



Frodsham Solar

Environmental Statement: Volume 2

Appendix 4-1: Noise Impact Assessment

May 2025



PINS Ref: EN010153

Document Ref: EN010153/DR/6.2

**Planning Act 2008; and Infrastructure Planning (Applications:
Prescribed Forms and Procedure) Regulations Regulation 5(2)(a)**

Revision P01



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Noise Impact Assessment

Frodsham Solar

at

**Frodsham Marsh
Frodsham**

For

**Axis
on behalf of
Frodsham Solar Ltd**

**Report No.: R23.0205/2/DRK
Date: March 2025**

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Date: May 2025

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1.0 INTRODUCTION

- 1.1 Frodsham Solar Ltd (“the Applicant”) is proposing to construct and operate a solar photovoltaic array and battery energy storage system (“BESS”) installation referred to as Frodsham Solar at Frodsham Marsh, Frodsham. The Proposed Development also includes the associated infrastructure for connection to the local electricity distribution network, as well as a private wire electricity connection that would enable local businesses to utilise the renewable energy generated by the Proposed Development. Full details of the Proposed Development are provided in ES Vol 1 Chapter 2: The Proposed Development [EN010153/DR/6.1].
- 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 This noise assessment includes a baseline sound survey to determine typical background sound levels in the vicinity of the nearest residential sensitive receptors (“NSR”) to the Proposed Development. Monitoring was carried out over a weekend period (i.e. Friday to Monday) to determine the representative background sound levels.
- 1.4 During the statutory consultation process, responses were received from CWACC and Natural England (“NE”) raising matters of concern.
- 1.5 The response from CWACC included a requirement for additional baseline monitoring and assessment of noise regarding the Traveller Site located on the intersection of Moorditch Lane and Brook Furlong to show that there would be no loss of residential amenity at this location as a result of the Proposed Development.
- 1.6 The response from NE requested further assessment of noise effects on the baseline sound levels at sensitive bird locations around the Site based on expected peak L_{Aeq} and L_{Amax} levels during each stage of the construction works.
- 1.7 This assessment includes the baseline sound survey work on Site to enable these aforementioned points to be addressed.

- 1.8 Following a study of the local area the NSR and nearest sensitive ecological receptors (“NSER”) were determined.
- 1.9 Typical site operating noise levels have been established from empirical data obtained from technology providers who provide battery storage, transformer and inverter plant. 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

- 1.10 Information, as well as the policy and guidance that has been used to inform this assessment has been obtained from the following sources:
- Ordnance Survey maps of the local area;
 - Information relating to the Site layout ;
 - Overarching National Policy Statement for Energy (EN-1)¹ November 2023;
 - National Policy Statement (NPS) for Renewable Energy Infrastructure² (EN-3) November 2023;
 - National Policy Statement (NPS) for electricity networks infrastructure³ (EN-5) January 2024;
 - Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015⁴;
 - Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019⁵;
 - BS 7445: 2003⁶ Description and measurement of environmental noise;
 - BS4142: 2014+A1:2019⁷ ‘Methods for rating and assessing industrial and commercial sound’;

¹ Department for Energy Security & Net Zero: Overarching National Policy Statement for Energy (EN-1) (November 2023).

² Department for Energy Security and Net Zero: Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) November 2023.

³ Department for Energy Security and Net Zero: National Policy Statement for electricity infrastructure (EN-5) January 2024.

⁴ Cheshire West & Cheshire Council Local Plan (Part One) Strategic Policies adopted January 2015.

⁵ Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019.

⁶ BS 7445: 2003 Description and measurement of environmental noise.

⁷ BS4142: 2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’.

- BS 5228:2009+A1:2014⁸ Part 1 Noise & Part 2 Vibration 'Code of practice for noise and vibration control on construction and open sites';
- Guidelines for Community Noise – World Health Organisation: April 1999⁹;
- Night Noise Guidelines for Europe: 2009¹⁰ – World Health Organisation;
- BS8233: 2014¹¹ 'Guidance on sound insulation and noise reduction for buildings';
- National Planning Policy Framework – December 2024¹²;
- Planning Practice Guidance – July 2019¹³;
- Noise Policy Statement for England (NPSE) – March 2010¹⁴: Department for Communities and Local Government;
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)¹⁵;
- ISO9613-2 ¹⁶ 2024 Acoustics – Attenuation of Sound During Propagation Outdoors;
- 'Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects': 2013¹⁷; and
- 'A review of the effects of noise on Birds' Version 1 published in 2018 by Natural England¹⁸

1.11 The aim of the assessment was to provide information and advice on the following:

- provide information on typical operating noise levels from the solar transformers and inverters, and from battery storage plant, inverters and

⁸ BS 5228:2009+A1:2014 Part 1 Noise & Part 2 Vibration 'Code of practice for noise and vibration control on construction and open sites'.

⁹ World Health Organisation: April 1999 - Guidelines for Community Noise.

¹⁰ Night Noise Guidelines for Europe: 2009¹⁰ – World Health Organisation.

¹¹ BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.

¹² National Planning Policy Framework – December 2024.

¹³ National Planning Practice Guidance – July 2019.

¹⁴ Noise Policy Statement for England (NPSE) – March 2010¹⁴: Department for Communities and Local Government.

¹⁵ Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11).

¹⁶ ISO9613-2 2024: Acoustics – Attenuation of Sound During Propagation Outdoors.

¹⁷ Waterbird Disturbance & Mitigation Toolkit) Institute of Estuarine and Coastal Studies, University of Hull. N Cutts, K Hemingway & J Spencer v3.2 March 2013

¹⁸ A review of the effects of noise on Birds' Version 1 published in 2018 by Natural England (Allan Drewitt, Emma Hawthorne, Richard Saunders & Sarah Anthony)

transformer plant;

- provide information on background and residual sound levels at the NSR during the most sensitive periods of proposed operation;
- provide information on peak construction noise and vibration at NSR and NSER;
- provide information on baseline sound levels at nearest sensitive NSER;
- provide information on peak construction noise and vibration levels at NSER; and
- advise on any operations that are shown to exceed appropriate and relevant noise criteria and where appropriate provide recommendations for further mitigation.

