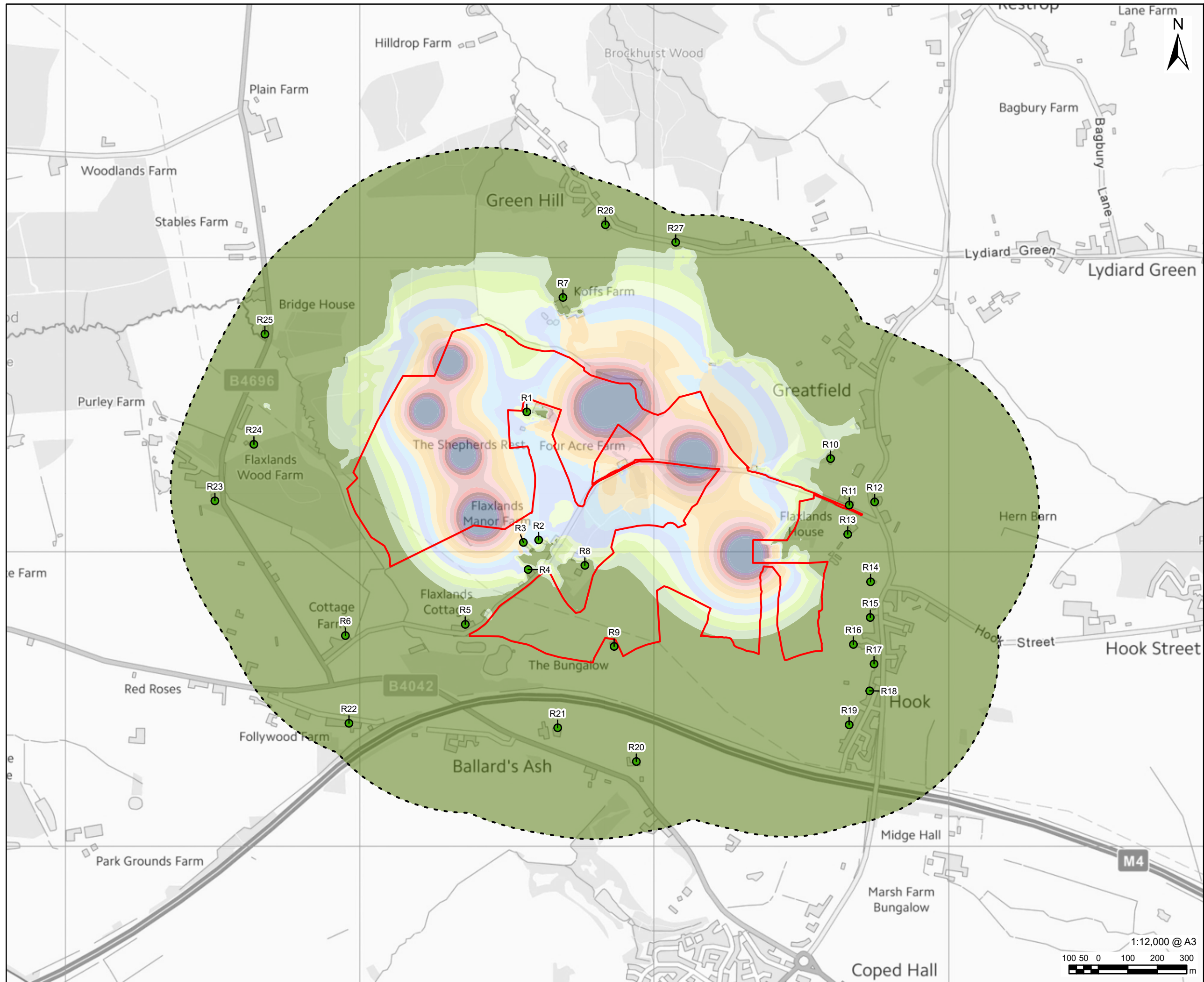
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FIGURE TITLE

