PDAS Appendix G – Noise and Vibration Assessment

Suite 2717
37 Westminster Buildings
Theatre Square
Nottingham
NG1 6LG
Tel No: 01773 603331
e-mail: nvc.acoustics@btopenworld.com

Noise Impact Assessment
For Solar Array Development

Land at Grove Farm
Off Potash Lane
Bentley
Suffolk

For

Axis
Acting on behalf of
Green Switch Capital Ltd

Report No.: R23.0708/DRK
Date: 31st August 2023

Consultant: D.R. Kettlewell MSc MAE MIOA I.Eng

Noise & Vibration Consultants Ltd

Member of Institute of Acoustics
Member of Association of Noise Consultants
Member of Academy of Experts

Report prepared by:
D R Kettlewell MSc MIOA MAE I.Eng – Principal Consultant:

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Summary

1. Green Switch Capital Ltd is proposing to construct and operate a solar photovoltaic ("PV") farm installation on land at Grove Farm, Off Potash Lane in Bentley, Suffolk.

2. At the request of Axis, Noise & Vibration Consultants Ltd ("NVC") were commissioned to undertake a noise assessment to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.

3. Following a study of the local area the nearest sensitive receptor ("NSRs") was determined.

4. Baseline sound monitoring was carried out at 4 fixed positions representing NSRs over a typical weekend period to determine the lowest likely representative background and residual sound levels.

5. Site operational noise has been calculated using empirical noise data for the solar inverters and transformers obtained from Technology Providers who have installed similar solar farm sites 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.

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

Conclusions

7. Following analysis of noise survey results our conclusions are as follows:

   (i) The results of baseline noise monitoring over a weekend monitoring period at five locations (in areas representing typical background sound levels) indicate that the representative background sound levels vary between 32dB to 35dB L_{A90} (with

ambient L_{Aeq} levels ranging between 44dB to 46dB) during the daytime and 30dB to 33dB L_{A90} (with ambient L_{Aeq} levels ranging between 39dB to 44dB) during the sunrise period.

(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 24dB and 32dB $L_{Aeq15mins}$ during maximum site operations at NSRs.

(iii) The results show that the noise contribution from maximum site operations at NSRs would not produce any adverse impacts.

(iv) According to BS4142: 2014+A1:2019 the resultant assessment during daytime and sunrise operating periods would conclude that noise from the site would result in a **low impact** at NSRs.

(v) For sunrise periods, the absolute noise levels generated by the solar farm are well below sleep disturbance criteria (i.e. WHO guidelines of an external level of 40dB $L_{Aeq8hrs}$ and internal bedroom guidance levels of 30dB $L_{Aeq,8hrs}$ according to BS8233:2014). Predicted levels within bedrooms with an open window would be between 9dB and 17dB L_{Aeq}. This level is significantly lower than WHO guidance and limits provided within BS8233: 2014 for sleeping conditions within bedrooms (i.e. 30dB $L_{Aeq,8hrs}$).

(vi) The results show that the site noise contribution at NSRs during sunrise operating periods would be well below typical residual sound levels of 39dB to 44dB L_{Aeq} established during the baseline study survey.

(vii) The Local Authority are able to condition the site in terms of noise, to ensure noise levels are acceptable and comply with relevant noise guidance and standards.

(viii) Predictions of construction noise would indicate no significant impacts and `best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.

(ix) Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the NSRs, would indicate that this would be a **negligible to slight** impact and would be **not significant** in accordance with Government advice and guidance.

(x) Maximum vibration levels during peak construction activities are predicted to be well below perceptible levels of vibration without mitigation measures and therefore **not significant**.

8. The assessment concludes that the site has been 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.

CONTENTS

1.0 INTRODUCTION

1.1 Green Switch Capital Ltd ("the Developer") is proposing to construct and operate a solar photovoltaic (PV) farm installation on land at Grove Farm off Potash Lane in Bentley, Suffolk.

1.2 At the request of Axis, acting on behalf of the applicant, Noise & Vibration Consultants Ltd ("NVC") were commissioned to undertake a noise assessment to assess the impact and advise (where appropriate) on noise mitigation measures to meet planning guidance and noise standards.

1.3 Following a study of the local area the nearest sensitive receptors ("NSRs") were determined. The study benefits from a baseline sound survey to determine typical background sound levels in the vicinity of NSRs to the proposed development. Monitoring was carried out over a weekend period (i.e. Friday to Monday) to determine representative background sound levels.

1.4 Site operational noise has been calculated using empirical noise data for transformers and inverter plant 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.

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

- 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 – July 2021;
- 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 (DMRB), LA 111 Noise and Vibration (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 and solar inverter plant;
- provide information on background and residual noise levels at the NSRs 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 (PV) solar panels (up to 3m high) and associated support frames and cabling;
- Inverter and Transformer Stations;
- Control Building;
- Substation;

- Storage buildings;
- Access tracks;
- Security fencing;
- CCTV security cameras and supports;
- New hedgerows and woodland planting;
- Creation of species rich grassland and pasture; and
- Management of existing hedgerows (including gapping up where required).

1.11 The Proposed Development would be for a time limited period of 40 years after which time the Site will be decommissioned and restored back to full agricultural use.

2.0 SITE DESCRIPTION

2.1 Location

2.1.1 The location of the Proposed Development is illustrated in Figure 1. The Site comprises two vacant fields.

2.1.2 The Site lies approximately 1.5km north of the centre of Bentley Village and circa 2km to the south-east of the A12 Junction 32A. The field west of Church Road is bounded by Potash Lane to the south, a field to the west and a private road, to church farm and Glebe Cottage, to the north. The field east of Church Road is bounded by trees to the south, a private dwelling to the north and the Great Eastern Main Line railway to the east. In addition, the site includes a slim section of a field to the northeast of the main site, to be utilised for the proposed substation and substation access road.

2.1.3 Construction traffic will route to the Site from the A12 Junction 32A and onto the Site via an existing farm track off Station Road, which will be upgraded. From the Station Road access, construction vehicles will be routed across an upgraded field track to Potash Lane in the east. Beyond Grove Farm, vehicles will access the western site parcel via a new construction access off Potash Lane.

2.1.4 Access to the eastern site parcel construction traffic via a crossing point over Church Road during the construction phase.

2.1.5 Vehicular access to the proposed substation will be provided via the unnamed road off the A137 to the east of the site.

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.

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.

2.4 Nearest Receptors

Residential Receptors

2.4.1 Based on distance relative to the Proposed Development, the NSRs are generally located to the south and north of the Site. The closest residential receptors are located to the south to southwest off Potash Lane (Receptor R4), to the north off Church Road (Receptors R1and R2) and to the southeast off Church Road (Receptors R3).

2.4.2 There are other receptors located at greater distance than the above, which are either in similar directions or to the east of Site, which are shown on the noise map. As the impact would be lower these receptors are not included in the assessment. The NSR positions are indicated on Figure 1 together with the application site position.

2.4.3 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 – July 2021 (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 174 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 185 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'

3.2.15 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).

3.2.16 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."

3.2.17 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.

3.2.18 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 are unlikely to be perceptible at the NSR and we would therefore not apply a correction.

b) In terms of impulsivity this is unlikely to be a characteristic of solar inverters, transformers or switchgear 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.

3.2.19 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'

3.2.20 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.

3.2.21 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

Activity	***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 $L_{Aeq,8hours}$

3.2.22 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

3.2.23 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."*

3.2.24 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."*

3.2.25 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 For residents of houses that could be exposed to construction noise, BS5228:2009+A1:2014[7] is considered to be the appropriate standard. This standard does not prescribe limits but requires 'best practicable means' ("BPM") to be employed to control noise generation. The criterion therefore is that BPM should be employed and conditions implemented for example to restrict construction and demolition noise to non-sensitive hours.

3.4.2 The construction impact semantic scale, set out in Table 3.4 below, is based on the ABC method of assessment described in Annex E.3.2 of BS5228, which sets out threshold values depending upon the ambient noise at receptors, which have been defined from the baseline sound survey.

3.4.3 According to the guidance found within the Design Manual for Roads and Bridges (DMRB LA 111), the LOAEL and SOAEL for noise sensitive receptors within the construction activity study area, with reference to baseline noise levels are established in accordance with Table 3.4.

Table 3.4: Impact Magnitude Category – Construction Noise

Time Period	LOAEL	SOAEL	Threshold Level $LAeq_{1hr}$ dB
Day (0700-1900 Weekday and 0700-1200 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	65-75
Night (2300-0700)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	45-55
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	55-65

3.4.4 The magnitude of impact for construction noise, shall be determined in accordance with Table 3.5 (as defined in DMRB LA 111).

Table 3.5: Magnitude of Impact and Construction Noise Descriptions

Magnitude of Impact	Construction Noise Level
Negligible	Below LOAEL
Minor	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Major	Above or equal to SOAEL +5dB

Construction Road Traffic Noise

3.4.5 According to the LA 111 guidelines, the magnitude of impact at noise sensitive receptors from construction traffic is set out in Table 3.6.

Table 3.6: Magnitude of Impact for Construction Road Traffic Noise

Magnitude of Impact	Increase in Basic Noise Level of Closest Public Road used for Construction Traffic (dB)
Negligible	Less than 1.0
Minor (Slight)	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major (Substantial/Severe)	Greater than or equal to 5.0

Note: Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
1) 10 or more days or nights in any 15 consecutive days or nights;
2) a total number of days exceeding 40 in any 6 consecutive months.

Construction Vibration

3.4.6 For construction phase vibration the LOAEL and SOAEL is set out in DMRB LA 111 and provided in Table 3.7.

Table 3.7: Construction Vibration LOAELs and SOAELs

Time Period	LOAEL	SOAEL
All time periods	0.3mm/sec PPV	1.0mm PPV

3.4.7 The magnitude of impact for construction vibration, shall be determined in accordance with Table 3.8 (as defined in DMRB LA 111).

Table 3.8: Magnitude of Impact at Receptors

Magnitude of Impact	Vibration Level
Negligible	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below 10mm/s PPV
Major	Above or equal to 10mm/s PPV

Note: Construction vibration shall constitute a likely significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
1) 10 or more days or nights in any 15 consecutive days or nights; or
2) a total number of days exceeding 40 in any 6 consecutive months.

3.4.8 Vehicular access to the Proposed Development would be via Church Road, which is east of the Site. During the construction phase, access would be from the same access.

3.4.9 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.

3.5 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. In the situation where the background sound levels and rating levels are low (i.e. around 30dB(A)) then the Standard states:

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

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 a 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 circa 45dB with an open window (i.e. 15dB reduction through open window according to BS8233:2014).

3.5.3 In view of the low background sound levels at NSRs and in order to ensure protection of amenity we would therefore propose a noise limit during daytime (0700-2300 hours) or sunrise periods (generally during Summer months between 0500-0700 hours) based on a `rating' level not exceeding the representative background sound level +3dB at NSRs. This is in accordance with a level **below an adverse** impact according to the relevant guidance (i.e. BS4142:2014+A1:2019).

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 at the NSRs to determine details of the noise climate to provide typical and representative background sound data. The four locations chosen to establish background sound were as follows:

4.1.2 The monitoring positions are shown on Figure 1. The noise monitoring positions are representative of NSRs 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 11th to Monday 14th November 2022 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 MP1 (North of Site) Proximity to Church Farm

4.1.6 Monitoring position MP1 is representative of the nearest receptor located north of the Site in proximity to Church Farm. Noise levels at this location are generally affected by birdsong, local and distant road traffic and intermittent train movement. The monitoring position was chosen in the field just to the south of the property at Church Farm (i.e. Receptor R1). Refer to Figure 1 for location.

Position MP2 (East of Site) – In Proximity to Uplands

4.1.7 Position MP2 was chosen as a suitable monitoring position to represent typical baseline levels in the vicinity of properties east to northeast of Site off Church Road (i.e. Receptor R2). Noise levels at this location are formed in general by distant road traffic noise, birdsong and intermittent train noise. The monitoring

position was chosen in the field just to the south of the properties in this area. Figure 1 shows the location.

Position MP3 (South to Southeast of Site) – Proximity to Falstaff Manor

4.1.8 This monitoring position is representative of receptors south to southeast of the overall Site and are located in proximity to Falstaff Manor (i.e. Receptors R3). Noise levels at this location are generally formed by local and distant road traffic noise and intermittent train movements. Monitoring at this location was in the field just to the northeast of the receptor. Figure 1 shows the location.

Position MP4 (South of Site) – Proximity to Potash Lane

4.1.9 This monitoring position is representative of the closest existing receptors south of the Site (i.e. Receptor R4). Noise levels at this location are generally formed by local and distant road traffic noise, birdsong and intermittent train movement. Monitoring at this location was in the field just to the east of the NSR. 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.

4.1.12 The main source of existing sound affecting NSR properties relates to local and distant road traffic noise, occasional train movement and bird sound.

4.1.13 For noise measurements at the NSR positions the following noise meters were used:

Table 4.1: Instrumentation

Manufacturer	***Description***	***Type***	***Calibration Due Date***	***Serial No.***
Norsonic	Real Time Sound Analyser	118	April 2023	31832
Norsonic	Real Time Sound Analyser	118	April 2023	31337
Rion	Sound Level Meter	NL-52	August 2023	420712
Pulsar	Sound Level Meter	45	March 2023	PN1142
Pulsar	Electronic Calibrator	105	October 2023	53536
Norsonic	Electronic Calibrator	1251	October 2023	34495

4.1.14 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

4.1.15 Measurements were recorded over a period of approximately 76 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).

4.1.16 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: 114dB

4.1.17 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

4.1.18 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 Friday 11th to and removed the equipment on Monday 14th November 2022.

Meteorological Conditions

4.1.19 Weather details were recorded by the NVC consultant during the period of the survey are detailed below, which were provided by local weather stations in the area.

Friday 11th – Saturday 12th November 2022
Weather conditions were dry, variable cloud cover with light south-west to south-east winds (1-3m/s) and temperature 10deg to 16deg C. Overnight conditions were dry, variable cloud conditions with calm winds and temperature 6deg to 10deg C.

Saturday 12th – Sunday 13th November 2023
Weather conditions were dry, mostly cloudy with light east to southeast winds (1-2m/s) and temperature 11deg to 13deg C. Overnight, conditions were dry, cloudy conditions becoming clear skies, with light south southeast winds (1-2m/s) and temperature 10-14degC.

Sunday 13th to Monday 14th November 2022
Weather conditions were dry, fair conditions becoming cloudy with fog patches, with light south to east winds (0-1m/s) and temperature 10deg to 11deg C. During the night-time conditions were dry, variable cloud with calm conditions (0m/s), with temperature of 5deg to 8degC.

Monday 14th November 2023
Dry conditions, mostly cloudy with fog patches and calm winds to variable light westerly winds (0-1m/s), temperature 9deg to 10degC.

4.1.20 The above climatic conditions were suitable for monitoring environmental noise levels in accordance with advice given in BS7445: 2003 `Description and measurement of environmental noise' and BS4142:2014+A1:2019.

4.2 Results

Background Sound

4.2.1 In terms of what is defined as the background sound the standard states the following:

"8.1.3 Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.

8.1.4 The monitoring duration should reflect the range of background sound levels for the period being assessed. In practice, there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed.

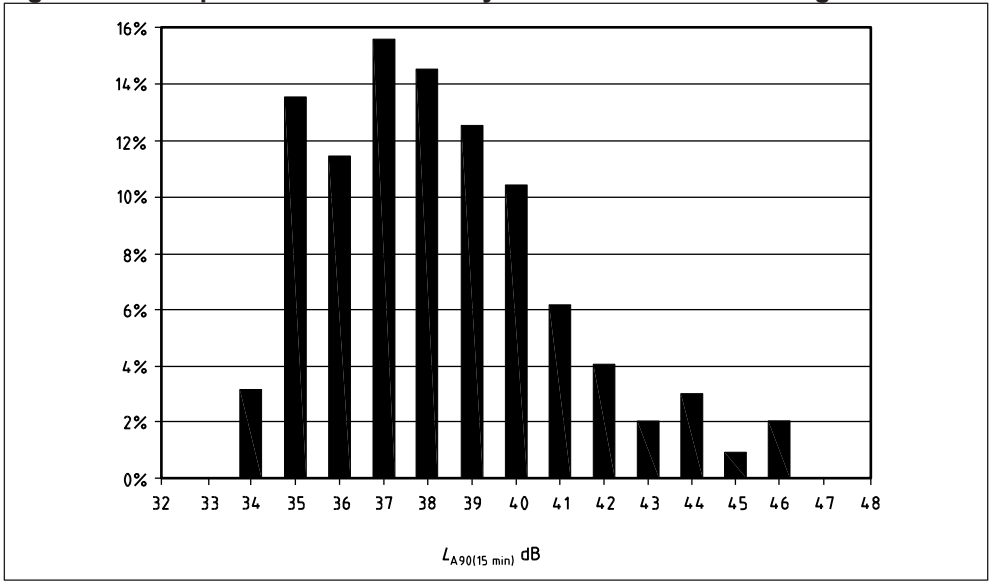
NOTE 1 To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.

NOTE 2 The mean average of a series of measured background sound levels is not numerically equal to the overall period background sound level that would otherwise be obtained by a single measurement spanning individual measurement periods.

NOTE 3 Background sound can be significantly affected by meteorological conditions, particularly where the main sources of residual sound are remote from the assessment location(s).

NOTE 4 Figure 4 shows an example of a statistical analysis of the results of all the measurement periods in order to determine a background sound level. For this distribution of the data an $L_{A90(15min)}$ of 37 dB was considered to be representative and in this instance was also the most commonly occurring value."

Figure 4: Example of a statistical analysis to determine the background sound level



4.2.2 To establish the background sound level the Standard requires the determination of a representative value which is not deemed to be the lowest but under statistical analysis the most common when measured over a representative time period.

4.2.3 Background sound measurements taken adjacent to the NSRs. The results of measurements taken at the fixed monitoring positions at site are presented below in Table 4.1 with detailed measurements in Appendix 2.

Table 4.1: Existing Daytime Background Sound Levels at Monitoring Positions

Monitoring Position	Time Period	Grid Ref X Y	LAeq dB	LA90 dB	LAmax dB	Representative[1] LA90 dB
MP1: North of Site	0700-2300	611389 238242	45	37	46-82	33
	0500-0700		40	33	38-72	31
MP2: East of Site	0700-2300	611856 238018	46	38	40-80	35
	0500-0700		44	35	49-78	32
MP3: South to South-east of Site	0700-2300	611896 237751	44	36	41-93	32
	0500-0700		44	33	40-78	30
MP4: South of Site	0700-2300	611600 237633	46	37	44-82	32
	0500-0700		39	32	41-73	32

[1]Takes into account the mean, median and most commonplace LA90 based on statistical analysis, whichever is lowest.

4.2.4 The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative background sound levels during the weekend daytime period (0700-2300 hours) vary between 32dB and 35dB L_{A90} with L_{Aeq} ambient levels between 44dB to 46dB L_{Aeq}. During sunrise hour periods (0500-0700 hours) the background levels were shown to vary between 30dB and 32dB L_{A90} with L_{Aeq} ambient levels between 39dB to 44dB L_{Aeq}.

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). We have compared the mean, median and most commonplace value and taken the lowest level to establish the representative background sound.

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 work 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, telehandlers, 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 The assessment below indicates the expected highest noise levels at the NSRs based on 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 (without mitigation measures) are shown below in Table 5.1.

Table 5.1: Noise Predictions for Construction Noise (without mitigation)

Position (Refer to Figure 1)	Distance to receptor (m)	Works	Residual Noise Levels L_{Aeq} dB	Noise Level at receptor, L_{Aeq1hr} dB	BS5228 Threshold Value L_{Aeq} dB Daytime
R1: Church Farm (north)	90-600	Piling (mini rig)	45	33-52	65
	80-600	Site Preparation	45	35-61	65
	90-600	General site activities	45	41-60	65
	80-600	Infrastructure	45	33-61	65
	90-600	PV Installation	45	41-60	65
R2: Uplands (East of Site)	75-400	Piling (mini rig)	46	37-54	65
	65-400	Site Preparation	46	39-63	65
	75-400	General site activities	46	45-62	65
	65-400	Infrastructure	46	36-63	65
	75-400	PV installation	46	44-62	65
R3. Falstaff Manor & Church Road (south)	80-500	Piling (mini rig)	44	35-54	65
	70-500	Site Preparation	44	37-62	65
	80-500	General site activities	44	43-61	65
	70-500	Infrastructure	44	34-62	65
	80-500	PV Installation	44	42-61	65
R4. Potash Lane receptors (south to southwest)	70-500	Piling (mini rig)	46	35-55	65
	60-500	Site Preparation	46	37-64	65
	70-500	General site activities	46	43-63	65
	60-500	Infrastructure	46	34-64	65
	70-500	PV installation	46	42-63	65
R5. Malting Farm/Garden House (east)	270-300	Piling (mini rig)	44[1]	39-41	65
	270-300	Site Preparation	44[1]	41-48	65
	270-300	General site activities	44[1]	47-48	65
	270-300	Infrastructure	44[1]	41-48	65
	270-300	PV installation	44[1]	47-48	65

[1]Assumed to be similar to those at monitoring position MP3.