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

1.13 The Proposed Development would comprise the following components:

- Photovoltaic panels and associated supporting frames and ground mounting;
- Solar panel inverters and transformers;
- Battery storage containers, inverters and transformers;
- Cabling linking battery containers and inverter and transformer stations to the on-site substation;
- Perimeter fencing and CCTV;
- DNO Substation including transformer;
- Client Substation (Switchgear Building);
- Control and Storage Rooms;
- Internal service roads;
- Overhead cable connection to the Frodsham SPEN substation;
- Below ground cable to provide a direct wire connection to supply electricity to local businesses;
- Scheme of landscaping, including ecological mitigation areas; and
- Temporary Compound & set down areas.

2.0 SITE DESCRIPTION & PROPOSED DEVELOPMENT

2.1 Location and Proposed Development Outline

2.1.1 The location of the Proposed Development is illustrated on Figure 1 located at the end of this report. Further details of the Site are provided in ES Vol 1 Chapter 1: Introduction [EN010153/DR/6.1] and ES Vol 1 Chapter 2: The Proposed Development [EN010153/DR/6.1].

2.2 Site Operation Noise Sources

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

- Noise from the operation of solar inverters, transformers and switchgear.
- Noise from the operation of the battery storage plant (i.e. inverters and transformers).
- Noise from the operation of cooling systems for enclosed battery plant.
- Noise from the transformers within Frodsham Solar Substation.

2.2.2 Construction phase noise sources including plant and traffic are considered in Section 3.5 below.

2.3 Site Plant and Operation Hours

2.3.1 Solar farms are inherently quiet installations with the PV panels not producing any noise due to the fact that there are no moving parts. The associated plant used to convert the DC current to AC at the correct voltage involves the use of inverters and transformers which do generate noise.

2.3.2 Transformers and inverters are not particularly noisy plant and generate a low level 'hum' at relatively close distances. By its nature the solar array is only operational during daylight hours, however during peak generation periods over the summer months there may be occasional periods when the operation of the inverters and transformers occurs after sunrise (i.e. around 0500-0700 hours

which falls within the assessment 'nighttime period'). Noise would only be generated during particularly warm periods when inverter cooling fans would need to operate, these periods are likely to be infrequent and cooling fans are unlikely to be at full capacity and noise levels are therefore likely to be lower than predicted.

- 2.3.3 The battery storage plant would be available for operation 24hrs/day and would provide energy when required. The BESS will store excess power generated by the Proposed Development that could not be exported or manage the export to make power available to the grid during times of peak demand or provide grid balancing services. The BESS would comprise battery containers along with associated inverters and transformers and would be co-located with the Frodsham Solar Substation. During peak demand operations and higher ambient temperatures, associated plant cooling fans would be expected to produce higher levels of noise from the BESS. The predominant noise source from the BESS would be the cooling systems within the battery units and the inverters. Transformers located at the Frodsham Solar Sub-station would produce a low-level noise from the transformer body 'hum' at close range positions and, where applicable, any associated cooling fan operation.

2.4 Nearest Receptors

Residential Receptors

- 2.4.1 The NSR are generally located to the south and to the south-west of the Site. The closest residential receptors to the Solar Array Development Area are located to the south in Frodsham off Williams Way (circa 230m), Hawthorn Road and Wayford Mews (circa 140m) and Waterside Drive (circa 290m) with distances given being distances from Solar Array Development Area.
- 2.4.2 There are other receptors located at a greater distance away from the Solar Array Development Area than the above, with NSR to the north-east at a distance of 760m (off Cholmondley Road in Clifton) and to the north off Cavendish Farm Road at Weston at circa 840m. As the potential likely effects would be lower compared to the NSR described above, these receptors are not included in the

assessment but are included in the noise contour mapping results. The NSR are indicated on **Figure 1** located at the end of this report.

2.4.3 There are two travellers' sites in close proximity to one another located near to the southern boundary of the Proposed Development on the intersection of Moorditch Lane and Brook Furlong. These are not official designated sites and as set out in ES Vol 1 Chapter 1: Introduction [EN010153/DR/6.1] CWACC have taken enforcement action against one of the sites. Nonetheless, these sites have been considered as potential sensitive noise receptors. For the purpose of the assessment the two sites have been considered as a residential NSR and a 'worst case' noise prediction taken to be representative of both sites.

2.4.4 We are not aware of any other future receptors proposed that would be of greater sensitivity than those outlined above.

Nearest Sensitive Ecological Receptors (NSER)

2.4.5 The NSER in relation to the Proposed Development have been identified as the following:

- Sections of the River Weaver;
- Cells 2 and 5 for the duration of the NBBMA Cell 3 works (i.e. assumes Cells 2 and 5 are not developed until NBBMA works completed);
- Cell 3 NBBMA following work completed to create the NBBMA.
- Cell 6 (eastern lake); and
- Mersey Estuary SPA, Ramsar and SSSI to the north of Cell 2 and NBBMA.

Figure 3 located at the end of this report indicates the areas of ecological sensitivity that are closest to the Proposed Development. Also refer to ES Vol 3 Figure 1-4: Solar Array Development Area Site Context Plan [EN010153/DR/6.3] for locations of the Cells and the NBBMA.

2.4.6 The indicative layout of the Site used for the noise assessment is shown on ES Vol 3 Figure 2-2: Indicative Operational Site Layout [EN010153/DR/6.3]. There are two proposed locations for the BESS and Frodsham Solar Substation and the effects from both options have been considered in the assessment. It has also

been assumed that centralised inverter/transformer stations are used. Again, this is a worst-case assumption because if string inverters were used then the noise levels would be less than predicted by the model that considers centralised inverter/transformer stations. The Indicative Operational Site Layout is considered to be a reasonable worst-case layout which can be delivered in accordance with the Works Plans [EN010153/DR/2.3] and the Design Parameters [EN101053/DR/7.1].

3.0 NOISE POLICY, STANDARDS AND GUIDANCE

3.1 Introduction

3.1.1 Noise can be 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 National Planning Guidance

3.2.1 The following National Policy Statements set out national planning policies in relation to nationally significant solar photovoltaic generation developments:

- Overarching National Policy Statement (NPS) for Energy (EN-1);
- NPS for Renewable Energy Infrastructure (EN-3).;
- NPS for Electricity Networks Infrastructure (EN-5)

3.2.2 The National Planning Policy Framework (NPPF), and the accompanying online Planning Practice Guidance (PPG) are also important and relevant but are not the key policy documents against which the application will be determined.