Daytime Construction Noise Contours

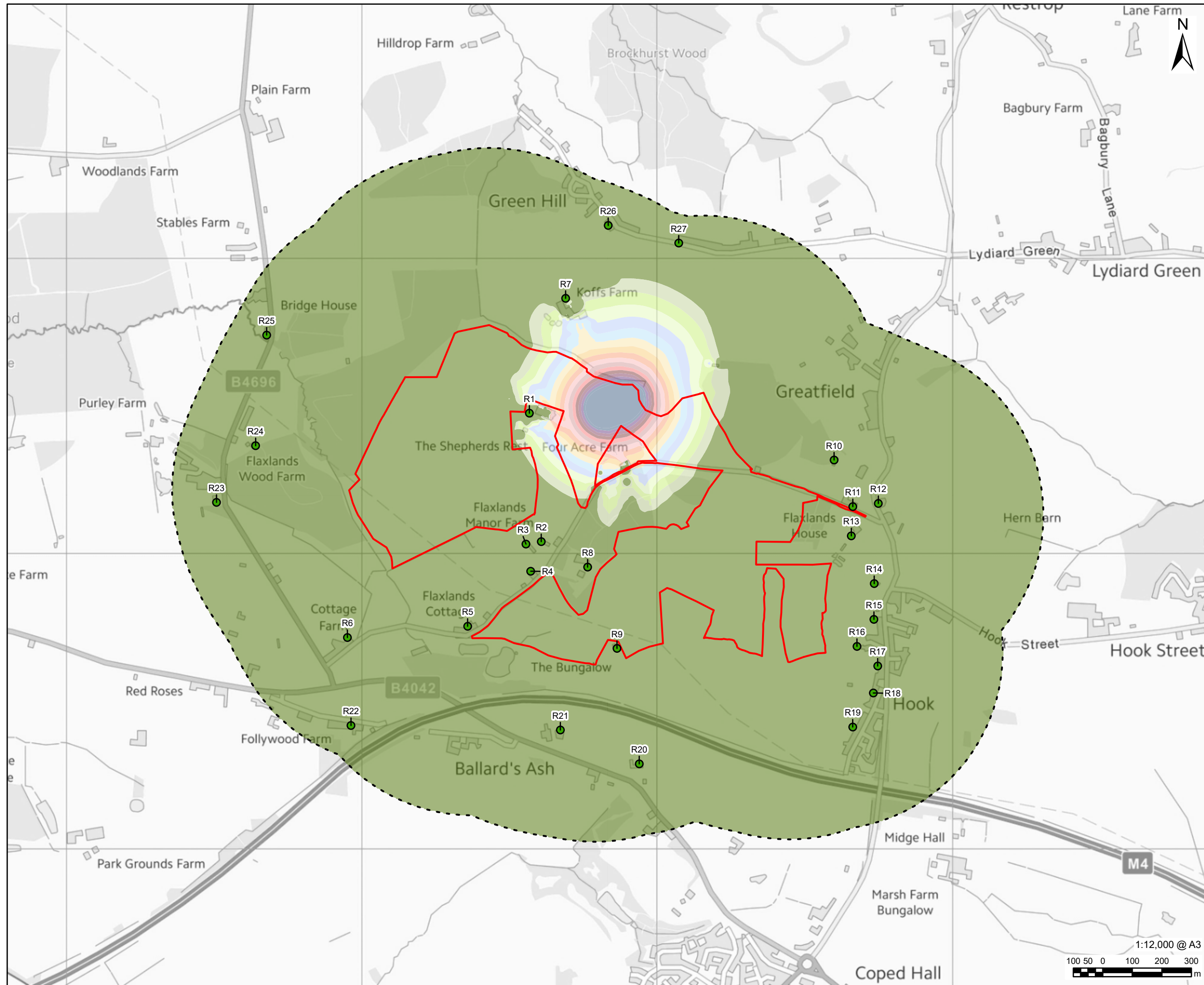
FIGURE NUMBER

Figure 2

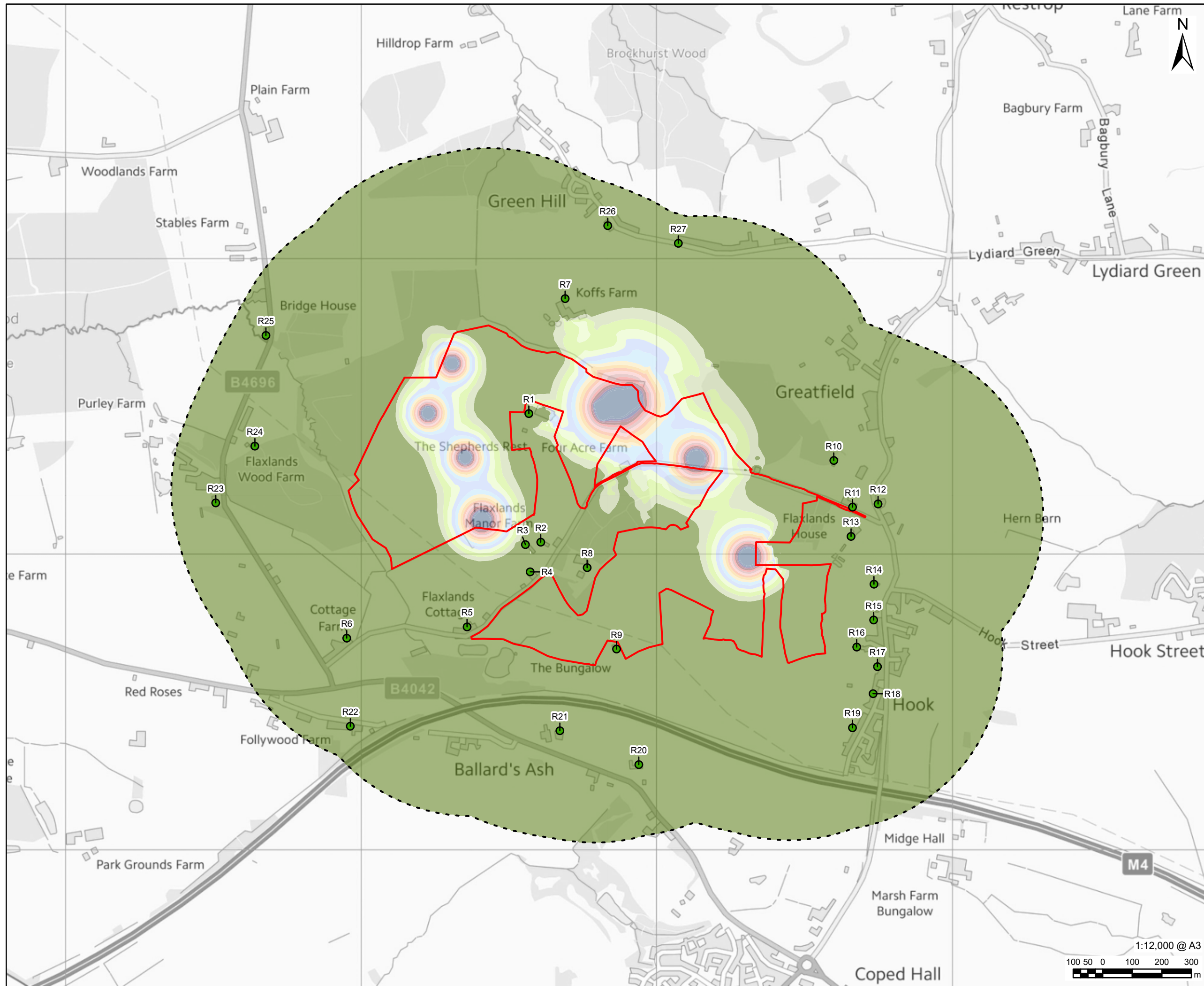


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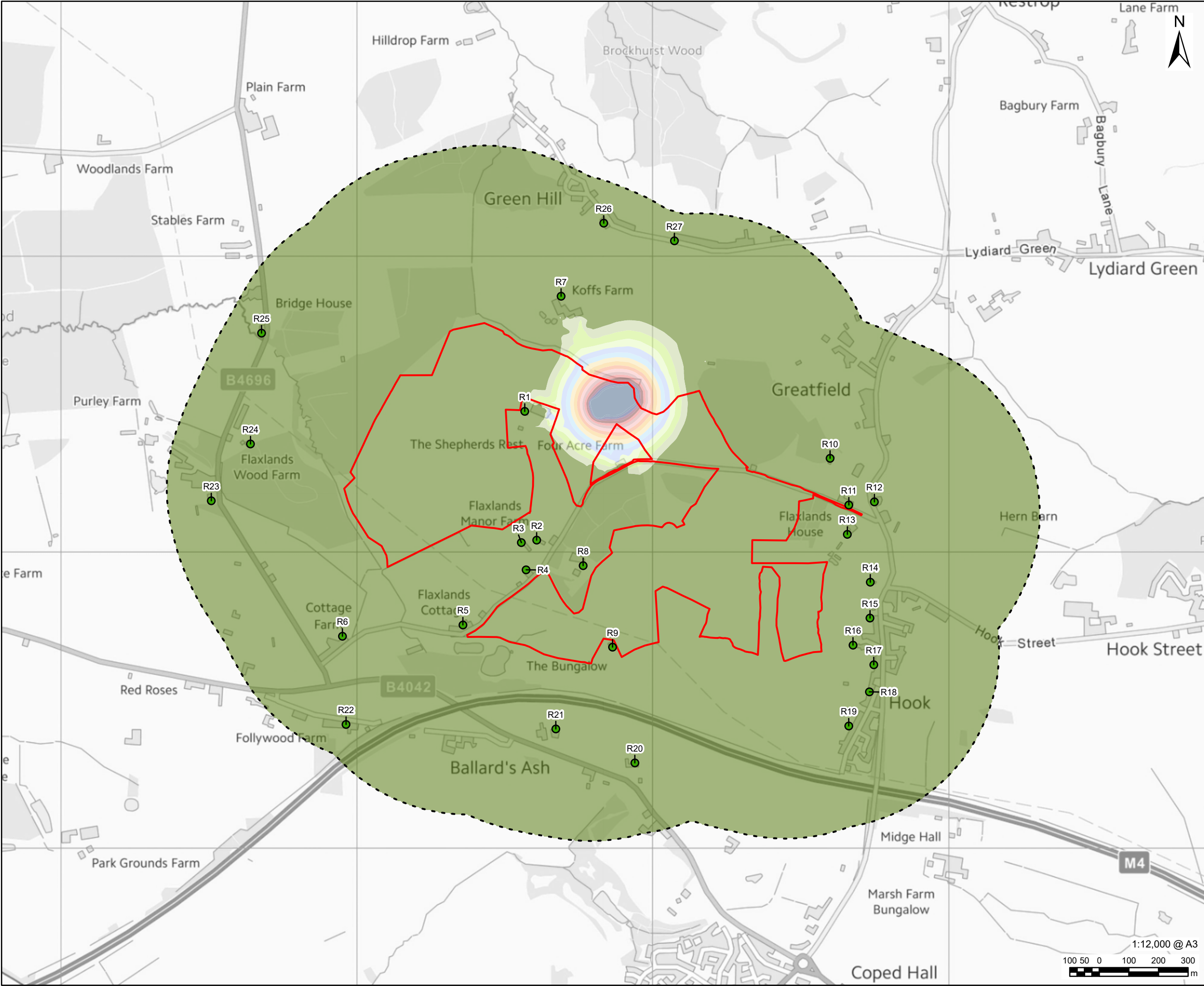
Figure 3