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.

5.3.5 Mitigation measures are provided below in paragraph 5.3.10 in accordance with BS5228, which employs best practical means to control construction noise generation.

5.3.6 On the basis of the above predictions and proposed mitigation measures, the magnitude of impact as a result of construction, would be **negligible to minor** (in accordance with Tables 3.4 and 3.5 and LA 111 guidance).

5.3.7 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. No deliveries on Sundays with the exception of one-off abnormal loads or large vehicles such as cranes.

Mitigation Measures

5.3.9 In accordance with BS5228-1:2009+A1:2014, best practical means (BPM) would be employed to control the noise.

5.3.10 In consideration of the likely highest levels of construction noise, the following BPM 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 NSRs (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.
- Locate plant away from NSRs or in locations which provide good screening in the direction of sensitive receptors.
- Use of broadband noise reverse alarms (where practicable) on mobile plant.
- Where plant is likely to operate within 50m of NSRs use of hoarding screen in working areas where plant is operating in direction of NSR to provide further reduction in peak noise levels.
- Community liaison with NSRs to provide information on what activities are taking place, timescales of works and contact details for the site construction manager to allow residents to report any noise issues.

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 NSRs 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 baseline flows along Station Road and the development traffic demand during peak construction activities. It is estimated that the Site would generate 8 two-way HGV movements per day during weeks

1 to 8, then 4 two-way HGV movements per day during weeks 9 to 28. The predicted noise increase on NSRs is provided below.

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

Receptor	Time Period	Baseline noise (`do nothing') $LA10_{,T}$ (dB)	Baseline + Development (`do something') $LA10_{,T}$ (dB)	Change[1] compared to baseline $LA10_{,T}$ (dB)
R1. Church Farm	0730-1800hrs (week 1-8)	45.3[1]	45.7	+0.4
R2. Uplands	0730-1800hrs (week 1-8)	49.9[1]	50.1	+0.2
R3. Off Church Rd	0730-1800hrs (week 1-8)	45.3[1]	46.5	+1.2
R4. Potash Lane	0730-1800hrs (week 1-8)	54.4[1]	54.7 – 55.4	+0.3 to +1
R5. Malting Farm	0730-1800hrs (week 1-8)	45.3[2]	45.4	+0.1
R6. Station Road	0730-1800hrs (week 1-8)	49.1-52.9	51.3-55.1	+2.2
R1. Church Farm	0730-1800hrs (week 9-28)	45.3[1]	45.8	+0.5
R2. Uplands	0730-1800hrs (week 9-28)	49.9[1]	50.1	+0.2
R3. Off Church Rd	0730-1800hrs (week 9-28)	45.3[1]	46.5	+1.2
R4. Potash Lane	0730-1800hrs (week 9-28)	54.4[1]	54.7 – 56.3	+0.3 to +1.9
R5. Malting Farm	0730-1800hrs (week 9-28)	45.3[2]	45.4	+0.1
R6. Station Road	0730-1800hrs (week 9-28)	49.1-52.9	51.4-55.1	+2.3

[1]Measured baseline at monitoring positions. [2] Assumed to be similar to MP3 monitoring position.

Note: The above assessment includes for staff vehicles during the construction works.

5.3.14 The impact due to the Proposed Development during peak vehicle movement during the construction phase at the main site on the local road network and access track has been calculated using Calculation of Road Traffic Noise (CRTN) methodology and impact methodology using DMRB LA 111.

5.3.15 According to Table 3.6 the DMRB LA 111, impact assessment for existing residential receptors is shown to be **negligible to slight** impacts and **neutral to minor** effects and therefore **not significant**.

5.3.16 During the construction work associated with the Sub-Station the vehicle access would be via the unnamed road off the A137 to the east of the site.

5.3.17 During the first two weeks of this construction phase of works (weeks 24-26), there would be a total of approximately 9 daily two-way delivery related movements to the site. Between the two remaining weeks (weeks 27 - 28), there would be approximately 2 daily two-way delivery related movements to the site. The associated staff vehicle movements for this phase (weeks 24-28) would be 10 two-way staff trips per day. Table 5.3 provides the results of noise predictions at the NSRs.

Table 5.3: Predicted Road Traffic Noise Increase at Existing Residential Properties During Peak Traffic Flow Period for the Construction Phase (Sub-Station Site)

Receptor	Time Period	Baseline noise (`do nothing') $LA10_{,T}$ (dB)	Baseline + Development (`do something') $LA10_{,T}$ (dB)	Change[1] compared to baseline $LA10_{,T}$ (dB)
R1. Church Farm	0730-1800hrs (week 24-26)	45.3[1]	45.3	0
R2. Uplands	0730-1800hrs (week 24-26)	49.9[1]	49.9	0
R3. Off Church Rd	0730-1800hrs (week 24-26)	45.3[1]	45.3	0
R4. Potash Lane	0730-1800hrs (week 24-26)	54.4[1]	54.4	0
R5. Malting Farm	0730-1800hrs (week 24-26)	45.3[2]	46.8 - 48.0	+1.5 to +2.7
R1. Church Farm	0730-1800hrs (week 24-26)	45.3[1]	45.3	0
R2. Uplands	0730-1800hrs (week 24-26)	49.9[1]	49.9	0
R3. Off Church Rd	0730-1800hrs (week 24-26)	45.3[1]	45.3	0
R4. Potash Lane	0730-1800hrs (week 24-26)	54.4[1]	54.4	0
R5. Malting Farm	0730-1800hrs (week 24-26)	45.3[2]	46.8	+1.5

[1]Measured baseline at monitoring positions. [2] Assumed to be similar to MP3 monitoring position.

Note: The above assessment includes for staff vehicles during the construction works.

5.3.18 The impact due to the Proposed Development during peak vehicle movement during the construction phase at the main site on the local road network and access track has been calculated using Calculation of Road Traffic Noise (CRTN) methodology and impact methodology using DMRB LA 111.

5.3.19 According to Table 3.6 the DMRB LA 111, impact assessment for existing residential receptors is shown to be **negligible to slight** impacts and **neutral to minor** effects and therefore **not significant**.

5.4 Construction Phase - Vibration Effects

5.4.1 The separation distance between the NSRs and nearest likely vibratory plant is circa 70m to 270m.

Typical Vibration Levels

5.4.2 The highest levels of vibration generated by construction plant is likely to include the following:

- Dozers;
- Vibratory rollers and compactors;
- Material offloading onto hard surfaces; and
- Concrete vibratory plant.

5.4.3 BS5228:2009+A1:2014 Part 2 deals with vibration from construction and open sites and provides information on the effects of the levels of vibration, human and structural response, response limits of structures and practical measures to reduce vibration.

5.4.4 Table 5.3 outlines the highest likely vibration levels that could be experienced during construction at the NSRs (i.e. during use of vibratory plant).

Table 5.3: Daytime Construction Vibration at NSRs without mitigation

Location	Approximate Nearest Distance to Receptor (m)	Receptor Sensitivity	Range of highest likely vibration (mm/sec)	Perceptible levels of vibration for residential receptors (mm/sec)	Cosmetic damage limits (mm/sec)
R1: Church Farm	90	High	<0.1	>0.3	>5.0
R2: Uplands (East)	75	High	<0.1	>0.3	>5.0
R3. Falstaff Manor & Church Road (south)	80	High	<0.1	>0.3	>5.0
R4. Potash Lane	70	High	<0.1	>0.3	>5.0
R5. Malting Farm/ Garden House (east)	270	High	0	>0.3	>5.0

*Note: Closest vibratory activity is likely to be use of vibratory compaction during site track preparation.

5.4.5 The above results show no significant vibration levels during construction and the highest likely vibration levels at all residential receptors are below the level at which vibration is perceptible (refer to Table 3.7 and 3.8).

5.4.6 Based upon the above information, it is clear that even at the closest approach to existing residential properties the level of vibration would be below 0.3mm/sec and would rapidly reduce to zero at further separation. It should be noted that the type of equipment, ground conditions and structural form could all affect the resultant level of vibration. At this stage, it has been assumed that the highest likely vibration level scenario occurs (i.e. a conservative estimate of potential effects).

5.4.7 The levels of vibration, as a result of construction, would be **negligible** and **not significant** during periods when peak vibration levels are likely to be experienced.

5.4.8 In view of the conclusions relating to construction vibration, no mitigation measures are required.

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 NSRs 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) = 1 (absorbent ground absorption due to ground retained as grassland)
Temperature = 10degC
Relative humidity = 70%
Receptor height = Assumed to be 1.5m above ground for daytime and 4m above ground for sunrise periods (i.e. during daytime periods residents are generally at ground floor level and at 0500-0700 hours they are generally in bedroom areas).

6.2.2 The methodology takes into account source position and distance to the NSRs. The noise modelling assumes that all inverters, transformers and switchgear plant 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. The mitigation strategy would be confirmed as part of any planning consent condition as proposed by the Environmental Health Protection Officer.

a) Transformer noise level of 70dB $L_{Aeq15mins}$ @ 1m sound pressure level.
b) Solar plant string inverters produce a noise level not exceeding 62dB $L_{Aeq15mins}$ @ 1m (based on measured levels with maximum load).
c) Substation switchgear noise level of 65dB $L_{Aeq15mins}$ @ 1m sound pressure level.
d) Acoustic screen mounted around 2 of the transformers closest to R4 (Potash Lane). Refer to Figure 3 for location. The screen should 0.5m higher than the height of the transformer enclosure (e.g. height of container 2.9m, screen height would be 3.4m) and formed by a solid material of minimum 12kg/m2 mass e.g. close boarded fencing to appropriate thickness with no gaps between boards or between boards and supports or ground.

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 [LAeq] L_{A90} dB	Predicted highest rating[2] noise level L_{Aeq} (dB)	Level Difference dB(A)*	Impact Magnitude BS4142
Daytime					
R1: Church Farm (north)	Daytime	33 [45]	**26**	-7	**Low**
R2: Uplands (East)	Daytime	35 [46]	**28-29**	-7 to -6	**Low**
R3. Falstaff Manor & Church Road (south)	Daytime	32 [44]	**27-28**	-5 to -4	**Low**
R4. Potash Lane receptors (south to southwest)	Daytime	32 [46]	**24-30**	-8 to -2	**Low**
R5. Malting Farm/ Garden House (east)	Daytime	32[1] [44]	**22-24**	-10 to -8	**Low**
Sunrise					
R1: Church Farm (north)	Sunrise	31 [40]	**29**	-2	**Low**
R2: Uplands (East)	Sunrise	32 [44]	**30-31**	-2 to -1	**Low**
R3. Falstaff Manor & Church Road (south)	Sunrise	30 [44]	**30**	0	**Low**
R4. Potash Lane receptors (south to southwest)	Sunrise	33 [44]	**27-32**	-6 to -1	**Low**
R5. Malting Farm/ Garden House (east)	Sunrise	32[1] [39]	**24-26**	-8 to -6	**Low**

Note: Column 5 is the subtraction of column 4 from column 3.
[1]Baseline levels assumed to be similar to R4 (Posn MP3).
[2] Noise characteristics at receptor locations do not include a penalty as this would be controlled by mitigation and design.

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 periods, (which in reality is unlikely to occur often).

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 and sunrise 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** at NSRs.

Sunrise Operations

6.3.5 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low impact** at NSRs.

6.3.6 In relation to absolute levels during night-time periods, the maximum noise levels generated by the solar farm are well below sleep disturbance limits (i.e. WHO guidelines of 40dB $L_{Aeq8hrs}$) and predicted levels within sensitive rooms with an open window would be between 9dB and 17dB L_{Aeq}. 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 vibration expected from this type of plant and therefore magnitude impacts would be **not significant**.

7.0 CONCLUSIONS

7.1 The proposed solar photovoltaic (PV) farm installation, 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 five locations (in areas representing typical background sound levels) indicate that the representative background sound levels vary between 32dB to 35dB L_{A90} (with ambient L_{Aeq} levels ranging between 44dB to 46dB) during the daytime and 30dB to 33dB L_{A90} (with ambient L_{Aeq} levels ranging between 39dB to 44dB) during the 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 of transformers and inverters from sites in the UK to provide input data for the noise model.

7.4 In order to ensure protection of amenity and to maintain levels that are well below sleep disturbance absolute criteria, we have proposed that during daytime and sunrise periods the rating level should not exceed the representative background sound level +3dB 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 24dB and 32dB $L_{Aeq15mins}$ during maximum site operations at NSRs.

7.6 The results show that the noise contribution from maximum site operations at NSRs would not produce any adverse impacts.

7.7 According to BS4142: 2014+A1:2019 the resultant assessment during daytime and sunrise operating periods would conclude that noise from the site would result in a **low impact** at NSRs.

7.8 For sunrise periods, the absolute noise levels generated by the solar farm are well below sleep disturbance criteria (i.e. WHO guidelines of an external level of 40dB $L_{Aeq8hrs}$ and internal bedroom guidance levels of 30dB $L_{Aeq,8hrs}$ according to BS8233:2014). Predicted levels within bedrooms with an open window would be between 9dB and 17dB L_{Aeq}. This level is significantly lower than WHO guidance and limits provided within BS8233: 2014 for sleeping conditions within bedrooms (i.e. 30dB $L_{Aeq,8hrs}$).

7.9 The results show that the site noise contribution at NSRs during sunrise operating periods would be well below typical residual sound levels of 39dB to 44dB L_{Aeq} established during the baseline study survey.

7.10 The Local Authority are able to condition the site in terms of noise, to ensure noise levels are acceptable and comply with relevant noise guidance and standards.

7.11 Predictions of construction noise would indicate no significant impacts and `best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.

7.12 Prediction calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the NSRs, would indicate that this would be a **negligible to slight** impact and would therefore be **not significant** in accordance with Government advice and guidance.

7.13 Maximum vibration levels during peak construction activities are predicted to be well below perceptible levels of vibration without mitigation measures and therefore **not significant**.

7.14 The assessment concludes that the site has been 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.

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'

