

Appendix L – Noise and Vibration Assessment





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Noise Impact Assessment For Solar Array Development

at

**Land south of Sperberry Hill
Little Wymondley
Hertfordshire**

For

Brockwell Storage and Solar Limited (BSSL)

Report No.: R24.0705/DRK

Date: 9th October 2024

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Date: 9th October 2024

Summary

1. Brockwell Storage and Solar Limited (BSSL/ the Applicant) is proposing to construct and operate a solar photovoltaic (PV) farm installation on land to the south of Sperberry Hill, Hertfordshire.
2. Planning Application (ref. 22/00709/FP) for a proposal with the same description of development and located on exactly the same site, was refused by North Hertfordshire District Council (NHDC) on 22nd November 2023 (hereafter referred to as the '2023 Scheme').
3. The 2023 Scheme was made by RNA Energy Ltd which was acquired by Brockwell Energy Limited and now exists as BSSL. The Applicant has decided to submit a revised planning application for the 2023 Scheme with some specific design changes (hereafter referred to as the 'Resubmission Scheme').
4. At the request of Axis, Noise & Vibration Consultants Ltd ("NVC") were commissioned to update the noise assessment (previously undertaken by NVC) for the Resubmission Scheme to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.
5. Following a study of the local area the nearest sensitive receptors (NSRs) were determined.
6. Baseline sound monitoring was carried out in October 2021 for the 2023 Scheme over a typical weekday and weekend period to determine the lowest likely representative background and residual sound levels.
7. Site operational noise has been calculated using empirical noise data for the battery storage, inverters and transformers obtained from similar solar farm sites operating in the UK. The assessment has used ISO9613-2 prediction methodology and CadnaA noise modelling software for producing noise contours of the highest likely generated noise with all plant operating.

8. An assessment of the resultant impacts has been undertaken by applying noise limits established from appropriate and relevant guidance and standards.

Conclusions

9. Following analysis of noise survey results our conclusions are as follows:
 - (i) The results of baseline noise monitoring over a weekend monitoring period at four locations (in areas representing typical background sound levels) indicate that modal (i.e. most common place value) or average background sound levels vary between 41dB to 44dB L_{A90} during the daytime, 33dB to 39dB L_{A90} during the night-time period and between 39dB to 43dB L_{A90} during the night-time sunrise period (refer to Appendix 1 for explanation of L_{A90} measurement index).
 - (ii) The predicted noise contribution from the application site using ISO9613-2 methodology and CadnaA noise modelling software shows noise levels from the Site to range between 27dB and 33dB $L_{Aeq15mins}$ during maximum site operations.
 - (iii) The results show that the noise contribution from maximum site operations would be below the representative background sound level during daytime periods. According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact**.
 - (iv) The results show that the noise contribution from maximum site operations would be below the representative background sound level during night-time periods (including the worst-case night-time sunrise operating hours). According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact**.

- (v) The noise impact during night-time operations would be **well below** night-time recommended limits external to bedroom windows to meet sleep disturbance criteria of 40dB $L_{Aeq8hrs}$ and the internal design criteria according to BS8233: 2014 assuming an open bedroom window.
 - (vi) The Local Authority are able to condition the site in terms of noise, to ensure noise levels and mitigation measures achieve a reasonable level of amenity in accordance with relevant guidance and standards.
 - (vii) Predictions of construction noise would indicate no significant impacts and 'best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.
 - (viii) Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the nearest receptors, would indicate that this would be a **slight** impact and **minor** effect and therefore not significant in accordance with Government advice and guidance.
 - (ix) Maximum levels of vibration during the construction phase (i.e. during the use of mini-piling rigs and vibratory plant) would be below perceptible levels and therefore not significant.
10. The assessment concludes that the site can be designed to operate such that it complies with all appropriate and relevant noise standards and guidance. There is, therefore, no reason to refuse the Proposed Development on the grounds of noise or vibration.

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1.0 INTRODUCTION

- 1.1 Brockwell Storage and Solar Limited (BSSL/ the Applicant) is proposing to construct and operate a solar photovoltaic (PV) farm installation on land to the south of Sperberry Hill, Hertfordshire.
- 1.2 Planning Application (ref. 22/00709/FP) for a proposal with the same description of development and located on exactly the same site, was refused by North Hertfordshire District Council (NHDC) on 22nd November 2023 (hereafter referred to as the '2023 Scheme').
- 1.3 The 2023 Scheme was made by RNA Energy Ltd which was acquired by Brockwell Energy Limited and now exists as BSSL. The Applicant has decided to submit a revised planning application for the 2023 Scheme with some specific design changes (hereafter referred to as the 'Resubmission Scheme').
- 1.4 At the request of Axis, Noise & Vibration Consultants Ltd ("NVC") were commissioned to update the noise assessment (previously undertaken by NVC) for the Resubmission Scheme to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.
- 1.5 The study benefits from a baseline sound survey undertaken in October 2021 for the 2023 Scheme to determine typical background sound levels in the vicinity of nearest sensitive receptors (NSRs) to the proposed development. Monitoring was carried out over a weekend period (i.e. Friday to Sunday) to determine representative background sound levels.
- 1.6 Following a study of the local area the residential NSRs were determined.
- 1.7 Site operational noise has been calculated using empirical noise data for the transformers, inverters and battery storage plant obtained from Technology Providers from similar solar farm sites operating in the UK. The assessment has used ISO9613-2 prediction methodology and CadnaA noise modelling software for producing noise contours of the highest likely generated noise with all plant operating.

Sources of Information

1.6 Information used in this assessment has been obtained from the following sources:

- Ordnance Survey maps of the local area;
- Information relating to the site layout was provided by Axis;
- BS 7445: 2003 Description and measurement of environmental noise;
- BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
- Guidelines for Community Noise – World Health Organisation: April 1999;
- Night Noise Guidelines for Europe: 2009 – World Health Organisation
- BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings';
- National Planning Policy Framework – December 2023;
- National Planning Practice Guidance – June 2021;
- Noise Policy Statement for England (NPSE) – March 2010: Department for Communities and Local Government; and
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration – May 2020 (formerly HD 213/11).

Assessment Methodology

1.7 The aim of the survey was to provide information and advice on the following:

- provide information on typical operating noise levels from the transformers, inverters and battery storage plant cooling system;
- provide information on background and residual noise levels at the nearest sensitive receptors during the most sensitive periods of proposed operation; and
- advise on any operations that are shown to exceed appropriate and relevant noise criteria and where appropriate provide recommendations for further mitigation.

1.8 Appendix 1 provides details of technical terms within the report, for ease of reference. There is also a chart showing typical everyday noise levels to assist in understanding the subjective level of noise in terms of decibels.

1.9 The Solar Farm will produce renewable electricity obtained directly from the sun using photovoltaic technology.

1.10 The development would basically consist of the following components:

- Photovoltaic panels and associated supporting frames and ground mounting;
- Inverters and transformers;
- Battery storage containers,
- Cabling linking battery containers and inverter and transformer stations to the on-site substation;
- Perimeter fencing and CCTV (invisible infra-red illumination at night, only pointing into the site);
- TNO Substation including transformer;
- Client Substation (Switchgear Building);
- Control and Storage Rooms;
- Internal service roads;
- Scheme of landscaping;
- Temporary Compound & set down area.

2.0 SITE DESCRIPTION

2.1 Location

2.1.1 The location of the Proposed Development is illustrated on Figure 1. The Site comprises a number of fields on farmland currently used for arable production.

2.1.2 The Proposed Development is located southwest of the village of Little Wymondley and on land just south to southeast of the National Grid Wymondley Transforming Station. The Site lies circa 1km to the northwest of the edge of the town of Stevenage.

2.1.3 The site is accessed via Stevenage Road, which connect to the A602 and the A1(M) which is located circa 1km east of the site boundary.

2.2 Site Operation Noise Sources

2.2.1 In terms of noise generated by this type of development, the assessment has considered the following noise sources:

- Noise from the operation of the inverters, transformers and switchgear.
- Noise from the operation of the battery storage plant.
- Noise from the operation of cooling systems for enclosed plant.

2.3 Site Operation Hours

2.3.1 Solar Farms are an inherently quiet installation due to the fact that there are no moving parts. The associated plant to convert the DC current to AC at the correct voltage involves the use of inverters and transformers.

2.3.2 Transformers are not particularly noisy plant and generate a low level 'hum' at relatively close distances driven by the mains frequency. By its nature the Solar Farm is only operational during daylight hours, however during peak generation during the summer months (i.e. under conditions of high temperatures) there may be occasional periods when the operation of the inverters and transformers

occurs just after sun rise (i.e. around 0500 hours), but this would not be at full capacity and noise levels would be reduced.

- 2.3.3 The battery storage plant would be available for operation 24hrs/day and would provide energy when required.

2.4 Nearest Receptors

Residential Receptors

- 2.4.1 Based on distance relative to the Proposed Development, the NSRs are generally located to the northwest, southwest and northeast of the Site. The closest residential receptors are located to the north to northwest off Sperberry Hill, Tittendell Lane and Stevenage Road.
- 2.4.2 The nearest receptors to the site boundary on the north to northwest land area i.e. off Tittendell Lane, Sperberry Hill and Stevenage Road. The nearest receptors to the site boundary on the southern land area are located off Little Armshoe Lane (e.g. The Wyck and Almshoebury Cottages).
- 2.4.3 There are other receptors located at greater distance than the above and in similar directions, which are shown on the noise map. As the impact would be lower (due to increased separation distance) these receptors are not specifically included in the assessment. The nearest sensitive receptor positions are indicated on Figure 1 together with the application site position.
- 2.4.4 We are not aware of any other future receptors proposed within existing planning developments that would be of greater sensitivity than those considered in this assessment.
- 2.4.5 Figure 2 attached shows the layout of the site.

3.0 NOISE POLICY, STANDARDS AND CRITERIA

3.1 Introduction

- 3.1 Noise has been defined as sound that is unwanted by the recipient. The effects of noise on the neighbourhood are varied and complicated, including such things as interference with speech communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

3.2 General Planning Guidance

National Planning Policy Framework – December 2023 (NPPF)

- 3.2.1 Chapter 15 of the National Planning Policy Framework (NPPF) relates to 'Conserving and enhancing the natural environment'.

- 3.2.2 Paragraph 180 e) refers directly to noise and states that:

“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;”

- 3.2.3 Paragraph 191 also states:

“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 the 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; and*
- c) *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

3.2.4 The Noise Policy Statement for England (NPSE) was published in March 2010. It specifies the following long-term vision in policy aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.”*

3.2.5 The NPSE introduced three concepts to the assessment of noise, which includes:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

3.2.6 The above categories are however, undefined in terms of noise levels and for the SOAEL the NPSE indicates that the noise level will vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research is therefore required to establish what may represent an SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy

flexibility until there is further evidence and guidance.

- 3.2.7 The NPSE indicates how the LOAEL and SOAEL relate to the three aims listed above. The first aim of NPSE requires that:

“significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.”

- 3.2.8 The second aim of the NPSE (mitigating and minimising adverse impacts on health and quality of life) refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

- 3.2.9 The third aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

Planning Practice Guidance – June 2021

- 3.2.10 In October 2014, the Ministry of Housing, Communities & Local Government updated the Planning Practice Guidance (“PPG”) on noise associated with Minerals, which provides guidance on the planning process. The main section of PPG was also updated in July 2019 and consultation and pre-decision matters updated in June 2021.

- 3.2.11 The PPG refers to the NPSE documents and under the heading ‘How can noise impacts be determined?’ it states:

“Plan-making and decision taking need to take account of the acoustic environment and in doing so consider:

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

3.2.12 At paragraph 004 the PPG includes a table summarising the noise exposure hierarchy, based on the likely response. Under the heading of 'example of outcome' the '*present and not intrusive*' assessment of noise is defined as '*noise can be heard, but does not cause any change in behaviour, attitude or physiological response. Can slight affect the acoustic character of the area but not such that there is a change in the quality of life*'. The increasing effect level under these conditions is deemed to be '*no observed adverse effect*' and '*no specific measures are required*'.

3.2.13 The PPG explains this by stating:

"At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behaviour, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

As the exposure increases further, it crosses the 'lowest observed adverse effect' level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

Increasing noise exposure will at some point cause the 'significant observed adverse effect' level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained adverse changes in behaviour and / or health without an ability to mitigate the effect of the noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be avoided.”

3.2.14 The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Table 3.1 below provides the perception, example of outcome, effect and action required relative to noise.

Table 3.1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect (NOEL)	No Specific Measures Required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOAEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. 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 and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

3.2.14 BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' is based on the measurement of background sound using L_{A90} noise measurements, compared to source noise levels measured in L_{Aeq} units. Once any corrections have been applied for source noise tonality, distinct impulses etc., the difference between these two measurements (i.e. known as the 'rating' level) determines the impact magnitude.

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact (although this can be dependent on the context).
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is, relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact (although this can be dependent on the context).

3.2.15 In order to establish the rating level, corrections for the noise character need to be taken into consideration. The Standard states that when considering the perceptibility:

"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."

3.2.16 The subjective method adopted includes the following character corrections:

Table 3.2: BS4142:2014+A1:2019 Character Corrections

Level of Perceptibility	Correction for Tonal Character dB	Correction for Impulsivity dB	Correction for Intermittency dB	Correction for other character dB
Not Perceptible	0	0	0	0
Just perceptible	+2	+3	0	0
Clearly perceptible	+4	+6	+3*	+3*
Highly perceptible	+6	+9	+3*	+3*

*Standard defines this should be readily distinctive against the residual acoustic environment, it is interpreted therefore to be either clearly or highly perceptible as a character. If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others, then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

3.2.17 The assessment of noise from the fixed plant at the NSR is considered and our expert opinion is provided below:

- a) In terms of tonality, given the separation distance, predicted noise levels, residual sound levels and proposed mitigation measures any tonal noise from transformers and cooling systems are unlikely to be perceptible at the NSR and we would therefore not apply a correction. The frequency analysis from empirical measurements of cooling systems would indicate no significant tonal character is normally expected (refer to Appendix 6).
- b) In terms of impulsivity this is unlikely to be a characteristic of solar farms, battery storage and transformers installations and is therefore not deemed to be applicable.
- c) In terms of intermittency the plant would work for reasonable long periods of time once demand requires use of its power and by its nature it does not tend to operate intermittently. The intermittency is therefore highly unlikely to be distinctive.

3.2.18 In conclusion, in view of the noise contribution from the site, residual sound levels and design approach to provide suitable mitigation measures, we would advise that a noise character penalty is not appropriate to add to the calculated noise contribution from the fixed plant.

BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

3.2.19 The British Standard BS8233 provides additional guidance on noise levels within buildings. These are based on the WHO recommendations and the criteria given in BS8233 for unoccupied spaces within residential properties.

3.2.20 The guidance provided in section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. Table 3.3 provides detail of the levels given in the standard.

Table 3.3: BS8233: 2014 Indoor ambient noise levels for dwellings

	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hours}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hours}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hours}$	30 dB $L_{Aeq,8hours}$

3.2.21 For a partially open window the standard refers to a reduction of approximately 15dB (Ref. Annex G: G.1). This would therefore indicate a noise level outside the window of approximately 50dB $L_{Aeq,16hours}$ for living rooms during daytime and 45dB $L_{Aeq,8 hours}$ during night-time outside bedrooms.

World Health Organisation (WHO) Guidelines for Community Noise: April 1999

3.2.22 This document provides further updated information on noise and its effects on the community. The document for noise 'In Dwellings' states "The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. Lower noise levels may be disturbing depending upon the nature of the noise source."

3.2.23 The WHO document also states "To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB L_{Aeq} . To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of

people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq} . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.”

3.2.24 In 2009, the WHO published: ‘Night Noise Guidelines for Europe’, which it describes as an extension to the WHO ‘Guidelines for Community Noise’ (1999). It concludes that: *“Considering the scientific evidence on the thresholds of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive (2002/48/EC), an $L_{night,outside}$ of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. $L_{night,outside}$ value of 55dB is recommended as an interim target for those countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach.”*

3.3 Survey Techniques

3.3.1 The background sound survey monitoring has been carried out in accordance with appropriate measurement conditions as defined in BS4142: 2014+A1:2019.

3.4 Guidance on Construction Noise

BS 5228-1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites’

3.4.1 BS 5228 refers to *“the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.”*

3.4.2 Part 1 deals with noise in terms of background legislation and gives recommendations for basic methods of noise control relating to construction and open sites where significant noise levels may be generated. The guidance is aimed at giving advice on achieving ‘best practice’ in controlling noise and

vibration from construction and open sites. There is an example of noise limits given in Annex E, which sets out cut-off limits between 65dB(A) and 75dB(A) or 5dB(A) above the ambient noise, whichever is the greater. Part 2 of BS 5228 deals specifically with vibration control and provides the legislative background to the control of vibration and recommendations for controlling vibration at source and management controls (e.g. liaison with communities, supervision, preparation and choice of plant etc.)

Road Traffic Noise

- 3.4.3 Vehicular access to the Proposed Development would be via Stevenage Road to the northern end of the Site.
- 3.4.4 No guidance is given in Planning Guidance on assessment of increased traffic noise from existing roads as a result of traffic generated by new developments. Furthermore, noise generated by traffic on the public highway as a result of a particular development is not considered to be the responsibility of the promoter of that development. However, permanent change in noise levels along affected roads is relevant to future planning applications and in respect of construction noise this is a temporary activity and therefore this would not apply.
- 3.4.5 Section 5.0 of this report includes an assessment of road traffic impacts relating to the construction phase of the Proposed Development on existing receptors.
- 3.4.6 The DMRB LA 111 provides guidance on the magnitude of change in terms of road traffic noise. The procedure for assessing noise impacts advises the use of a LA₁₀ measurement index based on a daytime 18-hour time period (i.e. 0600 to 2400 hours) and night-time period (i.e. 0000-0600 hours). Further assessment of the impact would be required where changes of 1dB(A) or more are expected in the short-term and changes of 3dB(A) in the long term. Tables 3.54a and 3.54 b are reproduced below as Table 3.4 and 3.5 below.

Table 3.4: Example of Magnitude of Impact for Changes in Road Traffic Noise in the short term

Noise Change, LA10,18hour	Magnitude of Impact
0	No Change
0.1-0.9	Negligible
1-2.9	Minor
3-4.9	Moderate
5+	Major

Table 3.5: Example of Magnitude of Impact for Changes in Road Traffic Noise in the long term (or night-time periods)

Noise Change, LA10,18hour	Magnitude of Impact
0	No Change
1.0-2.9	Negligible
3.0-4.9	Minor
5-9.9	Moderate
10+	Major

3.5 Relevant Noise Criteria

- 3.5.1 The relevant guidance would be BS4142:2014+A1:2019. This is appropriate to apply in general terms to any plant operational noise generated by the Site. To achieve a **low** impact the site rating level would not exceed the established representative background sound level. Where rating levels exceed background sound levels by around 5dB(A) then this would indicate an **adverse impact**.
- 3.5.2 Sleep disturbance criteria is set out in WHO 'Night Noise Guidelines for Europe' 2009, which it describes as an extension to the WHO 'Guidelines for Community Noise' (1999) and an external level of 40dB $L_{Aeq,8hrs}$ and BS8233:2014 for guidance within bedroom of 30dB $L_{Aeq,8hrs}$, which accords with an external level of between 40dB to 45dB with an open window (i.e. 10dB to 15dB reduction through open window).
- 3.5.3 In order to ensure protection of amenity we have proposed that during daytime and night-time periods the rating level should not exceed the representative background sound level at NSRs.

4.0 BASELINE SURVEY METHODOLOGY & RESULTS

4.1 Baseline Sound Monitoring (See Appendix 2 & Figure 1)

Instrumentation and Fieldwork Details

4.1.1 A detailed environmental baseline sound survey was carried out in the vicinity of the NSRs to determine details of the noise climate.

4.1.2 The four monitoring positions for establishing typical background sound levels are provided in Figure 1. The noise monitoring positions are representative of nearest residential receptors adjacent to the Proposed Development and provide broadband data of the existing sound climate at these receptors. Details of the instrumentation used for the survey are detailed below.

4.1.3 The existing baseline sound survey was undertaken over a weekend period on Friday 29th to Sunday 31st October 2021 at four fixed locations in proximity to NSRs to the Site and is therefore considered to provide representative baseline sound levels.

4.1.4 The existing background sound survey was carried out in accordance with the advice given in BS4142: 2014+A1:2019.

4.1.5 The monitoring positions were as follows:

Position A (Northwest of Site) – Off Tittendale Lane (northwest)

4.1.6 Monitoring position A is representative of the nearest receptors located northwest of the Site in proximity to Tittendell Lane and south of Sperberry Hill. Noise levels at this location are generally affected by distant and intermittent local road traffic noise. The monitoring position was chosen in the field just to the east of Tittendell Lane. Refer to Figure 1 for location.

Position B (Southwest of Site) – Proximity to Little Almshoe Lane

4.1.7 Position B was chosen as a suitable monitoring position to represent typical baseline levels in the vicinity of properties south to southwest of Site off Almshoe Lane (i.e. The Red House, The Wycke)). Noise levels at this location are formed in general by distant road traffic noise. Figure 1 shows the location.

Position C (Northeast of Site) – Proximity to Redcoats Farmhouse Hotel

4.1.8 This monitoring position is representative of the closest existing receptor northeast of the overall Site and is located in proximity to Redcoats Farmhouse and Robins. Noise levels at this location are generally formed by local and distant road traffic noise. Figure 1 shows the location.

Position D (Southeast of Site) – East of Almshoebury Cottages

4.1.9 Position D is located to the east of Almshoebury Cottages relates to properties closest to the site boundary on the south-eastern area of the Proposed Development. Noise is dominated by the A1(M) road traffic noise. Figure 1 shows the location.

4.1.10 In consideration of the cross section of monitoring positions and locations, which were in appropriate amenity areas of properties and a weekend period, it is considered that the results represent a robust indication of existing background sound levels.

4.1.11 The main source of existing sound affecting nearest receptor properties relates to local and distant road traffic noise, occasional aircraft and bird sound.