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AECOM

PROJECT
Flaxlands Solar Farm

CLIENT
Ampyr Solar Europe

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LEGEND

- Site Boundary
- Receptor
- Noise Contour 600m Study Area
- Operational Noise Contours L_{Aeq,8h} dB at 4.0m (Free Field)
- ≤35
- >35 and ≤36
- >36 and ≤37
- >37 and ≤38
- >38 and ≤39
- >39 and ≤40
- >40 and ≤41
- >41 and ≤42
- >42 and ≤43
- >43 and ≤44
- >44 and ≤45
- >45 and ≤46
- >46 and ≤47
- >47 and ≤48
- >48 and ≤49
- >49 and ≤50

NOTES
1: Contains OS data © Crown Copyright and database right 2022

ISSUE PURPOSE
NOISE IMPACT ASSESSMENT

PROJECT NUMBER
60727989

FIGURE TITLE
Night-time Operational Noise Contours
with Mitigation

FIGURE NUMBER
Figure 6

Appendix C Sound Monitoring Data

Table 8.1 Sound Monitoring Results LT1

Date	Daytime (07:00 - 19:00)		Evening (19:00 - 23:00)		Night-time (23:00 - 07:00)	
	L _{Aeq,12h} dB	Average L _{A90,1hr} dB	L _{Aeq,4h} dB	Average L _{A90,1hr} dB	L _{Aeq,8h} dB	Average L _{A90,1hr} dB
Wed 18/09/2024	45	40	39	37	41	38
Thu 19/09/2024	43	40	39	36	40	37
Fri 20/09/2024	49	40	40	37	47	36
Sat 21/09/2024	48	45	43	40	40	36
Sun 22/09/2024	51	48	48	45	47	43
Mon 23/09/2024	48	45	36	32	40	36
Tue 24/09/2024	50	45	47	44	49	46
Wed 25/09/2024	54	52	50	47	54	50
Thu 26/09/2024	54	52	50	46	44	38
Fri 27/09/2024	46	41	44	41	47	43
Sat 28/09/2024	48	44	50	47	52	48
Sun 29/09/2024	55	53	50	47	52	49
Mon 30/09/2024	52	50	46	42	48	44
Tue 01/10/2024	46	41	37	33	40	33
Wed 02/10/2024	45	39	38	36	49	42
Thu 03/10/2024	50	45	-	-	-	-
Average	49	46	45	42	46	42

* Logarithmic average of the ambient sound measurements

** Incomplete Monitoring Period

Table 8.2 Sound Monitoring Results LT2

Date	Daytime (07:00 - 19:00)		Evening (19:00 - 23:00)		Night-time (23:00 - 07:00)	
	L _{Aeq,12h} dB	Average L _{A90,1hr} dB	L _{Aeq,4h} dB	Average L _{A90,1hr} dB	L _{Aeq,8h} dB	Average L _{A90,1hr} dB
Wed 18/09/2024	48	38	43	37	42	36
Thu 19/09/2024	46	39	42	36	42	35
Fri 20/09/2024	48	39	38	35	41	33
Sat 21/09/2024	48	40	40	37	39	34
Sun 22/09/2024	46	42	45	43	42	36
Mon 23/09/2024	48	45	41	34	38	26
Tue 24/09/2024	50	38	42	40	41	37
Wed 25/09/2024	48	44	47	44	45	42
Thu 26/09/2024	48	45	47	45	43	37
Fri 27/09/2024	47	40	39	33	39	32
Sat 28/09/2024	44	38	41	38	44	39
Sun 29/09/2024	52	49	55	50	51	46
Mon 30/09/2024	50	44	48	41	40	34
Tue 01/10/2024	46	39	40	32	34	28
Wed 02/10/2024	46	38	36	33	40	36
Thu 03/10/2024	48	45	-	-	-	-

Average	48	42	44	39	42	36
----------------	-----------	-----------	-----------	-----------	-----------	-----------

* Logarithmic average of the ambient sound measurements

** Incomplete Monitoring Period

Table 8.3 Sound Monitoring Results LT3

Date	Daytime (07:00 - 19:00)		Evening (19:00 - 23:00)		Night-time (23:00 - 07:00)	
	L _{Aeq,12h} dB	Average L _{A90,1hr} dB	L _{Aeq,4h} dB	Average L _{A90,1hr} dB	L _{Aeq,8h} dB	Average L _{A90,1hr} dB
Wed 18/09/2024	51	45	49	42	45	39
Thu 19/09/2024	50	45	46	41	45	38
Fri 20/09/2024	51	45	44	38	44	36
Sat 21/09/2024	56	47	61	55	45	36
Sun 22/09/2024	51	46	52	49	49	45
Mon 23/09/2024	54	52	46	43	42	35
Tue 24/09/2024	53	49	52	50	49	45
Wed 25/09/2024	55	51	54	52	51	47
Thu 26/09/2024	56	54	53	51	47	40
Fri 27/09/2024	50	46	50	47	48	44
Sat 28/09/2024	53	48	53	50	51	48
Sun 29/09/2024	55	53	55	52	52	48
Mon 30/09/2024	55	53	50	48	49	45
Tue 01/10/2024	52	48	45	38	39	32
Wed 02/10/2024	49	44	43	38	40	36
Average	53	49	51	48	47	42

* Logarithmic average of the ambient sound measurements

** Incomplete Monitoring Period

Table 8.4 Sound Monitoring Results LT4

Date	Daytime (07:00 - 19:00)		Evening (19:00 - 23:00)		Night-time (23:00 - 07:00)	
	L _{Aeq,12h} dB	Average L _{A90,1hr} dB	L _{Aeq,4h} dB	Average L _{A90,1hr} dB	L _{Aeq,8h} dB	Average L _{A90,1hr} dB
Wed 18/09/2024	49	35	47	34	37	31
Thu 19/09/2024	49	36	45	32	37	31
Fri 20/09/2024	50	36	37	30	38	27
Sat 21/09/2024	50	36	35	29	35	27
Sun 22/09/2024	56	37	43	40	40	34
Mon 23/09/2024	49	43	45	32	36	25
Tue 24/09/2024	57	37	50	39	39	35
Wed 25/09/2024	47	40	49	44	44	40
Thu 26/09/2024	48	43	49	43	40	35
Fri 27/09/2024	47	38	54	33	37	32
Sat 28/09/2024	57	38	43	39	42	38
Sun 29/09/2024	53	46	47	45	45	42
Mon 30/09/2024	48	43	45	39	40	34
Tue 01/10/2024	47	38	48	32	36	26
Wed 02/10/2024	47	36	35	29	34	27
Thu 03/10/2024	48	40	-	-	-	-
Average	51	39	45	37	39	33

* Logarithmic average of the ambient sound measurements

** Incomplete Monitoring Period

Appendix D Background Sound Level

After a detailed review of the measured data and observations during measurements, and considering the sound sources in this area, the typical background sound levels for the assessment have been determined by professional judgement. These are shown below in Table D.1 to Table D.4

Details of the measurements used to determine these values are shown in Appendix C.