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

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: July 2021

National Planning Practice Guidance: June 2021

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

ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors

FIGURES

Figure 1: Noise Measurement Locations, Receptors & Site Position

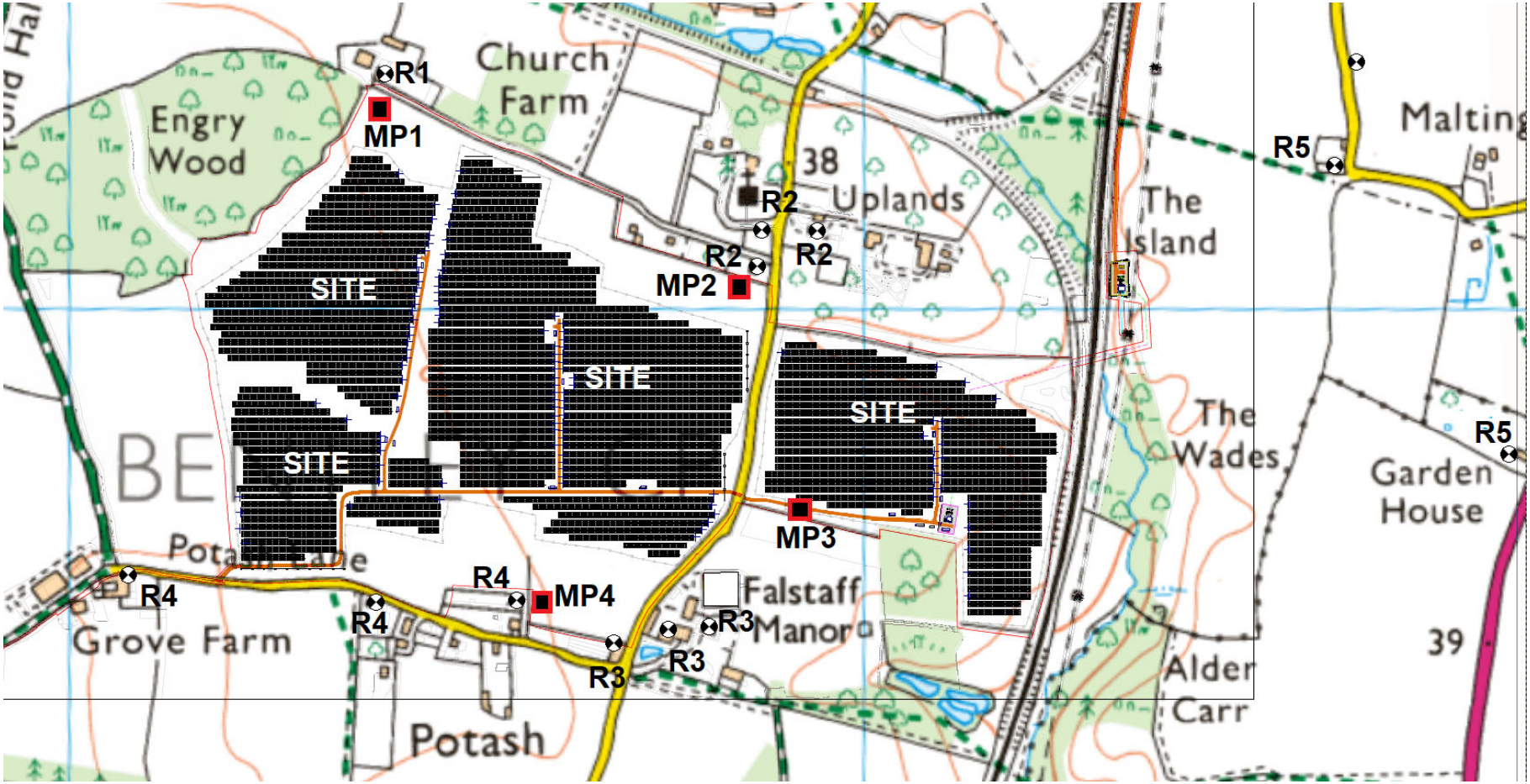


Figure 2: Site Layout

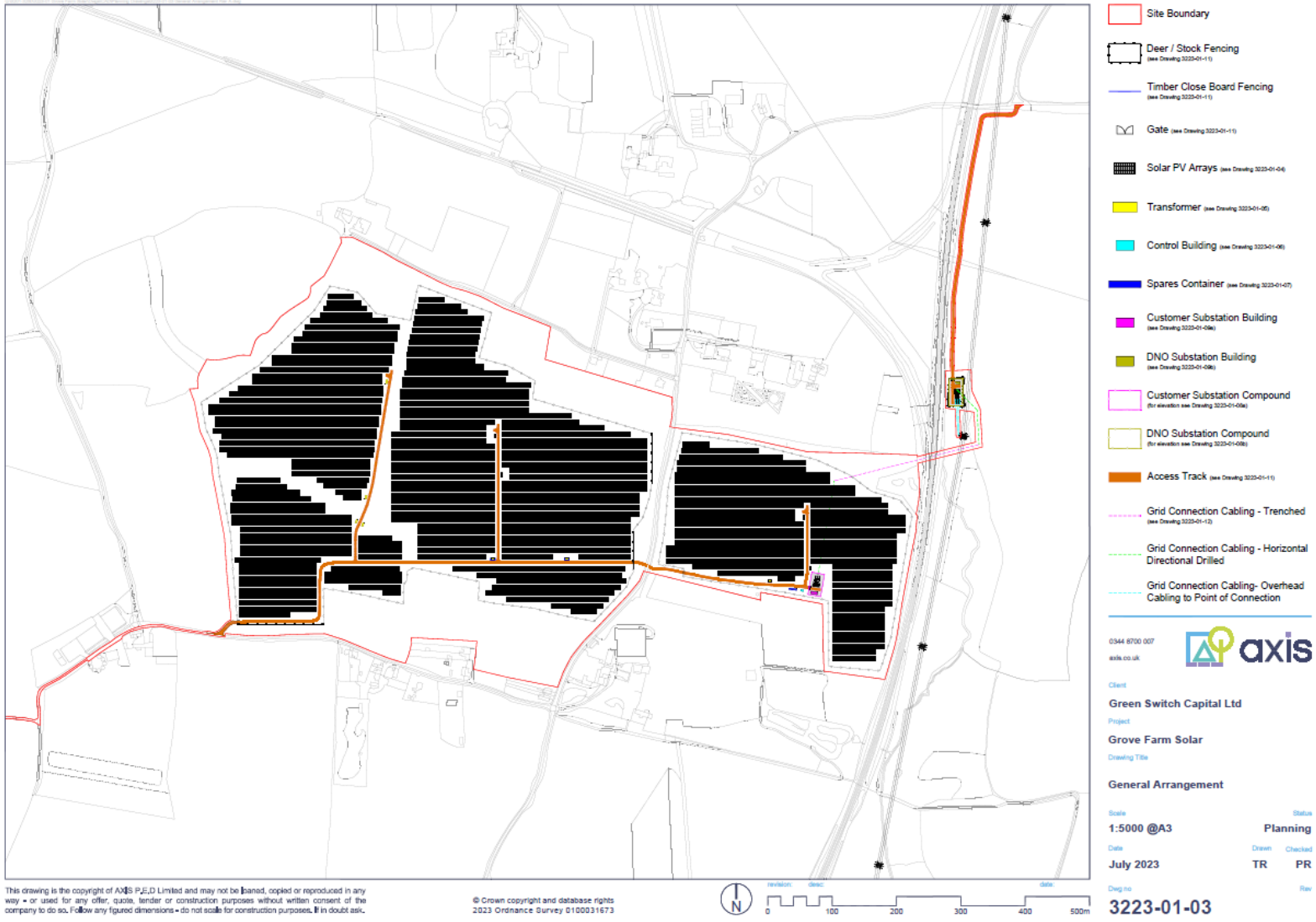
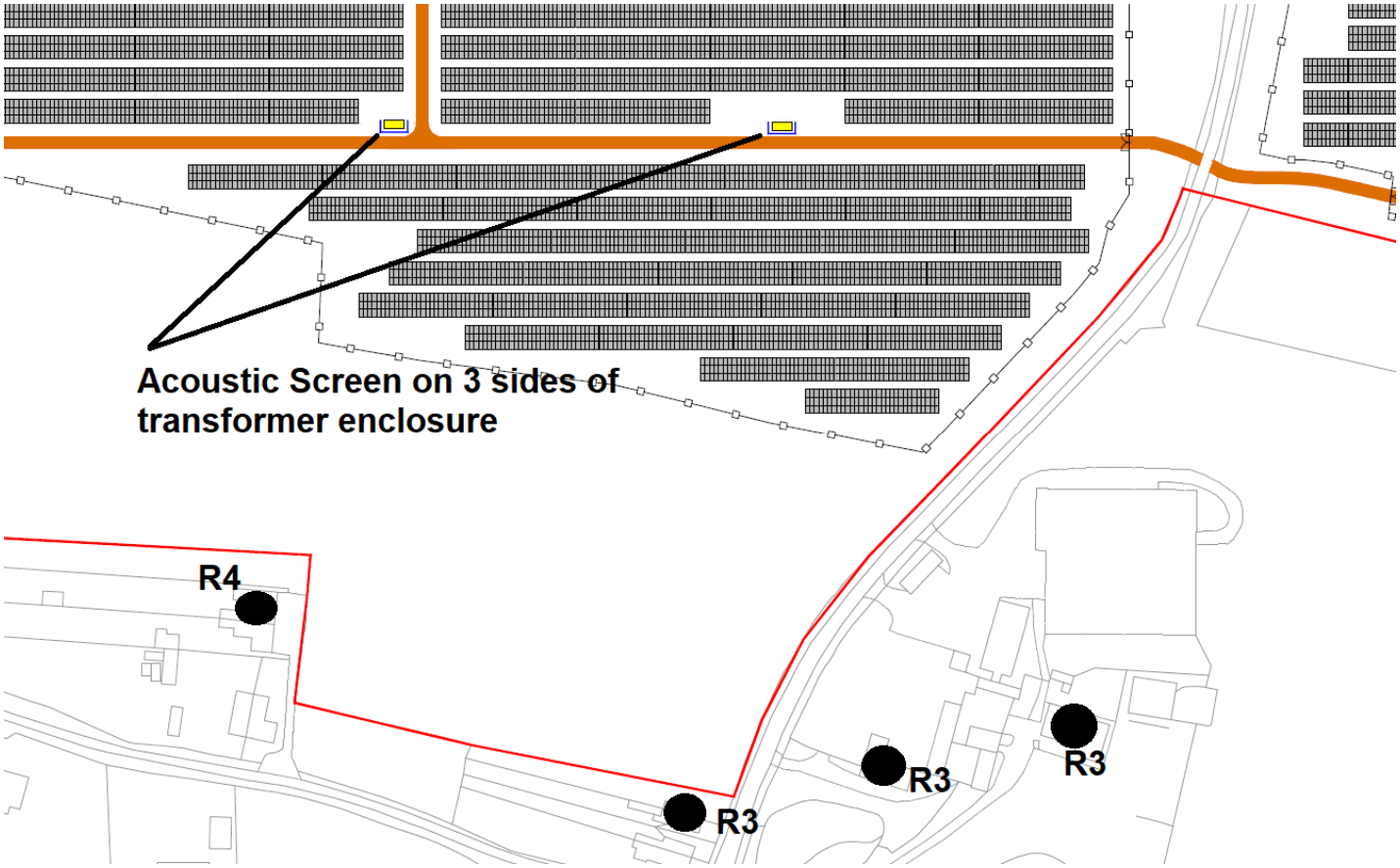


Figure 3: Location of 3 sided acoustic screen for transformer stations



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 meaningful where the level of noise is constant. In the typical industrial environment noise levels can vary widely and sometimes, for 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 considers 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 11th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 1**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
10:45	15:00	50.2	53.3	44.8	62.9	
11:00	15:00	50.6	54.2	43.0	62.4	
11:15	15:00	49.4	52.8	41.5	65.6	
11:30	15:00	50.4	53.7	44.0	64.2	
11:45	15:00	49.9	53.4	42.2	65.4	
12:00	15:00	48.3	51.6	42.8	61.9	
12:15	15:00	48.0	51.1	40.6	65.7	
12:30	15:00	49.3	52.6	42.9	63.3	
12:45	15:00	48.8	52.3	42.1	62.9	
13:00	15:00	52.4	56.2	43.6	67.0	
13:15	15:00	49.3	52.7	43.4	61.2	
13:30	15:00	48.5	52.0	42.2	62.1	
13:45	15:00	47.8	51.2	41.3	64.9	
14:00	15:00	47.8	51.3	41.1	60.1	
14:15	15:00	57.0	53.8	40.1	75.3	
14:30	15:00	47.2	50.7	39.1	63.1	
14:45	15:00	45.3	48.7	40.0	58.3	
Average 1045-1500		50.3	52.7	42.2	58-75	

Noise Survey Results

Date: Friday 11th November 2022 **TABLE 2**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	45.5	48.1	40.4	63.1	
15:15	15:00	43.2	45.6	39.6	58.8	
15:30	15:00	42.6	45.0	39.4	53.5	
15:45	15:00	41.9	43.9	39.2	58.1	
16:00	15:00	43.2	45.0	39.6	56.1	
16:15	15:00	46.0	48.7	42.2	58.2	
16:30	15:00	44.5	46.6	40.8	62.5	
16:45	15:00	44.4	47.5	39.9	53.1	
17:00	15:00	42.2	44.2	39.1	59.1	
17:15	15:00	44.1	47.1	40.0	56.6	
17:30	15:00	46.6	49.5	42.1	55.4	
17:45	15:00	46.5	49.8	41.0	59.4	
18:00	15:00	46.5	49.9	41.3	59.1	
18:15	15:00	46.3	49.4	40.9	60.1	
18:30	15:00	44.6	47.8	39.5	55.5	
18:45	15:00	43.3	46.2	38.8	57.1	
19:00	15:00	39.3	42.0	34.5	53.7	
19:15	15:00	39.0	39.8	33.7	63.1	
19:30	15:00	37.8	40.3	33.3	54.4	
19:45	15:00	42.3	41.6	33.3	71.2	
20:00	15:00	44.4	46.3	35.5	74.2	
20:15	15:00	44.2	47.7	37.4	56.9	
20:30	15:00	42.1	45.9	34.0	55.1	
20:45	15:00	41.6	44.6	36.8	53.8	
21:00	15:00	42.2	45.3	36.2	57.6	
21:15	15:00	41.2	44.5	34.1	56.6	
21:30	15:00	40.1	42.1	30.8	65.9	
21:45	15:00	38.9	41.4	29.2	62.4	
22:00	15:00	40.6	44.3	30.3	62.4	
22:15	15:00	38.2	40.3	29.5	53.5	
22:30	15:00	41.5	42.8	30.5	60.7	
22:45	15:00	40.2	43.2	30.6	58.9	
Average 1500-2300		43.3	46.0	38.2	53-74	

Noise Survey Results

Date: Friday 11th - Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 3**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	36.9	38.8	31.2	50.8	
23:15	15:00	38.7	41.3	34.4	52.6	
23:30	15:00	41.4	43.2	32.3	58.6	
23:45	15:00	33.6	36.2	30.1	43.4	
00:00	15:00	35.2	36.7	30.8	51.6	
00:15	15:00	46.0	46.8	31.0	60.6	
00:30	15:00	40.2	45.1	29.2	53.1	
00:45	15:00	41.6	40.5	27.9	63.2	
01:00	15:00	30.6	33.1	26.6	40.0	
01:15	15:00	32.2	34.2	26.8	45.2	
01:30	15:00	39.9	43.9	25.9	55.3	
01:45	15:00	29.8	32.2	26.2	38.2	
02:00	15:00	41.0	39.0	27.1	58.5	
02:15	15:00	29.9	32.2	25.9	46.0	
02:30	15:00	30.1	32.8	25.4	39.5	
02:45	15:00	35.0	38.4	24.9	48.2	
03:00	15:00	35.8	39.3	23.8	49.2	
03:15	15:00	25.7	28.4	21.8	37.8	
03:30	15:00	33.6	39.7	22.5	48.0	
03:45	15:00	26.5	25.9	18.9	55.6	
04:00	15:00	34.8	34.7	19.1	55.4	
04:15	15:00	38.1	40.7	21.6	54.5	
04:30	15:00	40.2	33.3	22.0	60.6	
04:45	15:00	26.8	29.7	22.3	37.9	
05:00	15:00	27.8	30.4	23.8	38.4	
05:15	15:00	28.5	31.0	24.7	40.2	
05:30	15:00	27.8	29.9	24.2	39.6	
05:45	15:00	34.6	35.2	24.2	51.5	
06:00	15:00	29.2	32.7	24.8	40.2	
06:15	15:00	31.8	33.7	27.3	53.2	
06:30	15:00	41.7	38.6	28.9	71.5	
06:45	15:00	45.4	43.9	30.9	71.0	
Average 2300-0700		38.2	39.2	27.7	38-72	
Average 1045-2300		47.1	49.6	40.0	53-75	

Noise Survey Results

Date: Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 4**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	44.4	45.6	32.7	68.6	
07:15	15:00	40.4	41.3	30.3	64.1	
07:30	15:00	37.4	39.9	30.1	53.7	
07:45	15:00	39.6	42.9	33.7	55.8	
08:00	15:00	47.0	44.2	32.9	76.1	
08:15	15:00	40.6	43.9	33.8	58.2	
08:30	15:00	40.9	43.3	33.4	59.3	
08:45	15:00	41.2	44.5	34.9	59.8	
09:00	15:00	51.6	47.7	33.7	74.1	
09:15	15:00	48.9	52.9	37.5	64.5	
09:30	15:00	53.5	51.7	37.5	74.1	
09:45	15:00	38.7	42.2	32.6	52.8	
10:00	15:00	36.5	39.7	30.9	56.9	
10:15	15:00	39.2	42.0	34.3	56.9	
10:30	15:00	40.2	43.1	33.1	57.6	
10:45	15:00	43.1	46.2	32.7	57.5	
11:00	15:00	39.6	42.8	32.8	57.3	
11:15	15:00	44.8	46.9	41.6	55.4	
11:30	15:00	57.2	62.0	43.7	67.8	
11:45	15:00	57.9	62.3	44.9	66.5	
12:00	15:00	56.9	60.4	43.8	72.4	
12:15	15:00	52.5	57.6	44.0	65.7	
12:30	15:00	43.8	48.4	34.3	56.7	
12:45	15:00	39.3	42.3	33.5	56.3	
13:00	15:00	38.6	40.7	32.4	59.4	
13:15	15:00	40.2	43.7	34.4	55.1	
13:30	15:00	40.9	44.1	35.2	56.3	
13:45	15:00	41.0	44.3	34.9	56.1	
14:00	15:00	40.8	43.4	33.8	60.3	
14:15	15:00	45.1	45.5	34.4	69.0	
14:30	15:00	45.1	45.7	35.6	61.6	
14:45	15:00	41.2	45.3	33.3	57.5	
Average 0700-1500		49.1	52.7	37.6	53-76	

Noise Survey Results

Date: Saturday 12th November 2022 **TABLE 5**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	40.6	44.2	34.2	58.9	
15:15	15:00	42.6	42.2	32.9	65.9	
15:30	15:00	39.6	42.4	33.2	58.2	
15:45	15:00	37.3	39.7	32.1	56.2	
16:00	15:00	40.3	43.5	34.8	57.5	
16:15	15:00	39.1	40.9	34.7	58.4	
16:30	15:00	40.6	44.2	34.0	55.8	
16:45	15:00	38.6	40.9	33.4	59.6	
17:00	15:00	38.3	38.8	33.7	55.5	
17:15	15:00	39.7	41.7	35.9	53.7	
17:30	15:00	40.4	42.8	34.8	60.1	
17:45	15:00	38.1	39.9	34.5	50.1	
18:00	15:00	42.6	45.1	34.4	65.8	
18:15	15:00	39.6	42.9	34.1	54.7	
18:30	15:00	39.1	39.9	33.9	57.1	
18:45	15:00	38.4	41.1	33.8	50.5	
19:00	15:00	39.7	40.2	33.2	67.7	
19:15	15:00	38.5	41.8	31.8	54.3	
19:30	15:00	40.8	43.2	30.8	63.6	
19:45	15:00	36.6	39.7	30.7	52.3	
20:00	15:00	38.4	41.2	31.6	54.4	
20:15	15:00	35.3	38.6	28.8	48.7	
20:30	15:00	35.4	38.5	28.1	49.8	
20:45	15:00	35.0	36.5	28.8	51.6	
21:00	15:00	37.6	40.4	30.1	51.7	
21:15	15:00	36.9	40.4	30.3	50.0	
21:30	15:00	37.6	40.4	30.9	58.3	
21:45	15:00	38.2	41.5	32.5	51.7	
22:00	15:00	37.5	41.0	31.6	50.0	
22:15	15:00	38.0	40.7	33.2	55.0	
22:30	15:00	39.0	42.0	32.5	58.1	
22:45	15:00	39.3	42.6	33.9	54.4	
Average 1500-2300		39.0	41.5	32.9	49-68	

Noise Survey Results

Date: Saturday 29th - Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 6**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	37.7	40.2	33.3	58.4	
23:15	15:00	37.6	40.7	33.2	54.9	
23:30	15:00	38.9	41.7	34.0	58.0	
23:45	15:00	40.3	43.0	36.0	57.8	
00:00	15:00	40.2	42.6	36.5	51.7	
00:15	15:00	39.9	42.1	36.7	57.4	
00:30	15:00	40.0	42.5	36.2	53.3	
00:45	15:00	39.1	41.5	35.8	53.7	
01:00	15:00	39.2	41.6	35.7	50.4	
01:15	15:00	39.3	41.6	35.7	53.0	
01:30	15:00	39.6	42.4	35.3	51.8	
01:45	15:00	38.1	40.7	33.5	53.3	
02:00	15:00	36.3	39.6	31.4	51.4	
02:15	15:00	35.0	37.3	31.3	51.4	
02:30	15:00	34.8	36.9	31.4	52.2	
02:45	15:00	33.6	35.5	29.9	58.3	
03:00	15:00	34.2	36.2	30.2	59.7	
03:15	15:00	34.2	36.3	30.2	52.0	
03:30	15:00	34.5	36.6	30.9	52.0	
03:45	15:00	35.0	37.2	31.4	54.3	
04:00	15:00	36.1	38.2	32.6	53.3	
04:15	15:00	34.9	36.8	31.6	54.5	
04:30	15:00	33.9	35.7	30.5	59.3	
04:45	15:00	32.8	34.8	29.5	50.8	
05:00	15:00	33.6	35.6	29.8	53.3	
05:15	15:00	34.4	36.7	30.7	53.2	
05:30	15:00	37.3	39.3	33.9	56.7	
05:45	15:00	37.4	39.5	34.4	52.2	
06:00	15:00	37.2	39.2	34.3	50.9	
06:15	15:00	36.9	39.3	33.0	57.8	
06:30	15:00	37.7	39.7	32.3	63.2	
06:45	15:00	38.3	41.5	30.4	60.5	
Average 2300-0700		37.3	39.8	33.4	50-63	
Average 0700-2300		46.5	50.0	35.9	49-76	

Noise Survey Results

Date: Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 7**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	35.4	38.1	31.2	49.2	
07:15	15:00	41.2	43.5	31.5	58.8	
07:30	15:00	45.3	48.7	32.9	63.3	
07:45	15:00	44.4	46.8	30.8	64.6	
08:00	15:00	45.1	48.0	33.1	65.6	
08:15	15:00	41.4	44.3	33.5	64.0	
08:30	15:00	44.0	42.5	34.8	68.7	
08:45	15:00	46.2	46.6	34.7	68.4	
09:00	15:00	41.7	45.3	34.3	58.7	
09:15	15:00	47.3	46.8	35.3	73.2	
09:30	15:00	44.6	41.6	32.0	70.1	
09:45	15:00	46.9	44.0	32.2	72.8	
10:00	15:00	40.4	40.7	33.0	63.0	
10:15	15:00	42.9	45.0	33.2	64.2	
10:30	15:00	42.1	43.1	33.3	71.4	
10:45	15:00	48.2	47.6	32.3	72.8	
11:00	15:00	35.8	36.4	32.0	60.3	
11:15	15:00	39.1	41.7	33.7	59.8	
11:30	15:00	41.2	43.0	33.1	60.6	
11:45	15:00	39.8	41.4	34.0	59.4	
12:00	15:00	38.8	39.9	33.6	58.5	
12:15	15:00	40.5	41.5	34.0	59.0	
12:30	15:00	44.8	45.3	33.1	65.8	
12:45	15:00	38.9	41.8	33.3	57.1	
13:00	15:00	36.5	38.4	32.3	58.8	
13:15	15:00	42.0	45.4	34.4	60.6	
13:30	15:00	39.9	42.5	33.4	62.1	
13:45	15:00	44.8	47.9	33.9	66.7	
14:00	15:00	38.1	40.3	33.5	60.6	
14:15	15:00	43.2	46.9	33.8	64.9	
14:30	15:00	39.3	41.1	33.9	62.5	
14:45	15:00	39.1	40.4	33.3	62.3	
Average 0700-1500		43.0	44.3	33.3	49-73	

Noise Survey Results

Date: Sunday 13th November 2022 **TABLE 8**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	41.8	45.1	32.0	60.9	
15:15	15:00	40.7	44.5	33.2	63.5	
15:30	15:00	39.3	42.0	32.8	63.7	
15:45	15:00	41.2	42.4	34.0	63.1	
16:00	15:00	40.6	43.0	33.9	61.6	
16:15	15:00	42.2	45.1	34.0	64.1	
16:30	15:00	49.4	48.3	34.1	81.6	
16:45	15:00	38.7	39.5	31.7	59.3	
17:00	15:00	40.1	42.9	32.5	55.3	
17:15	15:00	41.5	41.1	32.9	58.7	
17:30	15:00	40.8	37.6	32.3	64.1	
17:45	15:00	39.6	40.6	31.6	57.1	
18:00	15:00	34.1	36.2	31.0	46.0	
18:15	15:00	37.6	39.4	30.8	52.2	
18:30	15:00	39.9	39.4	31.6	67.0	
18:45	15:00	40.5	40.8	30.5	62.6	
19:00	15:00	37.7	41.8	29.3	50.8	
19:15	15:00	39.7	44.0	30.3	51.8	
19:30	15:00	40.6	42.3	29.5	62.9	
19:45	15:00	42.5	46.7	29.3	60.8	
20:00	15:00	35.2	36.5	29.1	49.0	
20:15	15:00	39.4	41.4	29.8	54.8	
20:30	15:00	38.4	39.2	29.2	59.8	
20:45	15:00	39.7	43.4	27.3	66.7	
21:00	15:00	34.7	37.6	26.4	50.8	
21:15	15:00	40.1	42.1	26.7	56.3	
21:30	15:00	40.0	42.4	25.9	62.3	
21:45	15:00	39.1	40.7	25.1	63.0	
22:00	15:00	38.7	36.0	22.7	63.6	
22:15	15:00	35.9	38.0	25.6	52.4	
22:30	15:00	38.9	37.9	23.8	64.9	
22:45	15:00	42.9	48.1	27.7	54.3	
Average 1500-2300		40.8	42.6	30.8	46-82	