4.1.12 For noise measurements at the nearest sensitive receptor positions the following noise meters were used:

Table 4.1: Instrumentation

Manufacturer	Description	Type	Calibration Due Date	Serial No.
Norsonic	Real Time Sound Analyser	140	February 2022	1405418
Norsonic	Real Time Sound Analyser	118	July 2022	31992
Cirrus	Real Time Sound Analyser	1710	April 2022	G066350
Cirrus	Real Time Sound Analyser	171B	April 2022	G056142
Cirrus	Electronic Calibrator	CR: 513A	April 2022	031523

4.1.13 The following set-up parameters were used on the sound level meters during measurements:

Static Sound Monitoring:

Time Weighting: Fast
Frequency Weighting: 'A'
Measurement Period: 15 minutes

Monitoring Period and Test Details

4.1.14 Measurements were recorded over a period of approximately 68 hours. Data logging of L_{Aeq} , L_{A10} , L_{A90} and L_{Amax} were recorded at 15-minute intervals for information on the variation of sound levels (see Appendix 2 for details).

4.1.15 The noise meters were mounted on a tripod at a height of between 1.2 to 1.5 metres above ground level and fitted with a wind and rain shield.

Calibration

Calibration setting: 94dB

4.1.16 The noise meters were calibrated with the electronic calibrator prior to commencement and on completion of the survey. No significant drift in calibration was observed.

Survey Dates and Personnel

4.1.17 Static sound measurement positions (shown on Figure 1) were chosen to establish typical and representative background and ambient sound data in vicinity of NSRs (see Appendix 3 for detailed information). Consultants of Noise & Vibration Consultants Limited set up the sound monitoring on the Friday 29th October and removed the equipment on Sunday 31st October 2021.

Meteorological Conditions

4.1.18 Weather details were recorded by the NVC consultant during the period of the surveys, and appear below:

Friday 29th to Saturday 30th October

4.1.19 The daytime morning monitoring period started with some rain showers becoming dry by circa 1100 hours, variable cloud with light south to southwest winds (2-3m/sec). Temperature between 10deg to 14deg C.

4.1.20 The night-time period remained dry, overcast with light winds (1-3m/sec).
Temperature 10deg C.

Saturday 30th to Sunday 31st October

4.1.21 Weather conditions were dry with some light showers in the morning and variable cloud cover with light south-west winds (1-3m/s) and temperature 9deg to 13deg C. During night-time periods it was dry, with light cloud cover and light south-east to southwest winds (1-3m/sec), temperature range 9deg to 11deg C.

Sunday 31st October

4.1.22 Periods of rain during morning, early afternoon and evening period, with variable cloud cover and light to moderate winds (3-7m/s), temperature 9deg to 13degC.

4.1.23 Periods of monitoring with rain and moderate wind speeds were removed from the data set, to ensure climatic conditions were suitable for monitoring noise levels in accordance with advice given in BS4142:2014+A1:2019.

4.2 Results

Background Sound

4.2.1 Background sound measurements taken adjacent to the nearest residential sensitive receptors.

4.2.2 The results of measurements taken at the fixed monitoring positions at site are presented in Tables 4.2 and 4.3 with detailed measurements in Appendix 2.

Table 4.2: Average Sound Levels during Daytime Periods

Position	Time Period	Grid Ref. X Y	LAeq dB	LA10 dB	LA90 dB	Representative LA90 dB	LAmix dB
A. Off Tittendell Lane	0700-2300	519974 226666	47	49	43	41	43-76
B. Off Little Almshoe Lane	0700-2300	520374 226296	51	54	43	43	52-85
C. Near Redcoats Farmhouse Hotel	0700-2300	520697 226481	52	55	46	41	52-75
D. East of Almshoebury Cottages	0700-2300	520835 225953	48	49	43	44	51-86

Table 4.3: Average Sound Levels during Night-time Periods

Position	Time Period	Grid Ref. X Y	LAeq dB	LA10 dB	LA90 dB	Representative LA90 dB	LAmx dB
A. Off Tittendell Lane	2300-0700 0500-0600	519974 226666	44 44	46 46	39 40	33 40	38-62 48-55
B. Off Little Almshoe Lane	2300-0700 0500-0600	520374 226296	43 40	44 42	38 39	36 39	44-76 45-55
C. Near Redcoats Farmhouse Hotel	2300-0700 0500-0600	520697 226481	46 45	48 47	41 43	39 43	47-76 51-59
D. East of Almshoebury Cottages	2300-0700 0500-0600	520835 225953	44 43	47 46	40 39	37 39	48-73 50-57

¹Representative taken as most commonplace or average whichever is the lower.

4.2.3 The methodology detailed in the latest version of BS4142:2014+A1:2019 provides an example of statistical analysis to determine the background sound level (i.e. most common place).

4.2.4 Based on the results of the background sound survey analysis, the following determined representative background sound level would be applicable:

Table 4.4: Proposed Noise Limits at NSRs to Achieve Low Impact according to BS4142:2014+A1:2019

Receptor	Time Period	Representative ¹ Background Sound Level LA90 dB	Proposed Noise Limit LAeq ² dB
R1 & R2. Off Tittendell Lane & Sperberry Hill	Daytime (0700-2300) Night-time (2300-0700) Night-time (0500-0600)	41 33 40	<=41 <=33 <=40
R3. Redcoats Farmhouse Hotel	Daytime (0700-2300) Night-time (2300-0700) Night-time (0500-0600)	41 39 43	<=41 <=39 <=43
R4. Off Little Almshoe Lane	Daytime (0700-2300) Night-time (2300-0700) Night-time (0500-0600)	43 36 39	<=43 <=36 <=39
R5. Almshoebury Cottages	Daytime (0700-2300) Night-time (2300-0700) Night-time (0500-0600)	44 37 39	<=44 <=37 <=39

¹Representative taken as most commonplace or average whichever is the lower.

²Daytime hours the time duration would be 1 hour and night-time 15 minutes according to BS4142.

4.2.4 The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative background sound levels during the daytime period (0700 to 2300 hours) vary between 41dB and 44dB LA90. During night-time (2300 to 0700 hours) the representative background sound levels are shown to range between 33dB and 39dB LA90. During the earliest likely solar array operating periods (i.e. between 0500 to 0600 hours) the background levels were shown to vary between 39dB and 43dB LA90.

4.2.5 The methodology detailed in the latest version of BS4142:2014+A1:2019 provides an example of statistical analysis to determine the background sound level (i.e. most common place).

4.3 Source Noise Levels

4.3.1 Refer to section 6.0 for details of noise levels for the transformers and inverters assumed for the noise prediction calculations.

5.0 CONSTRUCTION NOISE

5.1 Introduction

- 5.1.1 Typical planning consent conditions relating to construction noise will be based on the application of 'best practicable means' in accordance with BS5228-1:2009+A1:2014 and restriction on operating hours.

5.2 Construction Activities

- 5.2.1 Initial site preparation works is likely to involve the movement of soil, mini piling works, construction of infrastructure and installation of plant and PV equipment. It is considered that excavators, mini-piling rigs, JCB's, vehicles, dumpers, generators, compressors, concrete mixers and power tools etc. would be required to construct the site.
- 5.2.2 The above noise sources and their associated activities will vary from day to day and may be in use at different stages of the development for relatively short durations.

5.3 Construction Noise Prediction

- 5.3.1 Below the assessment indicates the expected highest noise levels at the nearest receptors based on vehicle movements, mini-rig piling works, general site activities and PV installation at the closest approach to existing residential areas.
- 5.3.2 The calculations use the methodology given in BS 5228: Part 1, 2009. For this method the sound power level of the noise source is defined, and the attenuation is calculated between its location and the selected receiver, taking account of distance, ground attenuation and the time that a noise source will be operating.
- 5.3.3 The results of calculations for vehicle movement, infrastructure, PV installation and general site activities are shown below in Table 5.1.

Table 5.1: Noise Predictions for Worst Case Construction Noise

Position (Refer to Figure 1)	Distance to receptor (m)	Works	Residual Noise Levels LAeq dB	Noise Level at receptor, LAeq _{1hr} dB	BS5228 Threshold Value LAeq dB Daytime
R1. Sperberry Hill	40-650	Vehicle movement	47	32-47	65
	50-650	Piling (mini rig)	47	35-61	65
	40-650	Site Preparation	47	35-60	65
	60-650	General site activities	47	40-65	65
	50-650	Infrastructure	47	33-65	65
	50-650	PV Installation	47	41-65	65
R2. Tittendell Lane	20-450	Vehicle Movement	47	33-48	65
	25-450	Piling (mini rig)	47	38-69	65
	20-450	Site Preparation	47	38-68	65
	40-450	General site activities	47	44-69	65
	25-450	Infrastructure	47	36-72	65
	25-450	PV installation	47	44-71	65
R3. Redhouse Farmhouse Hotel	40-300	Vehicle movement	52	36-48	65
	50-300	Piling (mini rig)	52	42-61	65
	40-300	Site Preparation	52	41-61	65
	60-300	General site activities	52	47-65	65
	40-300	Infrastructure	52	40-67	65
	50-300	PV Installation	52	48-65	65
R4. The Wyck, The Red House & Little Almshoe Cottage	130-400	Vehicle Movement	51	34-43	65
	135-400	Piling (mini rig)	51	39-51	65
	130-400	Site Preparation	51	39-50	65
	150-400	General site activities	51	45-56	65
	130-400	Infrastructure	51	37-54	65
	135-400	PV installation	51	45-56	65
R5. Almshoebury Cottages	280-530	Vehicle Movement	48	33-42	65
	290-530	Piling (mini rig)	48	37-43	65
	280-530	Site Preparation	48	36-42	65
	300-530	General site activities	48	42-47	65
	280-530	Infrastructure	48	35-46	65
	290-530	PV installation	48	43-48	65

5.3.4 The noise of activities during the construction of the site would vary throughout the day and would depend on the particular work being undertaken. The highest noise levels are likely to be created during site preparation, infrastructure activities and the PV installation. This would be within the level of noise normally found to be acceptable for an activity of this type and duration. During periods when the plant is at closest approach to NSRs the guidance threshold level could be exceeded and therefore noise mitigation measures are proposed.

5.3.5 In accordance with BS5228, best practical means would be employed to control the noise generation.

5.3.6 The basis of the above predictions the level of noise, as a result of construction, is not predicted to be significant although some short-term periods could exceed the guidance threshold level.

5.3.7 The application of applying best practicable means in accordance with BS5228-1:2009+A1:2014 will assist in minimising impact from construction noise. A Construction Environmental Management Plan (CEMP) would be provided to the LPA prior to commencement of works for agreement.

5.3.8 Construction hours for noise generating activity would typically be 0730-1800 Monday to Friday and 0730-1300 hours on Saturdays.

Mitigation Measures

5.3.9 In accordance with BS5228-1:2009+A1:2014, best practical means (BPM) would be employed to control the noise generation (e.g. using equipment that is regularly maintained, where practicable use equipment fitted with silencers or acoustic hoods).

5.3.10 In consideration of the likely highest levels of construction noise, the following approach would be considered as part of any CEMP:

- Restriction of construction hours to non-sensitive times of day would normally form part of the planning consent conditions.
- Sensible routing of the construction plant to minimise the effect on nearest residential properties (where practicable).
- Careful choice of piling rigs to minimise noise and vibration (e.g. non-percussive mini piling rigs).
- Avoid un-necessary plant operation and revving of plant or vehicles.
- Where practicable locate plant away from nearest sensitive receptors or in locations which provide good screening in the direction of sensitive receptors.
- Use of broadband noise reverse alarms (where practicable) on mobile plant (i.e. avoid tonal 'beeper' type reversing alarms).
- During periods when the plant is operating within circa 50m of a residential property boundary the introduction of site boundary hoarding screens should be introduced to reduce noise levels in the direction of NSRs. This could be formed by solid screen hoarding to a height of circa 3m, which could reduce noise levels by between 5-10dB(A) depending on the proximity of the plant to the screen.

- Plant will be serviced regularly to minimise adverse noise impacts.
- All vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers and where practicable acoustic enclosures/hoods and maintained in good efficient working order.
- Machines in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum.
- Materials will be handled with care and be placed (e.g. not dropped into skips or lorries or dropped onto metal surfaces).
- Any ancillary plant if required, such as generators, compressors and pumps will be positioned so as to cause minimum noise disturbance, i.e. furthest from receptors or behind close boarded noise barriers. If necessary, acoustic enclosures and /or shielding will be provided.
- Implementation of site rules related to considerate construction practices such as avoiding unnecessary revving of engines and switching off equipment when not required.
- Consider using a one-way system/turning circles and/or use of a banksman to avoid/reduce the need for reverse alarms.
- Battery operated tools would be used rather than compressed air tools wherever practicable.
- Where practicable, impact noise to be minimised (e.g. bangs, clatters, and crashes) particularly during sensitive hours (i.e. evening periods).

Community Liaison

Community Relations – this is one of the most important aspects of mitigation as providing the local residents with clear information of the activities that would be taking place and the length of time that any peak noise levels may occur will assist in allaying people's fears. BS5228 states *"It is suggested that good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. The person, company or organisation carrying out the work on site should appoint a responsible person to liaise with the public."*

5.3.11 The implementation of appropriate mitigation measures based on BPM would enable peak construction noise to be controlled to reasonable levels in accordance with BS5228.

Construction Road Traffic Noise onto Local Road

5.3.12 The daytime peak periods for traffic flow onto the local road network close to the Site (as provided by Axis) have been used to show the change in noise climate at the nearest sensitive receptors during the construction phased works (refer to Table 5.2).

5.3.13 The following tables provide details of the predicted impact due to the temporary increase in road traffic flow during the construction phase. The Traffic Assessment provides details of the measured baseline along Sperberry Hill and the development traffic demand during peak construction activities. It is estimated that the Site would generate 152 two-way vehicle movements per day (which includes 32 two-way movements for HGVs). The predicted noise increase on NSRs is provided below. This level of HGV traffic would only occur for the initial 4-week period when the access tracks are being laid down. HGV movements would then drop to 4 two-way trips per day after this period. The forecast maximum impact on Little Almshole Lane during the initial peak period is 16 HGVs per day.

Table 5.2: Predicted Road Traffic Noise Increase at Existing Residential Properties During Peak Traffic Flow Period for the Construction Phase

Receptor	Time Period	Baseline Noise ('do nothing') LA10 _{11hrs} (dB)	Baseline + Construction noise ('do something') LA10 _{11hrs} (dB)	Change ¹ compared to baseline LA10 _{11hrs} (dB)
Sperberry Hill	0730-1830	55.7*	57.3	+1.6
Stevenage Road	0730-1830	53.1	55.1	+2.0
Little Almshole Lane	0730-1830	55.7	56.5	+0.8

*Based on results at 10m from Little Almshole Road, which would appear robust as observations indicate that baseline flows along Sperberry Hill are either similar or higher.

5.3.14 The impact due to the Proposed Development during peak vehicle movement during the construction phase along Sperberry Hill, Little Almshole Road and Stevenage Road has been calculated using Calculation of Road Traffic Noise (CRTN) methodology and impact methodology using DMRB LA 111.

5.3.15 According to Table 3.4 the DMRB LA 111, impact assessment for existing residential receptors is shown to be a **slight** impact and **minor** effect and therefore not significant.

Construction Vibration Levels

5.3.16 The separation distance between the nearest site solar array panels and NSRs is circa 25m to 50m and the levels of vibration from mini-piling rigs or compaction works would be <0.3mm/sec up to a maximum of circa 0.5mm/sec at the closest approach of 25m, which is either below the level of perceptibility or marginally above and is therefore not significant in terms of impact.

6.0 PLANT NOISE LEVEL PREDICTIONS

6.1 Introduction

6.1.1 Noise has been defined as sound, which is undesired by the recipient. The effects of noise on the neighbourhood are varied and complicated, including such things as interference with speech communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

6.1.2 A measure that is in general use and is recommended internationally for the description of environmental noise is the equivalent continuous noise level or L_{Aeq} parameter.

6.1.3 In general, the level of noise in the local environs that arises from a development site will depend on a number of factors. The more significant of which are:-

- (a) The sound power levels (SWL's) of the plant or equipment used on site.
- (b) The periods of operation of the plant on site.
- (c) The distance between the source noise and the receiving position.
- (d) The presence or absence of screening effects due to barriers, or ground absorption.
- (e) Any reflection effects due to the facades of buildings etc.

6.1.4 The empirical noise levels have been used for the plant equipment to assist in determining the likely noise contribution at nearest sensitive receptors for comparison with the requirements of BS4142: 2014+A1:2019.

6.2 Prediction Methodology

Operational Noise

6.2.1 For site operational noise the assessment used ISO9613-2 prediction modelling and CadnaA software for producing a noise map of the highest likely generated noise during peak noise operations. The Input settings for the noise model include:

Ground factor (G) = 0.5 (mixed ground absorption)

Temperature = 10degC

Relative humidity = 70%

Receptor height = Assumed to be 1.5m above ground for daytime and 4m above ground during night-time (including sunrise periods).

- 6.2.2 The methodology takes into account source position and distance to the nearest sensitive receptors. The noise modelling assumes that all inverters, battery storage, cooling systems and transformers are in operation and therefore the noise predictions provide an indication of the highest likely noise level.

Source Noise Levels

- 6.2.3 The following example of mitigation measures is based on typical plant noise from similar sites in the UK. It is important to note that there is more than one method to control noise levels (e.g. plant selection or design) that can achieve similar levels at NSRs.

- a) Transformer noise level of 70dB $L_{Aeq15mins}$ @ 1m sound pressure level.
- b) Solar plant string inverters produce a noise level of ≤ 65 dB $L_{Aeq15mins}$ @ 1m (based on measured levels with varying load).
- c) Battery Storage Containers (excluding HVAC) 65dB $L_{Aeq15mins}$ @ 1m sound pressure level.
- d) HVAC for containerised battery storage units 73dB $L_{Aeq15mins}$ @ 1m sound pressure level. Tonal noise character would be controlled by the design of silencers on fan system.
- e) Substation switchgear noise level of 65dB $L_{Aeq15mins}$ @ 1m sound pressure level.
- f) Inverters for batteries 70dB-73dB $L_{Aeq15mins}$ @ 1m sound pressure level.

- 6.2.4 The results of the CadnaA software prediction modelling noise contours for site operations are provided in Appendix 3.

6.3 Results of Noise Predictions

Site Plant Noise Assessment:

6.3.1 Noise levels from fixed plant operating at the development site would be assessed against BS4142: 2014+A1:2019.

Noise Contribution Levels from the Proposed Solar Farm

Table 6.1: Predicted Noise from Proposed Solar Farm

Receptor Position (Refer to Figure 1)	Period	Representative Background Sound Level LA90 dB	Predicted highest rating ¹ noise level LAeq (dB)	Level Difference dB(A)*	Impact Magnitude BS4142
Daytime					
R1. Sperberry Hill	Daytime	41	27-31	-14 to -10	Low
R2. Tittendell Lane	Daytime	41	27-28	-14 to -13	Low
R3. Redhouse Farmhouse Hotel	Daytime	41	30-31	-11 to -10	Low
R4. The Wyck, The Red House & Little Almshoe Cottage	Daytime	43	28-33	-15 to -10	Low
R5. Almshoebury Cottages	Daytime	44	32	-12	Low
Night-time & Sunrise					
R1. Sperberry Hill	Night-time	33	20-24	-13 to -9	Low
	Sunrise	40	28-32	-12 to -8	Low
R2. Tittendell Lane	Night-time	33	20-22	-13 to -11	Low
	Sunrise	40	29-31	-11 to -9	Low
R3. Redhouse Farmhouse Hotel	Night-time	39	30-31	-9 to -8	Low
	Sunrise	43	31-32	-12 to -11	Low
R4. The Wyck, The Red House & Little Almshoe Cottage	Night-time	36	26-30	-10 to -6	Low
	Sunrise	39	29-33	-10 to -6	Low
R5. Almshoebury Cottages	Night-time	37	29-30	-8 to -7	Low
	Sunrise	39	32	-7	Low

Note: Column 5 is the subtraction of column 4 from column 3.

¹ Noise characteristics at receptor locations do not include a penalty as this would be controlled by mitigation and design. The night-time noise predictions assume the worst case i.e. the solar plant and battery storage plant are operating at same time (in theory the earliest operation of both sets of plant would be from or about 0500-0600 hours when the sun rises sufficiently)

6.3.2 Table 6.1 shows the range of predicted noise levels from the plant associated with the Solar Farm based on peak production during high ambient temperature conditions. Note: we have assumed maximum noise conditions during the sunrise night-time periods, (i.e. after around 0500 hours).

6.3.3 The fifth column in Table 6.1 shows the difference between the predicted rating noise level and the baseline sound level at the NSR. The rating level in column 4 is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019 for daytime impacts.

Daytime Operations

- 6.3.4 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude at all receptors.

Night-time Operations

- 6.3.5 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude at all receptors.
- 6.3.6 In relation to absolute levels during night-time periods (including the 'worst case' sunrise periods), the maximum noise levels generated by the solar farm are well below sleep disturbance limits (i.e. WHO external guidelines of 40dB $L_{Aeq8hrs}$) and predicted levels within sensitive rooms with an open window would be between 5dB and 18dB L_{Aeq} (when allowing 15dB drop through open window in accordance with BS8233: 2014). This level is significantly lower than guidance limits provided within BS8233: 2014 for bedrooms of 30dB L_{Aeq} .

Operational Road Traffic Noise

- 6.3.7 This type of development will attract negligible operational traffic demand and therefore no significant impacts would occur.

Operational Vibration Levels

- 6.3.8 There is no likely significant vibration expected from this type of plant and therefore magnitude impacts would **not** be insignificant.

7.0 CONCLUSIONS

- 7.1 The proposed solar photovoltaic (PV) farm at the Solar Farm site, has been assessed in terms of noise impact during maximum operational conditions. This report has been undertaken to provide technical support to the planning application for the development.
- 7.2 The results of baseline noise monitoring over a weekend monitoring period at four locations (in areas representing typical background sound levels) indicate that modal (i.e. most common place value) or average background sound levels vary between 41dB to 44dB L_{A90} during the daytime, 33dB to 39dB L_{A90} during the night-time period and between 39dB to 43dB L_{A90} during the night-time sunrise period (refer to Appendix 1 for explanation of L_{A90} measurement index).
- 7.3 Typical site operating noise levels have been established from empirical data obtained from Technology Providers taken from other sites in the UK to provide input data for the noise model.
- 7.4 In order to ensure protection of amenity we have proposed that during daytime and night-time periods the rating level should not exceed the representative background sound level at NSRs.
- 7.5 The predicted noise contribution from the application site using ISO9613-2 methodology and CadnaA noise modelling software shows noise levels from the Site to range between 27dB and 33dB $L_{Aeq15mins}$ during maximum site operations.
- 7.6 The results show that the noise contribution from maximum site operations would be below the representative background sound level during daytime periods. According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact**.
- 7.7 The results show that the noise contribution from maximum site operations would be below the representative background sound level during night-time periods (including the worst-case night-time sunrise operating hours). According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the site would result in a **low impact**.