Table D.1 Typical Background Sound Levels for LT1

Measurement Location	Background Sound Level, L_{A90} , dB	
	Most Typical	Typical Range
Daytime	40	38-54
Evening	38	35-51
Night-time	35	32-46

Table D.2 Typical Background Sound Levels for LT2

Measurement Location	Background Sound Level, L_{A90} , dB	
	Most Typical	Typical Range
Daytime	39	36-46
Evening	36	32-44
Night-time	32	29-40

Table D.3 Typical Background Sound Levels for LT3

Measurement Location	Background Sound Level, L_{A90} , dB	
	Most Typical	Typical Range
Daytime	48	43-54
Evening	43	39-52
Night-time	38	33-47

Table D.4 Typical Background Sound Levels for LT4

Measurement Location	Background Sound Level, L_{A90} , dB	
	Most Typical	Typical Range
Daytime	39	34-45
Evening	33	29-42
Night-time	28	24-35

As can be seen by the daily breakdown of $L_{A90,15min}$ levels in Appendix C, there is some variation in $L_{A90,15min}$ levels over time at the long-term measurement locations during the respective periods of the day. As such, there is a degree of uncertainty in the background sound levels in this area, with levels highly dependent on local sources such as local roads and nearby vegetation.

Background sound levels are highly variable, with differences between equivalent periods on different days, in some cases up to 13 dB.

At LT1, the L_{A90} levels do not often drop below 32 dB during the night-time (23:00-07:00) and 35 dB during the evening (19:00-23:00) periods, and do not often drop below 38 dB during the daytime (07:00-23:00). Histograms of the $L_{A90,15min}$ levels for these periods are shown in Figure 7 to Figure 9.

At LT2, the L_{A90} levels do not often drop below 29 dB during the night-time (23:00-07:00) and 32 dB during the evening (19:00-23:00) periods, and do not often drop below 36 dB during the daytime (07:00-23:00). Histograms of the $L_{A90,15min}$ levels for these periods are shown in Figure 10 to Figure 12.

At LT3, the L_{A90} levels do not often drop below 32 dB during the night-time (23:00-07:00) and 39 dB during the evening (19:00-23:00) periods, and do not often drop below 43 dB during the daytime (07:00-23:00). Histograms of the $L_{A90,15min}$ levels for these periods are shown in Figure 13 to Figure 15.

At LT4, the L_{A90} levels do not often drop below 24 dB during the night-time (23:00-07:00) and 29 dB during the evening (19:00-23:00) periods, and do not often drop below 34 dB during the daytime (07:00-23:00). Histograms of the $L_{A90,15min}$ levels for these periods are shown in Figure 16 to Figure 18.

From the data, the most typical background sound levels at the four measurement locations have been identified by professional judgement. These values have been used as the background sound levels in this assessment.

Figure 7 Daytime variation in Long-term $L_{A90,15min}$ Levels by Hourly Period LT1

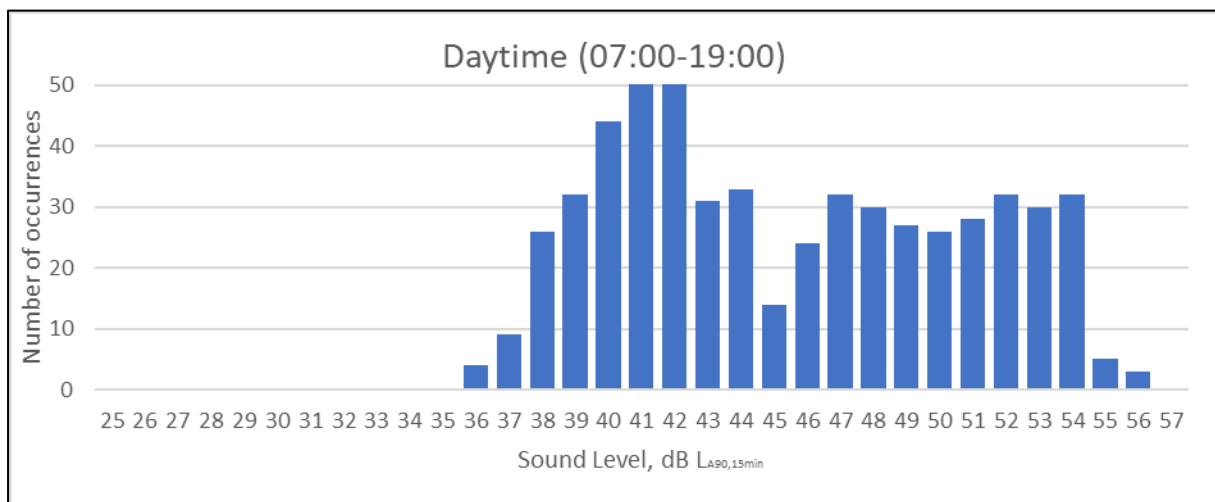


Figure 8 Evening variation in Long-term $L_{A90,15min}$ Levels by Hourly Period LT1

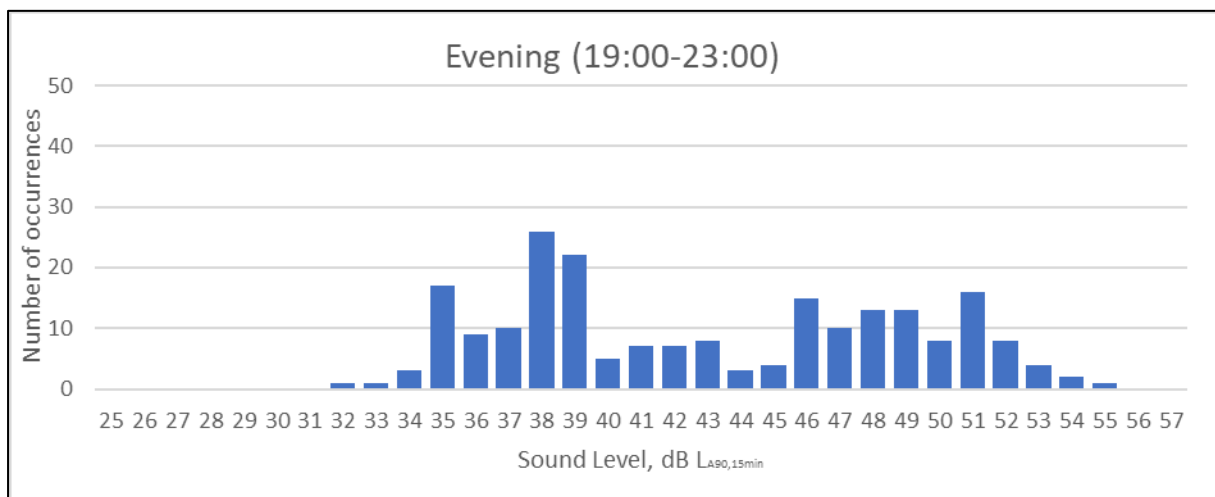


Figure 9 Night-time variation in Long-term LA90,15min Levels by Hourly Period LT1