Noise Survey Results

Date: Sunday 30th - Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 9**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	32.8	33.3	21.3	48.4	
23:15	15:00	33.0	33.8	22.4	48.7	
23:30	15:00	38.1	40.7	22.6	59.5	
23:45	15:00	24.7	27.9	20.0	34.4	
00:00	15:00	25.9	30.0	20.1	40.4	
00:15	15:00	35.7	32.7	19.3	54.1	
00:30	15:00	39.7	41.4	20.9	56.3	
00:45	15:00	23.6	26.3	19.6	36.6	
01:00	15:00	22.9	25.1	19.4	35.0	
01:15	15:00	24.6	27.3	19.9	37.0	
01:30	15:00	23.1	25.5	19.8	35.3	
01:45	15:00	22.8	25.2	19.6	38.6	
02:00	15:00	22.8	24.7	20.0	38.3	
02:15	15:00	27.6	32.2	20.0	39.1	
02:30	15:00	21.0	22.3	19.0	35.4	
02:45	15:00	28.1	30.9	20.8	41.6	
03:00	15:00	23.9	25.8	21.5	36.6	
03:15	15:00	32.8	34.1	23.0	47.3	
03:30	15:00	29.4	31.8	26.1	41.7	
03:45	15:00	28.2	30.3	25.4	38.0	
04:00	15:00	34.2	35.9	28.3	49.6	
04:15	15:00	31.6	34.0	28.1	41.1	
04:30	15:00	33.4	35.2	30.7	40.5	
04:45	15:00	34.5	36.4	31.9	45.0	
05:00	15:00	35.7	37.8	31.3	45.7	
05:15	15:00	35.6	35.5	32.9	50.6	
05:30	15:00	37.0	37.6	34.6	49.1	
05:45	15:00	39.2	40.8	36.3	51.7	
06:00	15:00	37.6	38.6	36.4	46.4	
06:15	15:00	45.4	47.5	36.8	69.5	
06:30	15:00	46.2	46.8	38.8	68.0	
06:45	15:00	45.1	47.7	38.7	66.2	
Average 2300-0700		37.3	39.0	31.1	34-70	
Average 0700-2300		42.0	43.6	32.2	46-82	

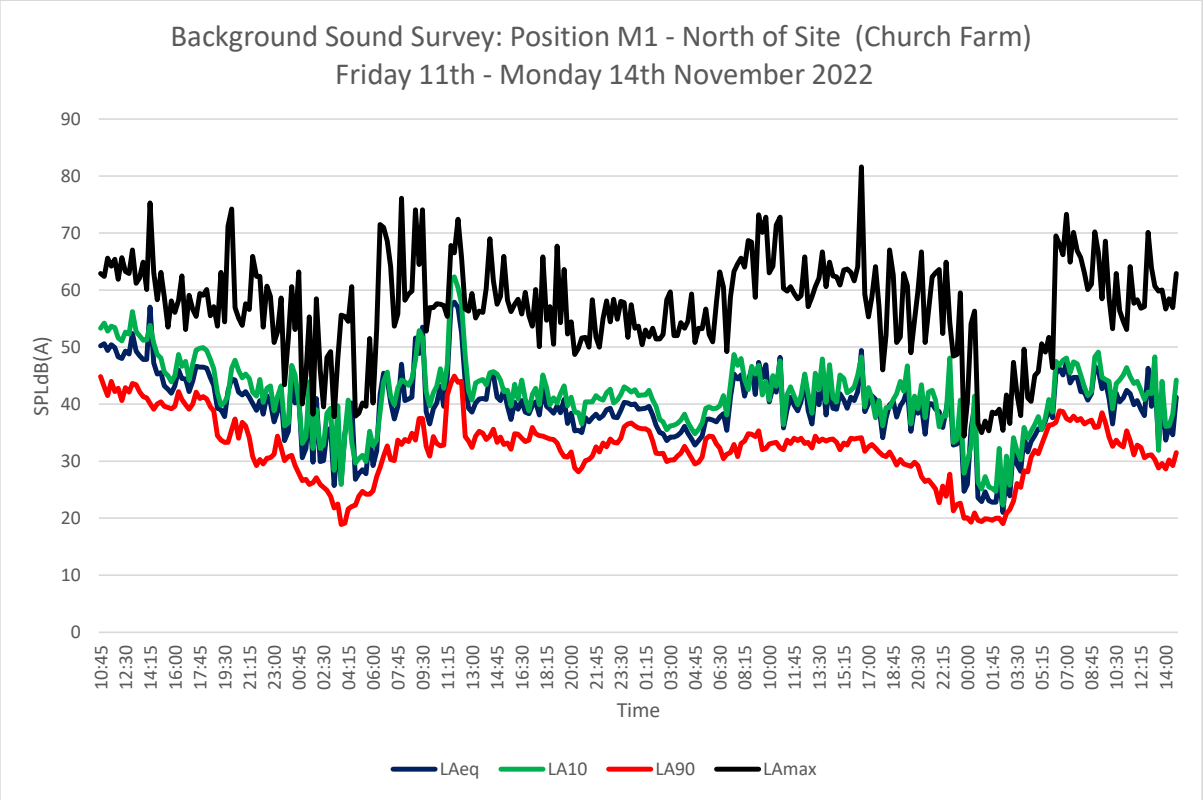
Noise Survey Results

Date: Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 10**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M1 - North of Site (Church Farm)**
Instrumentation: Norsonic 118 Real Time Analyser (31832)
Calibration: 94dB

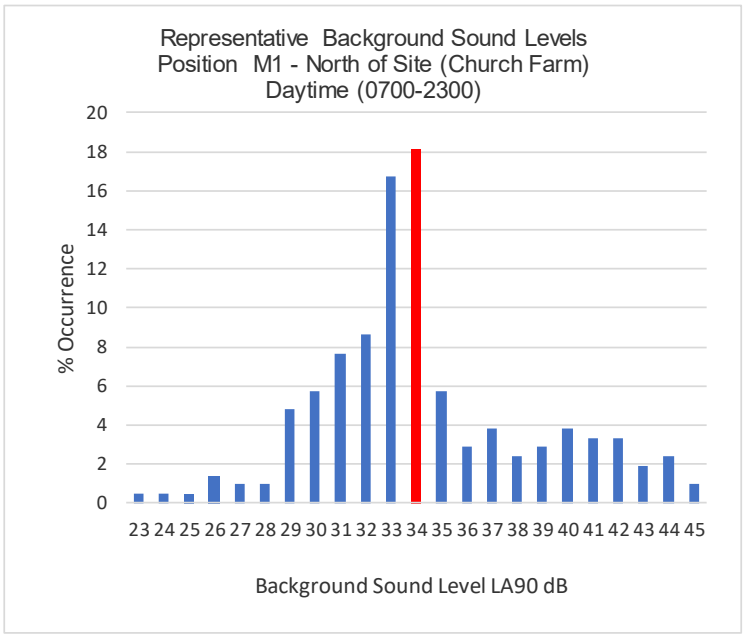
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	47.3	48.1	37.5	73.3	
07:15	15:00	43.7	45.5	37.1	64.9	
07:30	15:00	44.7	47.4	37.9	70.1	
07:45	15:00	44.7	47.1	37.1	66.9	
08:00	15:00	42.2	45.1	37.5	65.7	
08:15	15:00	42.1	43.0	36.5	63.0	
08:30	15:00	40.7	41.5	36.9	60.1	
08:45	15:00	41.8	42.2	37.2	61.0	
09:00	15:00	46.6	48.3	35.9	70.2	
09:15	15:00	45.9	49.1	36.0	66.6	
09:30	15:00	42.7	44.7	38.5	58.5	
09:45	15:00	44.1	44.3	36.8	68.6	
10:00	15:00	41.0	44.0	34.2	58.6	
10:15	15:00	36.5	39.2	32.6	53.2	
10:30	15:00	41.9	43.6	33.7	62.9	
10:45	15:00	40.4	44.2	32.9	56.4	
11:00	15:00	41.1	45.1	32.5	54.5	
11:15	15:00	42.4	46.4	35.3	53.1	
11:30	15:00	41.8	44.8	33.6	64.1	
11:45	15:00	39.9	43.6	31.1	57.7	
12:00	15:00	40.6	44.0	32.8	58.3	
12:15	15:00	39.1	42.4	32.4	56.8	
12:30	15:00	38.0	40.8	30.6	57.1	
12:45	15:00	46.3	42.1	31.0	70.1	
13:00	15:00	39.6	41.8	31.1	63.9	
13:15	15:00	44.7	48.3	30.3	60.7	
13:30	15:00	33.3	31.9	28.8	59.8	
13:45	15:00	40.8	44.0	29.6	60.0	
14:00	15:00	33.7	36.1	28.6	56.7	
14:15	15:00	36.1	36.2	30.2	58.5	
14:30	15:00	34.6	38.2	29.2	56.9	
14:45	15:00	41.2	44.2	31.5	62.9	
Average 0700-1500		42.4	44.6	34.6	53-73	

Overall Average	**37.6**	**39.3**	**31.3**	**34-72**	
Overall Average	**45.2**	**48.0**	**36.5**	**46-82**	

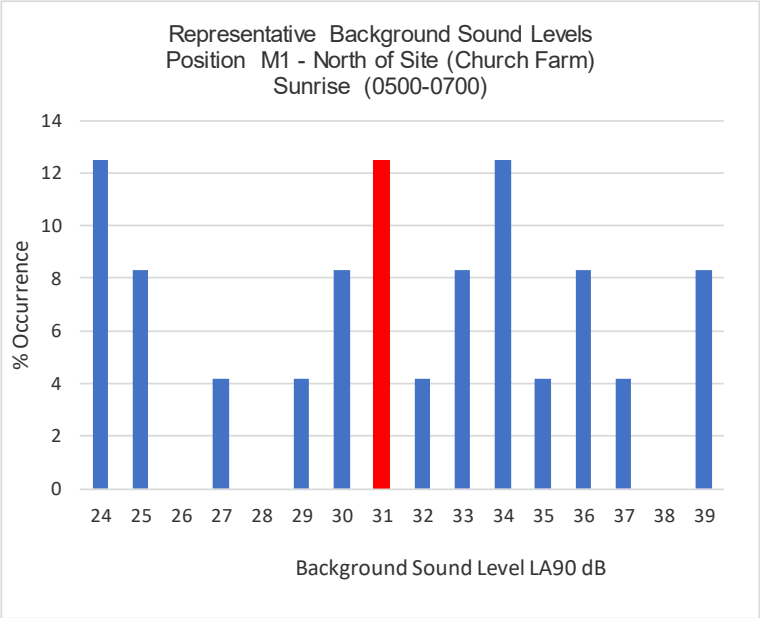
Average 0500-0700	**39.8**	**41**	**33.4**	**38-72**	
			31		



LA90	% Occurrence
23	0.5
24	0.5
25	0.5
26	1.4
27	1.0
28	1.0
29	4.8
30	5.7
31	7.7
32	8.6
33	**16.7**
34	**18.2**
35	5.7
36	2.9
37	3.8
38	2.4
39	2.9
40	3.8
41	3.3
42	3.3
43	1.9
44	2.4
45	1.0



LA90	% Occurrence
24	12.5
25	8.3
26	0.0
27	4.2
28	0.0
29	4.2
30	8.3
31	**12.5**
32	4.2
33	8.3
34	12.5
35	4.2
36	8.3
37	4.2
38	0.0
39	8.3



Noise Survey Results

Date: Friday 11th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 11**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
11:15	15:00	49.0	52.1	41.4	65.8	
11:30	15:00	47.6	49.3	42.0	68.8	
11:45	15:00	49.0	51.8	43.4	63.8	
12:00	15:00	49.2	52.1	42.3	70.7	
12:15	15:00	47.2	49.4	42.4	66.6	
12:30	15:00	49.3	52.5	43.1	70.4	
12:45	15:00	50.4	53.9	44.0	64.5	
13:00	15:00	49.5	52.5	43.7	62.4	
13:15	15:00	49.4	52.9	43.3	65.1	
13:30	15:00	47.4	49.9	42.0	61.8	
13:45	15:00	50.1	52.5	43.6	66.8	
14:00	15:00	49.4	52.2	42.6	65.4	
14:15	15:00	57.2	55.7	41.6	80.4	
14:30	15:00	49.1	51.3	42.7	69.6	
14:45	15:00	52.1	54.1	43.2	73.4	
Average 1115-1500		50.6	52.4	42.8	62-80	

Noise Survey Results

Date: Friday 11th November 2022 **TABLE 12**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	48.3	48.3	42.3	69.9	
15:15	15:00	46.3	47.4	41.3	63.3	
15:30	15:00	44.8	45.8	42.1	60.4	
15:45	15:00	47.0	47.2	42.8	66.7	
16:00	15:00	56.3	54.5	43.9	77.7	
16:15	15:00	49.0	50.5	45.8	63.5	
16:30	15:00	52.6	55.8	45.7	76.0	
16:45	15:00	57.2	60.3	41.9	74.9	
17:00	15:00	44.5	44.4	41.8	60.6	
17:15	15:00	45.5	45.2	41.1	63.4	
17:30	15:00	43.7	44.6	41.5	60.8	
17:45	15:00	46.5	47.4	41.1	69.7	
18:00	15:00	45.5	45.5	41.8	65.2	
18:15	15:00	46.0	46.6	41.7	67.0	
18:30	15:00	46.0	46.5	40.6	68.4	
18:45	15:00	44.9	45.3	39.9	61.0	
19:00	15:00	44.6	44.4	37.4	63.9	
19:15	15:00	45.0	42.6	36.7	72.3	
19:30	15:00	41.4	41.1	35.5	67.1	
19:45	15:00	45.6	47.3	36.5	68.3	
20:00	15:00	42.1	40.7	35.7	63.9	
20:15	15:00	41.6	44.3	37.3	53.0	
20:30	15:00	39.5	40.0	35.3	58.3	
20:45	15:00	45.5	43.8	36.7	71.9	
21:00	15:00	41.8	40.8	35.7	60.5	
21:15	15:00	43.6	42.2	35.6	61.1	
21:30	15:00	48.4	50.5	33.8	75.8	
21:45	15:00	40.4	40.1	32.8	64.0	
22:00	15:00	46.9	50.6	32.6	69.0	
22:15	15:00	43.5	43.6	31.8	61.9	
22:30	15:00	46.7	42.8	32.9	67.5	
22:45	15:00	45.2	47.9	33.4	61.3	
Average 1500-2300		48.2	49.5	40.2	53-78	

Noise Survey Results

Date: Friday 28th - Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 13**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	42.8	42.9	34.6	59.3	
23:15	15:00	41.2	41.2	33.8	61.5	
23:30	15:00	46.9	41.1	33.1	67.5	
23:45	15:00	35.0	37.0	31.4	51.1	
00:00	15:00	38.2	36.9	31.5	60.1	
00:15	15:00	49.5	52.2	32.4	65.2	
00:30	15:00	45.4	49.1	31.5	59.1	
00:45	15:00	45.7	41.1	31.0	64.6	
01:00	15:00	34.2	37.0	29.7	43.0	
01:15	15:00	36.2	39.5	29.5	48.5	
01:30	15:00	45.4	47.8	30.4	61.6	
01:45	15:00	33.6	36.0	29.7	47.7	
02:00	15:00	47.3	40.7	28.3	67.3	
02:15	15:00	32.2	34.8	28.5	44.7	
02:30	15:00	31.9	34.5	27.7	47.2	
02:45	15:00	44.4	43.3	27.2	61.0	
03:00	15:00	43.0	42.2	27.5	58.3	
03:15	15:00	30.2	32.6	26.1	43.4	
03:30	15:00	40.1	41.9	25.0	55.7	
03:45	15:00	27.1	30.6	21.5	46.5	
04:00	15:00	37.6	34.7	21.8	55.1	
04:15	15:00	42.0	39.6	27.8	59.2	
04:30	15:00	42.9	35.2	28.9	63.0	
04:45	15:00	38.9	36.8	31.1	50.5	
05:00	15:00	38.7	36.7	31.5	50.1	
05:15	15:00	39.2	38.3	31.9	49.4	
05:30	15:00	40.1	42.8	31.7	52.8	
05:45	15:00	39.5	38.5	30.8	57.4	
06:00	15:00	42.2	44.3	31.6	57.8	
06:15	15:00	39.8	41.3	31.5	56.7	
06:30	15:00	39.9	42.3	30.9	59.4	
06:45	15:00	48.1	43.3	30.8	71.2	
Average 2300-0700		42.7	42.7	30.5	39-71	
Average 1115-2300		49.1	50.7	41.2	53-80	

Noise Survey Results

Date: Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 14**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	46.5	47.2	32.0	67.3	
07:15	15:00	43.1	44.8	32.2	63.6	
07:30	15:00	41.8	41.1	32.1	65.6	
07:45	15:00	40.8	42.0	33.5	57.8	
08:00	15:00	39.9	41.4	32.9	61.1	
08:15	15:00	42.3	43.0	33.1	60.9	
08:30	15:00	46.4	49.2	33.8	68.1	
08:45	15:00	43.3	45.3	32.9	66.2	
09:00	15:00	43.3	45.6	34.0	61.3	
09:15	15:00	43.0	44.6	34.5	60.1	
09:30	15:00	41.1	43.4	33.1	60.7	
09:45	15:00	40.7	40.3	32.7	61.2	
10:00	15:00	54.3	41.5	31.4	78.8	
10:15	15:00	39.7	41.4	32.9	57.8	
10:30	15:00	42.8	43.1	34.0	63.0	
10:45	15:00	43.1	43.8	33.5	64.3	
11:00	15:00	38.5	37.8	32.4	59.8	
11:15	15:00	42.9	44.0	35.0	63.5	
11:30	15:00	43.8	43.8	34.0	71.0	
11:45	15:00	43.2	45.8	34.9	60.7	
12:00	15:00	39.4	41.4	34.8	59.0	
12:15	15:00	41.3	44.6	34.6	61.3	
12:30	15:00	41.3	43.7	35.1	61.0	
12:45	15:00	41.5	44.0	34.7	63.9	
13:00	15:00	44.7	41.9	34.2	66.0	
13:15	15:00	41.9	43.5	35.7	64.3	
13:30	15:00	43.0	43.6	35.4	62.5	
13:45	15:00	42.1	43.7	34.2	62.3	
14:00	15:00	42.9	43.6	34.9	63.4	
14:15	15:00	40.5	42.3	35.2	55.5	
14:30	15:00	43.8	46.2	36.0	63.5	
14:45	15:00	42.9	46.3	35.0	60.2	
Average 0700-1500		44.2	44.1	34.0	56-79	

Noise Survey Results

Date: Saturday 12th November 2022 **TABLE 15**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	46.0	43.8	33.9	67.4	
15:15	15:00	41.8	42.2	33.3	64.8	
15:30	15:00	43.4	43.9	35.0	66.0	
15:45	15:00	41.5	42.6	33.3	64.4	
16:00	15:00	39.7	42.4	34.3	61.6	
16:15	15:00	42.7	44.0	35.3	63.5	
16:30	15:00	43.4	46.5	37.2	61.0	
16:45	15:00	43.0	43.1	35.7	63.3	
17:00	15:00	39.5	42.0	36.7	48.7	
17:15	15:00	42.8	43.7	39.2	59.7	
17:30	15:00	42.5	43.7	39.0	59.3	
17:45	15:00	42.5	42.8	38.7	63.8	
18:00	15:00	46.3	46.6	38.5	70.8	
18:15	15:00	42.6	44.0	38.0	57.7	
18:30	15:00	43.0	42.2	37.4	64.7	
18:45	15:00	43.4	44.7	39.2	60.3	
19:00	15:00	42.5	44.4	38.3	58.0	
19:15	15:00	42.4	44.4	37.9	63.4	
19:30	15:00	44.1	44.6	33.7	66.5	
19:45	15:00	38.9	37.8	30.6	62.2	
20:00	15:00	41.2	39.9	32.1	66.0	
20:15	15:00	35.6	35.8	28.0	54.2	
20:30	15:00	37.9	33.4	26.8	58.5	
20:45	15:00	37.8	35.1	28.4	59.0	
21:00	15:00	41.9	41.7	27.8	65.4	
21:15	15:00	36.1	34.0	27.1	56.0	
21:30	15:00	39.8	32.9	27.1	62.9	
21:45	15:00	36.4	36.0	25.6	57.3	
22:00	15:00	39.3	42.0	27.0	61.6	
22:15	15:00	34.1	35.9	26.9	53.0	
22:30	15:00	40.1	39.5	25.3	65.6	
22:45	15:00	36.9	37.3	25.7	55.7	
Average 1500-2300		41.7	42.3	35.1	49-71	