- 7.8 The noise impact during night-time operations would be **well below** night-time recommended limits to meet sleep disturbance criteria of 40dB $L_{Aeq8hrs}$ and internal design criteria according to BS8233: 2014 assuming an open bedroom window.
- 7.9 The Local Authority are able to condition the site in terms of noise, to ensure noise levels and mitigation measures achieve a reasonable level of amenity in accordance with relevant guidance and standards.
- 7.10 Predictions of construction noise would indicate no significant impacts and 'best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.
- 7.11 Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the nearest receptors, would indicate that this would be a **slight** impact and **minor** effect and therefore not significant in accordance with Government advice and guidance.
- 7.12 Maximum levels of vibration during the construction phase (i.e. during the use of mini-piling rigs and vibratory plant) would be below perceptible levels of 0.3mm/sec with a maximum level of 0.5mm/sec at the closest approach and therefore not significant.
- 7.13 The assessment concludes that the site can be designed to operate such that it complies with all appropriate and relevant noise standards and guidance. There is, therefore, no reason to refuse the Proposed Development on the grounds of noise.

REFERENCES

BS7445:2003 Description and measurement of environmental noise.

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

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

Guidelines for Community Noise – World Health Organisation: April 1999

Night Noise Guidelines for Europe: 2009 – World Health Organisation

Noise Policy Statement for England (NPSE) – March 2010

Department for Communities and Local Government: National Planning Policy Framework: December 2023

Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)

ISO 9613-2: 2024 Acoustics – Attenuation of Sound During Propagation Outdoors

FIGURES

Figure 1: Noise Measurement Locations, Receptors & Site Position

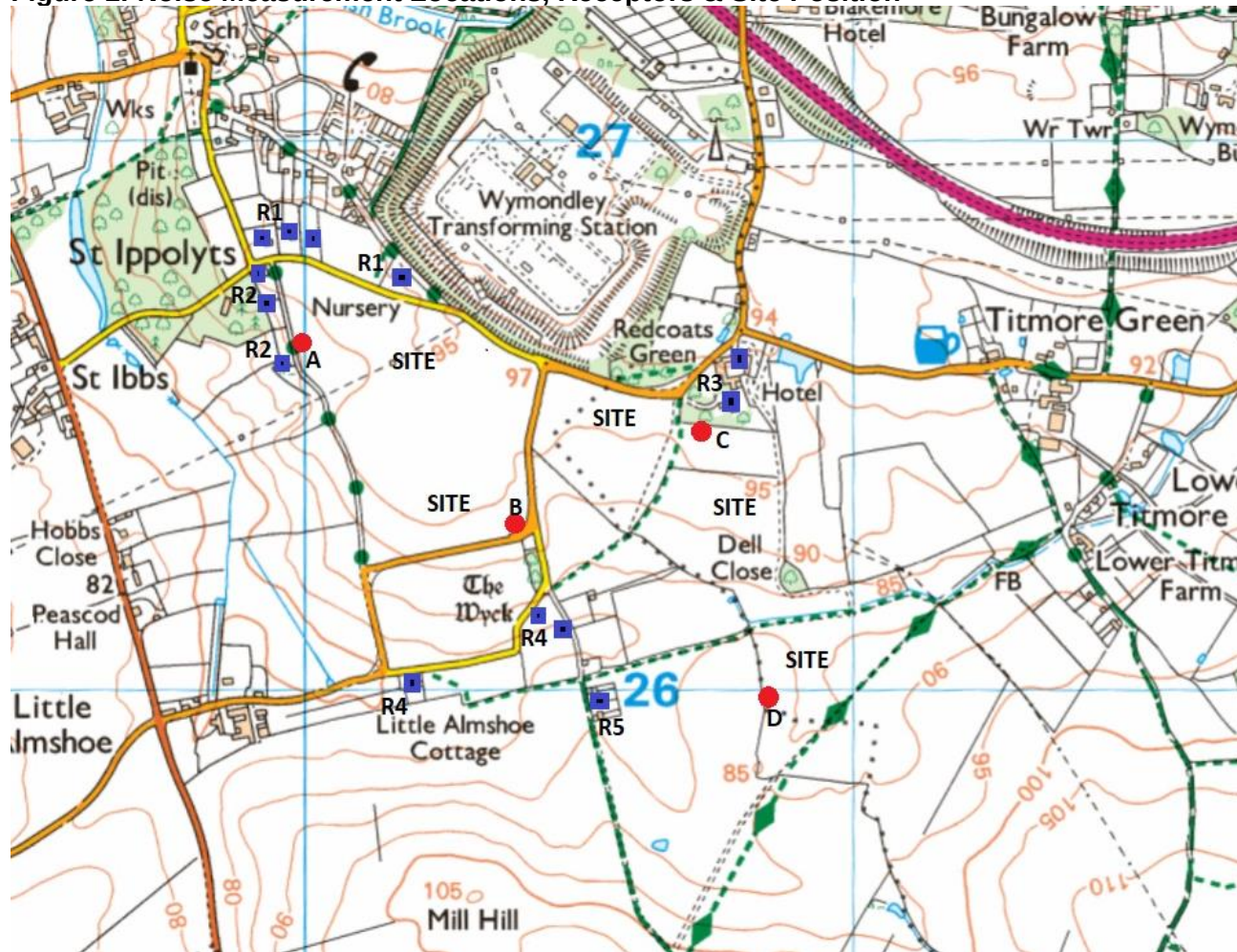
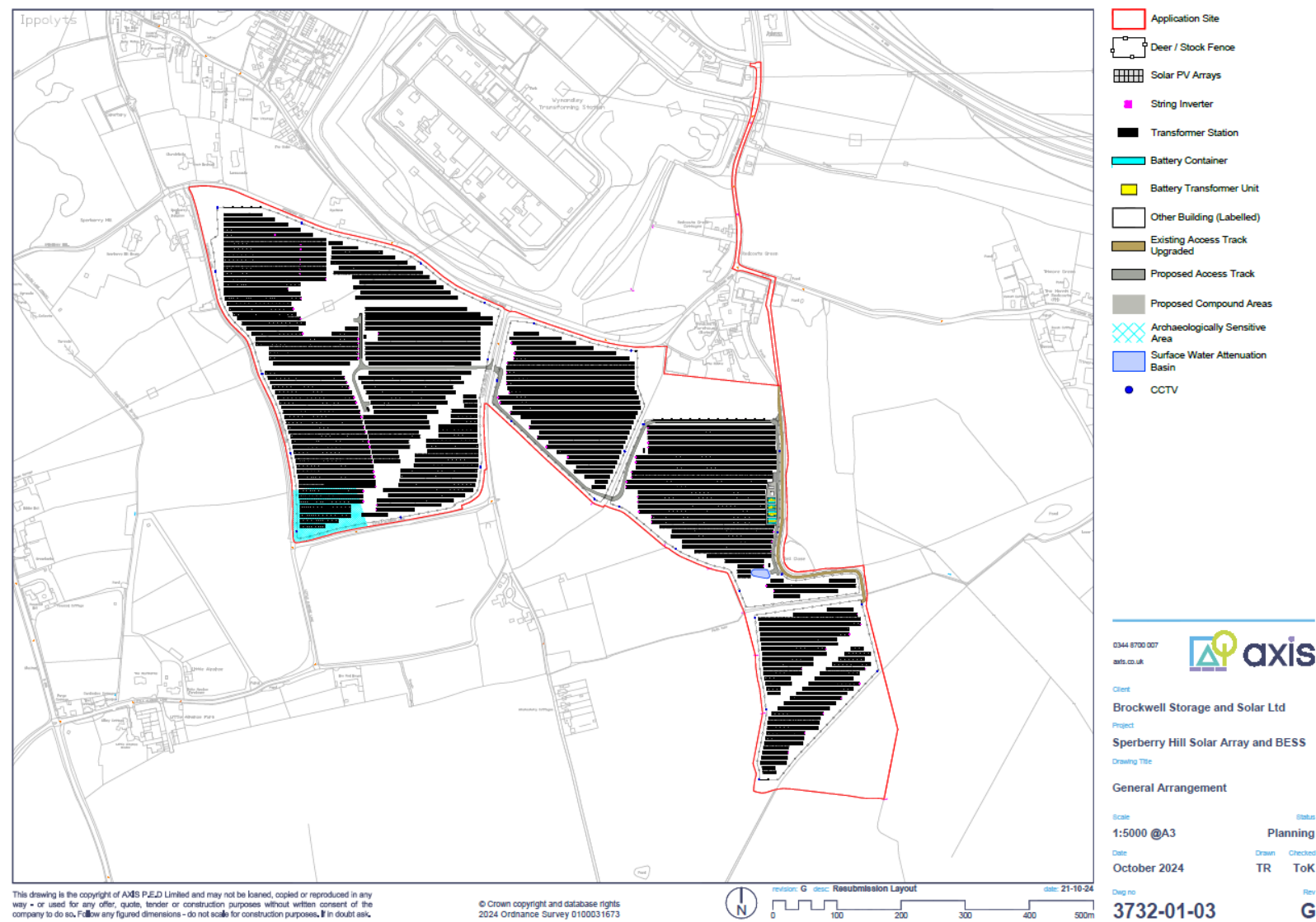


Figure 2: Site Layout



Appendix 1

BASIC ACOUSTIC TERMINOLOGY

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air.

Sound Pressure Level is a measurement of the size of these pressure fluctuations. It is expressed in decibels (dB) on a logarithmic scale. Each 3 dB increase in sound pressure level represents a doubling of the sound energy. The threshold of hearing is approximately 0 dB.

The rate at which the pressure fluctuations occur determines the pitch or frequency of the sound. The frequency is expressed in Hertz (Hz), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hz to 20,000 Hz. Although sound can be of one discrete frequency - a 'pure tone' - most noises are made up of many different frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same 'subjective' way. This is the basis of the A-weighted sound level dB(A), normally used to assess the effect of noise on people. The dB(A) weighting emphasises or reduces the importance of certain frequencies within the audible range.

Noise Measurement

The measurement of sound pressure level is only really meaningful where the level of noise is constant. In the typical industrial environment noise levels can vary widely and sometimes short duration high levels of noise are interspersed with periods of relative quiet. The most widely used means of 'averaging' the noise over a period of time is the Equivalent Continuous Sound Level. Normally written as L_{Aeq} this value takes into account both the level of noise and the length of time over which it occurs. There are many meters available which are capable of measuring L_{Aeq} by electronic integration over the measurement period.

The L_{Aeq} or A-weighted equivalent continuous noise level is a measure of the total noise energy over a stated time period and includes all the varying noise levels and re-expresses as an 'average', allowing for the length of time for which each noise level was presented.

The L_{An} parameters are defined as the noise levels which are exceeded for n% of the monitoring period, thus, for example, the L_{A90} parameter is the noise level exceeded for 90% of the 15 minute period, i.e. 13.5 minutes. The L_{A50} parameter is the noise level exceeded for 50% of the hourly period, i.e. 30 minutes, etc. The L_{max} parameter is the maximum RMS A-weighted noise level occurring during the measurement period.

The definition in layman's terms is given below for terminology used in the measurement and results obtained during the survey work.

A-weighting: Normal hearing covers the frequency (pitch) range from about 20Hz to 20,000 Hz but sensitivity of the ear is greatest between about 500Hz and 5000Hz. The "A-weighting" is an electrical circuit built into noise meters to mimic this characteristic of the human ear.

Ambient noise: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Attenuation: Noise reduction

Background noise: The general quiet periods of ambient noise when the noise source under investigation is not there.

Decibel (dB): The unit of measurement for sound based on a logarithmic scale. 0dB is the threshold of normal hearing; 140dB is the threshold of pain. A change of 1dB is only detectable under controlled laboratory conditions.

dB(A) [decibel A weighted]: Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) serves to distinguish sounds of different frequency (or pitch) in a similar way to how the human ear responds. Measurements in dB(A) broadly agrees with an individual's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal everyday conditions, and a change of 10dB(A) corresponds roughly to doubling or halving the loudness of sound.

dB(C): [decibel C weighted]: Frequency weighting which does not alter low frequency octave band levels by very much compared to 'A' weighting. Similar to linear reading (i.e. linear does not alter frequency spectra at all)

Frequency (Hz): The number of sound waves to pass a point in one second.

L_{Aeq}: This is a noise index used to describe the "average" level of a noise that varies with time (T). It allows for the different sensitivities of the human ear to different frequencies (pitch), and averages fluctuating noise levels in a manner which correlates well with human perceptions of loudness.

L_{A10,T}: This noise index gives an indication of the upper limit or peak levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 10 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours and the L_{A10} reading was say 60dB, then this means that for 1 hour out of 10 the level went above 60dB.

L_{A90,T}: This noise index gives an indication of the lower limit or levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 90 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours and the L_{A90} reading was say 50dB, then this means that for 9 hours out of 10 the level went above 50dB.

L_{Amax}: This is the highest 'A' weighted noise level recorded during a noise measurement period.

Residual noise: The ambient noise remaining at a given position in a given situation when the noise source under investigation is not there.

Specific noise: The noise source under investigation for assessing the likelihood of complaints

Examples of typical noise levels

Source/Activity	Indicative noise level [dB(A)]
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 350m	35-45
Busy road at 5km	35-45
Car at 65km/h at 100m	55
Busy general office	60
Conversation	60
Truck at 50km/h at 100m	65
City Traffic at 5m	75-85
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

Appendix 2

Baseline Sound Survey Results

Noise Survey Results

Date: Friday 29th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**

Instrumentation: Norsonic 118 Real Time Analyser (31992)

Calibration: 94dB

TABLE 1

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
13:30	15:00	47.5	49.6	41.6	60.1	Local and distant road traffic noise
13:45	15:00	43.6	45.6	40.5	53.5	Occasional aircraft noise
14:00	15:00	45.4	47.4	39.7	56.7	Birdsong
14:15	15:00	44.5	46.5	41.1	50.5	
14:30	15:00	48.0	48.9	41.7	59.7	
14:45	15:00	47.8	49.3	45.8	56.7	
15:00	15:00	48.1	50.2	41.1	61.7	
15:15	15:00	46.9	50.5	40.5	55.1	
15:30	15:00	46.1	47.9	42.0	59.2	
15:45	15:00	47.8	50.4	41.9	60.8	
16:00	15:00	46.6	48.3	41.6	57.9	
16:15	15:00	47.1	48.6	41.3	59.7	
16:30	15:00	46.7	48.2	42.0	58.3	
16:45	15:00	45.3	46.9	41.2	56.3	
17:00	15:00	44.1	45.9	40.4	57.9	
17:15	15:00	45.6	47.9	39.3	57.9	
17:30	15:00	46.5	49.9	40.5	58.2	
17:45	15:00	44.4	46.0	39.9	58.1	
18:00	15:00	44.6	47.7	39.7	54.1	
18:15	15:00	45.2	47.7	40.6	54.3	
18:30	15:00	43.6	45.4	40.4	52.4	
18:45	15:00	45.0	48.0	40.2	56.2	
19:00	15:00	44.8	46.1	39.2	57.6	
19:15	15:00	41.7	44.0	37.6	51.1	
19:30	15:00	40.8	43.9	36.3	48.6	
19:45	15:00	39.5	41.9	35.9	47.4	
20:00	15:00	46.3	50.3	38.5	59.3	
20:15	15:00	41.5	43.9	38.6	47.1	
20:30	15:00	42.5	44.8	39.0	51.2	
20:45	15:00	48.7	44.7	39.2	67.7	
21:00	15:00	41.4	43.5	38.4	50.0	
21:15	15:00	41.8	44.0	38.4	50.0	
21:30	15:00	40.1	42.0	37.9	44.9	
21:45	15:00	41.5	43.6	38.8	48.0	
22:00	15:00	42.6	45.0	39.5	49.1	
22:15	15:00	41.1	43.2	38.5	48.0	
22:30	15:00	42.0	43.8	39.2	47.8	
22:45	15:00	41.6	43.6	38.7	49.5	
Log Average 1330-2300		45.1	47.1	40.3	45-68	
Average 1330-2300		44.4	46.5	39.9	45-68	

Noise Survey Results

Date: Friday 29th - Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**

Instrumentation: Norsonic 118 Real Time Analyser (31992)

Calibration: 94dB

TABLE 2

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	43.0	45.3	39.9	48.1	
23:15	15:00	41.4	43.4	39.1	47.1	
23:30	15:00	42.5	45.0	38.6	50.7	
23:45	15:00	40.5	42.8	37.3	47.1	
00:00	15:00	39.7	41.9	37.0	46.5	
00:15	15:00	39.3	41.3	36.7	46.3	
00:30	15:00	40.5	42.8	37.5	46.7	
00:45	15:00	38.8	40.6	36.4	43.7	
01:00	15:00	38.9	41.0	36.1	46.9	
01:15	15:00	39.2	40.9	37.0	44.6	
01:30	15:00	38.7	40.8	35.6	48.4	
01:45	15:00	38.2	39.9	35.9	44.5	
02:00	15:00	37.7	40.3	33.8	44.2	
02:15	15:00	38.6	41.0	34.9	48.9	
02:30	15:00	40.4	43.2	36.5	47.6	
02:45	15:00	40.8	43.2	37.1	47.5	
03:00	15:00	38.6	40.9	35.1	47.8	
03:15	15:00	40.8	43.5	35.8	49.6	
03:30	15:00	42.4	45.2	38.3	48.9	
03:45	15:00	40.6	43.2	36.7	48.7	
04:00	15:00	41.5	44.1	37.6	49.7	
04:15	15:00	41.7	44.4	37.6	47.7	
04:30	15:00	43.1	45.9	38.7	51.6	
04:45	15:00	46.0	47.9	37.7	59.1	
05:00	15:00	43.9	46.6	40.0	50.0	
05:15	15:00	43.9	46.3	40.2	51.2	
05:30	15:00	42.5	44.8	39.4	48.1	
05:45	15:00	43.6	45.9	40.2	51.6	
06:00	15:00	46.3	48.8	41.9	56.8	
06:15	15:00	47.0	50.0	42.9	56.9	
06:30	15:00	52.9	50.4	43.7	71.3	
06:45	15:00	47.8	50.6	43.4	58.5	
Log Average 2300-0700		43.6	45.2	38.8	44-71	
Average 2300-0700		41.9	44.1	38.1	44-71	
Log Average 1330-2300		45.1	47.1	40.3	45-68	
Log Av. 0500-0600		43.5	45.9	39.9	48-52	

Noise Survey Results

Date: Saturday 30th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**
Instrumentation: Norsonic 118 Real Time Analyser (31992)
Calibration: 94dB

TABLE 3

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	47.1	49.2	44.3	57.2	
07:15	15:00	48.9	51.1	45.0	61.9	
07:30	15:00	49.5	52.3	45.1	57.7	
07:45	15:00	48.0	50.6	44.6	57.4	
08:00	15:00	49.9	52.4	45.8	58.4	
08:15	15:00	51.8	54.3	48.5	57.6	
08:30	15:00	52.0	55.1	46.8	63.4	
08:45	15:00	51.5	54.2	47.3	59.9	
09:00	15:00	50.5	52.3	45.7	62.4	
09:15	15:00	52.8	54.2	50.6	66.9	
09:30	15:00	51.1	52.5	46.0	65.6	
09:45	15:00	51.7	53.5	48.8	64.2	
10:00	15:00	47.9	49.7	44.9	61.4	
10:15	15:00	47.3	49.3	44.8	51.9	
10:30	15:00	46.5	48.9	42.9	54.9	
10:45	15:00	43.7	46.0	39.5	51.2	
11:00	15:00	43.7	45.9	39.8	49.4	
11:15	15:00	44.3	47.2	39.6	49.2	
11:30	15:00	45.2	48.2	40.5	53.4	
11:45	15:00	46.2	48.6	40.7	58.7	
12:00	15:00	43.8	46.3	39.9	54.0	
12:15	15:00	48.8	47.6	37.8	72.2	
12:30	15:00	43.8	45.8	40.5	51.5	
12:45	15:00	43.5	45.3	40.9	50.5	
13:00	15:00	43.8	45.5	41.0	60.2	
13:15	15:00	46.0	48.6	41.7	57.5	
13:30	15:00	47.2	49.8	41.4	60.7	
13:45	15:00	46.7	48.3	44.0	56.9	
14:00	15:00	47.2	48.5	43.0	62.4	
14:15	15:00	45.7	47.7	40.4	56.5	
14:30	15:00	42.7	44.9	38.4	55.1	
14:45	15:00	43.4	45.5	40.1	49.2	
Log Average 0700-1500		48.2	49.4	43.1	49-72	
Average 0700-1500		47.3	49.4	43.1	49-72	

Noise Survey Results

Date: Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**

Instrumentation: Norsonic 118 Real Time Analyser (31992)