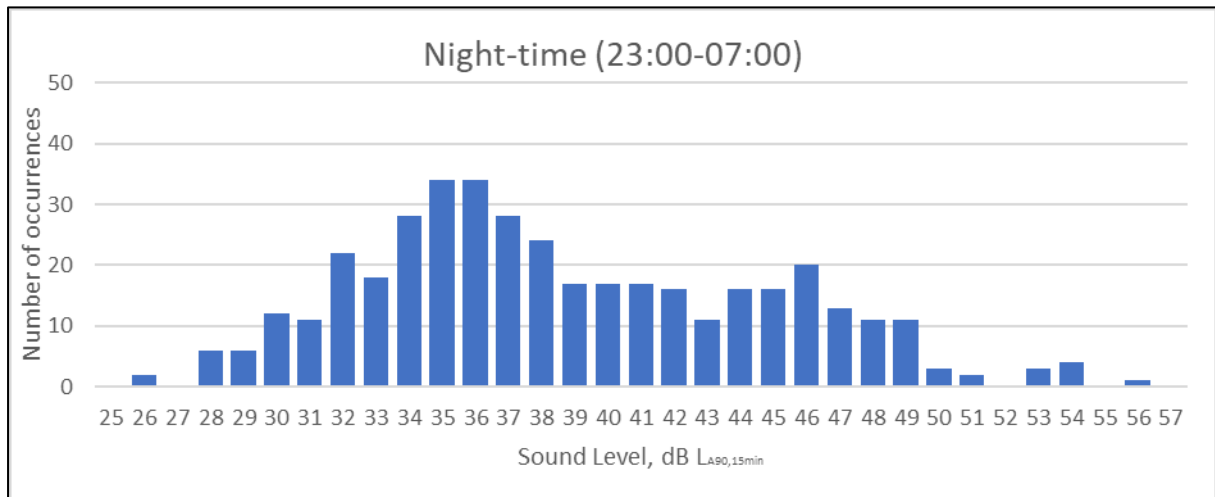


Figure 10 Daytime variation in Long-term LA90,15min Levels by Hourly Period LT2

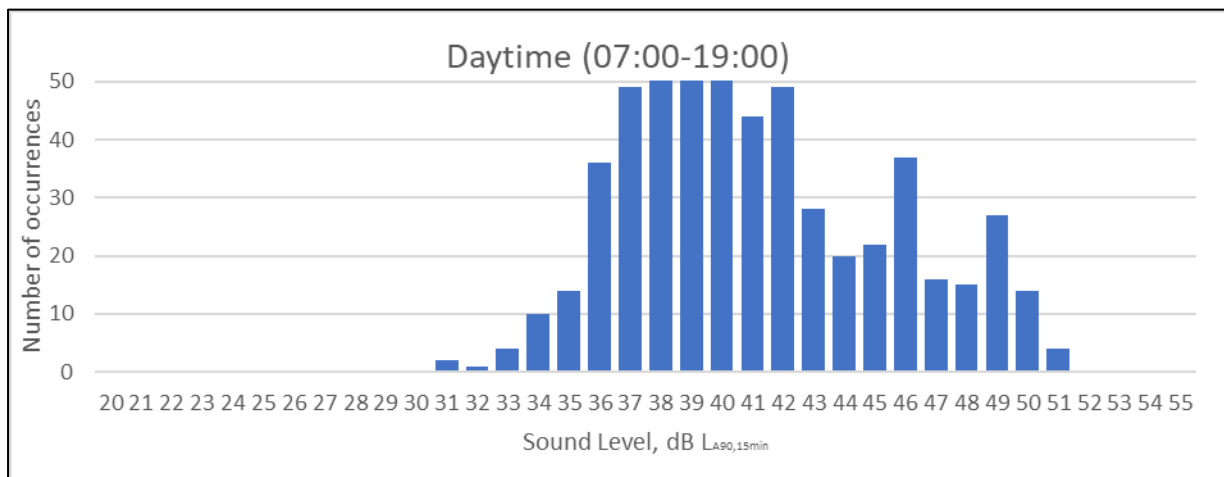


Figure 11 Evening variation in Long-term LA90,15min Levels by Hourly Period LT2

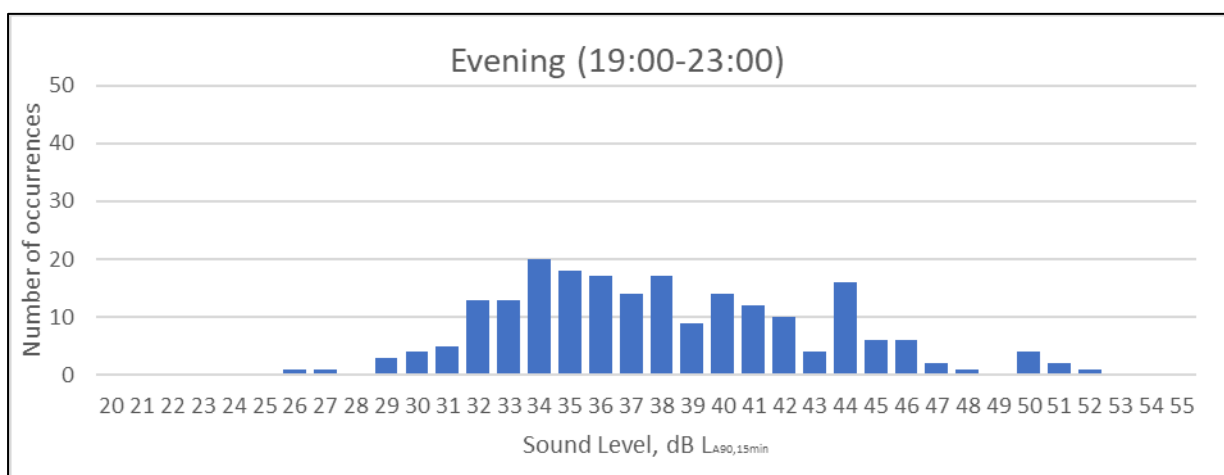


Figure 12 Night-time variation in Long-term LA90,15min Levels by Hourly Period LT2