Noise Survey Results

Date: Saturday 29th - Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 16**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	34.0	35.4	26.4	55.1	
23:15	15:00	37.1	38.8	26.1	55.1	
23:30	15:00	40.6	34.7	26.6	67.5	
23:45	15:00	38.8	36.2	26.5	62.0	
00:00	15:00	33.0	31.2	25.0	52.8	
00:15	15:00	34.9	35.2	25.8	51.8	
00:30	15:00	36.9	35.0	25.0	55.7	
00:45	15:00	31.2	34.2	25.6	46.8	
01:00	15:00	30.1	31.2	25.2	48.1	
01:15	15:00	38.9	35.2	26.0	65.2	
01:30	15:00	36.1	35.7	25.7	55.3	
01:45	15:00	35.3	33.0	24.2	55.4	
02:00	15:00	30.4	33.7	24.6	46.9	
02:15	15:00	28.0	30.8	23.6	43.8	
02:30	15:00	28.1	30.1	24.5	51.0	
02:45	15:00	27.6	29.9	23.9	44.6	
03:00	15:00	27.6	30.1	23.8	47.4	
03:15	15:00	27.5	29.6	23.6	48.2	
03:30	15:00	27.7	30.0	23.8	46.2	
03:45	15:00	29.0	31.6	24.4	46.9	
04:00	15:00	29.1	31.5	25.3	48.4	
04:15	15:00	29.0	31.2	25.6	46.5	
04:30	15:00	32.3	34.5	28.9	49.2	
04:45	15:00	33.0	35.0	28.7	53.6	
05:00	15:00	33.3	35.7	29.3	52.5	
05:15	15:00	34.0	36.8	29.1	49.3	
05:30	15:00	34.5	37.3	29.3	55.4	
05:45	15:00	33.1	35.7	28.5	54.9	
06:00	15:00	34.6	37.4	29.5	56.2	
06:15	15:00	37.2	39.8	30.4	59.7	
06:30	15:00	37.7	40.9	31.5	55.8	
06:45	15:00	43.2	45.1	31.6	67.3	
Average 2300-0700		35.3	36.2	27.2	44-68	
Average 0700-2300		43.1	43.3	34.6	49-79	

Noise Survey Results

Date: Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 17**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	37.8	39.0	31.2	61.3	
07:15	15:00	35.2	37.3	30.3	53.3	
07:30	15:00	39.6	42.3	32.2	60.2	
07:45	15:00	43.1	47.0	32.7	60.3	
08:00	15:00	41.5	44.4	34.0	63.5	
08:15	15:00	40.3	43.0	33.7	54.6	
08:30	15:00	39.1	41.3	34.8	55.2	
08:45	15:00	37.9	40.2	33.5	56.1	
09:00	15:00	42.9	45.4	35.0	69.0	
09:15	15:00	48.7	52.0	36.2	67.3	
09:30	15:00	42.1	44.3	32.4	62.7	
09:45	15:00	42.9	44.8	33.1	63.6	
10:00	15:00	41.2	41.0	34.4	66.1	
10:15	15:00	45.9	49.7	34.5	65.5	
10:30	15:00	43.8	45.7	34.2	65.8	
10:45	15:00	43.4	45.8	33.7	63.8	
11:00	15:00	39.0	40.7	33.0	59.5	
11:15	15:00	45.0	48.3	34.9	62.2	
11:30	15:00	44.4	44.6	34.6	70.5	
11:45	15:00	43.7	45.6	35.5	64.7	
12:00	15:00	45.1	43.7	34.9	65.9	
12:15	15:00	45.9	48.3	35.2	65.8	
12:30	15:00	48.1	48.5	36.5	71.5	
12:45	15:00	41.4	43.5	35.6	60.3	
13:00	15:00	48.1	49.1	34.5	69.7	
13:15	15:00	43.5	46.9	35.7	62.3	
13:30	15:00	39.6	41.8	35.0	59.0	
13:45	15:00	46.5	48.5	35.8	66.9	
14:00	15:00	41.4	42.7	36.5	63.9	
14:15	15:00	44.6	47.8	36.8	65.0	
14:30	15:00	48.6	50.4	36.1	68.8	
14:45	15:00	43.3	46.7	35.3	59.8	
Average 0700-1500		44.1	46.2	34.6	53-72	

Noise Survey Results

Date: Sunday 13th November 2022 **TABLE 18**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	40.6	43.5	34.6	55.8	
15:15	15:00	44.0	47.5	35.4	60.3	
15:30	15:00	41.4	44.0	35.0	61.6	
15:45	15:00	42.9	44.6	35.7	62.0	
16:00	15:00	42.1	42.9	35.7	59.9	
16:15	15:00	45.5	46.5	36.3	66.3	
16:30	15:00	43.1	43.3	36.3	63.5	
16:45	15:00	43.4	41.6	35.3	63.3	
17:00	15:00	41.5	42.4	35.7	62.8	
17:15	15:00	43.8	42.4	36.5	67.9	
17:30	15:00	42.9	40.1	35.1	65.8	
17:45	15:00	40.7	42.0	35.2	61.1	
18:00	15:00	36.8	39.1	33.7	45.0	
18:15	15:00	40.7	41.4	34.7	61.9	
18:30	15:00	43.3	40.9	33.8	66.6	
18:45	15:00	44.1	42.3	34.0	67.0	
19:00	15:00	39.3	42.6	31.9	60.2	
19:15	15:00	42.0	44.6	31.7	58.2	
19:30	15:00	44.1	42.9	31.3	63.6	
19:45	15:00	43.7	45.7	32.4	64.9	
20:00	15:00	36.9	39.8	31.9	45.0	
20:15	15:00	42.8	42.4	32.4	60.3	
20:30	15:00	42.1	39.8	31.2	67.2	
20:45	15:00	41.8	43.3	28.2	67.1	
21:00	15:00	37.1	38.1	26.7	56.3	
21:15	15:00	43.7	45.0	30.3	68.0	
21:30	15:00	43.0	42.1	28.2	67.1	
21:45	15:00	42.0	42.2	27.8	65.0	
22:00	15:00	40.0	39.2	26.1	64.2	
22:15	15:00	39.7	39.3	28.5	60.3	
22:30	15:00	43.3	38.5	26.3	67.0	
22:45	15:00	43.8	48.2	29.7	60.2	
Average 1500-2300		42.3	43.1	33.4	45-68	

Noise Survey Results

Date: Sunday 30th - Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 19**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	32.9	35.1	24.9	46.0	
23:15	15:00	38.7	36.8	25.9	63.0	
23:30	15:00	42.2	45.0	26.3	63.9	
23:45	15:00	31.4	31.8	22.6	58.4	
00:00	15:00	28.2	31.4	22.7	45.9	
00:15	15:00	41.8	34.1	22.7	63.8	
00:30	15:00	43.1	43.0	24.1	61.3	
00:45	15:00	28.6	31.3	22.6	47.6	
01:00	15:00	27.0	29.9	21.4	40.5	
01:15	15:00	29.3	32.0	24.2	44.9	
01:30	15:00	28.1	30.5	23.3	40.2	
01:45	15:00	28.1	30.6	22.8	47.3	
02:00	15:00	25.9	28.3	22.0	43.9	
02:15	15:00	30.3	34.4	21.9	48.1	
02:30	15:00	27.0	28.3	21.4	43.1	
02:45	15:00	27.3	29.8	22.5	40.1	
03:00	15:00	26.6	29.5	22.6	41.1	
03:15	15:00	39.3	37.2	24.1	58.5	
03:30	15:00	32.6	35.9	27.1	45.8	
03:45	15:00	33.7	36.7	28.5	42.7	
04:00	15:00	36.8	39.5	31.7	49.2	
04:15	15:00	35.6	38.6	30.8	44.5	
04:30	15:00	36.1	38.7	32.2	43.6	
04:45	15:00	35.8	38.3	32.5	42.5	
05:00	15:00	42.7	42.5	33.4	57.5	
05:15	15:00	41.8	39.1	35.7	59.8	
05:30	15:00	42.3	40.1	36.3	59.8	
05:45	15:00	44.2	44.7	36.9	63.2	
06:00	15:00	44.3	40.7	38.0	74.5	
06:15	15:00	50.9	50.4	38.3	78.4	
06:30	15:00	48.0	49.5	40.9	68.1	
06:45	15:00	50.1	51.3	41.3	66.5	
Average 2300-0700		41.8	42.2	33.0	40-78	
Average 0700-2300		43.3	45.0	34.0	45-72	

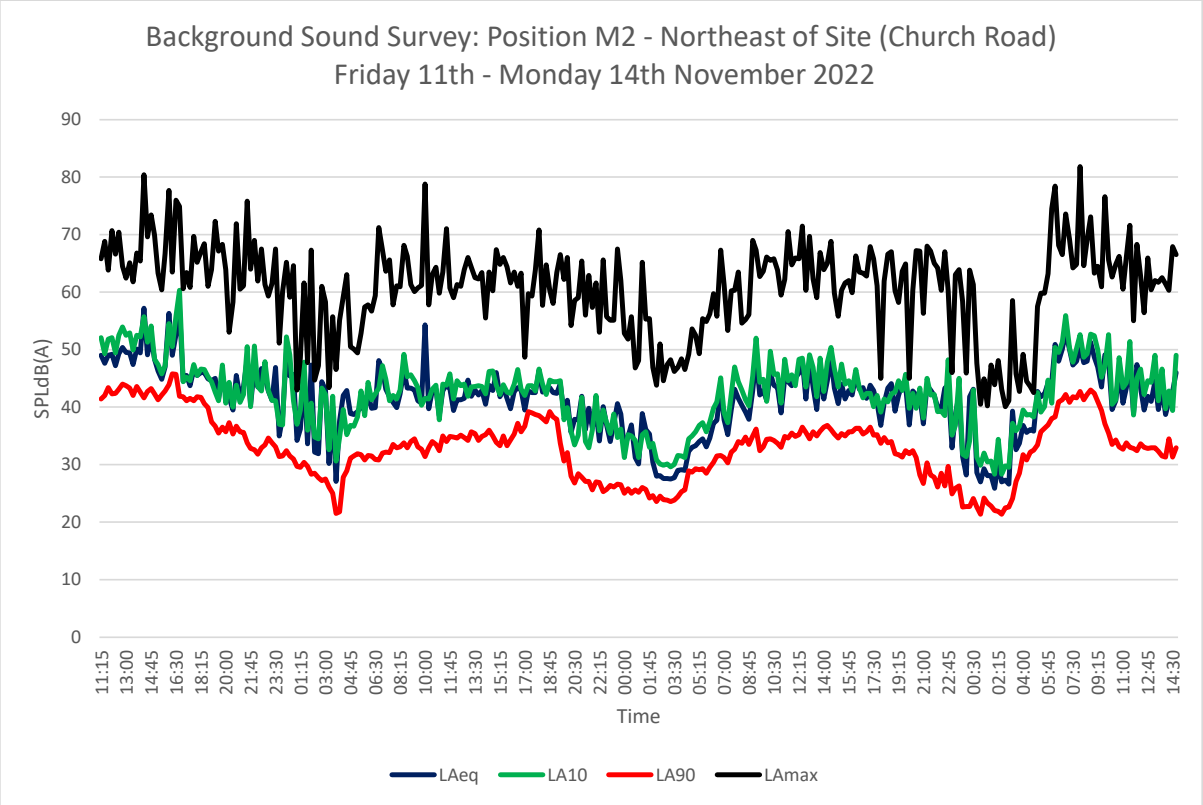
Noise Survey Results

Date: Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 20**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M2 - Northeast of Site (Church Road)**
Instrumentation: Norsonic 118 Real Time Analyser (31337)
Calibration: 94dB

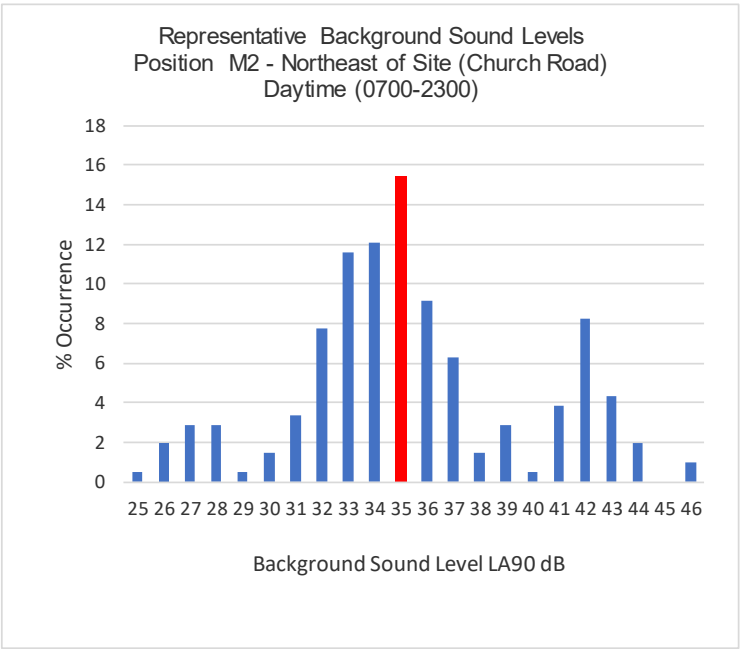
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	53.0	55.9	42.2	73.6	
07:15	15:00	50.0	50.3	40.8	69.2	
07:30	15:00	47.3	47.8	41.8	64.2	
07:45	15:00	48.0	50.2	41.6	64.8	
08:00	15:00	50.5	52.6	42.7	81.8	
08:15	15:00	47.7	48.7	41.3	64.6	
08:30	15:00	48.0	49.3	42.2	69.1	
08:45	15:00	51.3	52.7	43.0	73.1	
09:00	15:00	48.7	52.4	42.4	63.3	
09:15	15:00	47.0	50.0	41.0	64.5	
09:30	15:00	43.5	45.2	39.4	60.9	
09:45	15:00	49.1	47.1	37.1	76.6	
10:00	15:00	48.0	52.6	35.5	65.6	
10:15	15:00	39.6	40.5	33.5	62.6	
10:30	15:00	41.1	41.3	34.3	64.8	
10:45	15:00	46.1	48.6	33.1	66.2	
11:00	15:00	40.7	43.4	32.7	60.5	
11:15	15:00	43.3	44.2	33.8	66.1	
11:30	15:00	47.6	51.4	33.0	71.6	
11:45	15:00	38.9	38.6	32.8	55.0	
12:00	15:00	47.4	45.0	32.4	68.3	
12:15	15:00	43.3	46.6	33.6	62.8	
12:30	15:00	39.5	42.2	33.0	56.4	
12:45	15:00	41.9	44.6	32.8	65.9	
13:00	15:00	41.0	44.3	32.9	60.4	
13:15	15:00	44.5	49.0	32.9	62.0	
13:30	15:00	39.6	41.1	32.3	61.7	
13:45	15:00	43.3	46.6	31.5	62.5	
14:00	15:00	38.7	39.7	31.3	61.4	
14:15	15:00	41.0	42.8	34.5	60.3	
14:30	15:00	42.7	39.4	31.3	67.9	
14:45	15:00	46.0	49.0	32.9	66.5	
Average 0700-1500		46.6	48.7	38.2	55-82	

Overall Average	**40.9**	**41.2**	**30.9**	**39-78**	
Overall Average	**45.9**	**47.4**	**37.5**	**40-80**	

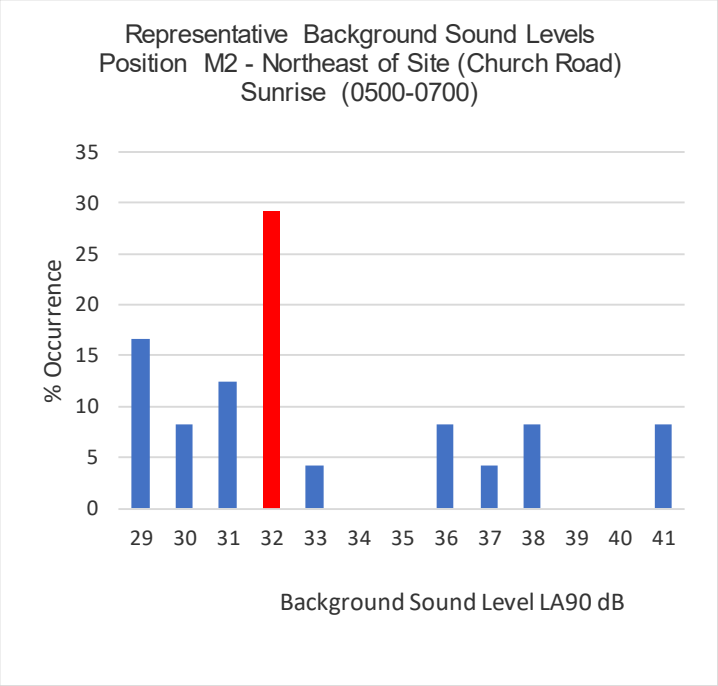
Average 0500-0700	**43.7**	**44**	**34.8**	**49-78**	
			32		



LA90	% Occurrence
25	0.5
26	1.9
27	2.9
28	2.9
29	0.5
30	1.4
31	3.4
32	7.7
33	11.6
34	12.1
35	**15.5**
36	9.2
37	6.3
38	1.4
39	2.9
40	0.5
41	3.9
42	8.2
43	4.3
44	1.9
45	0.0
46	1.0



LA90	% Occurrence
29	16.7
30	8.3
31	12.5
32	**29.2**
33	4.2
34	0.0
35	0.0
36	8.3
37	4.2
38	8.3
39	0.0
40	0.0
41	8.3



Noise Survey Results

Date: Friday 11th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 21**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
12:15	15:00	46.2	46.6	39.0	73.3	
12:30	15:00	42.3	43.2	38.4	59.8	
12:45	15:00	44.8	47.3	39.6	62.5	
13:00	15:00	53.5	46.1	38.7	83.7	
13:15	15:00	44.2	45.1	38.8	72.2	
13:30	15:00	43.8	44.9	39.4	62.0	
13:45	15:00	43.8	45.1	38.9	65.8	
14:00	15:00	43.9	44.2	39.0	67.6	
14:15	15:00	53.4	52.3	37.5	70.7	
14:30	15:00	48.3	47.3	38.5	74.9	
14:45	15:00	48.0	52.5	38.9	65.8	
Average 1215-1500		48.4	47.9	38.8	60-84	

Noise Survey Results

Date: Friday 11th November 2022 **TABLE 22**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	42.5	43.9	38.8	55.5	
15:15	15:00	43.6	43.9	39.0	65.0	
15:30	15:00	42.3	44.5	39.7	51.4	
15:45	15:00	46.2	46.6	39.7	64.0	
16:00	15:00	45.7	46.6	41.0	61.3	
16:15	15:00	46.0	47.4	41.6	64.3	
16:30	15:00	49.0	50.5	40.1	74.9	
16:45	15:00	46.9	47.6	38.7	71.9	
17:00	15:00	42.9	41.9	38.6	61.6	
17:15	15:00	44.3	41.3	37.8	63.9	
17:30	15:00	41.7	41.2	38.3	61.0	
17:45	15:00	44.5	42.9	38.1	68.6	
18:00	15:00	43.0	41.4	38.6	62.1	
18:15	15:00	43.8	43.1	38.6	65.7	
18:30	15:00	43.1	43.3	36.9	63.9	
18:45	15:00	42.9	43.1	36.1	61.9	
19:00	15:00	42.1	43.2	33.5	58.5	
19:15	15:00	47.6	42.5	33.5	78.2	
19:30	15:00	41.0	35.1	31.7	69.0	
19:45	15:00	43.8	45.8	32.5	59.8	
20:00	15:00	43.5	42.0	32.7	71.7	
20:15	15:00	35.9	36.5	32.7	52.3	
20:30	15:00	40.0	35.9	32.1	71.1	
20:45	15:00	43.4	42.3	33.8	66.5	
21:00	15:00	42.4	40.2	32.4	62.5	
21:15	15:00	41.4	37.9	33.0	61.6	
21:30	15:00	48.0	49.3	31.0	70.1	
21:45	15:00	40.5	39.0	29.6	59.1	
22:00	15:00	47.4	49.3	30.1	68.8	
22:15	15:00	43.4	41.1	28.8	64.0	
22:30	15:00	45.8	43.3	30.7	66.4	
22:45	15:00	45.5	47.2	29.8	68.4	
Average 1500-2300		44.5	44.6	36.8	51-78	