3.2.3 In addition, the Noise Policy Statement for England (NPSE) is relevant to this assessment.

3.2.4 Relevant national policies from the above documents are summarised in Table 3.1.

Table 3.1 – Summary of National Planning Policy

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
NPS EN-1	Section 5.12	Describes Noise and vibration impacts, including the factors that determine these impacts, what should be considered in the assessment of impacts, mitigation measures and the decision-making factors. Deals specifically with Noise and Vibration assessment, mitigation and the decision-making process. Includes reference to policy NPSE, NPPF and Standards BS 4142, BS 6472, BS 8233, BS 5228. Includes consideration of impacts on ecological sensitive receptors.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
NPS EN-3	Paragraph 2.5.2 Paragraphs 2.7.39 & 2.7.40	Proposals for renewable energy infrastructure should demonstrate good design particularly in the design of the project to mitigate impacts such as noise.
	Paragraphs 2.10.161 & 2.10.162	Describes the need to consider residential amenity impacts and refers to EN-1 for good design and impacts. Comments on construction impacts relative to noise and vibration and states limited weight to be applied by SoS.
NPS EN-5	Paragraph 2.9.37	Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors.
	Paragraph 2.9.38	Transformers are installed at many substations, and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures).
	Paragraph 2.9.39	For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards (for example BS4142) are satisfactory.
	Paragraph 2.9.40	For the assessment of noise from overhead lines, the applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive receptors.
	Paragraph 2.9.41	For instance, the applicant may use an appropriate noise modelling tool or tools for the prediction of overhead line noise and its propagation over distance, such as an ISO 9613-2 or Technical Report TR(T)94.
	Paragraph 2.10.9 & 2.10.10	The Applicants must consider the following measures: <ul style="list-style-type: none"> the selection of quieter cost-effective plants. In addition, the ES should include information on planned maintenance arrangements.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
NPSE	Para 2.19 to 2.25	Specifies the long- term vision and aims for noise for Government policy and development. Sets out the concepts of effect levels of noise and details the aims.
NPPF	Para. 187e	Includes aim to prevent new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.
	Para. 198	Planning decisions should ensure new development is appropriate for its location, taking into account the likely effects (including cumulative effects) of pollution on health. In doing so, they should 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. They should also identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
PPG on Noise	Para 003 to 005	Provides advice on how planning can manage potential impacts in new development. This includes ‘how noise impacts can be determined’, ‘what are the observed effect levels’ and ‘how can it be established whether noise is likely to be a concern’. This includes a table summarising the noise exposure hierarchy.
	Para 006 to 008	Further advice is provided in respect of ‘what factors influence whether noise could be a concern’, ‘can planning policies include noise standards’ and ‘what factors are relevant if seeking to identify areas of tranquillity’.

Noise Policy Statement for England

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

“Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This long-term vision is supported by the following aims:

Noise 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.”*

3.2.6 The NPSE introduced three concepts to the assessment of noise, as follows:

- 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.

3.2.7 The above categories are 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 a SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy flexibility until there is further evidence and guidance.

3.2.8 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.”*

3.2.9 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, as there may be situations where there is a limit to the effect of mitigation to try and minimise impacts, due to other essential operational requirements.

- 3.2.10 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.

3.3 Local Policy

Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies

- 3.3.1 The Cheshire West and Chester Local Plan (Part One) Strategic Policies was adopted in January 2015 to provide the overall vision, strategic objectives, spatial strategy and strategic planning policies for the borough to 2030. The Local Plan (Part One) relates to policies for planning applications and is supported by Part Two which relates to Land Allocations and Detailed Policies Plan.

- 3.3.2 Policy ENV 7 'Alternative energy supplies' will support renewable and low carbon energy proposal where there are no unacceptable impacts from a number of issues including noise.

Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies

- 3.3.3 Policy DM30 relates to Noise and states:

"In line with Local Plan (Part One) policy SOC 5, development must not give rise to significant adverse impacts on health and quality of life, from noise. Development which generates noise or is sensitive to it will only be permitted where it accords with the development plan and does not have an unacceptable adverse impact on human health or quality of life. Unless it can be demonstrated that a significant adverse impact on residential amenity arising from construction and demolition is unlikely it is expected that demolition and construction works shall be carried out during normal working hours. The Council must be satisfied

that the proposed location of any construction/demolition site compound will minimise the noise impact on neighbouring residential uses.”

Guidance

Planning Practice Guidance – July 2019

3.3.4 In October 2014, the Ministry of Housing, Communities & Local Government updated the Planning Practice Guidance (“PPG”) on noise, which provides further information in respect of new developments, which may be sensitive to the prevailing noise environment. The main section of PPG was also updated in July 2019.

3.3.5 The PPG refers to the NPPF and NPSE documents and under the heading ‘How to determine the noise impact?’ it states *“Local planning authorities’ plan-making and decision taking should take account of the acoustic environment and in doing so consider:*

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

3.3.6 The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Table 3.2 below provides the perception, example of outcome, effect and action required relative to noise.

Table 3.2: 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	Observed Adverse Effect	Mitigate and reduce to a minimum

Response	Examples of Outcomes	Increasing Effect Level	Action
	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.		
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

British Standards and other Guidance

3.3.7 The following British Standards and other guidance documents are relevant to the assessment of noise and vibration effects:

- BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
- BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings';
- BS5228: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites';
- BS 7445: 2003 Description and measurement of environmental noise;
- World Health Organisation (WHO) Guidelines for Community Noise: April 1999
- Night Noise Guidelines for Europe: 2009 – World Health Organisation;
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11) Rev 2: May 2020;
- ISO 9613-2: 2024 Acoustics – Attenuation of Sound During Propagation Outdoors;

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

3.3.8 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).

3.3.8 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."

3.3.10 The subjective method adopted includes the following character corrections:

Table 3.3: 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.

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

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

3.3.12 In conclusion, in view of the noise contribution from the Proposed Development, 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’

3.3.13 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.

3.3.14 The guidance provided in section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. Table 3.4 provides detail of the levels given in the standard.

Table 3.4: 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 $L_{Aeq,8hours}$

3.3.15 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 the bedroom window.

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

3.3.16 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.*”

3.3.17 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.”