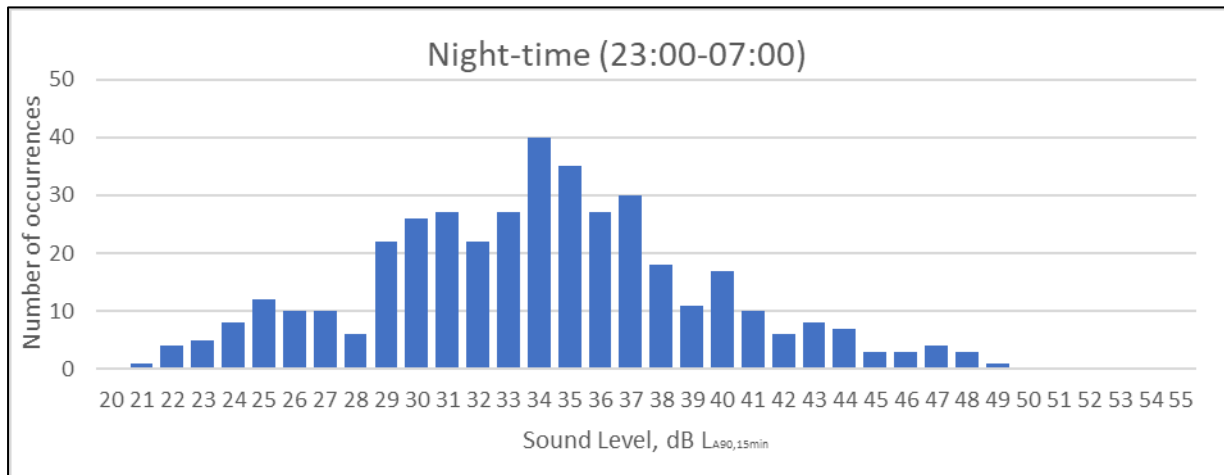


Figure 13 Daytime variation in Long-term LA90,15min Levels by Hourly Period LT3

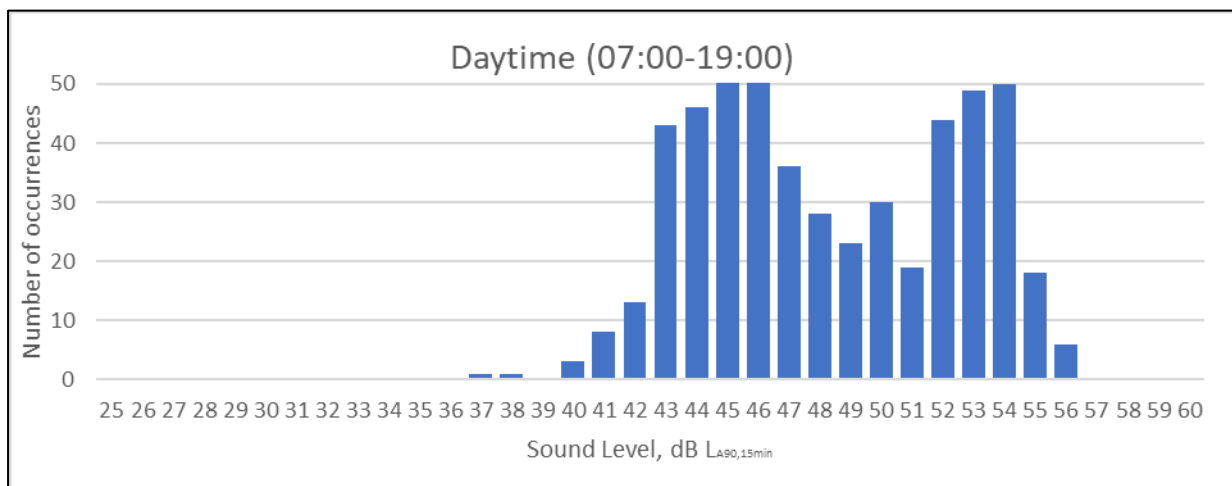


Figure 14 Evening variation in Long-term LA90,15min Levels by Hourly Period LT3

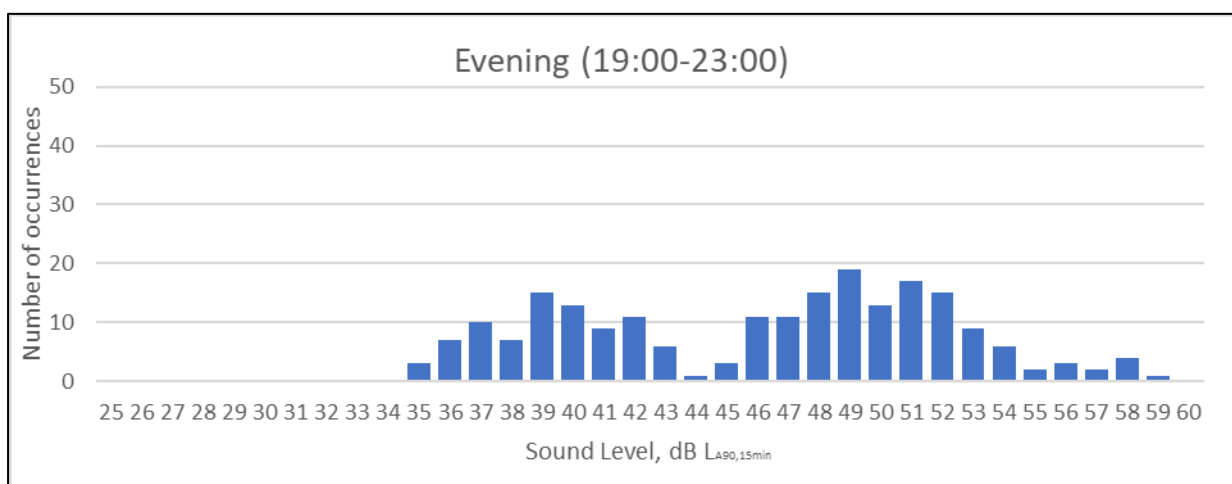


Figure 15 Night-time variation in Long-term LA90,15min Levels by Hourly Period LT3