Noise Survey Results

Date: Friday 28th - Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 23**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	40.1	37.6	31.4	56.7	
23:15	15:00	40.4	38.9	30.6	60.5	
23:30	15:00	46.4	39.7	30.4	67.3	
23:45	15:00	33.1	35.2	28.9	50.0	
00:00	15:00	37.9	35.2	29.1	61.5	
00:15	15:00	48.1	50.8	30.3	62.5	
00:30	15:00	46.6	50.1	28.7	61.5	
00:45	15:00	47.3	41.5	28.4	68.1	
01:00	15:00	31.1	33.9	26.3	42.6	
01:15	15:00	39.9	38.9	27.5	56.9	
01:30	15:00	44.9	37.6	27.8	61.5	
01:45	15:00	32.6	35.4	26.6	45.4	
02:00	15:00	49.5	35.1	26.1	69.3	
02:15	15:00	30.0	32.5	25.9	39.5	
02:30	15:00	44.3	36.8	25.2	62.5	
02:45	15:00	44.2	34.8	25.4	63.0	
03:00	15:00	47.3	43.4	24.7	63.0	
03:15	15:00	27.7	30.4	23.8	37.9	
03:30	15:00	42.6	44.4	22.6	58.8	
03:45	15:00	34.5	37.6	26.7	56.7	
04:00	15:00	39.3	35.4	26.8	58.3	
04:15	15:00	43.3	38.5	29.5	60.6	
04:30	15:00	39.8	35.3	29.7	58.7	
04:45	15:00	35.6	34.6	29.6	51.0	
05:00	15:00	36.7	35.6	30.2	57.8	
05:15	15:00	38.6	35.7	28.9	59.7	
05:30	15:00	37.8	35.4	29.2	57.8	
05:45	15:00	39.4	36.8	28.9	58.9	
06:00	15:00	40.3	37.8	30.1	54.5	
06:15	15:00	41.6	42.3	30.4	59.2	
06:30	15:00	36.3	38.5	31.3	56.8	
06:45	15:00	40.4	41.7	30.9	58.1	
Average 2300-0700		42.7	41.3	28.7	38-69	
Average 1215-2300		45.8	45.7	37.4	51-84	

Noise Survey Results

Date: Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 24**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	48.2	47.5	32.3	71.1	
07:15	15:00	44.1	43.1	31.4	70.1	
07:30	15:00	43.2	39.1	30.8	68.9	
07:45	15:00	37.5	37.2	29.8	59.5	
08:00	15:00	40.7	40.7	30.8	62.7	
08:15	15:00	35.5	36.1	30.3	58.9	
08:30	15:00	42.7	43.6	31.2	74.3	
08:45	15:00	45.2	43.9	31.0	73.0	
09:00	15:00	40.3	40.9	31.9	60.6	
09:15	15:00	39.0	39.1	32.1	67.8	
09:30	15:00	40.4	43.1	32.1	60.2	
09:45	15:00	40.0	39.7	31.5	64.1	
10:00	15:00	40.6	40.3	31.0	72.9	
10:15	15:00	38.7	39.7	30.8	63.9	
10:30	15:00	39.7	39.7	31.1	64.1	
10:45	15:00	40.2	41.8	30.2	57.3	
11:00	15:00	40.5	38.8	30.4	60.3	
11:15	15:00	39.3	43.0	33.1	54.9	
11:30	15:00	39.6	40.5	32.4	64.4	
11:45	15:00	41.9	43.4	33.5	64.5	
12:00	15:00	35.9	37.7	32.8	52.0	
12:15	15:00	39.9	42.9	32.8	66.9	
12:30	15:00	38.9	40.8	32.1	71.6	
12:45	15:00	40.1	43.1	31.8	61.8	
13:00	15:00	38.3	39.5	31.6	55.5	
13:15	15:00	39.8	42.5	33.3	61.8	
13:30	15:00	38.9	38.8	33.0	61.9	
13:45	15:00	38.6	39.7	32.6	61.1	
14:00	15:00	41.5	40.9	33.7	63.7	
14:15	15:00	41.0	41.5	34.3	58.3	
14:30	15:00	44.2	44.9	35.3	66.1	
14:45	15:00	45.2	47.8	34.1	65.1	
Average 0700-1500		41.5	42.1	32.2	52-74	

Noise Survey Results

Date: Saturday 12th November 2022 **TABLE 25**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	41.5	43.6	32.9	57.8	
15:15	15:00	40.8	42.1	32.7	71.2	
15:30	15:00	42.7	43.0	34.2	66.3	
15:45	15:00	38.9	37.9	32.2	68.1	
16:00	15:00	39.9	43.0	33.9	55.8	
16:15	15:00	38.9	41.6	33.8	51.7	
16:30	15:00	43.7	44.2	36.3	66.5	
16:45	15:00	43.6	43.2	35.2	65.0	
17:00	15:00	40.8	41.0	36.3	57.7	
17:15	15:00	42.0	43.2	39.0	52.5	
17:30	15:00	42.7	44.1	38.4	58.2	
17:45	15:00	42.8	42.6	37.6	66.7	
18:00	15:00	49.0	47.9	37.2	77.7	
18:15	15:00	44.1	44.4	37.6	63.6	
18:30	15:00	43.6	42.6	36.7	63.0	
18:45	15:00	43.2	43.7	36.8	59.4	
19:00	15:00	39.0	41.2	35.7	48.8	
19:15	15:00	43.5	43.5	33.9	65.2	
19:30	15:00	43.2	42.8	30.8	72.8	
19:45	15:00	39.3	35.4	28.8	61.2	
20:00	15:00	41.4	38.0	29.8	61.8	
20:15	15:00	35.6	34.2	27.3	55.3	
20:30	15:00	36.8	33.9	25.8	55.6	
20:45	15:00	37.5	35.3	26.5	57.2	
21:00	15:00	42.5	42.1	26.5	60.0	
21:15	15:00	36.8	33.7	26.2	59.7	
21:30	15:00	42.9	36.4	25.3	62.2	
21:45	15:00	34.0	36.1	22.8	53.4	
22:00	15:00	37.5	38.5	25.5	57.1	
22:15	15:00	35.3	36.2	26.5	53.8	
22:30	15:00	41.2	41.1	25.0	61.1	
22:45	15:00	38.4	38.9	25.4	59.2	
Average 1500-2300		41.8	41.8	33.9	49-78	

Noise Survey Results

Date: Saturday 29th - Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 26**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	31.2	34.1	25.7	49.8	
23:15	15:00	36.6	39.3	26.1	54.4	
23:30	15:00	40.6	33.3	25.1	60.2	
23:45	15:00	40.5	34.8	26.1	59.3	
00:00	15:00	37.2	33.3	24.7	55.9	
00:15	15:00	34.2	33.0	24.2	50.7	
00:30	15:00	39.0	30.5	24.0	62.1	
00:45	15:00	29.4	32.9	24.1	46.3	
01:00	15:00	29.4	31.3	24.9	47.6	
01:15	15:00	38.8	33.8	25.3	62.9	
01:30	15:00	39.1	32.5	24.8	61.2	
01:45	15:00	35.9	33.2	24.4	58.0	
02:00	15:00	27.6	30.4	23.6	42.0	
02:15	15:00	25.5	27.6	22.4	40.7	
02:30	15:00	25.4	27.3	22.2	41.6	
02:45	15:00	25.2	27.2	21.9	46.3	
03:00	15:00	25.1	26.8	21.8	49.7	
03:15	15:00	24.7	26.7	21.5	44.7	
03:30	15:00	24.8	26.7	21.8	42.3	
03:45	15:00	25.7	27.5	22.8	43.8	
04:00	15:00	26.0	28.0	23.0	40.0	
04:15	15:00	25.7	27.6	22.8	44.0	
04:30	15:00	32.2	34.2	29.1	49.8	
04:45	15:00	32.9	35.0	29.1	51.8	
05:00	15:00	33.5	35.5	30.3	49.3	
05:15	15:00	34.4	36.9	30.1	47.8	
05:30	15:00	33.9	36.2	30.4	47.8	
05:45	15:00	32.5	34.6	29.2	46.1	
06:00	15:00	36.3	39.6	30.5	48.0	
06:15	15:00	36.3	39.2	30.9	50.6	
06:30	15:00	40.5	43.6	30.4	58.3	
06:45	15:00	44.3	43.0	30.5	69.8	
Average 2300-0700		36.0	35.6	26.9	40-70	
Average 0700-2300		41.7	42.0	33.1	49-78	

Noise Survey Results

Date: Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 27**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	35.6	38.3	29.9	55.2	
07:15	15:00	36.3	39.7	29.5	54.3	
07:30	15:00	38.3	39.8	31.3	56.2	
07:45	15:00	39.3	42.1	30.4	56.5	
08:00	15:00	40.8	43.0	32.7	60.0	
08:15	15:00	42.4	42.4	34.7	65.9	
08:30	15:00	39.7	41.7	34.9	58.6	
08:45	15:00	40.2	41.9	33.9	62.2	
09:00	15:00	40.9	43.5	34.8	57.8	
09:15	15:00	41.7	43.7	35.2	62.0	
09:30	15:00	38.5	39.9	32.1	66.2	
09:45	15:00	41.6	42.3	33.5	62.4	
10:00	15:00	40.1	42.3	34.9	61.9	
10:15	15:00	43.5	43.7	34.7	63.5	
10:30	15:00	41.8	43.7	34.6	58.2	
10:45	15:00	40.0	42.9	34.5	53.8	
11:00	15:00	38.4	41.1	33.9	59.3	
11:15	15:00	42.6	43.8	34.8	57.7	
11:30	15:00	44.6	41.2	35.2	72.0	
11:45	15:00	44.3	42.8	35.3	74.6	
12:00	15:00	39.6	40.6	34.8	56.8	
12:15	15:00	43.0	44.6	35.6	62.8	
12:30	15:00	42.7	45.0	37.4	56.3	
12:45	15:00	41.6	43.5	34.8	58.3	
13:00	15:00	38.2	38.9	32.9	54.2	
13:15	15:00	43.6	45.1	35.7	60.9	
13:30	15:00	44.7	44.1	36.8	63.5	
13:45	15:00	44.0	47.5	37.2	59.7	
14:00	15:00	41.1	43.1	37.5	56.2	
14:15	15:00	55.7	47.9	37.5	92.7	
14:30	15:00	43.3	43.4	37.1	66.3	
14:45	15:00	41.3	41.9	35.3	62.8	
Average 0700-1500		44.1	43.2	34.9	54-93	

Noise Survey Results

Date: Sunday 13th November 2022 **TABLE 28**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	40.9	43.9	35.3	59.6	
15:15	15:00	45.8	47.5	36.3	68.7	
15:30	15:00	41.9	42.3	36.4	65.1	
15:45	15:00	43.0	42.3	37.2	65.0	
16:00	15:00	42.8	43.1	37.4	63.0	
16:15	15:00	46.6	46.1	37.6	63.9	
16:30	15:00	44.7	44.6	37.1	65.7	
16:45	15:00	40.3	42.1	36.6	57.0	
17:00	15:00	44.0	43.6	36.7	65.6	
17:15	15:00	45.5	44.9	36.5	66.2	
17:30	15:00	44.4	41.6	36.0	68.7	
17:45	15:00	39.8	42.0	35.7	49.0	
18:00	15:00	38.7	40.9	34.8	48.9	
18:15	15:00	44.7	43.3	36.0	63.8	
18:30	15:00	43.0	41.2	34.7	64.7	
18:45	15:00	42.8	41.2	35.1	65.6	
19:00	15:00	39.5	43.2	32.9	48.2	
19:15	15:00	47.0	46.0	32.7	66.9	
19:30	15:00	39.1	41.5	32.0	59.9	
19:45	15:00	44.8	45.8	34.1	64.2	
20:00	15:00	38.5	41.3	33.5	46.8	
20:15	15:00	46.5	47.1	33.5	67.3	
20:30	15:00	36.5	39.1	31.8	49.1	
20:45	15:00	47.5	42.3	28.6	79.6	
21:00	15:00	38.6	38.4	26.3	61.8	
21:15	15:00	45.4	44.1	31.9	68.0	
21:30	15:00	44.0	42.6	28.4	65.3	
21:45	15:00	43.5	40.9	26.6	66.2	
22:00	15:00	41.1	39.4	24.7	65.2	
22:15	15:00	44.6	42.4	27.6	67.3	
22:30	15:00	34.5	36.7	26.5	50.4	
22:45	15:00	45.6	48.3	26.1	66.1	
Average 1500-2300		43.6	43.5	34.3	47-80	

Noise Survey Results

Date: Sunday 30th - Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 29**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	34.5	36.4	24.7	51.8	
23:15	15:00	39.2	36.8	25.1	58.3	
23:30	15:00	43.0	43.0	24.6	64.2	
23:45	15:00	28.7	31.8	22.2	45.3	
00:00	15:00	29.2	32.6	21.7	45.0	
00:15	15:00	43.8	38.2	22.1	61.0	
00:30	15:00	43.3	39.3	23.4	63.2	
00:45	15:00	28.1	31.2	21.7	42.3	
01:00	15:00	25.8	28.3	20.6	44.0	
01:15	15:00	29.8	32.7	23.5	52.4	
01:30	15:00	28.0	30.9	22.4	41.3	
01:45	15:00	28.3	31.5	21.5	44.2	
02:00	15:00	24.0	26.2	21.1	38.7	
02:15	15:00	30.8	34.9	21.1	47.0	
02:30	15:00	28.8	32.9	20.6	42.6	
02:45	15:00	27.1	30.7	21.6	42.6	
03:00	15:00	27.1	29.8	21.9	42.9	
03:15	15:00	38.6	34.9	24.1	57.0	
03:30	15:00	30.3	33.5	25.0	41.8	
03:45	15:00	33.1	36.2	27.1	47.0	
04:00	15:00	34.8	37.0	28.8	51.3	
04:15	15:00	34.6	37.6	30.1	44.5	
04:30	15:00	34.7	37.2	31.0	48.1	
04:45	15:00	34.0	36.1	31.1	46.0	
05:00	15:00	47.1	42.7	31.2	66.0	
05:15	15:00	45.6	38.1	33.3	63.9	
05:30	15:00	41.4	38.3	35.0	59.8	
05:45	15:00	46.5	47.7	36.3	64.4	
06:00	15:00	51.0	48.4	35.9	78.3	
06:15	15:00	46.2	43.6	36.6	63.7	
06:30	15:00	49.4	42.7	38.3	70.6	
06:45	15:00	49.9	45.7	40.2	69.6	
Average 2300-0700		42.7	40.1	31.4	39-78	
Average 0700-2300		43.8	43.3	34.6	47-93	

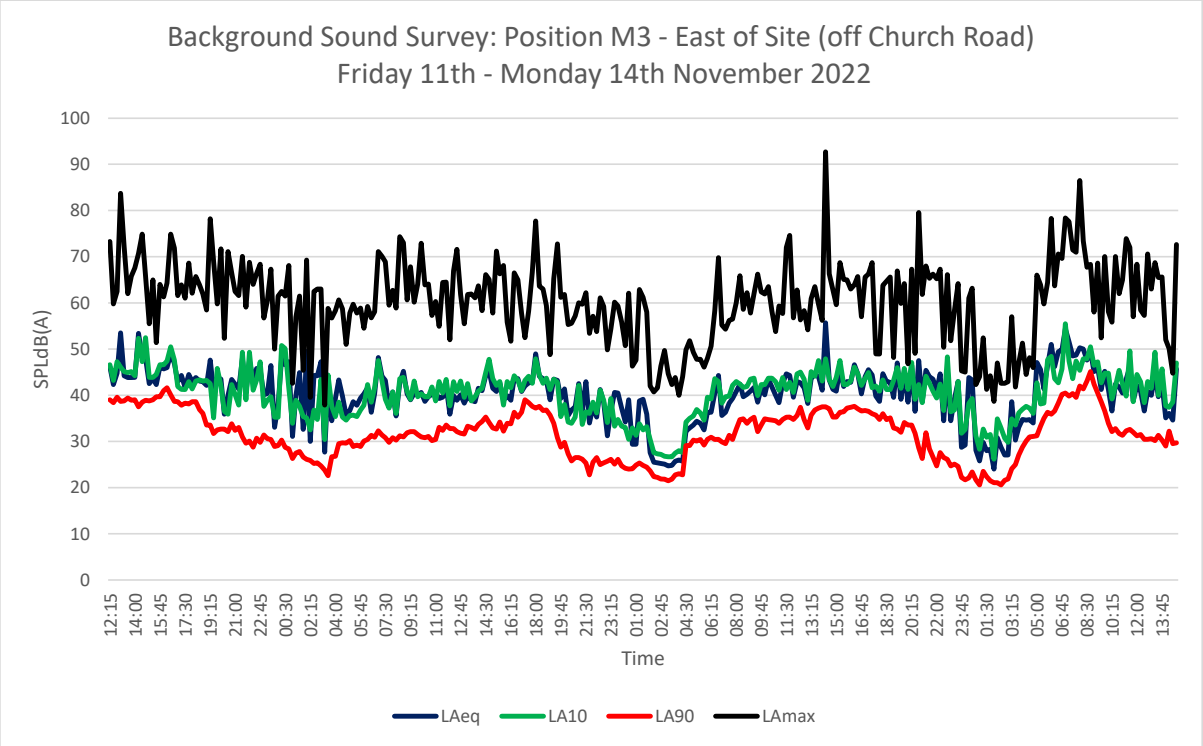
Noise Survey Results

Date: Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 30**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M3 - East of Site (Off Church Rd)**
Instrumentation: Pulsar 45 Real Time Analyser (PN1142)
Calibration: 94dB

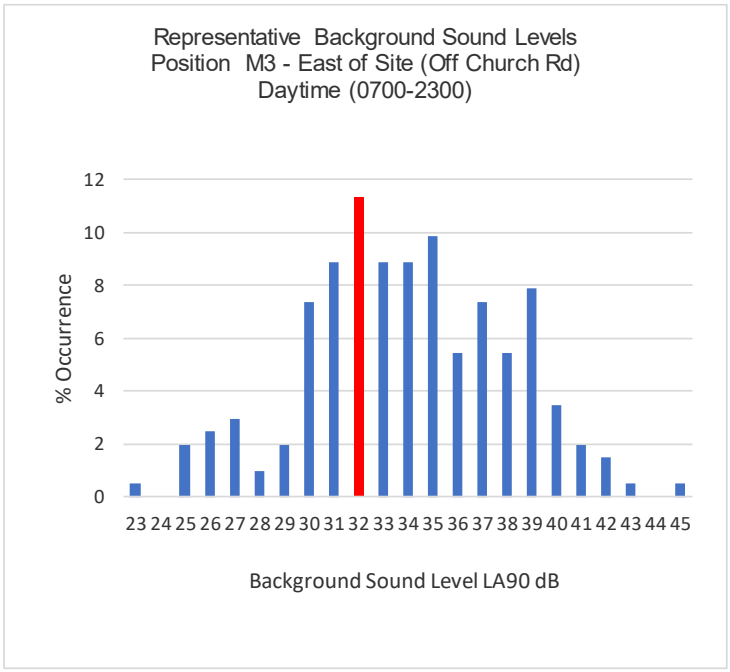
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	54.4	55.5	40.5	78.4	
07:15	15:00	51.6	47.4	39.8	77.6	
07:30	15:00	48.5	43.6	40.4	71.5	
07:45	15:00	48.7	47.4	39.5	71.0	
08:00	15:00	50.3	45.4	42.0	86.5	
08:15	15:00	50.0	47.9	41.4	73.4	
08:30	15:00	47.6	47.9	43.1	67.7	
08:45	15:00	49.6	50.5	45.1	68.3	
09:00	15:00	45.1	46.5	42.4	58.0	
09:15	15:00	46.0	47.2	40.5	68.6	
09:30	15:00	41.2	42.7	38.6	52.4	
09:45	15:00	45.2	44.8	36.6	70.0	
10:00	15:00	41.2	44.8	33.9	58.1	
10:15	15:00	36.6	39.2	32.1	55.8	
10:30	15:00	42.4	42.0	32.8	70.0	
10:45	15:00	41.8	45.4	31.7	62.0	
11:00	15:00	40.5	42.4	31.3	65.0	
11:15	15:00	43.5	39.8	32.3	73.9	
11:30	15:00	46.2	49.6	32.6	72.0	
11:45	15:00	38.8	38.6	32.0	57.0	
12:00	15:00	42.2	44.5	31.2	68.4	
12:15	15:00	40.8	42.9	31.5	58.5	
12:30	15:00	36.6	38.4	30.5	57.3	
12:45	15:00	40.8	43.0	30.5	70.6	
13:00	15:00	40.0	41.5	30.6	63.0	
13:15	15:00	44.5	49.3	30.2	68.7	
13:30	15:00	39.7	40.0	31.3	65.5	
13:45	15:00	42.3	45.7	30.3	65.6	
14:00	15:00	35.1	37.7	29.0	52.0	
14:15	15:00	36.1	37.4	32.2	50.1	
14:30	15:00	34.6	38.5	29.5	44.8	
14:45	15:00	45.7	47.0	29.7	72.6	
Average 0700-1500		46.1	46.4	37.7	45-87	