- 3.3.18 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.*”

3.4 Survey Techniques

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

3.5 Guidance on Construction Noise

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

Construction Plant Noise - Residential NSR

- 3.5.1 For the assessment of impacts from construction noise, the appropriate methodology is presented in the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration guidance. This document sets out the requirements for assessing, reporting and management of environmental effects, specifically from the changes in noise and vibration from construction, operation and maintenance projects.

- 3.5.2 The DMRB LA 111 guidance provides a means of determining the magnitude of the impact, the observed effect level and the resultant significance of construction noise.
- 3.5.3 For the prediction of construction noise, the DMRB LA 111 guidance refers to BS5228-1. For residents of houses that could be exposed to construction noise, BS5228-1:2009+A1:2014 is therefore considered to be the appropriate standard. This standard advises 'best practicable means' (BPM) to be employed to control noise generation.
- 3.5.4 At this stage it is not possible to identify precise detail of what temporary construction plant would be required and where it would be sited and for how long. As a consequence, an indicative range of levels of noise and vibration from specific types of task at the closest and most distant approach to all the working areas within the Site have been used to calculate the range of highest likely noise and vibration conditions relative to the NSR.
- 3.5.5 The construction impact semantic scale is set out in DMRB LA 111 and provided in Table 3.5 (i.e. ref. Table 3.12 of LA 111). We have added in column 4 to show the range of threshold levels for ease of reference, which is referred to in column 3 of Table 3.4 and taken from BS5228-1:2009+A1:2014 Annex E.3.2. The threshold level is determined by measuring typical ambient noise at the NSR and comparing this with three threshold limits between the stated range (e.g. daytime weekday would be 65dB, 70dB or 75dB L_{Aeq}). The specific limit for the project is determined by establishing whether the baseline noise level (rounded to the nearest 5dB) at NSR is either lower, equal to or higher than the three limits.
- 3.5.6 In order to relate the threshold level in terms of an effect level and an impact magnitude, the guidance compares the calculated noise level at the NSR with the measured baseline and the determined threshold limit. For example, if the calculated level is lower than the baseline level then it is considered to be a negligible impact (i.e. below the Lowest Observable Adverse Effect Level LOAEL). If the level is equal to or greater than +5dB above the threshold limit then it is considered to be a major impact (i.e. 5dB or greater than the Significant Observable Adverse Effect Level SOAEL). Table 3.6 provides the relative impact magnitude and how this is defined relative to the construction noise level.

Table 3.5: Construction Time Period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL	Threshold Level LAeq _{1hr} dB
Day (0700-1900 hours. Weekday and 0700- 1300 Saturdays)	Baseline noise levels LAeq,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 hours)	Baseline noise levels LAeq,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 LAeq,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

3.5.7 The magnitude of impact for construction noise is outlined in Table 3.6 (as defined in DMRB LA 111).

Table 3.6: Magnitude of Impact for Construction Noise

Magnitude of Impact	Construction noise level
Nealiable	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Major (Substantial/Severe)	Above or equal to SOAEL +5dB

Road Traffic Noise

3.5.3 Vehicular access to the Proposed Development during the construction phase would be from the west, connecting to the adopted highway at the roundabout between Pool Lane and Grinsome Road. There will be no access during construction and operation from roads/tracks linking directly to Frodsham to the south of the Site.

Construction Phase Traffic

3.5.4 Section 5.0 of this report includes an assessment of road traffic impacts relating to the construction phase of the Proposed Development on existing NSR. This assessment also provides a worst-case assessment for any significant replacement campaigns during the operational period of the Proposed Development and also decommissioning phase impacts.

3.5.5 According to the DMRB LA 111 guidelines, the magnitude of impact at noise sensitive receptors from construction traffic is set out in Table 3.7. The magnitude of impact is determined by establishing how much the existing baseline levels would increase by as a result of the temporary activity.

Table 3.7: Magnitude of impact at receptors

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	Greater than or equal to 5.0

3.5.6 As construction is a temporary activity, to establish whether a significant effect would occur at the NSR, the activity would have to be equal to or greater than an increase in 3dB and also occur for a relatively long period of time.

3.5.7 According to DMRB LA 111 (ref. paragraph 3.19 of the guidance) the period of time that this would occur is defined as:

“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 Phase – Vibration

3.5.8 In order to establish whether or not vibration generated by vibratory plant used during the construction phase would be significant it is necessary to predict the likely vibration level at the NSR.

3.5.9 The DMRB LA 111 guidance provides a means of determining the magnitude of the impact, the observed effect level and the resultant significance of construction vibration.

3.5.10 In order to relate the threshold level in terms of an effect level and an impact magnitude, the guidance compares the calculated noise level at the NSR with two threshold limits. The first threshold (i.e. 0.3mm/sec PPV) is the level at which vibration is said to be just perceptible and the threshold of LOAEL. A vibration level below 0.3mm/sec would represent a negligible impact and the second threshold (i.e. 1mm/sec PPV) was set as the level at which construction vibration can be tolerated with prior warning and the threshold of SOAEL. Below this level would be a minor impact. At levels above 1mm/sec and below 10mm/sec PPV would relate to a moderate impact and levels above 10mm/sec PPV would be considered to be a major impact.

3.5.11 For construction phase vibration the LOAEL and SOAEL is set out in DMRB LA 111 and provided in Table 3.8.

Table 3.8: Construction vibration LOAELs and SOAELs for all receptors

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

3.5.12 The magnitude of impact for construction vibration, shall be determined in accordance with Table 3.9 (as defined in DMRB LA 111).

Table 3.9: 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

3.5.13 As this is a temporary activity, to establish whether a significant effect would occur at the NSR, the activity would have to be equal to or greater than 1mm/sec and also occur for a relatively long period of time.

3.5.14 According to DMRB LA 111 (ref. paragraph 3.34) the period of time that this would occur is defined below:

“Construction vibration 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.”*

3.6 Relevant Noise Criteria

- 3.6.1 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 Proposed Development. To achieve a **low** impact the 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**.

Operational Vibration

- 3.6.2 The type of plant proposed would not generate any significant operational vibration and therefore any impact would be **negligible** and not significant.