Calibration: 94dB

TABLE 4

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	43.9	45.8	41.2	52.7	
15:15	15:00	44.9	46.5	41.3	57.4	
15:30	15:00	46.2	48.1	42.2	56.0	
15:45	15:00	44.0	46.2	40.2	51.4	
16:00	15:00	43.4	45.4	37.5	57.6	
16:15	15:00	47.6	49.1	38.6	61.9	
16:30	15:00	40.9	42.9	37.6	52.7	
16:45	15:00	45.6	46.5	38.9	60.0	
17:00	15:00	42.2	43.7	36.6	60.4	
17:15	15:00	44.8	45.8	37.2	61.6	
17:30	15:00	41.8	44.3	36.0	53.8	
17:45	15:00	41.0	42.9	36.2	54.5	
18:00	15:00	42.4	43.4	36.3	58.5	
18:15	15:00	40.1	43.2	35.7	47.6	
18:30	15:00	39.5	42.2	34.3	47.9	
18:45	15:00	41.7	44.0	36.3	53.2	
19:00	15:00	41.9	43.1	35.4	54.0	
19:15	15:00	42.1	44.1	34.2	55.2	
19:30	15:00	39.4	41.9	34.9	51.0	
19:45	15:00	40.6	42.8	35.6	55.6	
20:00	15:00	45.5	46.4	36.2	59.4	
20:15	15:00	40.2	43.2	35.1	48.2	
20:30	15:00	40.5	43.4	34.9	49.3	
20:45	15:00	39.8	42.6	34.0	49.2	
21:00	15:00	47.0	43.7	33.7	66.3	
21:15	15:00	38.1	41.0	33.9	46.5	
21:30	15:00	37.7	40.7	33.8	45.2	
21:45	15:00	42.0	43.8	36.1	53.5	
22:00	15:00	38.5	40.9	35.5	47.0	
22:15	15:00	39.6	42.4	35.2	49.4	
22:30	15:00	39.9	42.6	35.3	49.4	
22:45	15:00	36.7	39.1	33.4	43.1	
Log Average 1500-2300		42.7	44.3	37.0	43-66	
Average 1500-2300		41.9	43.8	36.4	43-66	

Noise Survey Results

Date: Saturday 30th - Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**

Instrumentation: Norsonic 118 Real Time Analyser (31992)

Calibration: 94dB

TABLE 5

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	38.7	41.9	33.4	47.9	
23:15	15:00	38.3	40.8	34.9	49.0	
23:30	15:00	38.7	42.1	33.3	46.2	
23:45	15:00	38.2	41.4	33.3	49.8	
00:00	15:00	36.3	38.8	33.0	43.3	
00:15	15:00	37.0	39.3	33.1	46.6	
00:30	15:00	35.7	37.5	33.4	41.5	
00:45	15:00	36.1	38.8	31.9	44.0	
01:00	15:00	34.5	36.3	31.0	43.4	
01:15	15:00	36.9	39.8	32.2	45.4	
01:30	15:00	34.2	36.4	31.1	41.7	
01:45	15:00	35.0	37.3	31.9	42.5	
02:00	15:00	36.7	39.5	32.4	46.5	
02:15	15:00	35.0	37.2	31.9	41.0	
02:30	15:00	34.3	36.3	31.8	40.3	
02:45	15:00	36.8	39.2	33.5	47.2	
03:00	15:00	36.8	39.2	33.1	44.1	
03:15	15:00	36.8	38.6	34.3	47.1	
03:30	15:00	35.7	37.8	32.7	42.5	
03:45	15:00	37.1	39.1	34.4	46.9	
04:00	15:00	38.1	40.7	34.4	45.8	
04:15	15:00	41.0	43.8	37.0	47.3	
04:30	15:00	42.0	44.8	37.8	49.6	
04:45	15:00	44.4	47.1	40.0	51.0	
05:00	15:00	44.9	47.6	40.1	53.3	
05:15	15:00	45.1	47.9	40.0	55.0	
05:30	15:00	43.9	46.7	39.5	53.4	
05:45	15:00	47.7	50.5	43.3	54.0	
06:00	15:00	50.1	53.2	44.5	56.6	
06:15	15:00	47.1	50.1	42.5	54.6	
06:30	15:00	51.0	54.3	45.5	60.2	
06:45	15:00	51.3	54.0	47.0	57.7	
Log Average 2300-0700		43.4	46.3	38.8	40-60	
Average 2300-0700		39.9	42.4	35.9	40-60	
Average 0700-2300		46.3	48.3	42.1	43-72	

Log Av. 0500-0600	45.6	48.4	41	53-55
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Noise Survey Results

Date: Sunday 31st October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**
Instrumentation: Norsonic 118 Real Time Analyser (31992)
Calibration: 94dB

TABLE 6

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	52.4	55.1	48.0	60.5	
07:15	15:00	54.7	57.5	49.9	63.1	
07:30	15:00	55.3	58.3	49.5	66.4	
07:45	15:00	56.1	59.1	49.9	67.5	
08:00	15:00	55.1	58.1	49.8	65.3	
08:15	15:00	56.0	58.9	50.8	64.1	Rain
08:30	15:00	58.9	62.1	53.3	65.9	Rain
08:45	15:00	58.8	62.2	52.8	67.3	Rain
09:00	15:00	59.9	62.8	54.3	69.4	Rain
09:15	15:00	59.9	62.5	55.1	68.9	Rain
09:30	15:00	59.0	61.9	54.1	67.4	Rain
09:45	15:00	58.3	61.5	52.0	68.3	Rain
10:00	15:00	60.2	63.1	55.1	68.4	Rain
10:15	15:00	64.0	67.2	57.3	74.6	Rain
10:30	15:00	62.9	66.6	56.6	73.6	Rain
10:45	15:00	60.7	64.0	54.8	72.1	Rain
11:00	15:00	59.2	61.8	54.9	70.6	Rain or high wind speeds
11:15	15:00	58.8	61.7	54.3	64.9	Rain or high wind speeds
11:30	15:00	55.0	58.0	51.3	60.6	Rain or high wind speeds
11:45	15:00	56.2	58.9	50.7	65.0	Rain or high wind speeds
12:00	15:00	51.5	54.5	46.9	58.6	Rain or high wind speeds
12:15	15:00	49.7	52.5	45.6	55.4	Rain or high wind speeds
12:30	15:00	50.3	53.0	44.8	56.8	Rain or high wind speeds
12:45	15:00	50.4	54.5	43.0	58.3	Rain or high wind speeds
13:00	15:00	49.9	53.4	44.4	56.4	Rain or high wind speeds
13:15	15:00	50.5	53.3	46.5	57.3	Rain or high wind speeds
13:30	15:00	51.4	54.4	47.0	57.4	Rain or high wind speeds
13:45	15:00	51.9	54.3	47.8	58.2	Rain or high wind speeds
14:00	15:00	50.4	52.7	46.6	60.1	Rain or high wind speeds
14:15	15:00	48.2	50.8	44.4	61.0	Rain or high wind speeds
14:30	15:00	49.8	52.5	44.8	58.5	Rain or high wind speeds
14:45	15:00	53.9	56.6	49.0	63.8	Rain or high wind speeds
Log Average 0700-1500		57.3	60.4	51.8	55-75	
Average 0700-1500		55.3	58.2	50.2	55-75	
Log Average 0700-0815		54.8	57.8	49.4	61-68	No Rain or high wind speeds

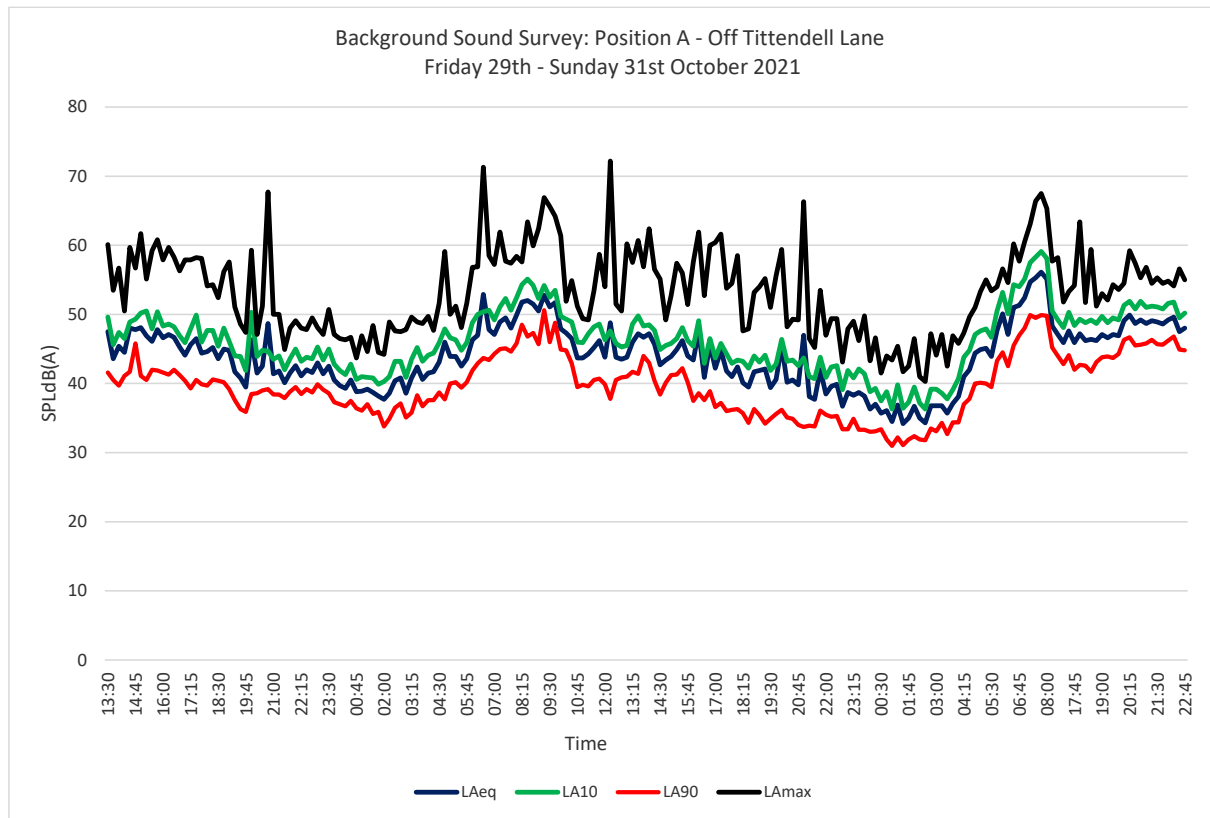
Noise Survey Results

Date: Sunday 31st October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position A - Off Tittendell Lane**
Instrumentation: Norsonic 118 Real Time Analyser (31992)
Calibration: 94dB

TABLE 7

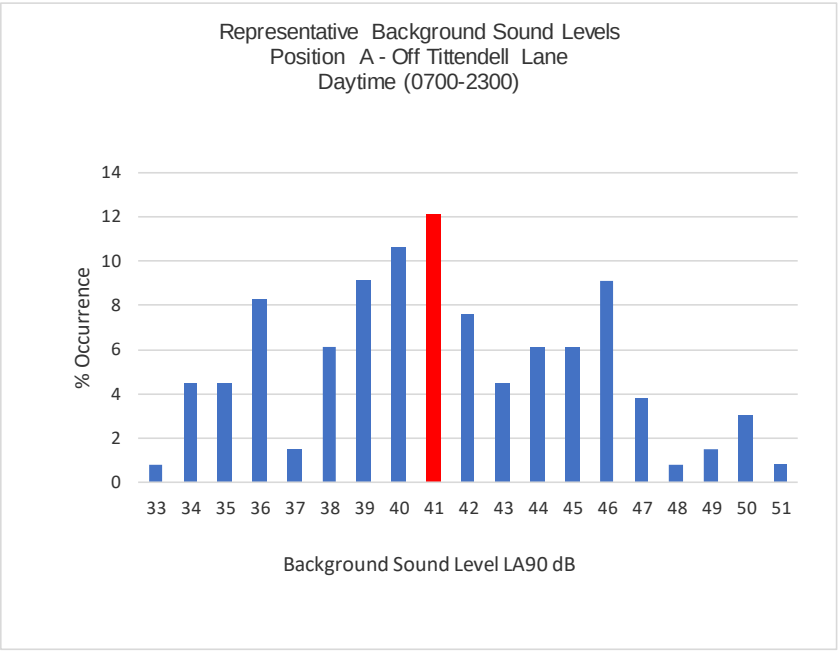
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	50.0	52.0	46.8	60.5	Rain or high wind speeds
15:15	15:00	51.3	53.6	47.4	58.5	Rain or high wind speeds
15:30	15:00	51.7	54.4	48.1	58.6	Rain or high wind speeds
15:45	15:00	51.2	53.4	47.6	63.9	Rain or high wind speeds
16:00	15:00	50.7	51.7	44.7	67.9	Rain or high wind speeds
16:15	15:00	49.5	52.1	45.1	59.6	Rain or high wind speeds
16:30	15:00	49.0	51.0	45.1	62.1	Rain or high wind speeds
16:45	15:00	48.3	50.5	45.2	57.7	
17:00	15:00	47.1	49.2	44.0	58.2	
17:15	15:00	45.9	48.1	42.8	51.8	
17:30	15:00	47.6	50.3	44.1	53.3	
17:45	15:00	45.9	48.4	42.0	54.2	
18:00	15:00	47.2	49.3	42.7	63.4	
18:15	15:00	46.2	48.8	42.6	51.7	
18:30	15:00	46.4	49.2	41.7	59.4	
18:45	15:00	46.2	48.7	43.1	51.2	
19:00	15:00	47.1	49.7	43.8	53.0	
19:15	15:00	46.6	48.8	43.9	52.1	
19:30	15:00	47.1	49.5	43.7	54.3	
19:45	15:00	46.9	49.2	44.3	53.6	
20:00	15:00	49.1	51.3	46.3	54.5	
20:15	15:00	49.9	51.9	46.7	59.2	
20:30	15:00	48.7	50.8	45.5	57.4	
20:45	15:00	49.2	51.9	45.6	55.3	
21:00	15:00	48.7	51.0	45.8	56.8	
21:15	15:00	49.1	51.2	46.3	54.5	
21:30	15:00	48.9	51.1	45.7	55.3	
21:45	15:00	48.6	50.8	45.6	54.5	
22:00	15:00	49.2	51.6	46.2	54.8	
22:15	15:00	49.6	51.8	46.8	54.1	
22:30	15:00	47.5	49.5	44.9	56.6	
22:45	15:00	48.0	50.2	44.8	55.0	
Log Average 1500-2300		48.6	50.9	45.2	51-68	
Average 1500-2300		48.4	50.7	45.0	51-68	
Log Average 1645-2300		47.9	50.2	44.8	51-63	No Rain or high wind speeds

Overall Log Average	43.5	45.8	38.8	38-62	No Rain or high wind speeds
Overall Log Average	47.1	49.4	42.8	43-76	No Rain or high wind speeds

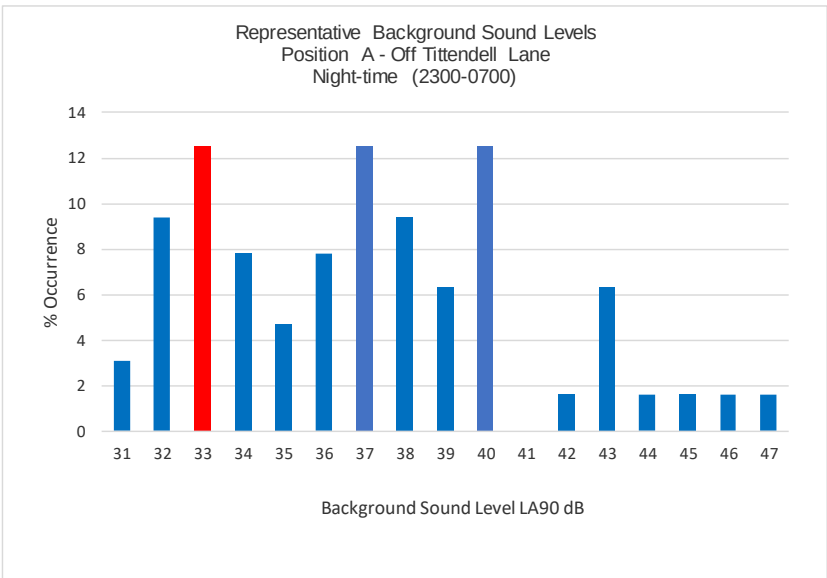


LA90 Representative Levels

LA90	% Occurrence
33	0.8
34	4.5
35	4.5
36	8.3
37	1.5
38	6.1
39	9.1
40	10.6
41	12.1
42	7.6
43	4.5
44	6.1
45	6.1
46	9.1
47	3.8
48	0.8
49	1.5
50	3
51	0.8



LA90	% Occurrence
31	3.1
32	9.4
33	12.5
34	7.8
35	4.7
36	7.8
37	12.5
38	9.4
39	6.3
40	12.5
41	0
42	1.6
43	6.3
44	1.6
45	1.6
46	1.6
47	1.6



Noise Survey Results

Date: Friday 29th October 2021

TABLE 8

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
13:30	15:00	52.7	56.3	42.7	67.6	Local and distant road traffic noise Occasional aircraft noise Birdsong
13:45	15:00	59.9	65.1	42.6	72.1	
14:00	15:00	50.1	52.1	39.8	69.2	
14:15	15:00	51.3	52.8	42.7	68.0	
14:30	15:00	50.0	53.0	42.5	62.5	
14:45	15:00	52.1	56.0	42.4	68.4	
15:00	15:00	52.2	55.9	42.7	68.5	
15:15	15:00	53.0	54.9	45.6	73.3	
15:30	15:00	51.8	55.3	42.5	67.3	
15:45	15:00	53.7	58.1	41.6	69.8	
16:00	15:00	53.2	57.1	43.1	68.2	
16:15	15:00	58.3	62.7	47.5	69.8	
16:30	15:00	52.8	57.2	41.8	69.5	
16:45	15:00	54.2	57.6	43.0	73.9	
17:00	15:00	55.9	59.4	41.7	74.2	
17:15	15:00	56.6	59.0	40.7	74.5	
17:30	15:00	59.0	64.3	42.7	71.6	
17:45	15:00	52.2	54.8	40.7	71.5	
18:00	15:00	51.5	54.6	41.0	65.8	
18:15	15:00	50.4	54.1	42.0	67.0	
18:30	15:00	51.8	51.5	41.2	74.3	
18:45	15:00	49.9	51.5	41.0	68.5	
19:00	15:00	50.4	52.8	41.0	65.3	
19:15	15:00	47.7	49.5	39.0	65.5	
19:30	15:00	45.8	44.4	38.0	65.6	
19:45	15:00	43.7	43.1	37.3	62.8	
20:00	15:00	49.8	53.8	39.9	65.2	
20:15	15:00	44.8	44.7	39.8	62.1	
20:30	15:00	46.7	48.4	40.6	63.2	
20:45	15:00	50.5	50.2	40.8	68.4	
21:00	15:00	44.2	45.7	39.5	61.9	
21:15	15:00	43.4	44.9	38.8	63.8	
21:30	15:00	42.9	43.8	39.5	62.7	
21:45	15:00	43.6	45.0	40.4	61.3	
22:00	15:00	48.3	48.9	40.8	66.2	
22:15	15:00	43.9	44.8	39.8	63.4	
22:30	15:00	45.2	46.0	40.1	63.8	
22:45	15:00	44.3	45.4	40.3	63.0	
Log Average 1330-2300		52.5	56.3	41.7	61-75	
Average 1330-2300		50.2	52.5	41.2	61-75	

Noise Survey Results

Date: Friday 29th - Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

TABLE 9

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	47.3	48.3	41.1	63.0	
23:15	15:00	44.3	44.5	39.7	64.2	
23:30	15:00	46.6	47.6	40.2	64.7	
23:45	15:00	43.3	44.8	38.0	60.8	
00:00	15:00	40.1	42.2	37.4	47.4	
00:15	15:00	42.5	43.1	38.1	60.3	
00:30	15:00	42.2	42.4	37.6	62.4	
00:45	15:00	41.3	41.2	36.0	64.1	
01:00	15:00	42.7	42.4	35.9	63.9	
01:15	15:00	41.0	41.0	35.8	62.2	
01:30	15:00	39.3	42.0	35.5	47.6	
01:45	15:00	37.9	39.9	35.1	46.6	
02:00	15:00	38.1	40.9	34.5	45.3	
02:15	15:00	37.7	39.9	34.5	48.4	
02:30	15:00	37.3	39.5	34.5	48.4	
02:45	15:00	40.6	40.3	34.2	62.9	
03:00	15:00	37.3	39.7	33.0	45.9	
03:15	15:00	39.4	41.2	36.9	45.8	
03:30	15:00	38.6	40.3	36.3	44.4	
03:45	15:00	39.0	41.2	36.3	54.8	
04:00	15:00	38.6	40.3	36.3	47.4	
04:15	15:00	39.5	41.3	36.9	52.5	
04:30	15:00	42.6	42.0	37.4	65.6	
04:45	15:00	46.8	46.7	37.1	63.0	
05:00	15:00	40.7	42.1	38.9	48.4	
05:15	15:00	41.5	42.9	39.5	47.1	
05:30	15:00	41.9	43.4	39.9	48.1	
05:45	15:00	42.4	44.0	40.3	54.6	
06:00	15:00	46.9	48.8	41.5	62.1	
06:15	15:00	48.0	50.4	43.0	62.8	
06:30	15:00	54.4	51.6	44.2	75.8	
06:45	15:00	48.7	51.7	43.5	65.8	
Log Average 2300-0700		44.5	45.1	38.7	44-76	
Average 2300-0700		42.1	43.4	37.8	44-76	
Log Average 1330-2300		52.5	56.3	41.7	61-75	

Log Av. 0500-0600	41.6	43.1	39.6	47-55
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Noise Survey Results

Date: Saturday 30th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**
Instrumentation: Norsonic 140 Real Time Analyser (1405418)
Calibration: 94dB

TABLE 10

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	50.2	50.9	43.7	70.9	
07:15	15:00	51.3	53.9	45.1	69.6	
07:30	15:00	56.7	53.9	45.3	84.5	
07:45	15:00	50.8	53.8	45.1	66.3	
08:00	15:00	51.0	52.6	45.9	68.1	
08:15	15:00	54.0	55.5	46.9	73.6	
08:30	15:00	55.0	56.9	46.2	74.7	
08:45	15:00	51.2	53.5	46.1	70.6	
09:00	15:00	50.6	51.3	44.7	75.5	
09:15	15:00	50.8	52.1	44.2	74.5	
09:30	15:00	51.7	53.4	45.5	70.7	
09:45	15:00	52.5	55.2	46.4	63.7	
10:00	15:00	52.3	54.3	42.8	70.0	
10:15	15:00	51.6	53.4	43.4	66.7	
10:30	15:00	50.3	52.4	42.3	66.3	
10:45	15:00	51.7	54.7	40.2	71.0	
11:00	15:00	52.5	52.6	40.5	73.0	
11:15	15:00	51.5	54.3	42.0	67.1	
11:30	15:00	53.0	55.2	42.5	72.3	
11:45	15:00	48.9	50.1	40.8	67.5	
12:00	15:00	50.0	51.3	41.1	67.6	
12:15	15:00	48.7	50.5	39.0	65.0	
12:30	15:00	49.9	49.4	39.2	72.7	
12:45	15:00	49.9	52.9	39.1	66.5	
13:00	15:00	52.8	55.6	46.8	70.0	
13:15	15:00	51.5	54.5	41.5	68.4	
13:30	15:00	50.4	54.4	39.0	66.0	
13:45	15:00	49.7	50.6	41.3	67.7	
14:00	15:00	49.1	51.2	39.4	63.5	
14:15	15:00	50.6	53.8	38.1	64.6	
14:30	15:00	49.4	52.1	40.3	63.1	
14:45	15:00	50.3	53.2	41.9	64.1	
Log Average 0700-1500		51.6	53.1	42.7	63-85	
Average 0700-1500		51.2	53.1	42.7	63-85	