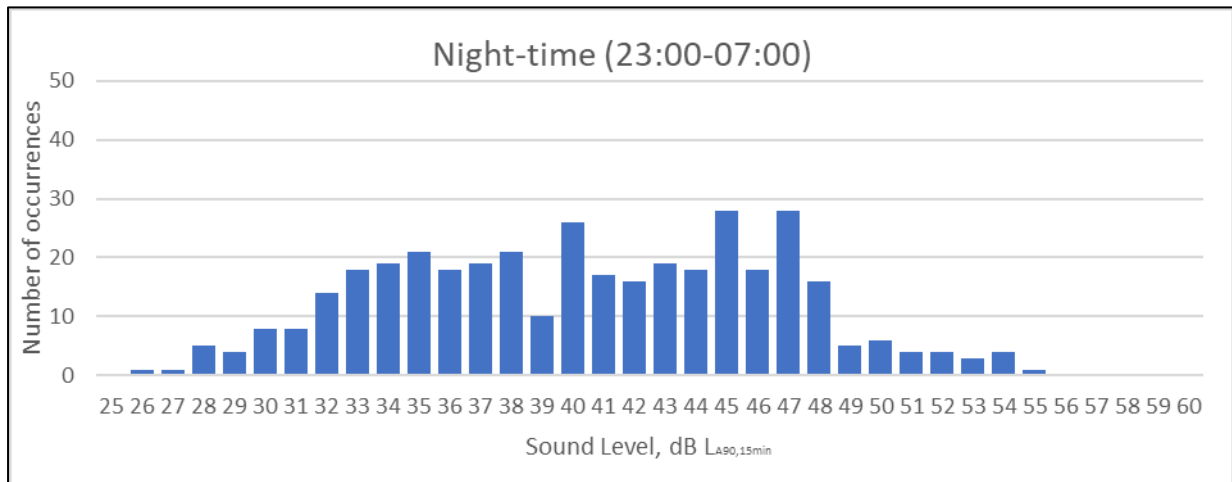


Figure 16 Daytime variation in Long-term LA90,15min Levels by Hourly Period LT4

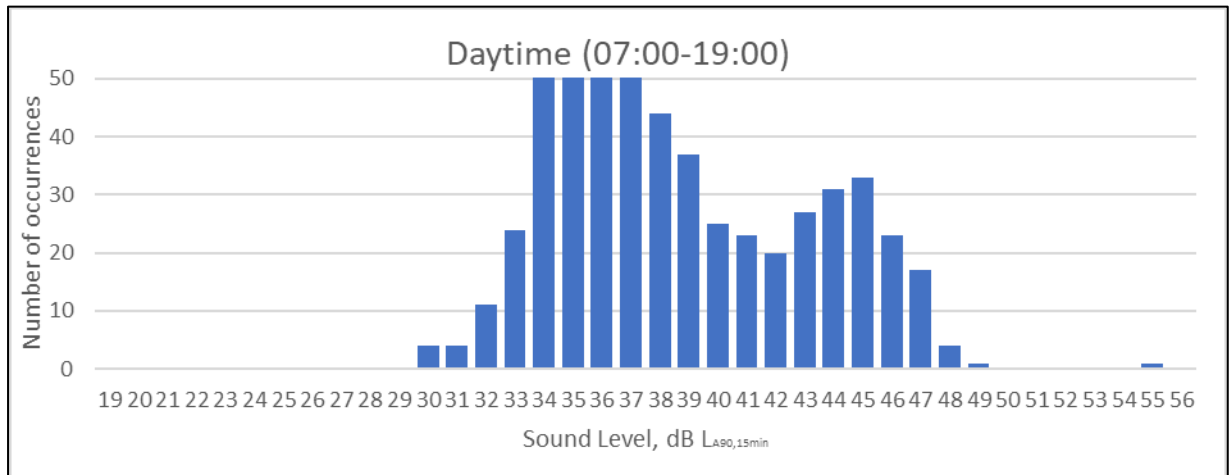


Figure 17 Evening variation in Long-term LA90,15min Levels by Hourly Period LT4

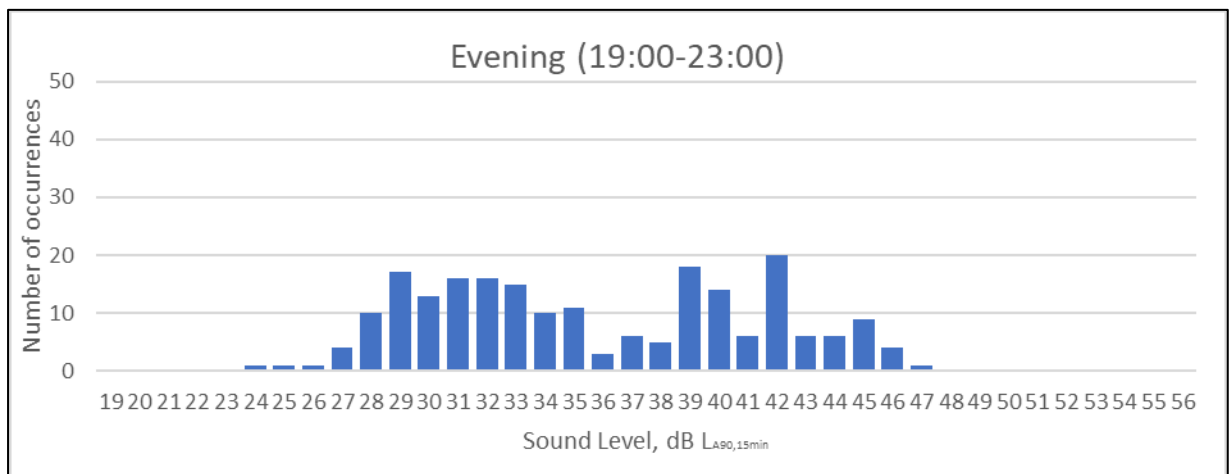
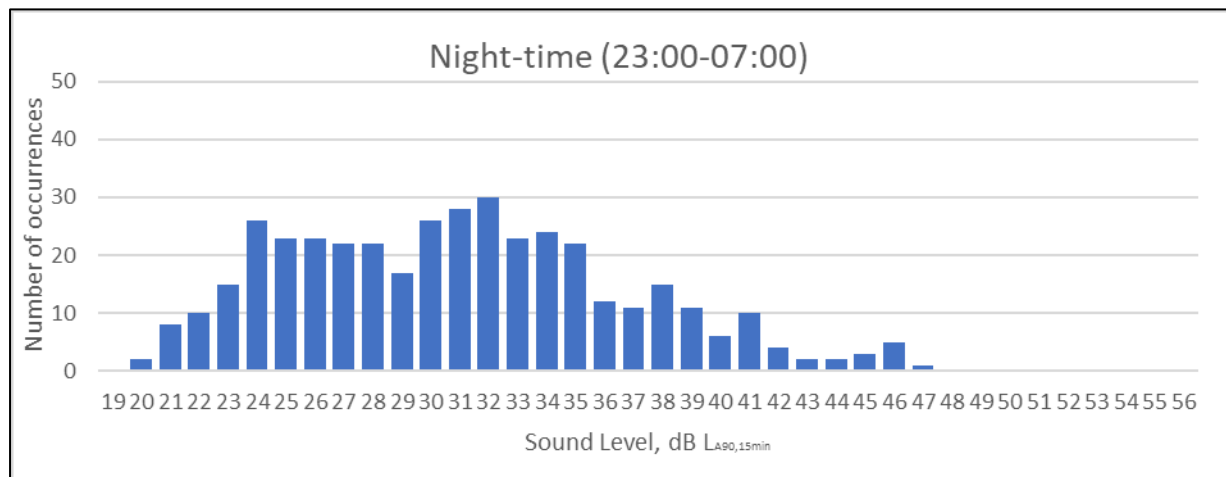


Figure 18 Night-time variation in Long-term LA90,15min Levels by Hourly Period LT4