3.7 Stakeholder Engagement

Consultation

- 3.7.1 Scoping of the Noise and Vibration Assessment was undertaken as part of the wider EIA scoping exercise, the findings of which were recorded in the Scoping Report (ES Vol 2 Appendix 1-1: Frodsham Solar Scoping Report (May 2023) [EN010153/DR/6.2]) and the Scoping Opinion (ES Vol 2 Appendix 1-2: Planning Inspectorate Scoping Opinion (July 2023) [EN010153/DR/6.2]). The Scoping Opinion confirmed that there were unlikely to be significant effects from noise and vibration and therefore it was agreed that noise and vibration could be scoped out from a detailed technical chapter in the ES provided that the embedded mitigation secured through environmental management plans is demonstrated in the DCO application documentation and agreed with relevant consultation bodies. The Outline CEMP [EN010153/DR/7.5] and Outline OEMP [EN010153/DR/7.5] include sections on control of noise and vibration arising from the assessment in this report.

3.7.2 Table 3.10 summarises the responses received from the Statutory Consultation on the Preliminary Environmental Information Report (PEIR) in relation to noise impacts.

Table 3.10: PEIR Consultation Responses

Consultee	Comment	Response to Consultation
CWACC – Environmental Protection Comments	<p>Given the existing high background levels arising predominantly from the M56, predicted levels at residential properties are unlikely to present any loss of residential amenity. The exception to this is the Traveller site located on the intersection of Moorditch Lane and Brook Furlong. The location is significantly closer to the proposed development and standard acoustic assessment criteria are not valid as the noise insulating properties of caravans are, in general, significantly lower than that of houses. There are other confounding matters at the Traveller site irrespective of its planning status as it is possible that the noise climate already exceeds levels specified in BS8233.</p> <p>As previously advised, if the Travellers' Site is likely to remain then specific monitoring data is required to ensure that any assessment is valid. To that end a monitoring location is required either there or at a comparable proxy location. Without this it will make predictions regarding the impact of the proposed development subject to an unacceptably high degree of uncertainty.</p>	<p>The impact on the Travellers Site is covered in this noise assessment which assesses the likely internal noise levels from existing ambient and any cumulative effects from the Proposed Development. Refer to paragraphs 1.5, 2.4.3, 4.1.3, 4.1.9, 6.3.7, 7.1 and 7.13 and Tables 4.1, 4.2, 4.4, 5.1, 5.3 and 6.1 for information.</p> <p>The assessment includes a baseline survey undertaken over a weekend period in proximity to the Travellers' Site. This has been used to inform the updated assessment of the likely effects on the caravans at the Traveller Site.</p>
	<p>We would advise that any application should be able to demonstrate compliance with the following conditions for operational noise.</p> <p>Plant / equipment - Prior to the installation of any plant / mechanical extraction for the proposed development a scheme to control noise from the premises shall be submitted to and approved in writing by the Local Planning Authority.</p> <p>i) The scheme shall ensure that the rating level of noise emitted from any plant associated with the proposed development shall be 5 dB(A) below the background noise level (as measured as an LA90) at any time as measured at the nearest noise sensitive receptor. The measurement and assessment shall be made in accordance with BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'.</p> <p>ii) The scheme shall be implemented in full prior to operation and retained thereafter; any variation to the agreed scheme shall be agreed in writing with the Local Planning Authority prior to any works being undertaken. All equipment shall be maintained according to manufacturers' recommendations.</p>	<p>The noise assessment for site operations shows site generated noise levels would be well within the levels proposed by the Council, to the extent that there would be no requirement to set a threshold level as there is so much headroom before the thresholds would be exceeded that it would be unnecessary, refer to Table 6.1 and 6.2. Furthermore, it is noted that equipment such as BESS units and PCUs are becoming less noise as technology advances. Therefore the assessment presented is considered to present a conservative position.</p>

<p>Natural England (NE)</p>	<p>Noise and visual disturbance Natural England disagrees with the conclusions regarding noise disturbance and the statement made in paragraph 8.8.7 'Noise Impact Assessment (PEIR Volume 2 Appendix 4 1) reveals that all anticipated activities that have potential to cause higher levels of noise associated with the Proposed Development (including CFA piling and movement and activity of HGVs associated with the BESS, works within the NBBMA such as activity of dump trucks, excavators and dozer, and plant installing the solar arrays) would result in predicted disturbance to waterbirds according to the (TIDE) assessment criteria'.</p> <p>The Noise Impact Assessment relies upon the thresholds taken from the Waterbird Disturbance Mitigation/ TIDE Toolkit to rule out significant noise impacts on SPA birds. However Natural England advise that the thresholds set out within the Toolkit are not applicable in individual developments as each development site is different with different background levels and existing patterns of disturbance.</p> <p>As any disturbance is likely to be site and species specific the use of thresholds is not appropriate. We advise the ES and HRA considers the baseline noise levels at bird and a comparison is made with the expected peak noise levels (L_{Amax}) during each stage of the construction works (including the use of multiple types of machinery at the same time). Where there is an increase of 3dB or above then further assessment is required and appropriate mitigation provided.</p> <p>Consideration of the effects of noise and the increased use of the access routes to the development site should also be included in any assessment. We note that construction noise maps for the expected L_{Aeq} levels have been included within the Noise Impact Assessment (Appendix 3) which is welcomed however we advise maps are also produced for the L_{Amax} levels, and that further detail on the works being assessed for each map would also be useful.</p> <p>We similarly advise caution when considering distance thresholds (paragraph 8.8.5), and the application of the buffer distances set out within the Goodship and Furness (2022) Disturbance Distances Review report. Although these distances can be used as guidelines when considering disturbance from human activity, they may not be appropriate for construction activities.</p> <p>We acknowledge that whilst there may be habituation to existing levels and types of disturbance by birds using both the designated site and development site the construction period however will involve the use of machinery that is not typically in use within the development area and so further consideration will be needed within the ES and HRA regarding disturbance levels and impacts for SPA/Ramsar birds.</p>	<p>The NE response makes reference to the consideration of any increase of 3dB above the typical baseline sound levels at the ecological sensitive areas in terms of L_{Aeq} and L_{Amax} measurement indices. We assume that this preferred approach rather than the Tide Toolkit approach has been taken from the NE document entitled:</p> <p>'A review of the effects of noise on Birds' Version 1 published in 2018 by Natural England (Allan Drewitt, Emma Hawthorne, Richard Saunders & Sarah Anthony).</p> <p>As a result of these comments, a further baseline study has been undertaken (refer to section 4.0 for baseline data).</p> <p>Further predictions on the effect of measured baseline levels in terms of L_{Aeq} and L_{Amax} have been considered set against the peak construction noise periods at NSER. Refer to Table 5.2.</p> <p>Additional 'worst case' predictions within the NBBMA have been undertaken which shows that the threshold level of typical baseline +3dB would be achieved at adjacent cells with the application of 'best practicable means' (BPM). Refer to paragraphs 5.3.5 to 5.3.13 for further information.</p> <p>Noise maps have been included in Appendix 5 of the highest likely operation and construction noise in respect of L_{Aeq} (average) levels. Noise maps of L_{Amax} are difficult to produce due to the variability relative to source and infinite location positioning. What has been provided is an indication of the typical range of L_{Amax} for each type of activity (this is based on empirical library data of measured plant noise</p>
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Consultee	Comment	Response to Consultation
		<p>in relation to L_{Amax} when compared with L_{Aeq} levels during the measured events). Refer to Table 5.2. Appendix 5 Noise Map 16 does however provide maximum L_{Amax} levels for a pessimistic piling activity at the BESS, which shows no exceedance of NE guidance.</p> <p>Possible measures for mitigation are provided in paragraph 5.3.18 to 5.3.21.</p>