Noise Survey Results

Date: Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

TABLE 11

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	47.6	49.2	38.4	64.9	
15:15	15:00	49.0	51.5	38.7	67.0	
15:30	15:00	50.1	53.1	41.8	65.7	
15:45	15:00	50.6	53.4	39.9	68.8	
16:00	15:00	48.7	52.5	38.8	63.6	
16:15	15:00	51.4	54.6	43.7	65.6	
16:30	15:00	48.3	50.5	40.3	65.5	
16:45	15:00	51.1	53.8	41.6	66.9	
17:00	15:00	51.7	53.5	41.6	73.0	
17:15	15:00	52.3	54.6	38.0	74.3	
17:30	15:00	50.2	53.5	39.1	62.7	
17:45	15:00	49.5	51.4	40.4	66.8	
18:00	15:00	48.5	48.8	37.3	71.6	
18:15	15:00	47.8	48.0	35.6	66.9	
18:30	15:00	46.7	48.0	36.7	63.1	
18:45	15:00	45.8	47.8	37.3	64.5	
19:00	15:00	47.6	50.5	36.4	69.3	
19:15	15:00	47.2	50.1	35.8	64.2	
19:30	15:00	44.6	44.0	36.1	65.0	
19:45	15:00	39.3	41.1	36.1	53.0	
20:00	15:00	47.8	49.2	37.7	63.5	
20:15	15:00	45.8	45.9	36.8	65.3	
20:30	15:00	45.3	46.7	37.7	63.8	
20:45	15:00	43.1	44.5	36.3	61.1	
21:00	15:00	46.8	47.1	36.4	66.9	
21:15	15:00	47.1	43.0	35.8	76.1	
21:30	15:00	41.5	42.5	36.6	62.8	
21:45	15:00	44.9	47.7	38.1	60.4	
22:00	15:00	40.1	42.0	37.7	54.0	
22:15	15:00	44.9	45.3	38.0	64.3	
22:30	15:00	41.3	44.4	37.3	52.3	
22:45	15:00	39.6	40.1	35.6	59.9	
Log Average 1500-2300		47.9	50.1	38.6	52-76	
Average 1500-2300		46.8	48.4	38.1	52-76	

Noise Survey Results

Date: Saturday 30th - Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

TABLE 12

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	43.8	45.6	36.2	63.3	
23:15	15:00	43.2	42.8	36.6	64.1	
23:30	15:00	42.7	43.9	36.1	63.3	
23:45	15:00	42.5	43.5	35.4	63.5	
00:00	15:00	40.5	40.0	35.3	63.0	
00:15	15:00	43.5	44.0	35.8	62.5	
00:30	15:00	38.0	40.0	35.5	45.6	
00:45	15:00	38.7	40.9	35.1	46.9	
01:00	15:00	38.2	40.8	33.8	49.3	
01:15	15:00	42.8	43.3	34.3	64.2	
01:30	15:00	36.4	38.7	33.2	45.8	
01:45	15:00	37.1	39.1	34.1	49.5	
02:00	15:00	38.8	41.1	34.5	51.8	
02:15	15:00	37.3	39.4	34.0	46.8	
02:30	15:00	35.7	37.7	32.7	44.1	
02:45	15:00	39.0	41.1	33.7	55.9	
03:00	15:00	37.0	39.5	33.3	44.5	
03:15	15:00	36.9	39.0	33.9	48.2	
03:30	15:00	35.6	37.4	33.0	43.6	
03:45	15:00	36.9	39.0	33.8	44.3	
04:00	15:00	36.1	37.8	33.9	43.5	
04:15	15:00	37.1	39.1	34.2	44.5	
04:30	15:00	37.2	38.9	34.8	48.0	
04:45	15:00	38.2	39.8	35.9	44.8	
05:00	15:00	38.5	40.5	35.7	45.2	
05:15	15:00	39.4	41.1	37.1	46.6	
05:30	15:00	40.2	41.8	38.0	48.6	
05:45	15:00	41.2	42.8	39.4	46.6	
06:00	15:00	43.0	44.6	40.7	48.6	
06:15	15:00	42.3	43.7	40.6	48.6	
06:30	15:00	43.7	45.0	42.0	48.1	
06:45	15:00	46.9	48.4	42.6	71.0	
Log Average 2300-0700		40.7	42.1	36.7	44-71	
Average 2300-0700		39.6	41.3	35.8	44-71	
Average 0700-2300		50.1	52.1	41.6	52-85	

Log Av. 0500-0600	39.9	41.6	37.7	45-49
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Noise Survey Results

Date: Sunday 31st October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**
Instrumentation: Norsonic 140 Real Time Analyser (1405418)
Calibration: 94dB

TABLE 13

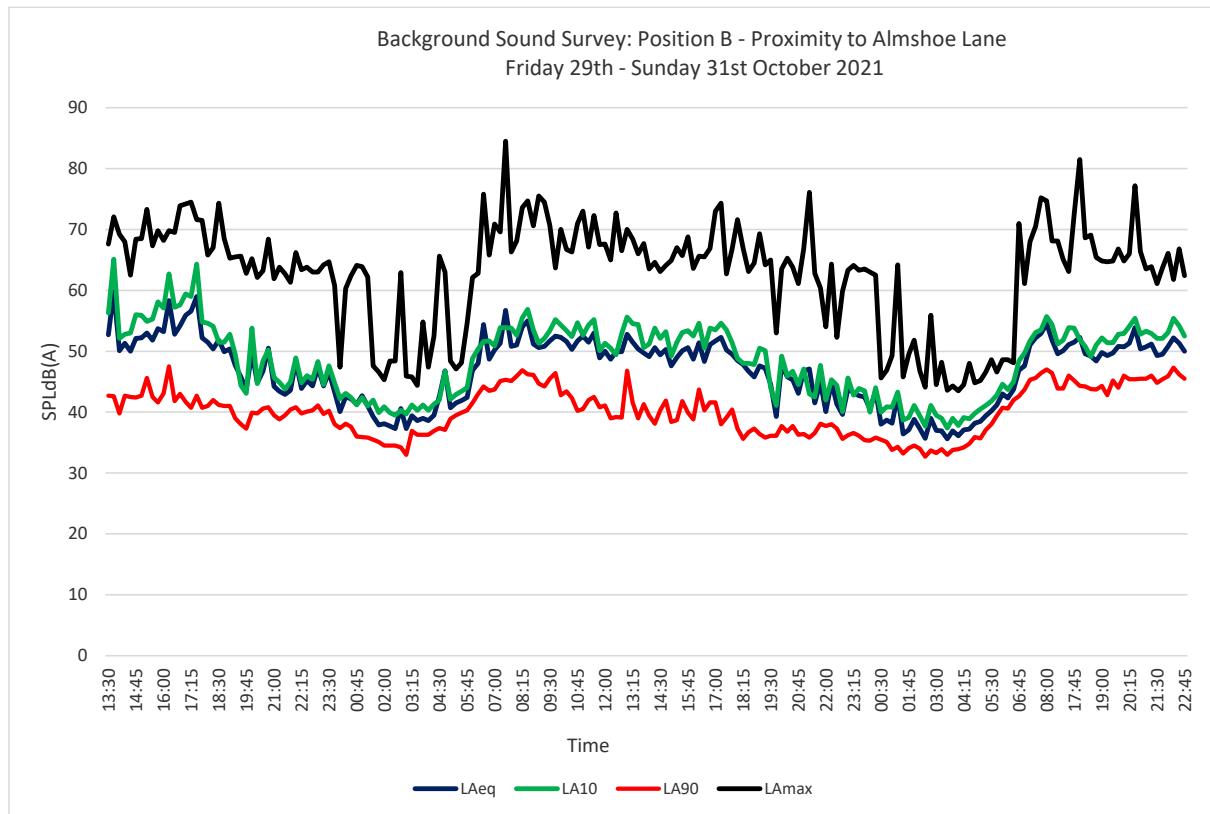
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	47.6	49.7	43.7	61.1	
07:15	15:00	51.0	51.7	45.3	68.0	
07:30	15:00	52.2	53.1	45.6	70.5	
07:45	15:00	52.9	53.5	46.4	75.2	
08:00	15:00	54.5	55.7	47.0	74.7	
08:15	15:00	50.7	52.7	46.8	63.5	Rain
08:30	15:00	52.1	54.6	48.5	67.2	Rain
08:45	15:00	52.0	53.0	49.1	70.5	Rain
09:00	15:00	54.5	56.6	50.0	72.8	Rain
09:15	15:00	54.2	56.1	51.0	70.9	Rain
09:30	15:00	55.0	57.1	50.8	68.0	Rain
09:45	15:00	55.7	57.5	48.5	76.7	Rain
10:00	15:00	54.7	57.4	50.2	69.5	Rain
10:15	15:00	55.9	58.2	51.9	68.1	Rain
10:30	15:00	55.5	57.7	52.5	65.8	Rain
10:45	15:00	55.7	57.9	52.7	65.8	Rain
11:00	15:00	57.1	59.7	51.7	72.2	Rain or high wind speeds
11:15	15:00	58.1	61.6	52.3	69.4	Rain or high wind speeds
11:30	15:00	55.4	57.9	50.6	70.8	Rain or high wind speeds
11:45	15:00	58.6	62.0	52.1	67.5	Rain or high wind speeds
12:00	15:00	55.1	57.3	51.0	65.0	Rain or high wind speeds
12:15	15:00	56.9	58.6	54.1	68.8	Rain or high wind speeds
12:30	15:00	59.9	62.3	57.8	66.2	Rain or high wind speeds
12:45	15:00	50.2	58.0	32.2	62.0	Rain or high wind speeds
13:00	15:00	32.4	32.7	32.1	33.2	Rain or high wind speeds
13:15	15:00	32.7	33.0	32.4	34.5	Rain or high wind speeds
13:30	15:00	62.2	67.6	33.2	69.4	Rain or high wind speeds
13:45	15:00	58.9	62.3	50.6	72.5	Rain or high wind speeds
14:00	15:00	53.0	55.6	47.2	66.8	Rain or high wind speeds
14:15	15:00	52.4	54.5	46.6	65.4	Rain or high wind speeds
14:30	15:00	53.3	55.6	47.1	66.3	Rain or high wind speeds
14:45	15:00	55.9	59.6	48.4	70.2	Rain or high wind speeds
Log Average 0700-1500		55.5	58.6	50.1	33-77	
Average 0700-1500		53.3	55.7	47.5	33-77	
Log Average 0700-0815		52.1	53.1	45.7	61-75	No Rain or high winds

Noise Survey Results

Date: Sunday 31st October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position B - Proximity to Little Almshoe Lane**
Instrumentation: Norsonic 140 Real Time Analyser (1405418)
Calibration: 94dB

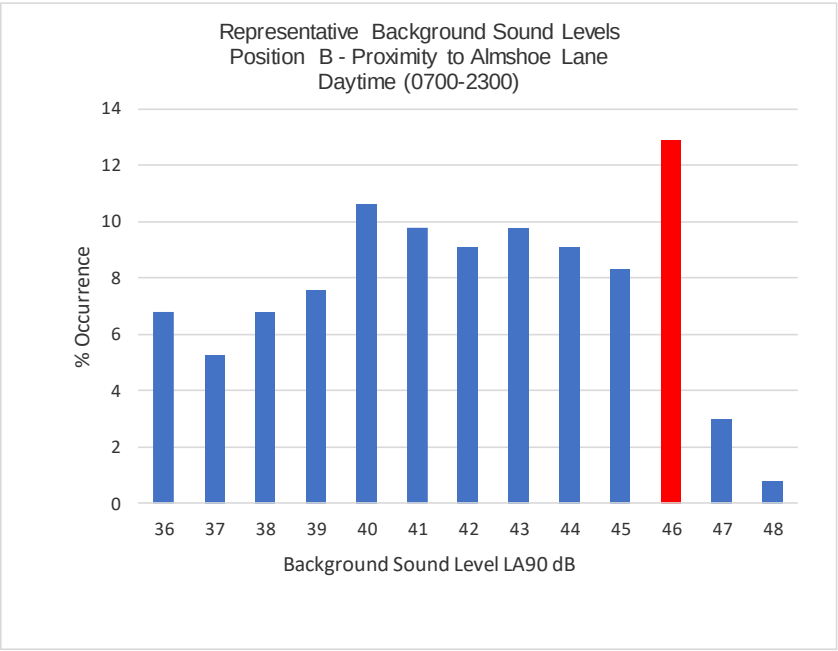
TABLE 14

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	56.4	59.8	47.6	75.5	Rain or high wind speeds
15:15	15:00	55.0	58.3	48.7	63.5	Rain or high wind speeds
15:30	15:00	53.5	56.6	48.2	64.3	Rain or high wind speeds
15:45	15:00	54.4	57.4	49.0	64.2	Rain or high wind speeds
16:00	15:00	51.5	54.7	44.2	67.2	Rain or high wind speeds
16:15	15:00	54.6	57.6	47.6	69.4	Rain or high wind speeds
16:30	15:00	51.3	53.5	46.4	63.9	Rain or high wind speeds
16:45	15:00	51.8	54.4	46.4	68.1	
17:00	15:00	49.6	51.2	43.9	68.1	
17:15	15:00	50.1	51.8	43.9	65.1	
17:30	15:00	51.1	53.9	46.0	63.1	
17:45	15:00	51.5	53.8	45.2	72.4	
18:00	15:00	52.3	51.9	44.3	81.5	
18:15	15:00	49.6	50.8	44.2	68.6	
18:30	15:00	49.2	49.1	43.8	69.1	
18:45	15:00	48.4	51.0	43.7	65.4	
19:00	15:00	49.8	52.2	44.3	64.8	
19:15	15:00	49.3	51.4	42.8	64.7	
19:30	15:00	49.7	51.4	45.2	64.8	
19:45	15:00	50.8	52.8	44.0	66.8	
20:00	15:00	50.7	52.9	46.0	64.8	
20:15	15:00	51.3	54.1	45.4	66.0	
20:30	15:00	53.9	55.4	45.4	77.2	
20:45	15:00	50.4	52.8	45.5	66.4	
21:00	15:00	50.7	53.3	45.5	63.5	
21:15	15:00	51.2	52.9	46.0	63.9	
21:30	15:00	49.3	52.1	44.8	61.1	
21:45	15:00	49.5	52.1	45.4	63.7	
22:00	15:00	50.8	53.1	45.9	66.1	
22:15	15:00	52.2	55.4	47.3	61.8	
22:30	15:00	51.3	54.2	46.2	66.8	
22:45	15:00	50.0	52.5	45.5	62.4	
Log Average 1500-2300		51.7	54.2	45.8	61-82	
Average 1500-2300		51.3	53.6	45.6	61-82	
Log Average 1645-2300		50.7	52.8	45.1	61-82	No Rain or high winds
Overall Log Average		43.0	43.8	37.8	44-76	No Rain or high winds
Overall Log Average		51.0	53.7	42.6	52-85	No Rain or high winds

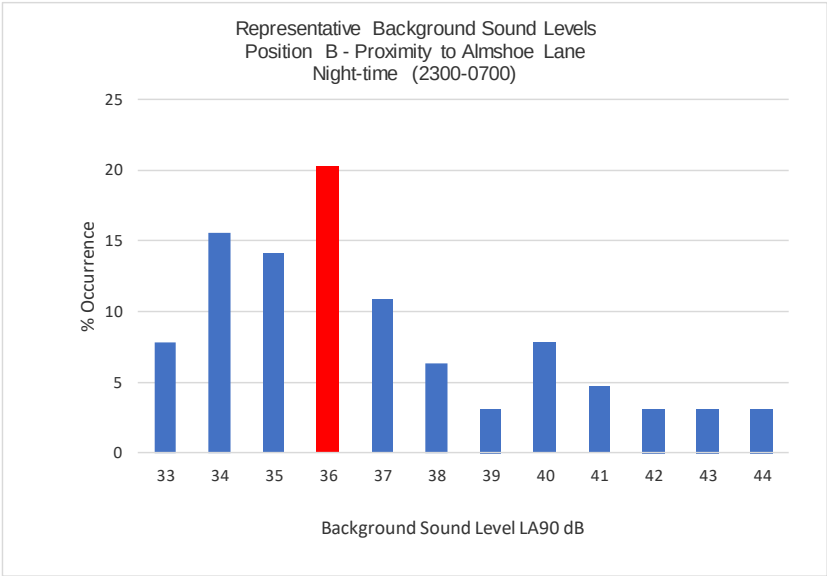


LA90 Representative Levels

LA90	% Occurrence
36	6.8
37	5.3
38	6.8
39	7.6
40	10.6
41	9.8
42	9.1
43	9.8
44	9.1
45	8.3
46	12.9
47	3.0
48	0.8



LA90	% Occurrence
33	7.8
34	15.6
35	14.1
36	20.3
37	10.9
38	6.3
39	3.1
40	7.8
41	4.7
42	3.1
43	3.1
44	3.1



Noise Survey Results

Date: Friday 29th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

TABLE 15

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
13:30	15:00	52.5	56.4	43.6	67.4	Local and distant road traffic noise
13:45	15:00	48.3	50.5	43.1	61.9	Occasional aircraft noise
14:00	15:00	47.8	51.1	41.4	62.1	Birdsong
14:15	15:00	50.6	53.7	44.9	60.3	
14:30	15:00	52.1	55.2	45.4	67.3	
14:45	15:00	50.3	53.3	45.1	65.2	
15:00	15:00	52.4	53.7	44.4	72.3	
15:15	15:00	54.3	57.6	47.5	64.1	
15:30	15:00	50.9	54.8	43.9	65.1	
15:45	15:00	50.4	52.7	41.9	68.5	
16:00	15:00	50.0	53.3	41.2	64.6	
16:15	15:00	50.0	52.2	43.9	67.7	
16:30	15:00	49.2	50.5	42.3	64.9	
16:45	15:00	48.1	50.2	42.0	66.8	
17:00	15:00	44.4	46.7	40.9	55.8	
17:15	15:00	47.6	50.8	40.9	66.2	
17:30	15:00	49.4	51.5	41.3	68.3	
17:45	15:00	45.5	47.9	41.1	60.7	
18:00	15:00	47.5	51.5	41.2	61.5	
18:15	15:00	48.1	50.7	42.7	61.5	
18:30	15:00	44.6	46.4	42.4	53.8	
18:45	15:00	48.2	50.8	43.0	61.3	
19:00	15:00	49.3	51.4	43.4	64.3	
19:15	15:00	43.9	47.2	39.5	55.2	
19:30	15:00	42.2	44.6	39.4	53.2	
19:45	15:00	41.5	42.8	38.8	57.2	
20:00	15:00	48.2	51.5	42.0	61.7	
20:15	15:00	43.9	45.5	41.3	53.8	
20:30	15:00	46.0	48.3	42.4	57.2	
20:45	15:00	50.2	48.6	42.9	68.9	
21:00	15:00	45.9	48.2	42.1	64.7	
21:15	15:00	44.8	46.7	41.6	58.9	
21:30	15:00	44.0	45.4	42.1	58.9	
21:45	15:00	45.3	47.1	42.7	53.7	
22:00	15:00	45.5	47.9	42.5	55.9	
22:15	15:00	44.7	46.6	41.7	56.9	
22:30	15:00	45.8	48.1	42.5	55.8	
22:45	15:00	44.8	46.7	41.9	57.4	
Log Average 1330-2300		48.6	51.2	42.7	53-72	
Average 1330-2300		47.6	50.0	42.4	53-72	

Noise Survey Results

Date: Friday 29th - Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

TABLE 16

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	45.8	48.0	42.7	56.2	
23:15	15:00	44.6	46.5	41.3	55.3	
23:30	15:00	46.2	48.7	41.3	59.2	
23:45	15:00	43.7	45.8	38.9	54.9	
00:00	15:00	41.7	43.6	38.9	48.8	
00:15	15:00	43.2	45.2	39.3	53.8	
00:30	15:00	42.7	44.5	39.4	55.1	
00:45	15:00	41.3	43.4	38.7	49.9	
01:00	15:00	42.2	44.4	38.7	52.7	
01:15	15:00	42.2	44.0	39.3	60.2	
01:30	15:00	42.3	44.8	37.9	55.2	
01:45	15:00	40.8	43.1	37.5	53.0	
02:00	15:00	42.8	45.1	39.1	52.8	
02:15	15:00	43.4	45.4	39.4	51.9	
02:30	15:00	43.6	45.8	39.2	53.0	
02:45	15:00	41.9	44.7	37.3	54.6	
03:00	15:00	42.2	44.1	39.4	51.4	
03:15	15:00	43.8	46.0	40.7	50.8	
03:30	15:00	43.1	45.3	39.6	50.5	
03:45	15:00	45.1	47.5	41.5	53.6	
04:00	15:00	43.3	45.9	39.6	49.1	
04:15	15:00	43.4	45.4	40.2	50.8	
04:30	15:00	45.2	47.7	40.9	63.0	
04:45	15:00	49.9	48.7	41.0	68.2	
05:00	15:00	44.5	46.5	42.0	51.1	
05:15	15:00	45.7	47.4	42.8	55.4	
05:30	15:00	45.6	47.5	43.0	54.2	
05:45	15:00	45.8	47.8	42.7	58.7	
06:00	15:00	49.9	51.2	44.7	66.8	
06:15	15:00	50.8	53.3	46.3	66.2	
06:30	15:00	54.0	54.3	46.8	75.6	
06:45	15:00	50.2	52.1	45.9	64.3	
Log Average 2300-0700		46.1	47.7	41.6	49-76	
Average 2300-0700		44.7	46.7	40.8	49-76	
Log Average 1330-2300		48.6	51.2	42.7	53-72	
Log Av. 0500-0600		45.4	47.3	42.6	51-59	