Overall Average	**41.4**	**39.6**	**29.4**	**38-78**	
Overall Average	**44.3**	**44.2**	**35.6**	**41-93**	

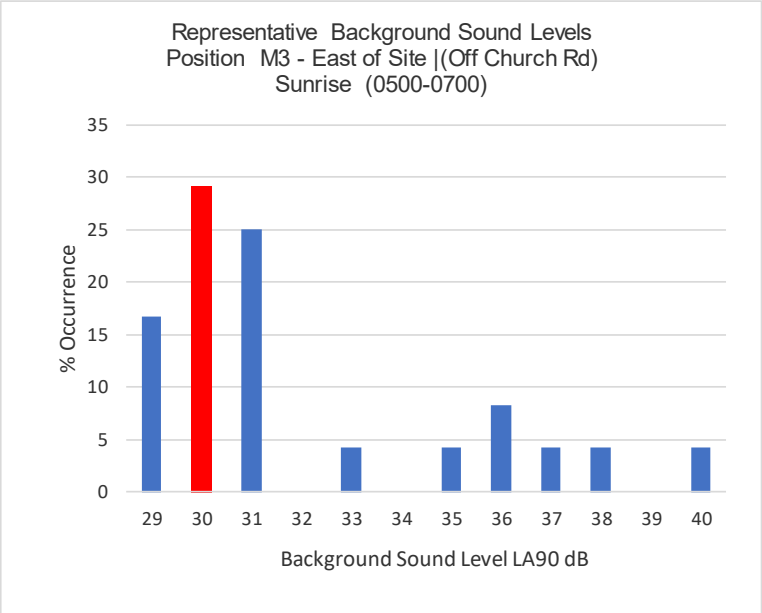
Average 0500-0700	**44.1**	**41.9**	**33.4**	**40-78**	
			31		



LA90	% Occurrence
23	0.5
24	0.0
25	2.0
26	2.5
27	3.0
28	1.0
29	2.0
30	7.4
31	8.9
32	**11.3**
33	8.9
34	8.9
35	9.9
36	5.4
37	7.4
38	5.4
39	7.9
40	3.4
41	2.0
42	1.5
43	0.5
44	0.0
45	0.5



LA90	% Occurrence
29	16.7
30	**29.2**
31	25.0
32	0.0
33	4.2
34	0.0
35	4.2
36	8.3
37	4.2
38	4.2
39	0.0
40	4.2



Noise Survey Results

Date: Friday 11th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 31**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
11:45	15:00	52.8	46.2	37.0	77.6	
12:00	15:00	39.0	40.4	36.2	55.7	
12:15	15:00	40.4	42.2	36.1	63.8	
12:30	15:00	42.2	43.1	36.4	64.2	
12:45	15:00	40.6	43.0	37.2	53.6	
13:00	15:00	40.5	42.3	36.1	61.9	
13:15	15:00	38.7	40.7	36.4	48.5	
13:30	15:00	38.8	40.5	36.3	56.4	
13:45	15:00	43.1	44.1	36.5	69.9	
14:00	15:00	41.6	43.8	35.4	58.8	
14:15	15:00	54.4	47.6	35.3	77.6	
14:30	15:00	45.0	44.5	36.7	67.0	
14:45	15:00	43.7	47.9	36.3	63.9	
Average 1145-1500		46.8	44.2	36.3	49-78	

Noise Survey Results

Date: Friday 11th November 2022 **TABLE 32**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	38.7	40.5	36.1	54.7	
15:15	15:00	47.0	49.9	36.4	68.6	
15:30	15:00	60.8	63.5	57.4	67.3	
15:45	15:00	64.2	68.6	37.8	71.7	
16:00	15:00	58.3	54.3	35.8	77.4	
16:15	15:00	57.6	60.4	42.7	74.3	
16:30	15:00	42.7	43.9	37.1	69.4	
16:45	15:00	44.1	48.2	35.3	64.2	
17:00	15:00	38.7	39.7	34.9	54.3	
17:15	15:00	39.6	40.1	34.1	62.4	
17:30	15:00	37.5	38.5	34.8	52.6	
17:45	15:00	38.5	39.7	34.0	60.2	
18:00	15:00	37.3	37.4	34.3	51.1	
18:15	15:00	38.2	40.8	34.5	54.9	
18:30	15:00	36.2	37.7	32.8	50.8	
18:45	15:00	35.8	37.8	31.3	60.5	
19:00	15:00	35.1	38.3	29.4	52.5	
19:15	15:00	39.4	36.6	29.3	69.0	
19:30	15:00	33.5	32.1	27.7	55.9	
19:45	15:00	37.7	40.8	28.7	62.4	
20:00	15:00	37.2	38.7	27.8	64.5	
20:15	15:00	31.2	32.6	28.5	45.7	
20:30	15:00	31.9	32.3	27.5	57.1	
20:45	15:00	35.6	36.4	28.8	60.2	
21:00	15:00	36.8	39.1	27.2	56.3	
21:15	15:00	35.6	34.5	28.4	55.5	
21:30	15:00	43.5	47.4	28.1	64.3	
21:45	15:00	37.3	38.2	26.0	56.1	
22:00	15:00	41.9	47.3	27.3	60.4	
22:15	15:00	37.6	38.3	25.3	53.4	
22:30	15:00	42.1	43.6	28.2	60.5	
22:45	15:00	40.8	42.8	24.8	65.0	
Average 1500-2300		52.2	55.4	42.9	46-77	

Noise Survey Results

Date: Friday 28th - Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 33**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	35.7	36.1	27.0	50.4	
23:15	15:00	34.9	36.6	27.0	54.3	
23:30	15:00	40.1	39.3	26.1	63.0	
23:45	15:00	29.4	32.0	24.9	43.8	
00:00	15:00	31.1	32.9	25.4	48.7	
00:15	15:00	43.6	50.0	27.1	56.6	
00:30	15:00	42.3	45.9	24.9	56.5	
00:45	15:00	42.2	41.1	24.0	62.1	
01:00	15:00	24.9	27.0	22.1	36.2	
01:15	15:00	36.3	39.2	23.8	53.1	
01:30	15:00	43.2	40.7	22.8	58.8	
01:45	15:00	35.5	32.1	23.5	54.8	
02:00	15:00	44.1	30.4	22.6	63.1	
02:15	15:00	24.4	26.5	21.7	35.0	
02:30	15:00	38.6	33.6	22.7	53.9	
02:45	15:00	33.7	33.7	20.4	51.1	
03:00	15:00	40.5	45.4	19.9	54.5	
03:15	15:00	22.6	25.1	19.6	35.2	
03:30	15:00	37.9	43.0	19.3	51.9	
03:45	15:00	21.2	23.9	19.2	34.3	
04:00	15:00	36.0	35.5	23.5	53.5	
04:15	15:00	40.0	40.3	27.8	56.5	
04:30	15:00	38.0	35.3	27.7	54.7	
04:45	15:00	35.5	35.9	28.5	56.7	
05:00	15:00	35.4	38.5	29.6	57.7	
05:15	15:00	36.2	35.4	28.6	55.6	
05:30	15:00	37.8	36.6	30.7	56.9	
05:45	15:00	34.8	35.2	31.5	57.5	
06:00	15:00	37.8	36.8	31.7	60.5	
06:15	15:00	36.7	35.8	30.6	57.8	
06:30	15:00	35.3	37.6	30.5	60.2	
06:45	15:00	38.7	42.6	32.2	63.7	
Average 2300-0700		38.3	40.1	27.1	34-63	
Average 1145-2300		51.2	54.1	41.7	46-78	

Noise Survey Results

Date: Saturday 12th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 34**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	44.5	47.5	31.7	71.7	
07:15	15:00	36.6	38.8	30.4	52.4	
07:30	15:00	38.1	37.8	29.1	64.0	
07:45	15:00	35.1	34.6	27.3	62.8	
08:00	15:00	37.4	38.7	28.9	60.6	
08:15	15:00	37.0	37.0	29.2	64.4	
08:30	15:00	37.7	41.4	29.5	60.8	
08:45	15:00	38.4	37.7	29.6	64.0	
09:00	15:00	39.8	42.3	31.5	56.4	
09:15	15:00	37.2	39.6	31.2	54.1	
09:30	15:00	39.8	43.2	31.4	54.5	
09:45	15:00	34.9	36.1	30.2	56.2	
10:00	15:00	36.6	38.1	29.2	52.9	
10:15	15:00	34.6	38.2	29.8	50.1	
10:30	15:00	39.3	39.5	29.5	69.5	
10:45	15:00	38.7	41.7	29.3	60.0	
11:00	15:00	36.4	38.2	29.2	54.6	
11:15	15:00	38.3	42.1	31.9	53.5	
11:30	15:00	37.9	39.8	31.0	61.8	
11:45	15:00	40.0	42.9	32.7	59.8	
12:00	15:00	43.0	42.2	32.6	65.2	
12:15	15:00	39.3	43.1	32.3	65.7	
12:30	15:00	39.5	43.6	32.3	59.2	
12:45	15:00	41.6	45.2	31.8	59.5	
13:00	15:00	37.3	39.9	30.1	53.6	
13:15	15:00	37.8	41.5	32.5	51.5	
13:30	15:00	38.8	39.2	31.8	66.3	
13:45	15:00	36.8	39.7	31.2	53.8	
14:00	15:00	38.1	39.1	32.5	61.9	
14:15	15:00	38.6	41.2	33.0	59.3	
14:30	15:00	42.6	44.4	34.5	62.5	
14:45	15:00	43.8	47.5	32.4	68.2	
Average 0700-1500		39.3	41.7	31.2	50-72	

Noise Survey Results

Date: Saturday 12th November 2022 **TABLE 35**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	40.5	44.3	32.3	56.5	
15:15	15:00	37.6	41.3	30.9	56.3	
15:30	15:00	43.9	42.9	32.5	66.4	
15:45	15:00	36.5	37.3	31.3	62.1	
16:00	15:00	38.8	42.9	32.9	51.1	
16:15	15:00	36.9	39.6	32.2	46.4	
16:30	15:00	41.5	44.8	34.9	58.2	
16:45	15:00	39.8	42.0	33.4	57.2	
17:00	15:00	38.5	39.3	33.9	55.3	
17:15	15:00	40.7	42.6	36.9	52.5	
17:30	15:00	41.1	43.4	36.0	62.1	
17:45	15:00	41.3	40.6	34.8	66.7	
18:00	15:00	42.6	42.6	34.4	67.3	
18:15	15:00	41.9	44.0	35.7	62.3	
18:30	15:00	43.3	42.8	34.5	64.5	
18:45	15:00	40.7	42.3	32.3	64.7	
19:00	15:00	35.6	38.6	30.7	46.2	
19:15	15:00	39.9	42.5	28.2	57.7	
19:30	15:00	39.1	42.4	27.5	64.1	
19:45	15:00	35.1	32.8	26.2	53.7	
20:00	15:00	37.4	34.4	26.2	59.8	
20:15	15:00	31.6	31.7	25.3	51.4	
20:30	15:00	35.2	33.6	24.5	54.5	
20:45	15:00	34.7	33.2	23.5	55.6	
21:00	15:00	39.6	41.3	23.5	57.8	
21:15	15:00	33.0	31.2	23.7	53.8	
21:30	15:00	37.8	37.5	23.2	57.9	
21:45	15:00	32.3	34.6	21.6	49.4	
22:00	15:00	35.7	37.5	23.7	54.1	
22:15	15:00	33.0	36.2	23.7	49.9	
22:30	15:00	38.2	41.8	23.1	59.7	
22:45	15:00	34.8	37.5	22.9	50.6	
Average 1500-2300		39.2	40.8	31.5	46-67	

Noise Survey Results

Date: Saturday 29th - Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 36**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	29.4	32.1	23.6	43.4	
23:15	15:00	34.3	38.9	23.2	51.5	
23:30	15:00	37.5	30.6	21.9	58.7	
23:45	15:00	36.2	32.2	22.2	54.3	
00:00	15:00	32.5	32.9	21.1	49.1	
00:15	15:00	31.1	29.7	21.8	50.3	
00:30	15:00	33.6	27.9	20.8	53.8	
00:45	15:00	27.1	29.7	21.4	40.9	
01:00	15:00	26.0	28.9	21.7	38.9	
01:15	15:00	34.1	33.1	21.9	54.2	
01:30	15:00	35.4	30.0	22.4	57.3	
01:45	15:00	35.9	29.9	21.7	57.8	
02:00	15:00	24.9	27.0	21.6	36.4	
02:15	15:00	23.3	25.3	21.0	36.1	
02:30	15:00	22.6	24.6	20.2	34.4	
02:45	15:00	22.1	23.9	20.0	33.3	
03:00	15:00	21.4	23.0	19.6	37.1	
03:15	15:00	21.3	22.7	19.6	35.3	
03:30	15:00	21.8	23.5	19.9	33.6	
03:45	15:00	22.8	24.2	20.9	44.4	
04:00	15:00	22.8	24.5	20.7	34.2	
04:15	15:00	26.8	28.4	24.9	39.6	
04:30	15:00	27.3	29.2	25.2	39.6	
04:45	15:00	27.7	29.7	25.4	47.1	
05:00	15:00	32.2	33.2	28.2	41.3	
05:15	15:00	33.5	34.8	28.7	44.2	
05:30	15:00	32.3	34.2	28.3	42.9	
05:45	15:00	33.3	35.2	29.2	42.0	
06:00	15:00	33.8	37.9	28.9	45.6	
06:15	15:00	33.6	37.6	30.2	47.5	
06:30	15:00	41.9	42.4	31.7	70.2	
06:45	15:00	44.9	44.7	31.5	69.1	
Average 2300-0700		34.5	34.7	25.5	33-69	
Average 0700-2300		39.2	41.3	31.3	46-72	

Noise Survey Results

Date: Sunday 13th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 37**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	35.3	38.2	29.6	57.5	
07:15	15:00	35.4	38.6	28.2	48.8	
07:30	15:00	35.7	38.1	29.9	50.5	
07:45	15:00	37.5	40.9	29.1	52.8	
08:00	15:00	41.8	44.3	31.8	60.6	
08:15	15:00	37.8	40.5	34.0	47.1	
08:30	15:00	38.5	41.2	34.5	50.6	
08:45	15:00	43.2	44.7	33.8	65.3	
09:00	15:00	39.7	43.2	34.2	55.3	
09:15	15:00	38.4	41.1	33.8	49.1	
09:30	15:00	39.0	42.7	31.6	57.2	
09:45	15:00	39.8	40.1	33.4	63.6	
10:00	15:00	37.6	39.5	33.4	53.9	
10:15	15:00	41.0	41.2	33.9	64.7	
10:30	15:00	41.4	43.4	34.0	64.5	
10:45	15:00	38.5	41.2	33.3	52.0	
11:00	15:00	36.5	38.6	32.9	53.0	
11:15	15:00	40.9	43.6	34.3	58.0	
11:30	15:00	38.2	38.6	33.9	55.2	
11:45	15:00	40.1	41.3	34.0	56.7	
12:00	15:00	39.4	42.2	34.2	54.1	
12:15	15:00	42.1	45.3	34.2	59.8	
12:30	15:00	39.6	41.1	35.3	53.7	
12:45	15:00	40.3	43.2	33.7	58.0	
13:00	15:00	39.9	40.6	32.3	57.1	
13:15	15:00	41.7	44.9	34.2	57.4	
13:30	15:00	41.7	44.1	34.7	62.4	
13:45	15:00	42.8	46.1	35.4	60.4	
14:00	15:00	39.6	42.2	35.6	58.7	
14:15	15:00	45.8	48.6	36.1	77.3	
14:30	15:00	42.4	44.5	35.9	61.4	
14:45	15:00	38.9	41.2	34.5	55.1	
Average 0700-1500		40.3	42.7	33.7	47-77	

Noise Survey Results

Date: Sunday 13th November 2022 **TABLE 38**
Location: Grove Farm, Potash Lane, Ipswich
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
15:00	15:00	39.6	43.3	33.8	56.1	
15:15	15:00	44.2	47.2	34.6	62.6	
15:30	15:00	41.1	42.3	35.2	66.4	
15:45	15:00	39.0	40.6	36.1	52.0	
16:00	15:00	44.9	43.1	36.2	65.3	
16:15	15:00	44.0	46.4	36.5	59.2	
16:30	15:00	41.9	43.2	36.0	62.8	
16:45	15:00	38.2	40.6	35.2	45.9	
17:00	15:00	41.4	43.4	35.3	59.5	
17:15	15:00	43.4	43.6	35.2	62.5	
17:30	15:00	40.3	40.1	33.7	60.9	
17:45	15:00	37.3	39.4	32.5	49.5	
18:00	15:00	35.9	38.4	32.1	44.1	
18:15	15:00	42.0	43.6	34.5	62.1	
18:30	15:00	40.5	40.6	32.7	57.5	
18:45	15:00	40.6	40.3	33.5	61.3	
19:00	15:00	38.9	43.2	31.4	48.3	
19:15	15:00	43.7	46.6	31.0	62.5	
19:30	15:00	40.2	42.3	29.8	60.3	
19:45	15:00	42.6	45.9	32.3	64.2	
20:00	15:00	37.1	40.2	31.6	47.5	
20:15	15:00	42.9	45.7	31.7	59.1	
20:30	15:00	35.0	37.9	30.2	47.6	
20:45	15:00	41.6	43.7	27.9	69.0	
21:00	15:00	36.5	37.8	25.8	55.6	
21:15	15:00	42.3	43.3	31.0	59.7	
21:30	15:00	42.6	44.3	27.6	62.2	
21:45	15:00	37.4	39.3	25.9	60.3	
22:00	15:00	38.1	39.0	24.0	60.3	
22:15	15:00	41.3	41.9	26.1	61.9	
22:30	15:00	33.2	34.7	25.0	47.1	
22:45	15:00	43.9	48.2	22.0	64.3	
Average 1500-2300		41.2	43.2	32.8	44-69	

Noise Survey Results

Date: Sunday 30th - Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 39**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
23:00	15:00	33.6	35.2	22.7	48.3	
23:15	15:00	35.5	35.8	22.7	55.1	
23:30	15:00	40.1	43.0	22.1	60.6	
23:45	15:00	25.9	28.7	19.4	46.9	
00:00	15:00	27.2	31.5	19.4	43.6	
00:15	15:00	40.3	40.7	18.9	56.6	
00:30	15:00	41.0	38.6	20.5	59.6	
00:45	15:00	24.2	27.2	18.8	40.9	
01:00	15:00	22.6	25.2	18.4	37.4	
01:15	15:00	25.5	28.7	20.0	38.9	
01:30	15:00	24.7	27.6	19.7	44.6	
01:45	15:00	25.3	28.4	19.8	43.2	
02:00	15:00	21.0	22.3	19.5	36.1	
02:15	15:00	28.6	33.2	20.1	38.8	
02:30	15:00	28.0	32.4	19.9	41.6	
02:45	15:00	23.9	25.5	21.7	36.2	
03:00	15:00	23.6	25.6	20.7	35.0	
03:15	15:00	37.2	31.5	22.5	58.4	
03:30	15:00	26.1	27.5	24.6	33.8	
03:45	15:00	25.1	26.8	23.1	38.3	
04:00	15:00	32.4	34.5	25.2	50.2	
04:15	15:00	29.5	31.3	26.9	39.0	
04:30	15:00	30.3	32.1	28.1	37.2	
04:45	15:00	30.9	31.9	28.6	42.5	
05:00	15:00	37.0	40.3	32.2	49.8	
05:15	15:00	37.8	37.6	31.6	51.2	
05:30	15:00	34.2	36.0	31.7	57.8	
05:45	15:00	39.1	40.5	32.6	55.1	
06:00	15:00	43.3	41.8	32.5	73.2	
06:15	15:00	41.0	43.4	34.2	64.0	
06:30	15:00	43.8	47.9	35.1	58.1	
06:45	15:00	43.4	42.8	34.8	61.9	
Average 2300-0700		36.8	38.2	28.3	34-73	
Average 0700-2300		40.8	43.0	33.3	44-77	