3.8 Ecological Receptor Disturbance – Noise Guidance

- 3.8.1 The Natural England document 'A review of the effects of noise on Birds' Version 1 was published in 2018 by NE (Allan Drewitt, Emma Hawthorne, Richard Saunders & Sarah Anthony) states in the introduction:

“This guidance note describes the nature of noise and explains how it is heard and measured. Variable and unpredictable noises often result in the greatest disturbance effects on birds and methods to make representative measurements of variable noise level are presented and discussed. Noise also has other more subtle and less easily measured effects on birds, including masking important acoustic signals and potentially harmful physiological changes caused by increased stress. The available literature for a wide range of effects of different noise sources on birds has been reviewed and summarised, and a list of references for further reading is provided.”

- 3.8.2 At section 4.3 the NE guidance states:

“What are the effects of industrial and construction noise?”

A number of assessments of noise effects on waterbirds have been undertaken on the Humber Estuary, including the effects of hydraulic hammer or percussive piling, steam venting and other construction activities (Cutts et al. 2009, IECS 2004, 2008, Wright et al. 2010). General conclusions from these studies are that that the potential for bird disturbance increases as the difference between the highest discontinuous noise levels and simultaneous continuous noise levels increases, and that birds are more likely to be disturbed by sudden noises than a wide range of more steady, and predictable, noise levels.”

- 3.8.3 In conclusion, the NE guidance states:

“Caution should be exercised when attempting to define a threshold based on noise levels alone. As described above, other factors such as noise ‘peakiness’, including rise time of a noise signal, and the frequency content of the noise source, should also be expected to affect bird behaviour.”

As with other forms of disturbance, bird response varies with other factors such as degree of habituation to ambient noise levels, flock size and availability of resources such as foraging and roosting habitats. Additionally, Halfwerk et al. (2010) argue that knowledge of the spatial, temporal and spectral overlap between noise and species-specific acoustic behaviour are important for effective noise management. For example, road noise in the same range of frequencies as those of a bird's vocalizations (generally 2-4 kHz) has a much greater masking effect on the detection of acoustic signals than noises outside this range (Dooling & Popper 2007).

For all these reasons it seems clear that generic noise threshold levels are unlikely to offer a suitable approach for assessing the potential effects of noise on birds. A potentially more suitable approach might be the application of a threshold increase in noise levels, either continuous noise or sporadic noise. In the case of sporadic noise, a greater than 3 dBA increase in peak noise might be a useful and sufficiently precautionary rule-of-thumb when considering the likelihood of a significant effect (as described above, a difference of 3 dBA in similar types of noise is just distinguishable to people). Thus, as a general rule, if the noise source is no more than 3dB higher than existing noise levels it is unlikely to be significant, but noting that a 3dB increase in the average noise level could mask a significant increase in impulsive noise. Similarly, if considering the potential effect of chronic noise on breeding birds, the absence of a 3dB increase in the maximum level should not be used to exclude an impact linked to an increase in average baseline levels."

- 3.8.4 In summary, the guidance would indicate the following noise level thresholds to be appropriate:
- a) Where L_{Amax} levels are likely to exceed 70dB L_{Amax} , then mitigation measures should be considered.
 - b) Where L_{Aeq} or L_{Amax} levels are likely to exceed the existing baseline levels by 3dB, then mitigation measures should be considered.

4.0 BASELINE SURVEY METHODOLOGY & RESULTS

4.1 Baseline Sound Monitoring (See Appendix 2, Appendix 3& Figures 1 and 2)

Instrumentation and Fieldwork Details

- 4.1.1 Two detailed environmental baseline sound surveys were carried out at the NSRs to determine details of the noise climate to provide typical and representative background sound data. Three locations were chosen to establish background sound.
- 4.1.2 The monitoring positions are shown on **Figure 1** and **Figure 2** located at the end of this report. The noise monitoring positions are representative of NSR 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 surveys were undertaken over weekend periods. The first survey was carried out at three fixed locations (Location A, B and C) representing residential NSR on Thursday 8th to Monday 12th December 2022 (refer to **Figure 1**). The second survey was undertaken from Friday, 14th to Monday, 17th February 2025, at three fixed monitoring positions relating to the Traveller Site (Location D) and two at NSER. Some additional spot roaming measurement positions were chosen during the second survey at four additional NSER locations (refer to **Figures 1 & 2**). The baseline assessment is therefore considered to provide representative baseline sound levels for NSR and NSER. Refer to **Appendix 2** and **Appendix 3** for further detail.
- 4.1.4 The existing background sound survey was carried out in accordance with the advice given in BS4142: 2014+A1:2019.
- 4.1.5 The monitoring positions were as follows:
- Position A (South-east of Site – on opposite side of the M56 Motorway) – Rear of Saltworks Close*
- 4.1.6 Monitoring position A is representative of the nearest receptor located south-east of the Site in proximity to Saltworks Close. Noise levels at this location are generally affected by distant road traffic noise from the M56 Motorway. The

monitoring position was chosen just to the north and rear of Saltworks Close. Refer to **Figure 1** for location.