Noise Survey Results

Date: Saturday 30th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**
Instrumentation: Cirrus 171B Real Time Analyser (G056142)
Calibration: 94dB

TABLE 17

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	50.1	52.2	46.3	65.1	
07:15	15:00	51.3	54.1	46.9	64.7	
07:30	15:00	52.7	55.8	47.5	67.5	
07:45	15:00	51.2	53.7	47.1	65.0	
08:00	15:00	51.0	52.3	47.1	65.4	
08:15	15:00	52.4	54.7	48.2	69.2	
08:30	15:00	54.2	56.1	48.0	72.3	
08:45	15:00	52.3	54.9	48.6	65.7	
09:00	15:00	54.5	57.4	49.7	67.8	
09:15	15:00	52.8	55.1	48.9	67.1	
09:30	15:00	58.4	61.5	51.7	67.4	
09:45	15:00	57.8	60.6	52.3	75.0	
10:00	15:00	51.0	54.1	45.7	64.4	
10:15	15:00	53.2	56.3	46.5	63.5	
10:30	15:00	51.3	55.1	43.6	62.9	
10:45	15:00	47.6	50.4	42.6	62.9	
11:00	15:00	46.1	48.7	41.4	62.8	
11:15	15:00	47.8	49.9	42.5	68.6	
11:30	15:00	49.0	51.5	43.2	66.5	
11:45	15:00	48.2	51.1	42.8	66.2	
12:00	15:00	47.4	50.1	42.1	59.8	
12:15	15:00	45.5	47.9	40.5	61.8	
12:30	15:00	47.0	50.3	41.0	61.0	
12:45	15:00	45.9	49.3	40.3	56.5	
13:00	15:00	50.0	52.9	44.3	63.8	
13:15	15:00	49.9	53.3	40.9	64.5	
13:30	15:00	49.0	52.8	39.2	66.9	
13:45	15:00	53.9	53.0	42.1	75.0	
14:00	15:00	47.7	51.3	40.7	58.0	
14:15	15:00	46.2	49.8	35.7	62.5	
14:30	15:00	43.6	46.5	38.3	56.6	
14:45	15:00	47.3	50.5	39.2	58.9	
Log Average 0700-1500		51.6	52.9	44.2	57-75	
Average 0700-1500		50.2	52.9	44.2	57-75	

Noise Survey Results

Date: Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

TABLE 18

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	45.7	48.5	39.4	64.1	
15:15	15:00	46.7	49.7	40.6	64.4	
15:30	15:00	49.3	50.3	39.9	74.0	
15:45	15:00	48.3	51.5	42.2	62.2	
16:00	15:00	46.9	48.9	40.2	63.9	
16:15	15:00	45.4	48.7	38.7	60.1	
16:30	15:00	45.2	48.8	38.7	66.8	
16:45	15:00	48.4	48.8	39.8	67.4	
17:00	15:00	41.4	43.7	38.3	58.3	
17:15	15:00	44.5	47.4	37.2	60.4	
17:30	15:00	43.6	47.0	37.2	60.6	
17:45	15:00	39.8	42.2	36.6	51.9	
18:00	15:00	41.7	45.1	36.0	57.6	
18:15	15:00	44.1	45.1	35.6	69.0	
18:30	15:00	41.2	44.0	37.3	53.3	
18:45	15:00	44.9	46.0	38.4	62.2	
19:00	15:00	45.1	47.1	37.3	61.7	
19:15	15:00	45.5	47.1	37.2	61.6	
19:30	15:00	41.3	43.3	37.8	54.9	
19:45	15:00	41.8	42.5	38.2	59.5	
20:00	15:00	49.6	51.0	39.9	66.2	
20:15	15:00	44.1	47.2	38.9	57.9	
20:30	15:00	44.8	48.1	39.3	57.5	
20:45	15:00	42.8	45.5	38.3	56.4	
21:00	15:00	43.9	45.9	38.6	60.4	
21:15	15:00	41.2	43.6	37.8	54.1	
21:30	15:00	41.1	42.5	37.9	54.4	
21:45	15:00	44.9	45.3	39.6	58.8	
22:00	15:00	42.5	44.0	39.5	58.6	
22:15	15:00	43.7	46.5	39.7	58.0	
22:30	15:00	43.8	46.1	39.6	58.8	
22:45	15:00	40.8	42.6	37.4	54.0	
Log Average 1500-2300		44.9	47.1	38.7	52-74	
Average 1500-2300		44.2	46.4	38.5	52-74	

Noise Survey Results

Date: Saturday 30th - Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

TABLE 19

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	44.0	46.6	37.7	62.9	
23:15	15:00	41.3	43.5	38.3	51.1	
23:30	15:00	42.6	45.6	38.4	54.7	
23:45	15:00	41.8	45.0	37.3	54.3	
00:00	15:00	40.3	42.3	37.5	49.3	
00:15	15:00	41.5	43.6	37.4	54.9	
00:30	15:00	38.9	40.7	36.4	48.0	
00:45	15:00	40.1	43.0	35.7	49.5	
01:00	15:00	39.4	41.5	35.1	51.2	
01:15	15:00	41.3	44.7	35.7	53.6	
01:30	15:00	38.2	40.2	35.4	47.0	
01:45	15:00	38.9	40.9	36.0	48.2	
02:00	15:00	41.5	43.7	36.3	54.0	
02:15	15:00	39.5	42.0	35.0	48.5	
02:30	15:00	38.1	40.3	34.5	48.1	
02:45	15:00	40.7	42.8	36.6	53.4	
03:00	15:00	42.0	44.0	38.3	51.1	
03:15	15:00	41.7	43.6	39.2	48.7	
03:30	15:00	42.5	44.5	39.6	50.5	
03:45	15:00	43.3	45.5	39.3	51.4	
04:00	15:00	43.1	45.3	39.0	50.0	
04:15	15:00	42.0	44.2	39.0	47.8	
04:30	15:00	43.4	45.8	39.2	50.2	
04:45	15:00	45.0	47.6	40.9	52.2	
05:00	15:00	45.3	47.8	41.6	54.0	
05:15	15:00	45.7	47.7	42.3	55.9	
05:30	15:00	48.7	51.5	44.5	57.4	
05:45	15:00	47.8	50.0	44.3	56.2	
06:00	15:00	50.7	53.5	45.5	60.3	
06:15	15:00	49.4	51.7	46.1	58.9	
06:30	15:00	51.0	53.6	47.0	58.2	
06:45	15:00	52.5	55.1	47.6	66.2	
Log Average 2300-0700		45.2	47.7	41.1	47-66	
Average 2300-0700		43.2	45.6	39.3	47-66	
Average 0700-2300		49.5	52.1	43.7	52-75	
Log Av. 0500-0600		47.1	49.5	43.3	54-57	

Noise Survey Results

Date: Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

TABLE 20

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	53.7	56.4	48.8	65.7	
07:15	15:00	54.2	57.2	49.1	66.7	
07:30	15:00	57.4	60.3	51.8	69.6	
07:45	15:00	56.9	59.9	51.5	67.9	
08:00	15:00	56.5	59.3	51.0	68.4	
08:15	15:00	56.3	58.7	51.2	72.0	Rain
08:30	15:00	58.3	61.2	53.2	68.7	Rain
08:45	15:00	60.2	63.2	55.0	70.7	Rain
09:00	15:00	59.7	62.4	55.4	69.6	Rain
09:15	15:00	61.2	64.1	56.0	71.6	Rain
09:30	15:00	61.5	64.5	55.9	77.7	Rain
09:45	15:00	59.8	62.2	54.3	73.3	Rain
10:00	15:00	61.0	64.1	55.1	70.2	Rain
10:15	15:00	65.5	68.9	58.7	75.5	Rain
10:30	15:00	65.9	69.0	60.3	74.1	Rain
10:45	15:00	69.3	72.7	63.4	80.8	Rain
11:00	15:00	69.8	73.2	62.3	81.5	Rain or high wind speeds
11:15	15:00	68.9	72.7	61.3	80.9	Rain or high wind speeds
11:30	15:00	65.0	68.5	56.9	76.8	Rain or high wind speeds
11:45	15:00	65.3	69.0	55.7	78.3	Rain or high wind speeds
12:00	15:00	59.1	62.0	52.7	70.8	Rain or high wind speeds
12:15	15:00	56.8	60.0	49.6	68.3	Rain or high wind speeds
12:30	15:00	61.1	64.7	49.0	76.4	Rain or high wind speeds
12:45	15:00	60.8	64.9	50.5	76.6	Rain or high wind speeds
13:00	15:00	60.9	64.8	51.9	70.5	Rain or high wind speeds
13:15	15:00	60.5	63.7	53.5	71.4	Rain or high wind speeds
13:30	15:00	60.6	64.4	52.2	72.7	Rain or high wind speeds
13:45	15:00	60.4	63.4	53.7	72.2	Rain or high wind speeds
14:00	15:00	57.2	61.1	49.2	69.3	Rain or high wind speeds
14:15	15:00	54.2	58.1	45.0	65.3	Rain or high wind speeds
14:30	15:00	59.1	62.7	50.8	72.7	Rain or high wind speeds
14:45	15:00	61.7	65.2	54.8	71.2	Rain or high wind speeds
Log Average 0700-1500		62.8	66.2	55.9	65-82	
Average 0700-1500		60.6	63.8	53.7	65-82	
Log Average 0700-0815		55.9	58.8	50.6	66-70	No Rain or high wind speeds

Noise Survey Results

Date: Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position C - Proximity to Redcoats Farmhouse Hotel**

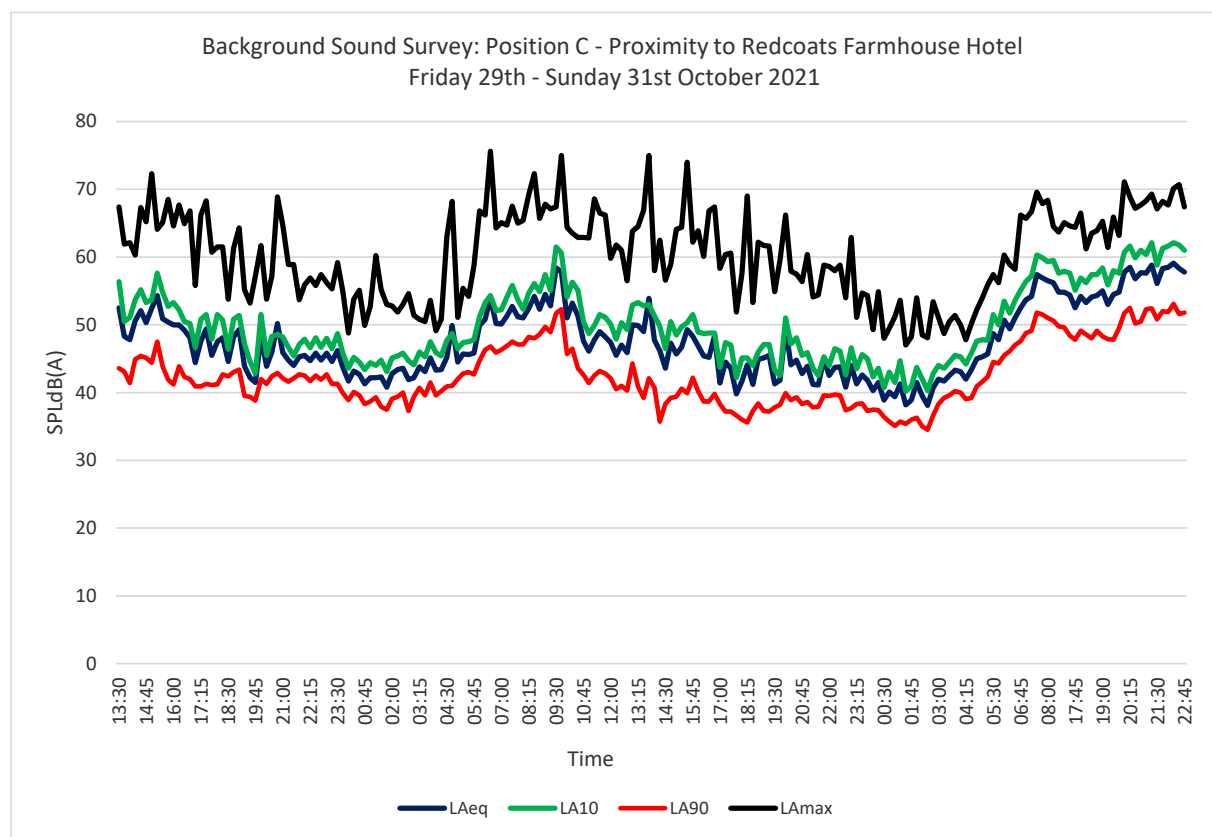
Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

TABLE 21

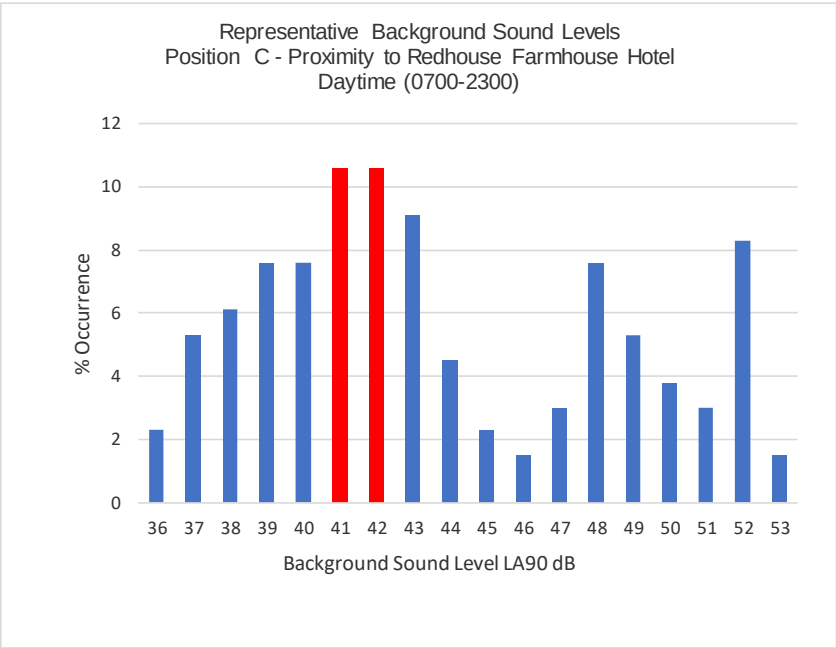
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	62.1	65.5	53.4	74.9	Rain or high wind speeds
15:15	15:00	61.8	65.5	53.4	71.4	Rain or high wind speeds
15:30	15:00	62.7	66.1	55.8	74.5	Rain or high wind speeds
15:45	15:00	60.6	63.7	54.2	71.2	Rain or high wind speeds
16:00	15:00	56.8	59.6	51.4	68.4	Rain or high wind speeds
16:15	15:00	56.1	59.1	50.7	68.7	Rain or high wind speeds
16:30	15:00	56.2	59.2	51.7	64.5	Rain or high wind speeds
16:45	15:00	56.2	59.5	50.6	64.5	
17:00	15:00	54.8	57.6	49.8	63.7	
17:15	15:00	54.8	57.9	49.6	65.1	
17:30	15:00	54.4	57.6	48.4	64.6	
17:45	15:00	52.5	55.1	47.8	64.4	
18:00	15:00	54.2	56.9	49.1	66.5	
18:15	15:00	53.3	56.2	48.6	61.2	
18:30	15:00	54.1	57.4	48.0	63.5	
18:45	15:00	54.3	57.4	49.1	63.9	
19:00	15:00	55.0	58.4	48.3	65.3	
19:15	15:00	53.0	55.9	47.9	61.4	
19:30	15:00	54.5	58.0	47.8	65.9	
19:45	15:00	54.8	57.6	49.5	63.2	
20:00	15:00	57.8	60.7	51.7	71.1	
20:15	15:00	58.5	61.6	52.5	68.9	
20:30	15:00	56.8	59.9	50.2	67.2	
20:45	15:00	57.7	61.0	50.5	67.7	
21:00	15:00	57.6	60.4	52.3	68.3	
21:15	15:00	58.8	62.1	52.4	69.3	
21:30	15:00	56.1	58.8	50.8	67.1	
21:45	15:00	58.3	61.3	52.0	68.2	
22:00	15:00	58.5	61.6	51.9	67.7	
22:15	15:00	59.1	62.1	53.1	70.1	
22:30	15:00	58.3	61.8	51.6	70.7	
22:45	15:00	57.8	61.0	51.8	67.4	
Log Average 1500-2300		57.6	60.8	51.2	61-75	
Average 1500-2300		56.8	59.9	50.8	61-75	
Log Average 1645-2300		56.5	59.5	50.5	61-71	No Rain or high wind speeds

Overall Log Average	45.7	47.7	41.3	47-76	No Rain or high wind speeds
Overall Log Average	51.9	54.8	46.1	52-75	No Rain or high wind speeds

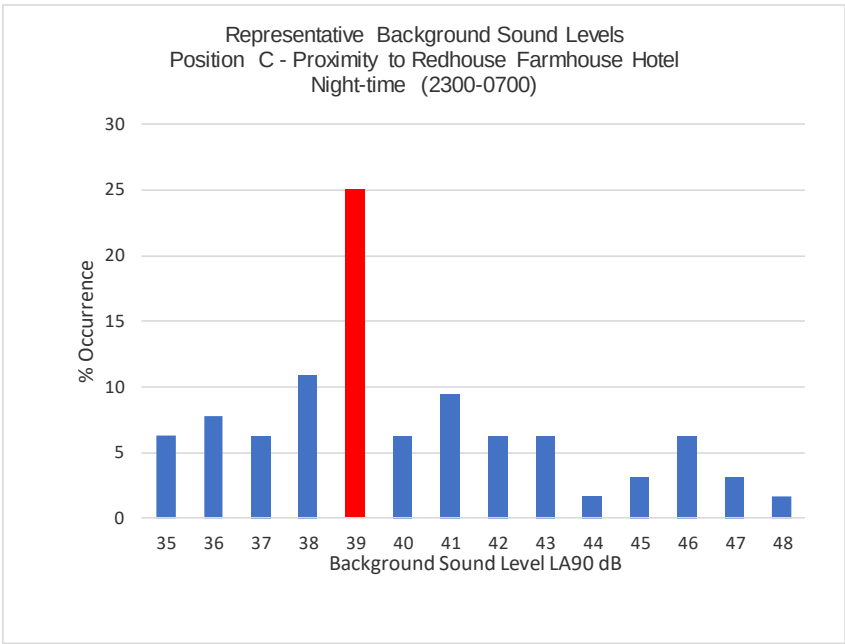


LA90 Representative Levels

LA90	% Occurrence
36	2.3
37	5.3
38	6.1
39	7.6
40	7.6
41	10.6
42	10.6
43	9.1
44	4.5
45	2.3
46	1.5
47	3.0
48	7.6
49	5.3
50	3.8
51	3
52	8.3
53	1.5



LA90	% Occurrence
35	6.3
36	7.8
37	6.3
38	10.9
39	25
40	6.3
41	9.4
42	6.3
43	6.3
44	1.6
45	3.1
46	6.3
47	3.1
48	1.6



Noise Survey Results

Date: Friday 29th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 22

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
13:30	15:00	48.0	50.6	42.5	64.1	Local and distant road traffic noise Occasional aircraft noise Birdsong
13:45	15:00	44.9	46.9	40.9	62.2	
14:00	15:00	43.9	46.0	39.0	60.1	
14:15	15:00	44.7	47.8	39.7	56.4	
14:30	15:00	47.4	48.1	40.8	68.8	
14:45	15:00	45.3	47.4	40.8	61.1	
15:00	15:00	49.2	50.8	41.1	67.8	
15:15	15:00	47.1	50.6	41.0	59.9	
15:30	15:00	46.0	48.8	41.1	61.3	
15:45	15:00	48.2	50.2	40.0	68.7	
16:00	15:00	46.5	48.8	39.6	63.2	
16:15	15:00	46.2	47.9	40.0	63.1	
16:30	15:00	47.1	49.2	40.9	63.1	
16:45	15:00	45.0	46.0	41.0	61.7	
17:00	15:00	43.1	44.6	41.0	55.7	
17:15	15:00	46.4	49.6	40.9	61.0	
17:30	15:00	47.3	49.8	41.7	61.8	
17:45	15:00	45.0	47.1	42.2	57.3	
18:00	15:00	46.2	49.5	42.3	57.8	
18:15	15:00	47.0	48.9	43.1	59.4	
18:30	15:00	45.3	46.6	43.5	52.0	
18:45	15:00	47.1	50.1	42.8	60.7	
19:00	15:00	47.3	49.3	41.9	62.5	
19:15	15:00	43.4	45.1	41.0	52.9	
19:30	15:00	43.2	44.8	41.0	57.3	
19:45	15:00	42.5	43.8	40.3	53.6	
20:00	15:00	47.6	50.5	42.9	62.5	
20:15	15:00	45.6	47.0	43.7	52.4	
20:30	15:00	46.2	48.1	43.6	54.6	
20:45	15:00	49.8	49.2	43.7	69.0	
21:00	15:00	47.1	47.9	42.7	68.9	
21:15	15:00	44.8	46.6	41.7	58.7	
21:30	15:00	44.7	46.2	42.8	53.7	
21:45	15:00	46.4	48.1	44.0	53.4	
22:00	15:00	46.5	48.4	44.0	55.9	
22:15	15:00	45.7	47.6	42.7	55.8	
22:30	15:00	46.6	48.6	43.2	57.7	
22:45	15:00	45.7	47.4	43.0	56.0	
Log Average 1330-2300		46.3	48.3	41.9	52-69	
Average 1330-2300		46.1	48.0	41.8	52-69	