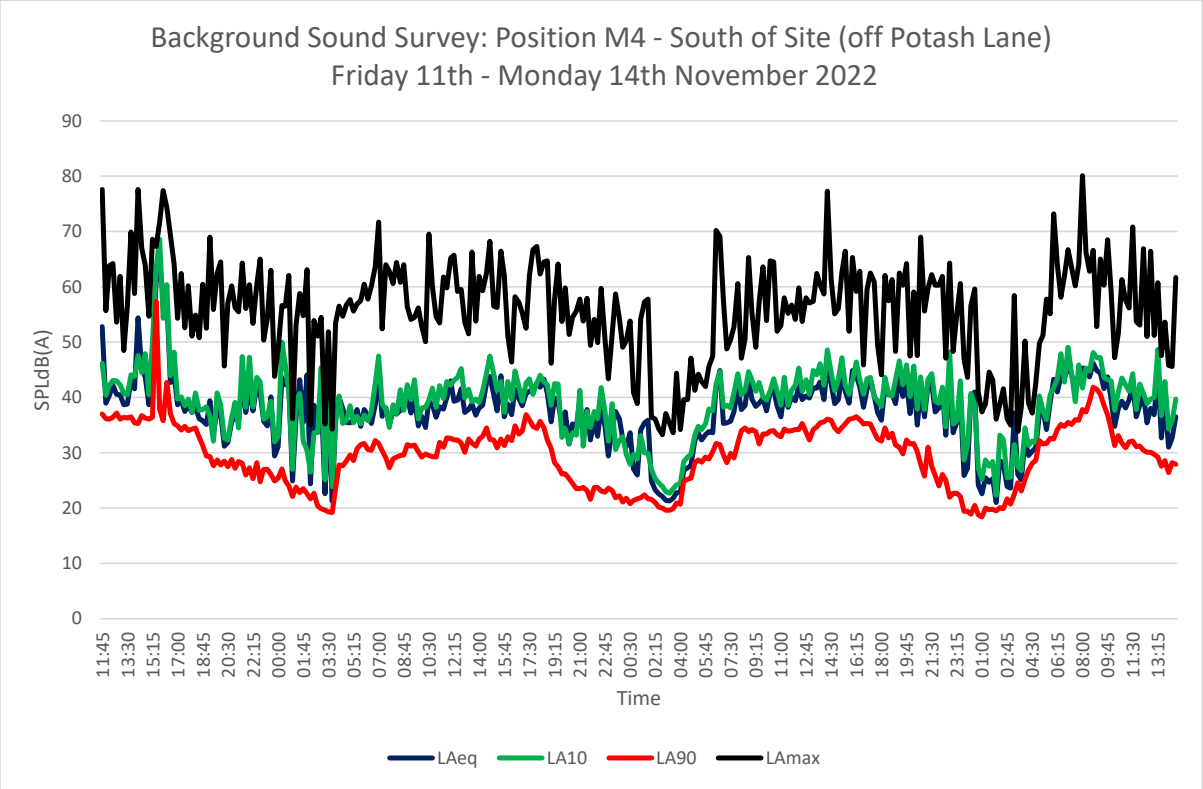
Noise Survey Results

Date: Monday 14th November 2022
Location: Grove Farm, Potash Lane, Ipswich **TABLE 40**
Client: Axis
Project: Grove Farm Solar Array
Data: **Baseline Sound Survey: Position M4 - South of Site (off Potash Lane)**
Instrumentation: Rion NL-52 Real Time Analyser (420712)
Calibration: 94dB

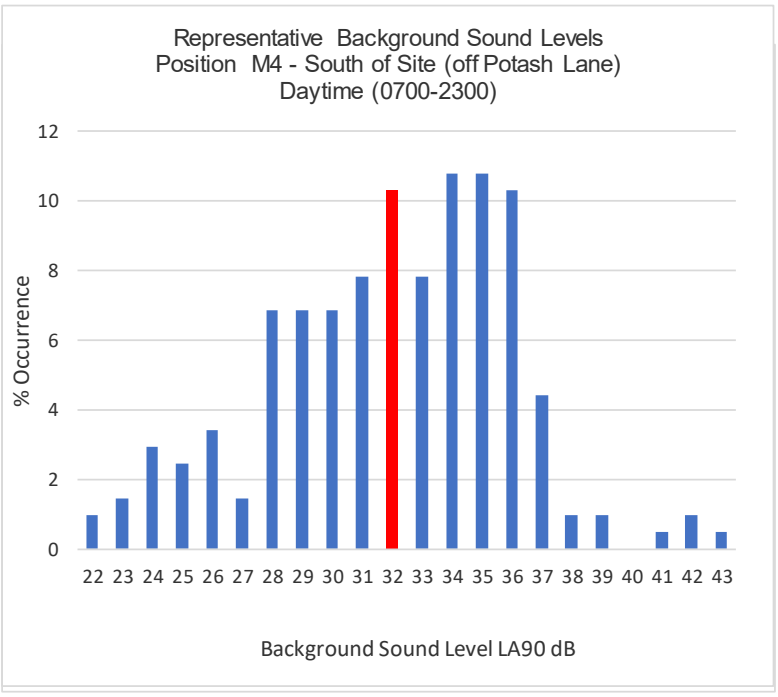
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmax (dB)	Observations
07:00	15:00	45.9	49.1	35.5	66.7	
07:15	15:00	44.1	44.2	35.1	63.5	
07:30	15:00	41.4	39.2	36.0	60.2	
07:45	15:00	44.1	45.9	35.9	64.1	
08:00	15:00	45.3	41.7	37.8	80.1	
08:15	15:00	45.2	45.3	37.4	66.2	
08:30	15:00	43.7	44.8	39.3	62.8	
08:45	15:00	46.2	48.1	41.9	66.6	
09:00	15:00	44.9	47.2	41.5	52.8	
09:15	15:00	44.4	47.2	40.6	65.0	
09:30	15:00	41.6	43.6	38.6	60.3	
09:45	15:00	43.7	43.2	36.9	68.5	
10:00	15:00	39.6	43.0	34.3	59.1	
10:15	15:00	34.8	37.7	31.3	47.2	
10:30	15:00	38.0	41.0	33.1	51.6	
10:45	15:00	39.3	43.5	31.8	61.3	
11:00	15:00	38.1	42.3	30.9	57.6	
11:15	15:00	39.5	41.1	32.0	56.2	
11:30	15:00	42.1	44.3	32.1	70.8	
11:45	15:00	36.5	37.8	31.1	53.7	
12:00	15:00	38.6	42.4	31.2	53.1	
12:15	15:00	40.5	40.7	30.5	66.9	
12:30	15:00	35.4	38.9	30.1	51.0	
12:45	15:00	38.0	39.7	30.1	66.4	
13:00	15:00	36.9	40.0	29.7	51.2	
13:15	15:00	44.8	48.7	29.2	60.7	
13:30	15:00	32.7	36.7	27.6	47.6	
13:45	15:00	39.4	42.9	28.6	53.6	
14:00	15:00	31.0	34.3	26.4	45.8	
14:15	15:00	32.7	35.8	28.2	45.6	
14:30	15:00	36.5	39.7	27.9	61.7	
Average 0700-1445		41.8	43.7	35.5	55-82	

Overall Average	**36.8**	**38.2**	**27.1**	**33-73**	
Overall Average	**45.7**	**48.5**	**36.9**	**44-82**	

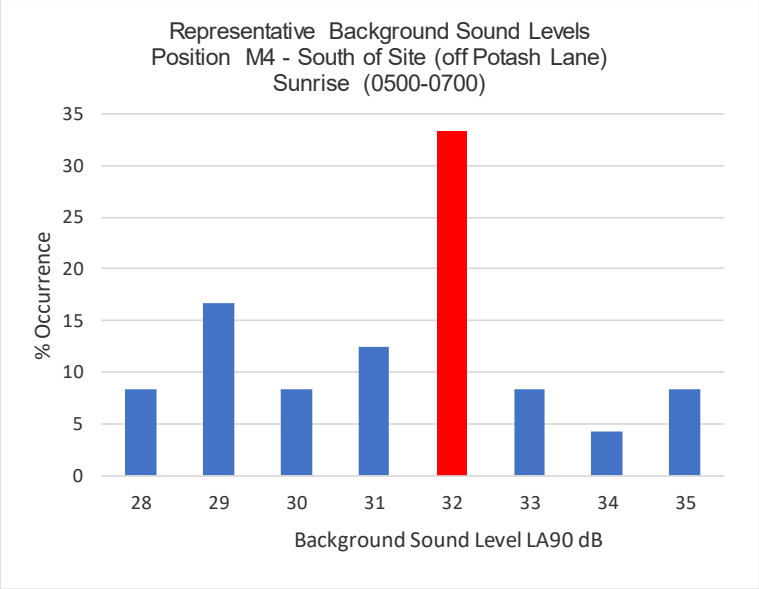
Average 0500-0700	**39.1**	**40.5**	**31.5**	**41-73**	
			32		



LA90	% Occurrence
22	1.0
23	1.5
24	2.9
25	2.5
26	3.4
27	1.5
28	6.9
29	6.9
30	6.9
31	7.8
32	**10.3**
33	7.8
34	10.8
35	10.8
36	10.3
37	4.4
38	1.0
39	1.0
40	0.0
41	0.5
42	1.0
43	0.5



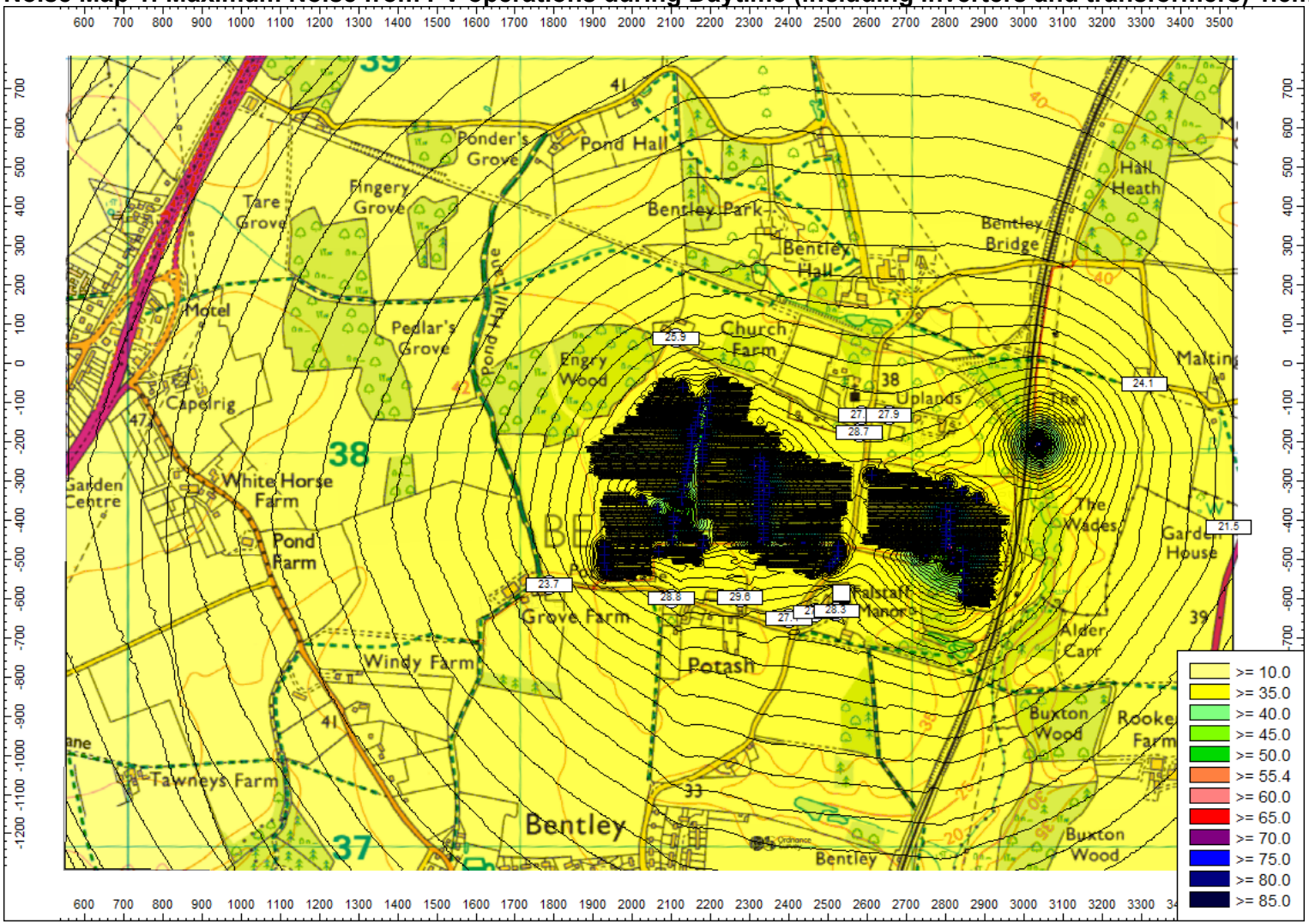
LA90	% Occurrence
28	8.3
29	16.7
30	8.3
31	12.5
32	**33.3**
33	8.3
34	4.2
35	8.3



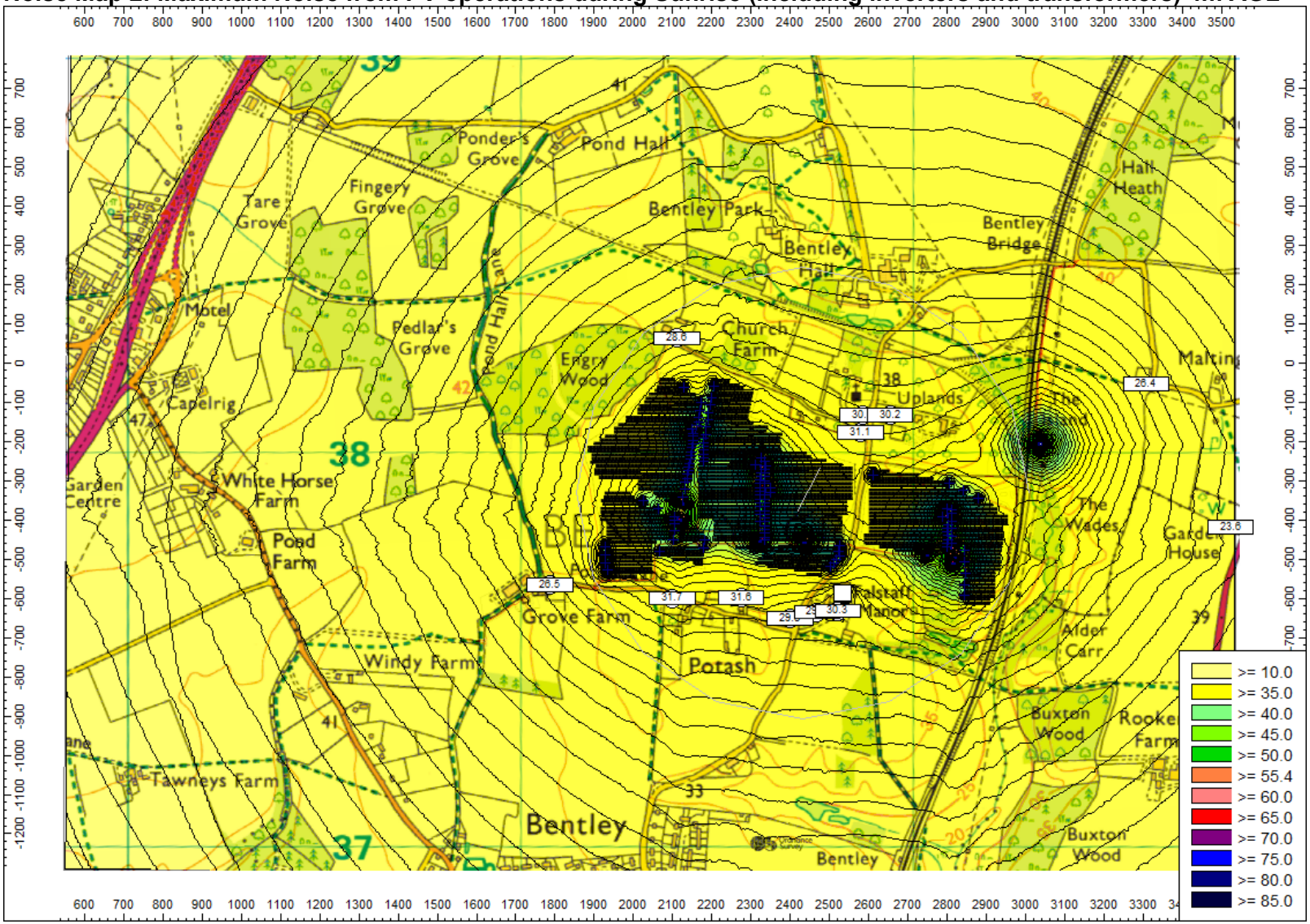
Appendix 3

Noise Mapping Results

Noise Map 1: Maximum Noise from PV operations during Daytime (including inverters and transformers) 1.5m AGL



Noise Map 2: Maximum Noise from PV operations during Sunrise (including inverters and transformers) 4m AGL



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:

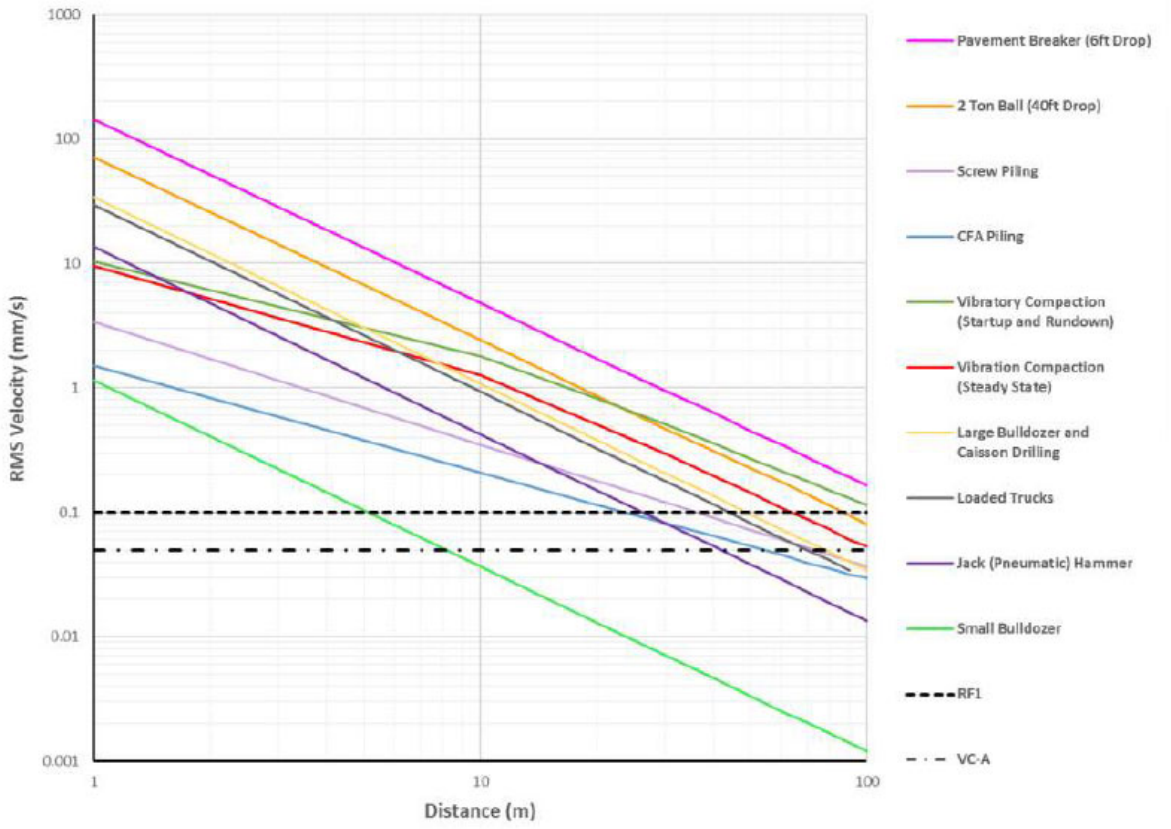
a) **Longitudinal** – back and forth particle movement in the same direction that the vibration wave is travelling.

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
Transformers	70 @ 1m	100	Design of plant or inside container	Daytime & Sunrise
String Inverters	62 @ 1m	100	Design of plant or inside container	Daytime & Sunrise
Switchgear	65 @ 1m	100	Design of plant or inside enclosure	Daytime & Sunrise
Sub-station Transformer & Switchgear	55 @ 10m	100	Design	Daytime & Sunrise

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 35 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 Planning Appeals & Hearings
- 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

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)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