Position B (South of Site) – Adjacent to Wayford Mews

- 4.1.7 Position B was chosen as a suitable monitoring position to represent typical baseline levels in the vicinity of properties south of Site off Wayford Mews. Noise levels at this location are formed in general by road traffic noise from the M56 Motorway. The monitoring position was chosen in the field just to the east of Wayford Mews and north of the properties off Ship Street. **Figure 1** shows the location.

Position C (South-west of Site) – off Williams Way

- 4.1.8 This monitoring position is representative of the closest receptors southwest of the BESS Site off Williams Way. Noise levels at this location are generally formed by local road traffic noise off the M56 Motorway. Monitoring at this location was in the field just to the east of the receptors. **Figure 1** shows the location.

Position D (Traveller Site) – Off Moorditch Lane

- 4.1.9 Position D was chosen as being representative for the assessment of existing sound levels in respect of the Traveller Site. Noise levels are generally formed and dominated by local road traffic noise from the M56 Motorway. Monitoring at this location was in the field to the west of the Traveller Site at a similar distance from the M56 as the most northern location relative to caravan locations. **Figure 1** shows the location.

Position E (Ecological Receptor) - Cell 2/Cell 3 Ecological Receptor Areas

- 4.1.10 This fixed monitoring position is representative of the ecological receptors in the area of cells 2 and 3 which is in proximity to Frodsham Marsh Farm. Noise levels at this location are generally formed by distant road traffic noise, occasional aircraft movement and bird call. Monitoring at this location was in the field just to the east of the receptors. **Figure 2** shows the location.

Position F (Ecological Receptor) – Cell 1 & River Weaver Ecological Receptor

- 4.1.11 This fixed monitoring location is principally for the assessment of existing noise at the River Weaver NSER. Noise levels at this location are generally formed by

distant road traffic, bird call, distant wind turbine noise and intermittent aircraft noise. The location for monitoring was located at River level off the footpath in proximity to the River edge. **Figure 2** shows the location.

Position G (Ecological Receptor) – Spot Roaming Measurement Cell 6 (Eastern Lake)

4.1.12 Position F is located at the southern boundary of Cell 6 to represent NSER in this area. Noise levels are dominated by distant road traffic noise, occasional aircraft and bird call. The location chosen was just off the access track off Moorditch Lane. **Figure 2** shows the location.

Position H (Ecological Receptor) – Spot Roaming Measurement (Cell 3)

4.1.13 This spot roaming measurement position was located in Cell 3 NSER and used as a proxy to compare with Position E measurements, which was at a similar distance to noise generating sources (e.g. Motorway, and local bird call etc). The location was within cell 3 at the north and central location away from grazing farm animals. **Figure 2** shows the location.

Position I (Ecological Receptor) – Spot Roaming Measurement (River Weaver)

4.1.14 This spot roaming measurement position is principally for the assessment of existing noise at the River Weaver NSER at a location further southeast and slightly closer towards the Motorway. Noise levels at this location are generally formed by distant road traffic, bird call and intermittent aircraft noise. The location for monitoring was located at river level off the footpath in proximity to the river edge. **Figure 2** shows the location.

Position J (Ecological Receptor) – Spot Roaming Measurement (River Weaver)

4.1.15 This spot roaming measurement position is principally for the assessment of existing noise at the River Weaver NSER at a location further northwest and slightly further away from the Motorway. Noise levels at this location are generally formed by distant road traffic, intermittent aircraft noise and wind turbine noise. The location for monitoring was located at river level off the footpath in proximity to the embankment edge. **Figure 2** shows the location.

4.1.16 The monitoring positions and locations were in appropriate amenity areas of properties and ecological sensitive receptor areas over a weekend period and provide a representative cross section of the receptors close to the Site. It is considered that the results represent a robust indication of existing background sound levels.

4.1.17 The main source of existing sound affecting nearest receptor properties relates to local and distant road traffic noise, dominated by the M56 Motorway, intermittent aircraft movement and bird sound.

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

Table 4.1: Instrumentation

Manufacturer	Description	Type	Calibration Due Date	Serial No.
Survey: December 2022				
Cirrus	Real Time Sound Analyser	171A	June 2023	G061253
Cirrus	Real Time Sound Analyser	1710	April 2024	G063350
Cirrus	Real Time Sound Analyser	171B	April 2023	G056142
Cirrus	Electronic Calibrator	CR: 513A	April 2023	031523
Survey: February 2025				
Cirrus	Real Time Sound Analyser	171A	July 2025	G061253
Cirrus	Real Time Sound Analyser	1710	May 2025	G063350
Cirrus	Real Time Sound Analyser	1710	March 2025	G304789
Norsonic	Real Time Sound Analyser	140	March 2025	1405418
Cirrus	Electronic Calibrator	CR: 513A	May 2025	031523

4.1.19 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

4.1.20 Measurements were recorded over a period of approximately 74 to 96 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** and **Appendix 3** for details).

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

Calibration

Calibration setting: 94dB

- 4.1.22 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

- 4.1.23 Static sound measurement positions (shown in Figure 1 and Figure 2 at the end of this report) were chosen to establish typical and representative background and ambient sound data in the vicinity of NSR and NSER (see **Appendix 2** and **Appendix 3** for detailed information). Consultants of Noise & Vibration Consultants Limited set up the sound monitoring for the first survey on the 8th December 2022 and removed the equipment on 12th December 2022. For the second survey, equipment was set up on 14th February 2025 and removed on 17th February 2025.

Meteorological Conditions

- 4.1.24 Weather details were recorded by the NVC consultant during the period of the surveys using a portable Davis Vantage Vue weather station (Position D, grid reference 351864 378674 for the first survey and 349807 379136 for the second survey). The results of the weather conditions are provided in **Appendix 2** and **Appendix 3**.
- 4.1.25 Any periods of monitoring where rain or high wind speeds occurred were removed from the data set for the statistical analysis.

4.1.26 The above climatic conditions were suitable for monitoring environmental noise levels in accordance with advice given in BS4142:2014+A1:2019.

4.2 Results

Background Sound

4.2.1 To establish the background sound level BS4142:2014+A1:2019 requires the determination of a representative value which is not deemed to be the lowest but under statistical analysis an example using the most commonplace value is depicted when measured over a representative time period.