Noise Survey Results

Date: Friday 29th - Saturday 30th October 2021

Location: Redcoats Farm, Wymondley

TABLE 23

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**

Instrumentation: Cirrus 171A Real Time Analyser (G066350)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	46.4	48.8	42.8	54.1	
23:15	15:00	44.8	46.8	41.6	52.9	
23:30	15:00	46.2	48.5	42.7	57.6	
23:45	15:00	44.3	46.6	40.1	52.7	
00:00	15:00	42.8	44.8	39.6	50.8	
00:15	15:00	44.1	46.4	40.4	54.6	
00:30	15:00	43.8	45.8	40.5	55.0	
00:45	15:00	42.6	45.2	38.4	52.3	
01:00	15:00	43.3	45.6	38.8	54.4	
01:15	15:00	42.5	45.0	38.1	50.9	
01:30	15:00	42.8	46.0	37.0	52.0	
01:45	15:00	41.2	43.9	37.4	51.4	
02:00	15:00	41.2	44.3	35.8	53.4	
02:15	15:00	40.6	42.8	36.8	51.5	
02:30	15:00	40.5	43.1	36.4	51.6	
02:45	15:00	40.1	42.7	35.2	52.5	
03:00	15:00	40.3	42.6	35.9	49.4	
03:15	15:00	41.7	44.3	38.1	50.8	
03:30	15:00	41.8	44.0	38.5	49.1	
03:45	15:00	42.3	44.7	38.8	49.9	
04:00	15:00	41.2	43.3	37.7	54.0	
04:15	15:00	42.0	44.2	38.6	49.7	
04:30	15:00	42.5	44.6	39.0	52.0	
04:45	15:00	48.2	46.6	38.7	66.5	
05:00	15:00	43.1	44.7	40.6	52.3	
05:15	15:00	44.5	46.2	41.6	55.9	
05:30	15:00	45.0	46.9	42.3	53.0	
05:45	15:00	45.2	47.3	42.4	56.8	
06:00	15:00	48.8	50.2	44.2	65.3	
06:15	15:00	49.7	51.8	45.8	64.5	
06:30	15:00	52.8	53.6	46.3	73.0	
06:45	15:00	49.3	51.6	45.9	63.4	
Log Average 2300-0700		45.2	47.0	40.9	49-73	
Average 2300-0700		43.9	46.0	39.9	49-73	
Log Average 1330-2300		46.3	48.3	41.9	52-69	
Log Av. 0500-0600		44.5	46.3	41.7	52-57	

Noise Survey Results

Date: Saturday 30th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 24

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	49.7	51.2	46.7	62.3	
07:15	15:00	51.0	53.2	47.6	66.1	
07:30	15:00	52.3	55.0	47.8	66.0	
07:45	15:00	50.5	52.7	47.2	63.9	
08:00	15:00	51.0	52.0	47.2	72.2	
08:15	15:00	51.9	54.1	48.8	65.3	
08:30	15:00	53.3	54.4	48.8	70.8	
08:45	15:00	51.6	53.4	48.2	69.8	
09:00	15:00	50.3	51.9	47.2	64.7	
09:15	15:00	49.7	51.6	46.0	63.6	
09:30	15:00	49.4	50.9	45.1	76.7	
09:45	15:00	48.5	51.2	44.1	62.8	
10:00	15:00	46.7	48.7	43.8	60.0	
10:15	15:00	46.1	47.4	42.9	67.3	
10:30	15:00	43.4	45.1	40.8	55.7	
10:45	15:00	44.6	47.3	40.8	61.6	
11:00	15:00	43.8	45.9	40.0	60.6	
11:15	15:00	44.4	47.1	39.8	65.7	
11:30	15:00	46.9	49.5	40.5	68.5	
11:45	15:00	44.1	46.8	38.7	66.4	
12:00	15:00	43.7	46.1	39.7	55.2	
12:15	15:00	41.8	43.7	37.7	56.7	
12:30	15:00	44.8	48.0	39.3	58.0	
12:45	15:00	42.3	45.4	37.5	56.3	
13:00	15:00	44.5	47.5	39.1	57.7	
13:15	15:00	45.9	49.6	38.1	60.5	
13:30	15:00	45.5	47.6	37.3	65.8	
13:45	15:00	60.9	49.1	38.6	85.5	
14:00	15:00	42.2	45.9	35.5	55.3	
14:15	15:00	44.8	47.6	36.2	66.0	
14:30	15:00	41.9	44.5	36.6	58.4	
14:45	15:00	40.8	42.7	36.0	58.2	
Log Average 0700-1500		50.0	49.0	42.0	55-86	
Average 0700-1500		47.1	49.0	42.0	55-86	

Noise Survey Results

Date: Saturday 30th October 2021
Location: Redcoats Farm, Wymondley
Client: AXIS
Project: Solar Farm
Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 25

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	43.3	46.5	36.3	68.1	
15:15	15:00	41.9	45.4	35.2	58.9	
15:30	15:00	43.3	46.8	36.9	58.2	
15:45	15:00	42.7	45.6	37.2	66.5	
16:00	15:00	43.2	45.0	35.4	59.3	
16:15	15:00	42.2	45.1	37.6	59.1	
16:30	15:00	43.7	45.3	36.9	64.9	
16:45	15:00	45.1	46.5	37.7	62.8	
17:00	15:00	39.9	41.6	36.7	55.9	
17:15	15:00	43.9	47.2	37.8	61.5	
17:30	15:00	43.1	46.3	38.2	58.5	
17:45	15:00	40.7	42.4	37.9	52.2	
18:00	15:00	41.9	44.9	37.6	52.5	
18:15	15:00	40.8	43.4	36.8	55.0	
18:30	15:00	41.0	42.9	38.4	52.9	
18:45	15:00	43.6	45.4	39.2	58.3	
19:00	15:00	43.6	46.3	37.5	57.6	
19:15	15:00	44.3	45.9	38.1	59.0	
19:30	15:00	41.6	43.6	38.1	53.7	
19:45	15:00	41.5	42.9	39.0	56.0	
20:00	15:00	47.5	49.1	40.5	63.1	
20:15	15:00	44.4	47.2	39.8	58.4	
20:30	15:00	44.3	47.6	40.0	55.4	
20:45	15:00	42.7	44.6	38.9	54.6	
21:00	15:00	45.5	46.8	39.4	64.3	
21:15	15:00	42.1	43.7	38.9	54.7	
21:30	15:00	41.8	43.5	38.3	54.3	
21:45	15:00	44.0	45.6	40.3	55.6	
22:00	15:00	43.1	44.5	40.6	60.0	
22:15	15:00	44.0	46.4	40.6	55.5	
22:30	15:00	43.8	46.2	40.1	54.6	
22:45	15:00	41.3	43.0	38.1	51.2	
Log Average 1500-2300		43.2	45.5	38.4	51-68	
Average 1500-2300		43.0	45.2	38.3	51-68	

Noise Survey Results

Date: Saturday 30th - Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

TABLE 26

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**

Instrumentation: Cirrus 171A Real Time Analyser (G066350)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	43.5	46.2	38.3	61.4	
23:15	15:00	41.5	43.5	38.5	51.3	
23:30	15:00	42.2	44.8	37.8	54.7	
23:45	15:00	41.5	43.8	37.6	53.9	
00:00	15:00	39.7	41.4	36.9	54.0	
00:15	15:00	41.1	42.3	37.0	57.6	
00:30	15:00	40.2	41.8	38.0	47.9	
00:45	15:00	41.2	43.6	37.5	50.5	
01:00	15:00	40.8	43.0	36.9	49.4	
01:15	15:00	41.5	43.8	36.8	52.7	
01:30	15:00	40.5	42.9	36.5	48.4	
01:45	15:00	40.6	42.7	37.3	50.7	
02:00	15:00	42.4	45.2	37.4	55.7	
02:15	15:00	41.1	43.6	36.4	52.3	
02:30	15:00	40.4	42.8	35.2	49.5	
02:45	15:00	41.7	44.8	34.9	54.5	
03:00	15:00	40.6	43.6	35.3	51.9	
03:15	15:00	39.8	42.0	36.2	49.8	
03:30	15:00	39.9	42.3	36.0	50.2	
03:45	15:00	40.9	43.3	37.0	48.4	
04:00	15:00	40.1	42.7	35.8	50.1	
04:15	15:00	40.6	43.2	36.0	49.1	
04:30	15:00	41.0	43.4	37.0	51.2	
04:45	15:00	42.2	44.9	37.4	49.8	
05:00	15:00	40.9	43.3	37.1	50.0	
05:15	15:00	42.1	44.4	38.3	51.5	
05:30	15:00	44.3	47.0	39.5	55.8	
05:45	15:00	44.7	47.0	40.7	55.4	
06:00	15:00	46.1	48.4	42.7	54.0	
06:15	15:00	46.9	49.7	42.9	56.1	
06:30	15:00	49.3	52.6	44.1	58.8	
06:45	15:00	49.5	52.9	43.5	65.5	
Log Average 2300-0700		43.1	45.8	38.6	48-66	
Average 2300-0700		42.2	44.6	37.9	48-66	
Average 0700-2300		47.8	48.4	42.1	51-86	
Log Av. 0500-0600		43.2	45.7	39.1	50-56	

Noise Survey Results

Date: Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**

Instrumentation: Cirrus 171A Real Time Analyser (G066350)

Calibration: 94dB

TABLE 27

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	50.2	53.1	45.2	65.4	
07:15	15:00	50.8	53.3	46.1	66.3	
07:30	15:00	53.5	56.5	46.8	70.2	
07:45	15:00	53.5	56.5	47.1	70.0	
08:00	15:00	54.3	57.4	48.3	67.7	
08:15	15:00	54.1	57.0	48.5	66.8	Rain
08:30	15:00	55.9	59.3	49.5	67.9	Rain
08:45	15:00	57.3	60.8	50.2	70.5	Rain
09:00	15:00	56.6	59.8	50.4	71.7	Rain
09:15	15:00	58.4	61.4	51.9	77.2	Rain
09:30	15:00	57.8	60.9	51.0	75.4	Rain
09:45	15:00	55.4	58.4	49.8	67.6	Rain
10:00	15:00	58.0	61.1	52.4	72.8	Rain
10:15	15:00	61.5	64.6	54.0	77.4	Rain
10:30	15:00	61.6	65.1	54.0	76.0	Rain
10:45	15:00	64.9	69.0	55.9	78.6	Rain
11:00	15:00	62.6	66.6	51.3	77.4	Rain or high wind speeds
11:15	15:00	57.3	60.3	49.2	76.7	Rain or high wind speeds
11:30	15:00	52.4	54.8	47.9	73.0	Rain or high wind speeds
11:45	15:00	54.5	57.5	48.1	71.4	Rain or high wind speeds
12:00	15:00	50.0	53.1	45.0	64.3	Rain or high wind speeds
12:15	15:00	48.1	50.5	44.1	63.4	Rain or high wind speeds
12:30	15:00	47.2	49.6	43.3	59.0	Rain or high wind speeds
12:45	15:00	48.1	51.0	43.4	58.9	Rain or high wind speeds
13:00	15:00	50.3	53.0	45.4	61.3	Rain or high wind speeds
13:15	15:00	49.7	52.8	44.8	60.9	Rain or high wind speeds
13:30	15:00	50.5	53.5	45.6	62.7	Rain or high wind speeds
13:45	15:00	49.3	52.2	45.2	60.0	Rain or high wind speeds
14:00	15:00	49.7	52.3	44.8	65.8	Rain or high wind speeds
14:15	15:00	47.1	49.0	43.1	59.5	Rain or high wind speeds
14:30	15:00	48.3	50.8	44.0	59.9	Rain or high wind speeds
14:45	15:00	50.7	54.0	45.1	66.6	Rain or high wind speeds
Log Average 0700-1500		56.5	60.0	49.3	59-77	
Average 0700-1500		53.7	56.7	47.9	59-77	
Log Average 0700-0815		52.7	55.7	46.8	65-70	No Rain or high wind speeds

Noise Survey Results

Date: Sunday 31st October 2021

Location: Redcoats Farm, Wymondley

Client: AXIS

Project: Solar Farm

Data: **Baseline Sound Survey: Position D - East of Almshoebury Cottages**

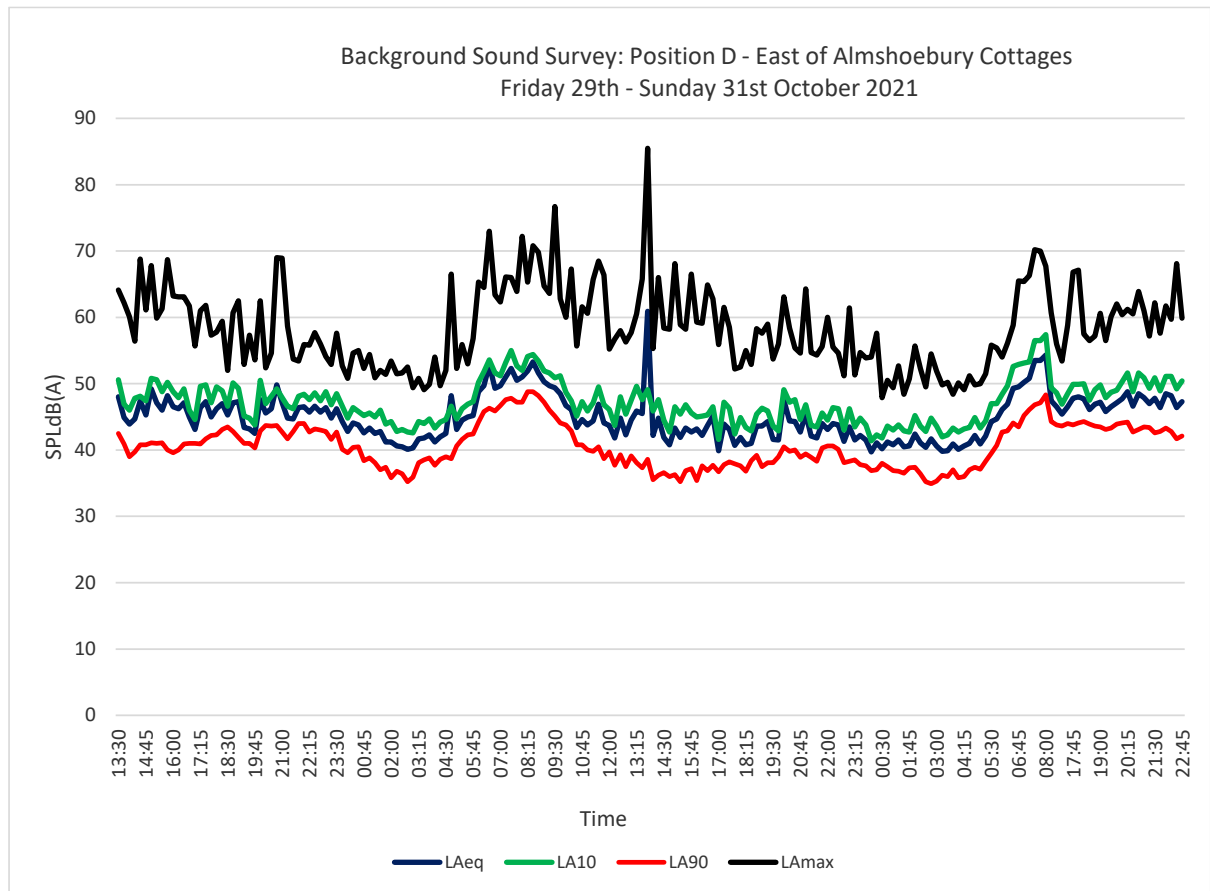
Instrumentation: Cirrus 171A Real Time Analyser (G066350)

Calibration: 94dB

TABLE 28

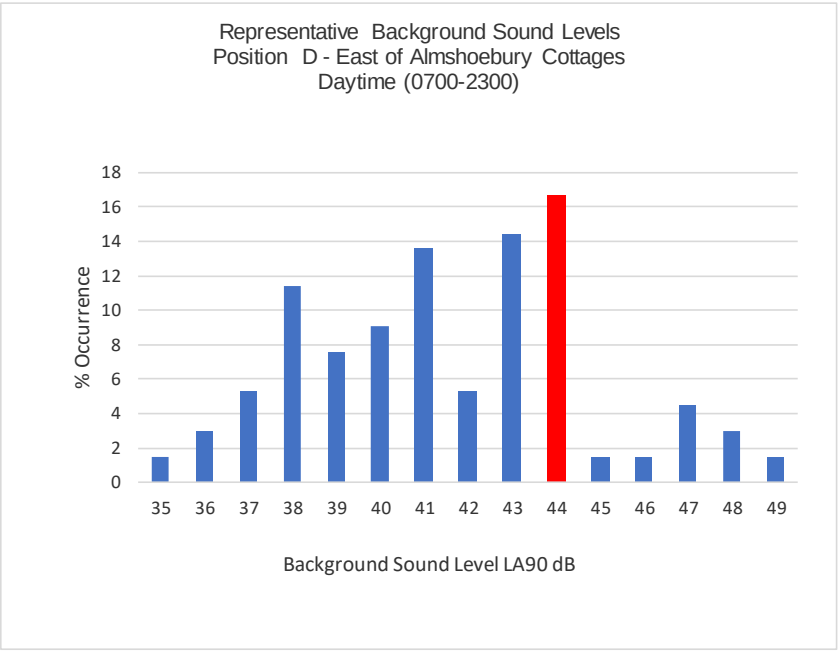
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	50.7	53.6	45.8	66.1	Rain or high wind speeds
15:15	15:00	52.0	54.9	45.8	68.8	Rain or high wind speeds
15:30	15:00	51.3	54.3	45.8	65.1	Rain or high wind speeds
15:45	15:00	50.1	53.2	44.4	67.3	Rain or high wind speeds
16:00	15:00	48.0	50.3	43.2	65.9	Rain or high wind speeds
16:15	15:00	48.6	50.5	43.7	65.3	Rain or high wind speeds
16:30	15:00	47.1	49.5	43.8	59.4	Rain or high wind speeds
16:45	15:00	47.4	49.4	44.3	60.7	
17:00	15:00	46.5	48.6	43.8	56.0	
17:15	15:00	45.4	46.9	43.6	53.4	
17:30	15:00	46.5	48.5	44.0	58.8	
17:45	15:00	47.8	49.9	43.8	66.8	
18:00	15:00	48.0	49.9	44.1	67.1	
18:15	15:00	47.7	50.0	44.3	57.5	
18:30	15:00	46.1	47.5	43.9	56.5	
18:45	15:00	46.9	49.1	43.6	57.2	
19:00	15:00	47.2	49.8	43.5	60.6	
19:15	15:00	45.8	47.9	43.1	56.5	
19:30	15:00	46.5	48.7	43.3	60.1	
19:45	15:00	47.1	49.0	43.9	62.0	
20:00	15:00	47.7	50.3	44.1	60.4	
20:15	15:00	48.8	51.6	44.2	61.2	
20:30	15:00	46.6	48.8	42.7	60.5	
20:45	15:00	48.5	51.6	43.1	63.9	
21:00	15:00	47.9	50.9	43.5	61.0	
21:15	15:00	47.0	49.3	43.4	57.2	
21:30	15:00	47.8	50.9	42.6	62.2	
21:45	15:00	46.4	48.9	42.8	57.6	
22:00	15:00	48.5	51.1	43.3	61.7	
22:15	15:00	48.2	51.1	42.8	59.7	
22:30	15:00	46.4	49.2	41.7	68.1	
22:45	15:00	47.3	50.4	42.1	59.9	
Log Average 1500-2300		48.0	50.6	43.7	53-69	
Average 1500-2300		47.7	50.2	43.7	53-69	
Log Average 1645-2300		47.2	49.7	43.4	53-68	No Rain or high wind speeds

Overall Log Average	44.3	46.5	39.9	48-73	No Rain or high wind speeds
Overall Log Average	47.5	49.1	42.5	51-86	No Rain or high wind speeds

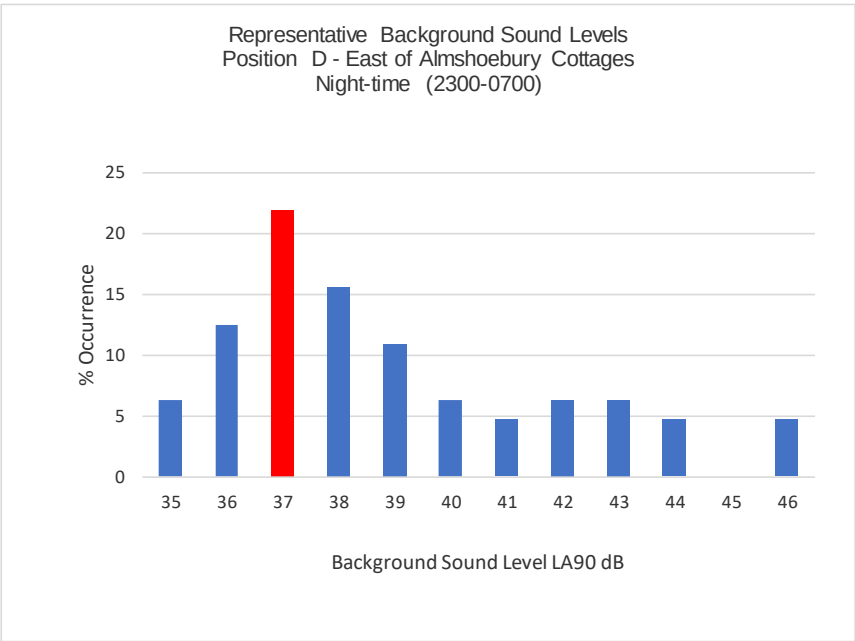


LA90 Representative Levels

LA90	% Occurrence
35	1.5
36	3.0
37	5.3
38	11.4
39	7.6
40	9.1
41	13.6
42	5.3
43	14.4
44	16.7
45	1.5
46	1.5
47	4.5
48	3.0
49	1.5