Appendix E Sound Monitoring Time Histories

Figure 19 Sound Monitoring Time History LT1

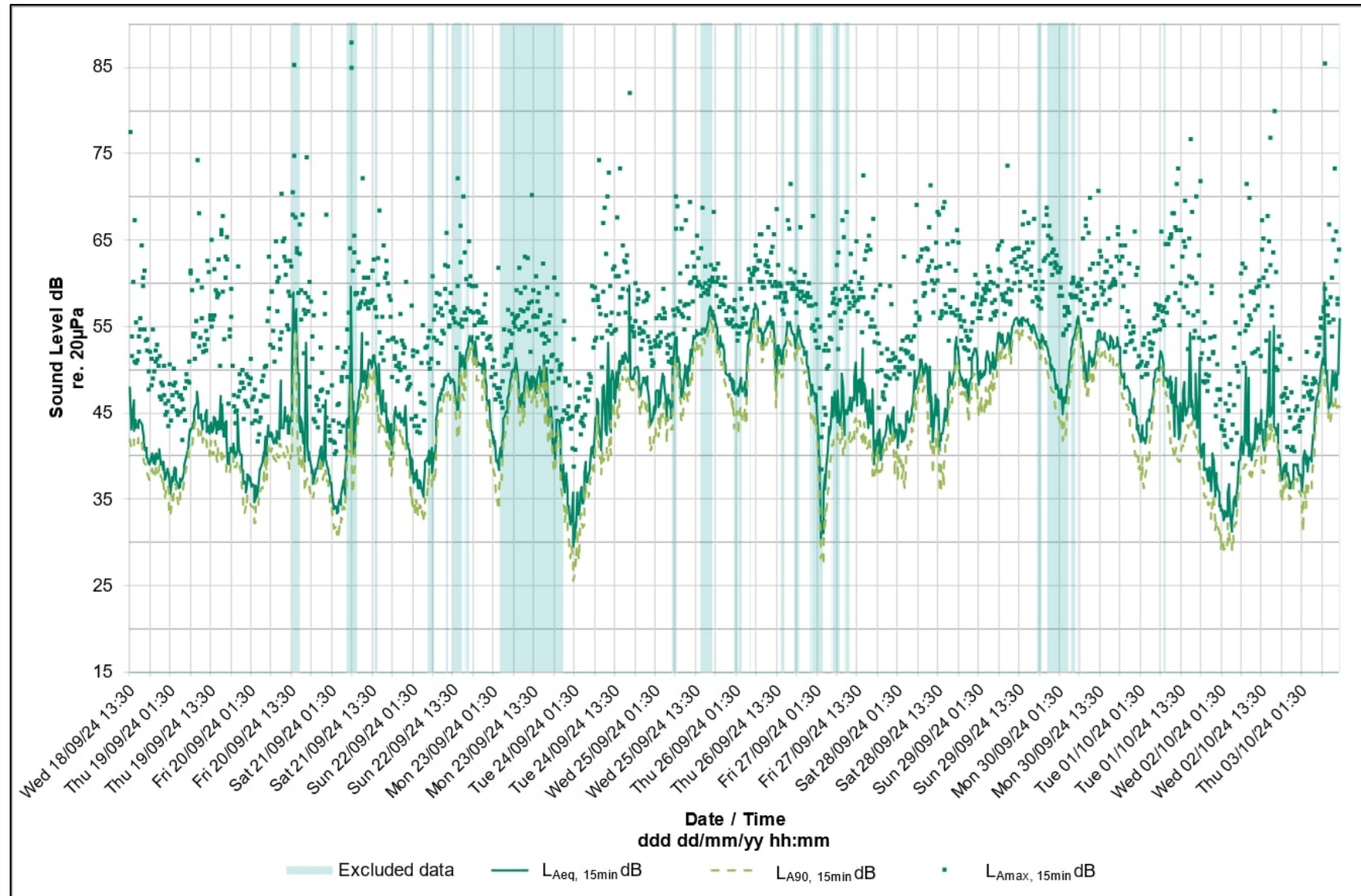


Figure 20 Sound Monitoring Time History LT2

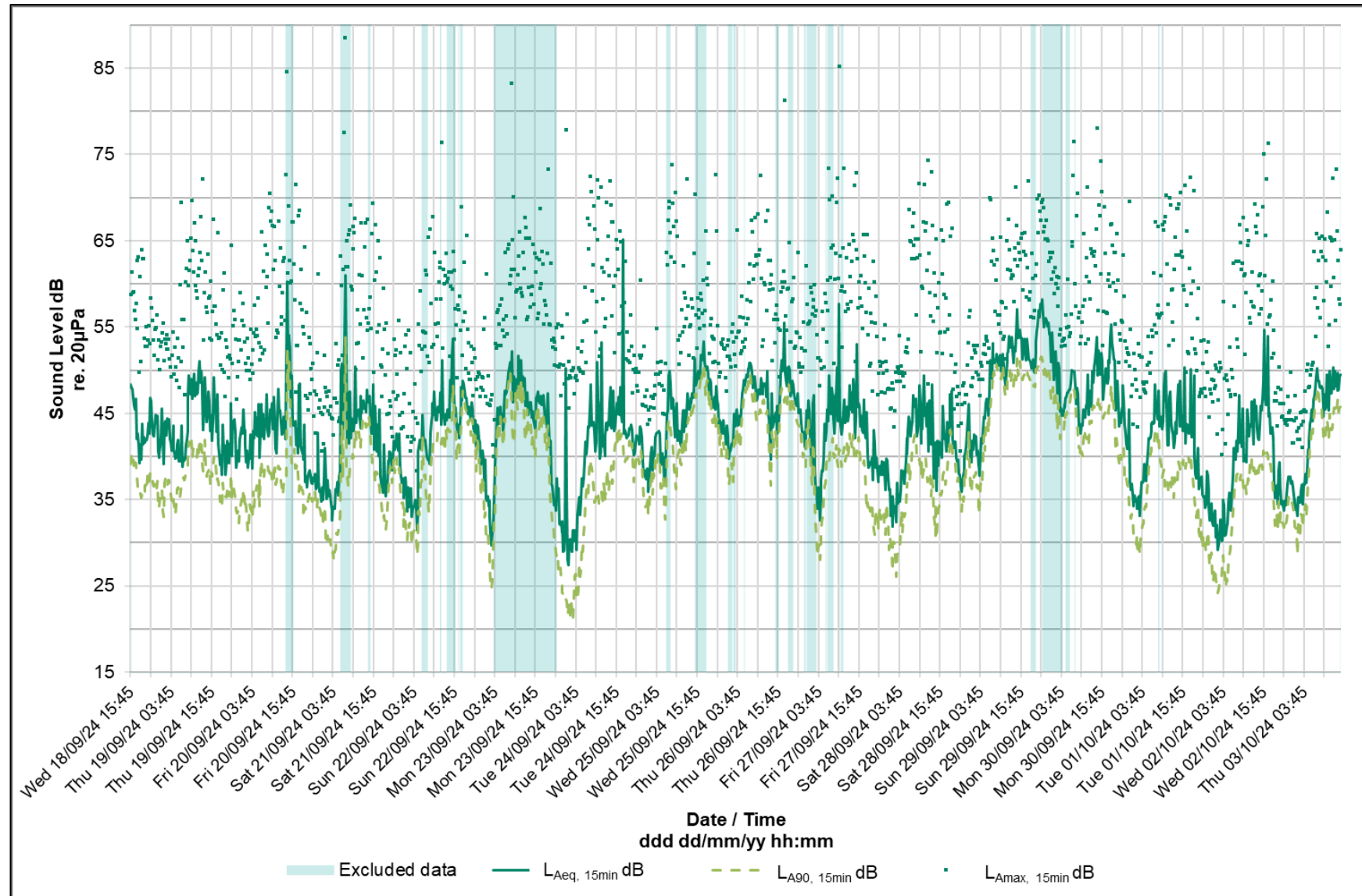


Figure 21 Sound Monitoring Time History LT3

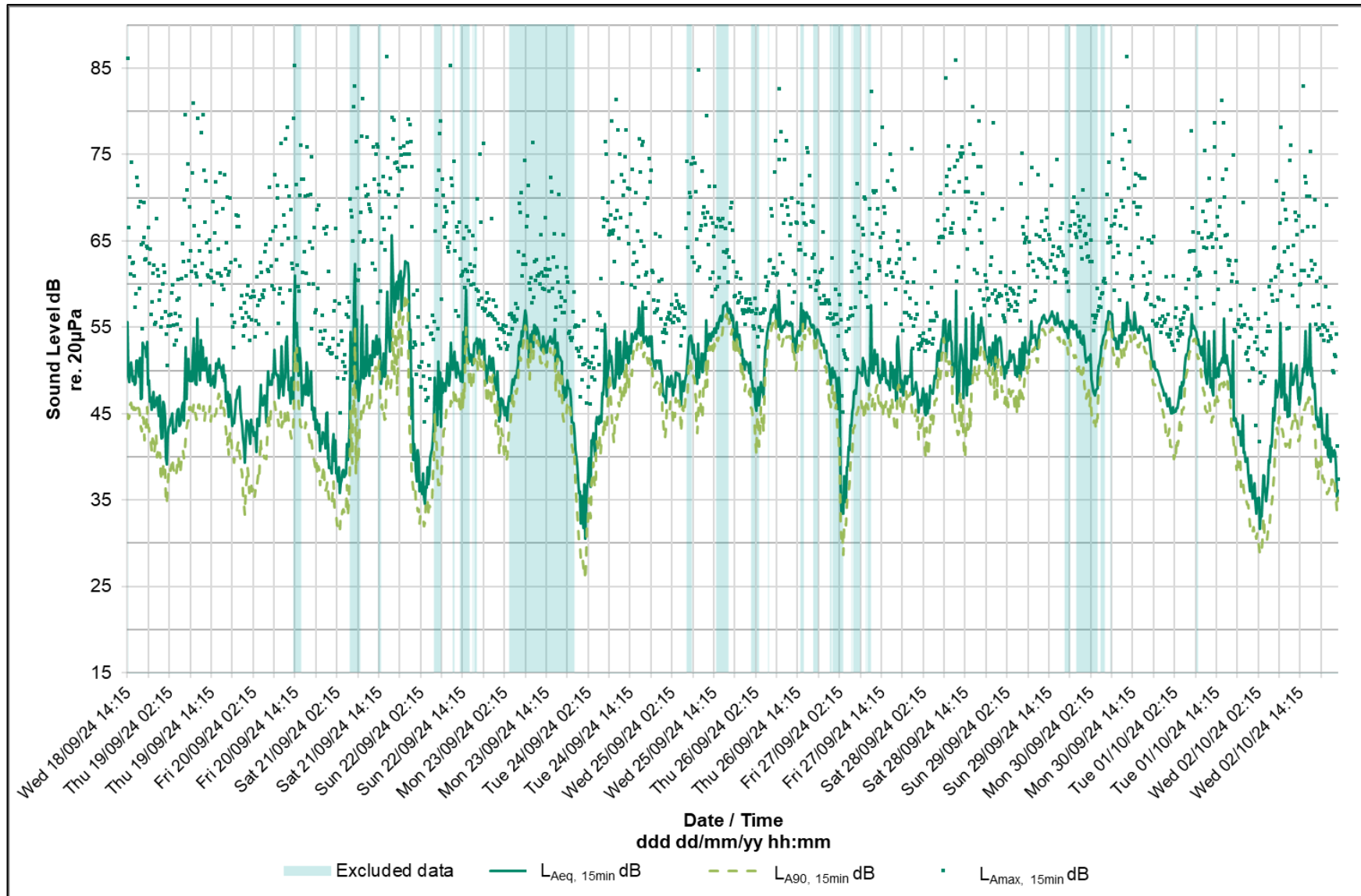


Figure 22 Sound Monitoring Time History LT4