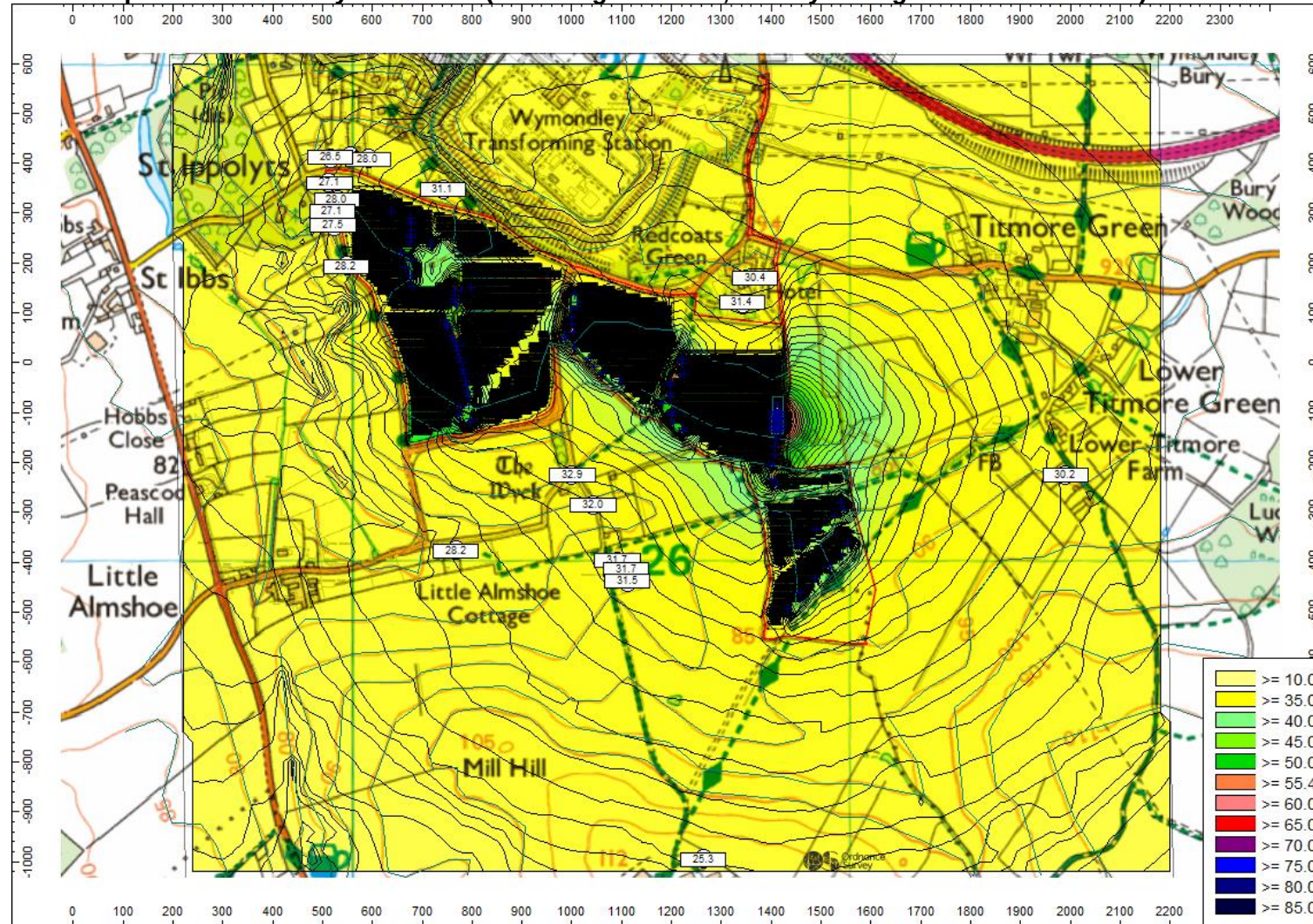
LA90	% Occurrence
35	6.3
36	12.5
37	21.9
38	15.6
39	10.9
40	6.3
41	4.7
42	6.3
43	6.3
44	4.7
45	0
46	4.7



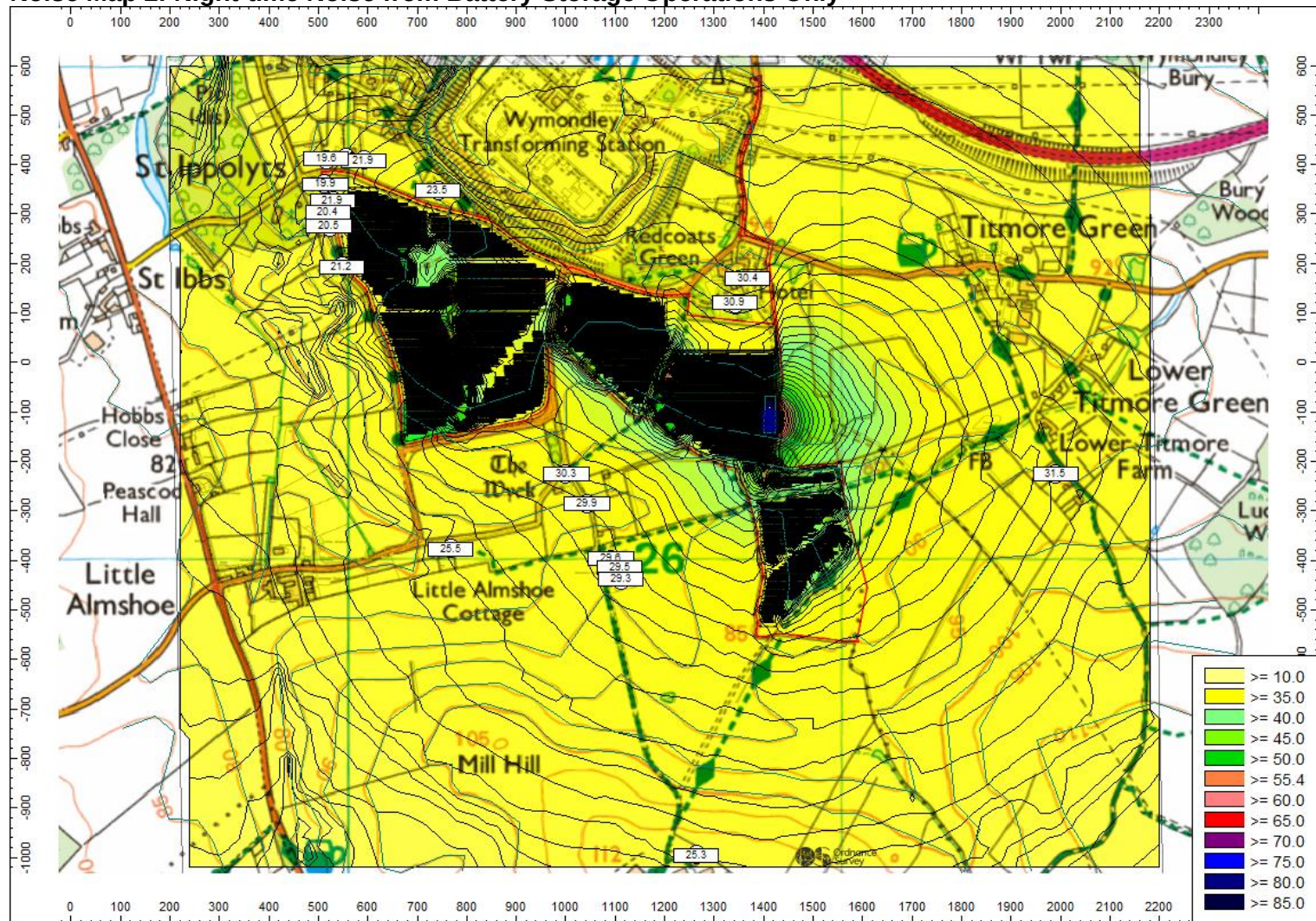
Appendix 3

Noise Mapping Results

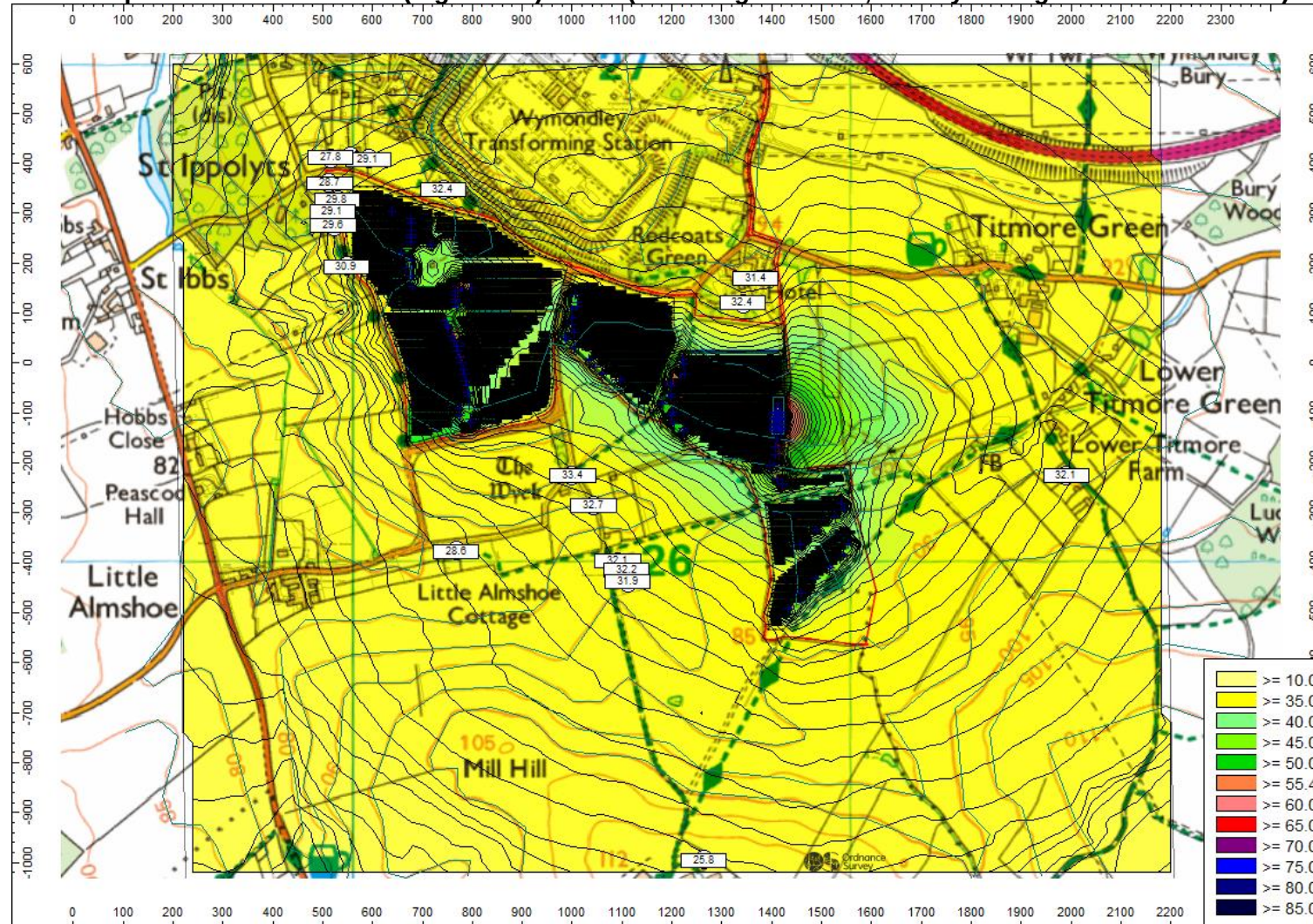
Noise Map 1: Maximum Daytime Noise (including inverters, battery storage and transformers) with landform contours



Noise Map 2: Night-time Noise from Battery Storage Operations Only



Noise Map 3: Maximum Sunrise (night-time) Noise (including inverters, battery storage and transformers)



Appendix 4

Vibration Terminology

Ground Borne Vibrations

For any source of vibration on or near the surface of the ground, energy propagates away from the source via:

- a) Elastic body (or compression) waves – which radiate energy into the ground in all directions
- b) Surface (or shear) waves – which carry energy along the ground surface, caused when body waves are reflected back into the ground at the ground-surface interface

Thus, at any point away from that source, the ground motion is the sum of all the wave motions at that point. When wave motion has been generated, the waves will be attenuated as they travel away from the source. The two main mechanisms for attenuation are:

- a) Enlargement of the wavefront as the distance from the source increases, and
- b) Internal damping of the transmitting medium (the ground)

Ground borne vibration is therefore made up of a combination of different waves, travelling in different directions, at different speeds and at different frequencies. The frequency component of the vibration will affect the rate at which attenuation occurs since the internal damping of the ground is frequency dependent.

Since vibration enters buildings through the foundations, the hard structure of the building is normally affected to a greater degree than by air borne vibration. Often ground borne vibrations are more noticeable when standing or sitting near the middle of suspended wooden floors.

Ground Borne Vibration Measurement Units

Ground borne vibration is caused when the individual particles making up the strata are caused to oscillate by the passage of a pressure wave. The resulting vibration can be summarized in terms of 4 main parameters:

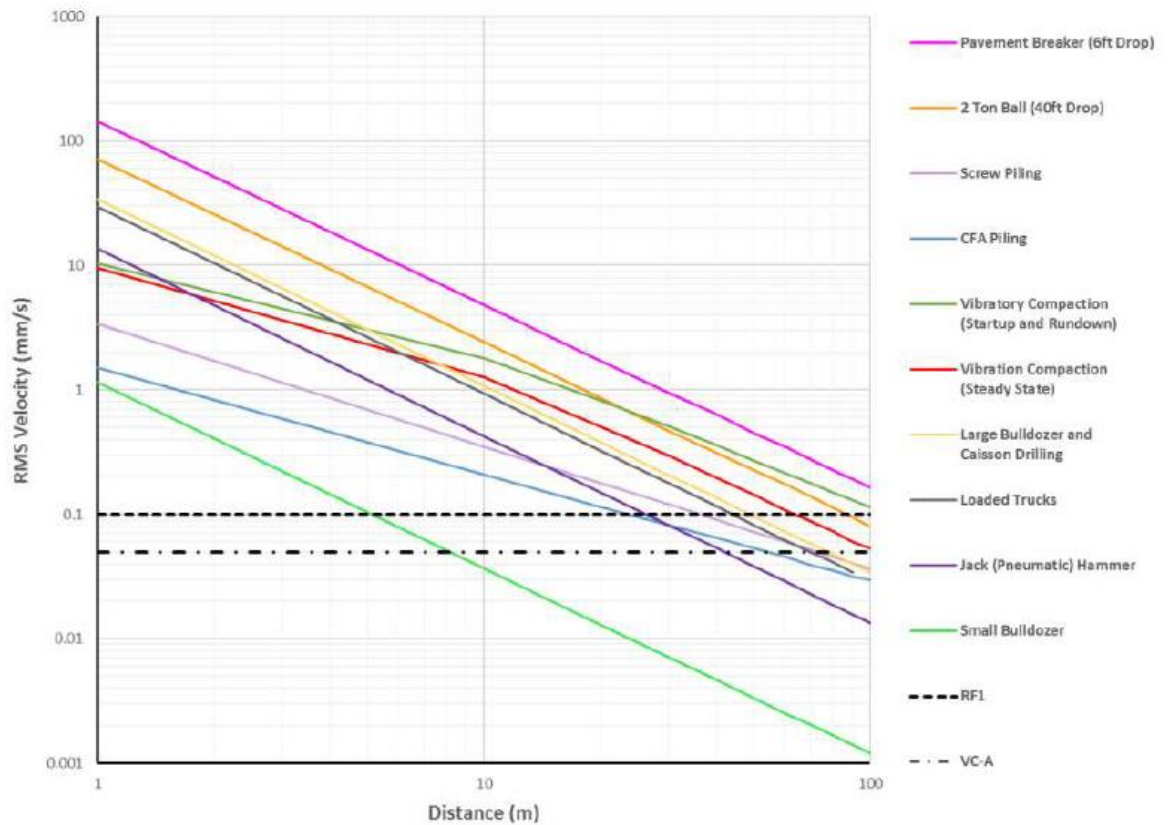
- a) **Velocity** – how fast the particles move when they are oscillating. Since the velocity of these particles continually change as the pressure wave passes the most useful value that is often reported is the maximum or peak particle velocity (PPV). PPVs are usually expressed in terms of ms^{-1} or mms^{-1} .
- b) **Acceleration** – is the rate at which the particle velocity changes during oscillation. It is usually measured in ms^{-2} mms^{-2} or “g’s”. 1g is that acceleration imparted to an object by the earth’s gravitational pull and is approximately 9.81 ms^{-2} .
- c) **Displacement** – is the distance moved by oscillating particles. This is usually very small and measured in mm or even μm .
- d) **Frequency** – is the number of oscillations per second which a particle undergoes due to the passage of a vibration wave. It is measured in cycles per second or Hertz (Hz).

The movement of particles induced to oscillate by vibration waves are usually measured in three mutually perpendicular directions to fully describe the vibration intensity, as particles will be oscillating in three dimensions. These are:

- a) **Longitudinal** – back and forth particle movement in the same direction that the vibration wave is travelling.
- b) **Vertical** – up and down movement perpendicular to the direction the vibration wave is travelling.
- c) **Transverse** – left and right particle movement perpendicular to the direction the vibration wave is travelling.

Appendix 5

Vibration Levels from a Range of Construction Activities



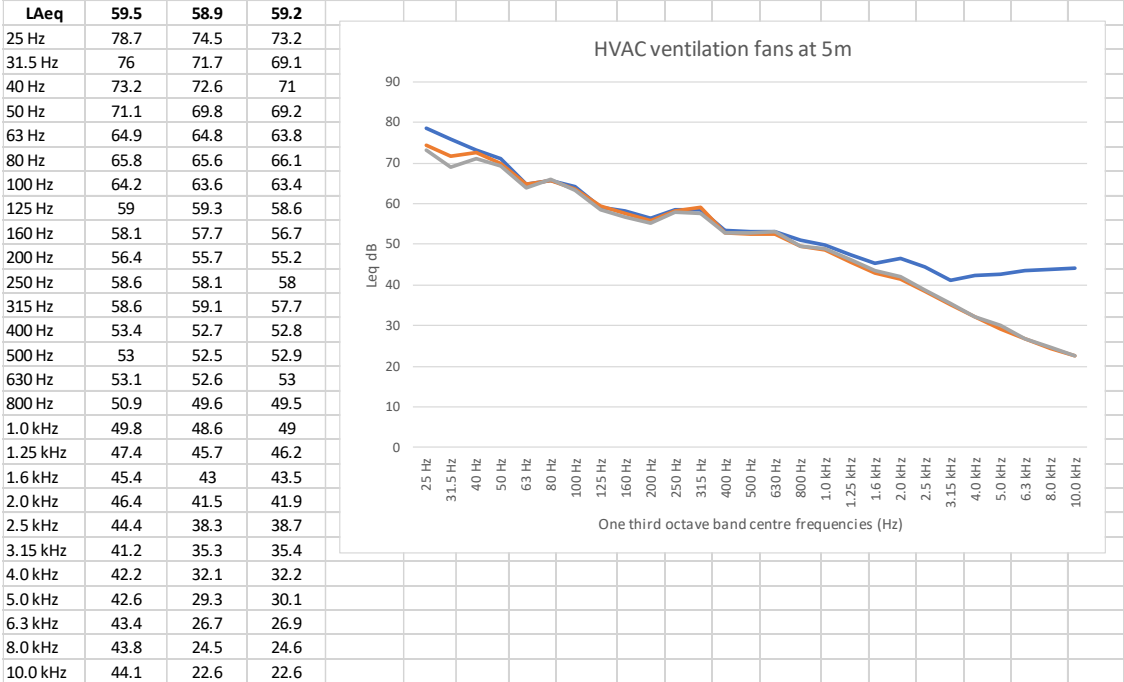
Appendix 6

Plant Noise Levels

Assumed Noise Levels for Site Plant

Plant Type	Sound Pressure Level LAeq [dB]	Assumed % Operating Time	Example of mitigation	Period of Operation
Cooling systems	73 @ 1m	100	Silencing of vent openings or design (no tonality at NSR)	Daytime & Night-time
Transformers	65 @ 1m	100	Design of plant or inside container (no tonality at NSR)	Daytime & Night-time
Battery Containers	65 @ 1m	100	Design, insulation as required (no tonality at NSR)	Daytime & Night-time
Inverters	65 @ 1m	100	Design of plant or inside container (no tonality at NSR)	Daytime & Night-time
Switchgear	65 @ 1m	100	Design of plant or inside enclosure (no tonality at NSR)	Daytime & Night-time

Typical Cooling Fan Noise Levels at 5m



Appendix 7

Consultant's Experience & Qualifications

**Consultant: Dean Robert Kettlewell - MSc MIOA MAE I.Eng
(Director - Principal Acoustic Consultant)**

Précis

As Director and Principal Acoustic Consultant with Noise & Vibration Consultants Ltd, Dean has over 40 years background experience in a wide range of issues relating to environmental, industrial and commercial noise and vibration assessment. He currently manages corporate and unit specific contracts for:

- Assessment of Environmental & Industrial Noise
- Environmental Noise Impact Assessments
- Expert Witness representation for Deafness and 'Vibration White Finger' Claims
- Integrated Pollution Prevention and Control (IPPC) Applications
- Industrial Noise Assessment and Control
- Planning Issues for Residential and Commercial Development
- Noise at Work Regulations Assessments
- Building Acoustics and Sound Insulation Tests
- Wind Farm Noise Impact Assessments
- Entertainment Noise Assessment and Control
- Architectural Acoustics
- Specialist knowledge in the Design of Noise Control Systems
- Ground borne vibration measurement and assessment
- Project Management of Noise Control Systems
- Hand-arm Vibration Assessments

Relevant Work Experience

Director & Principal Consultant - Noise & Vibration Consultants Ltd	2001- to date
Senior Acoustic Consultant - Vibrock Limited	1998 - 2001
Associate & Principal Acoustic Consultant - John Savidge & Associates	1994 - 1998
Technical Manager – LBJ Limited (Noise Control Division)	1990 - 1994
Technical Engineer/Technical Manager (1988) - Vibac (Noise Control) Ltd	1982 - 1990

Qualifications and Education

M.Sc. Applied Acoustics (Derby University – Distinction)
HNC Electrical & Electronic Engineering
IOA Diploma in Acoustics & Noise Control
IOA Certificate in Law and Administration
Certificate of Competence in Workplace Noise Assessment
Certificate of Competence in Ground Vibration Monitoring

Affiliations: Member of Institute of Acoustics (MIOA)
 Member of Academy of Experts (MAE)
 Member of Association of Noise Consultants (ANC)
 Incorporated Engineer (I.Eng)