4.2.2 Background sound measurements were taken adjacent to the nearest residential sensitive receptors. The results of measurements taken at the fixed monitoring positions are presented below in Tables 4.1 to 4.2, with detailed measurements in **Appendix 2** and **Appendix 3**.

Table 4.1: Existing Daytime Background Sound Levels at Monitoring Positions

Monitoring Position (Figure 1)	Time Period	Grid Ref X Y	LAeq dB	LA90 dB	LAmix dB	Representative ¹ LA90 dB
A) Saltworks Close	0700-2300	352616 378812	63	61	57-82	60
B) Wayford Mews	0700-2300	351958 378433	66	65	64-85	64
C) Williams Way	0700-2300	351306 377970	63	61	63-83	61
D) Traveller Site	0700-2300	350871 378060	68	67	57-85	67

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

Table 4.2: Existing Night-time Background Sound Levels at Monitoring Positions

Monitoring Position (Figure 1)	Time Period	Grid Ref X Y	LAeq dB	LA90 dB	LAmix dB	Representative ¹ LA90 dB
A) Saltworks Close	2300-0700	352616 378812	56	53	55-78	52
	0500-0700		60	58	58-72	54
B) Wayford Mews	2300-0700	351958 378433	60	56	62-80	54
	0500-0700		63	61	65-80	59
C) Williams Way	2300-0700	351306 377970	58	54	61-79	52
	0500-0700		62	59	64-79	57
D) Traveller Site	2300-0700	350871 378060	63	60	65-75	57
	0500-0700		66	64	68-75	61

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

4.2.3 The methodology detailed in the latest version of BS4142:2014+A1:2019 provides an example of statistical analysis to determine the background sound level (i.e. most commonplace). The mean, median and most commonplace value

have been compared and the lowest level has been used to establish the representative background sound.

- 4.2.4 The results of existing background sound measurements taken at the fixed monitoring positions indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 60dB and 67dB L_{A90} . During night-time periods (2300-0700 hours) the background levels were shown to vary between 52dB and 57dB L_{A90} and during sunrise hours (around 0500-0700 hours during Summer months i.e. May to September) a background level of 54dB and 61dB L_{A90} .

Baseline Levels at NSER

- 4.2.5 The latest survey results at the NSER are presented in Table 4.3 in terms of the range of L_{Aeq} and L_{Amax} levels during daytime periods. Refer to **Appendix 3** for further detail.

Table 4.3: Existing Daytime and Night-time Residual Sound Levels at NSER Monitoring Positions

Monitoring Position (Figure 2)	Time Period	Grid Ref. X Y	L_{Aeq} dB Average [15mins range]	L_{Amax} dB Range
E) Cell 2 (north)	0700-1800 (weekday) 0700-1300 (Sat) 0700-2300 2300-0700	349497 378882	56 [49-64] 51 [48-57] 54 48	59-84 54-77 53-84 52-77
F) River Weaver	0700-1800 (weekday) 0700-1300 (Sat) 0700-2300 2300-0700	350788 379060	58 [54-62] 55 [54-59] 56 51	58-76 57-81 56-81 53-75
G) Cell 6 (Eastern Lake)	0745-0845 & 0900-1000	349898 378253	62 [59-64]	67-70
H) Cell 3 (north)	0945-1045 & 0730-0830	348723 378471	54 [53-56]	65-71
I) River Weaver	1130-1230 & 1015-1115	351155 379057	56 [54-57]	58-72
J) River Weaver	1245-1345 1130-1230	350318 379524	54 [52-56]	55-68

- 4.2.6 The results of monitoring at NSER locations indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 51dB and 62dB L_{Aeq} . During night-time periods (2300-0700 hours) the background levels were shown to vary between 48dB and 51dB L_{Aeq} .

Noise Criteria

NSR (Residential)

- 4.2.7 Based on the impact assessment methodology found within BS4142:2104+A1:2019, which is deemed to be the most appropriate and relevant standard, an operational noise limit that would normally be applied to achieve a 'low impact' would relate to a rating level 'not exceeding the representative background sound level (LA90) when measured in terms of LAeq (1 hour measurement period during 0700 to 2300 hours and 15 minutes between 2300 to 0700 hours).
- 4.2.8 The assessment has taken into account CWACC's view that *"the rating level of noise emitted from any plant associated with the proposed development shall be 5 dB(A) below the background noise level (as measured as an LA90) at any time as measured at the nearest noise sensitive receptor. The measurement and assessment shall be made in accordance with BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'".*
- 4.2.9 Table 4.4 provides the proposed operational noise limits as advised by CWACC as calculated from the background noise level measured as LA90.

Table 4.4: Noise Limits Proposed by CWACC for NSR

NSR (Figure 1)	Time Period	Representative LA90 dB	CWACC noise limits LAeq,T
R1. Saltworks Close/Waterside Drive	0700-2300	60	55
	2300-0700	52	47
	0500-0700	54	49
R2. Ship Street	0700-2300	60	55
	2300-0700	52	47
	0500-0700	54	49
R3. Wayford Mews	0700-2300	64	59
	2300-0700	54	49
	0500-0700	59	54
R4. Rodgers Close	0700-2300	64	59
	2300-0700	54	49
	0500-0700	59	54
R5. Williams Way	0700-2300	61	56
	2300-0700	52	47
	0500-0700	57	52
R6. Travellers Site	0700-2300	67	62
	2300-0700	57	52
	0500-0700	61	56

4.2.10 For construction noise the guidance threshold levels would be defined by B25228:2009+A1:2014 using the ABC method.

Noise Criteria for NSER (Ecological)

4.2.11 Table 4.4 provides the NE guidance thresholds for construction and operational noise as detailed in 'A review of the effects of noise on Birds': 2018. The proposed thresholds include:

- a) Where L_{Amax} levels are likely to exceed 70dB L_{Amax} then mitigation measures should be considered.
- b) Where L_{Aeq} or L_{Amax} levels are likely to exceed the existing baseline levels by 3dB then mitigation measures should be considered.

Table 4.4: Noise Guidance Thresholds by NE for NSER during Construction Works and Site Operations

NSER (Figure 2)	Typical Ambient Noise Levels Average L_{Aeq} [Range L_{Aeq}] dB	Typical Ambient Noise Levels Range L_{AFmax} dB	NE Guidance of $L_{Aeq} +3dB$	NE L_{Amax} Guidance dB
E) Cell 2 (north)	56 [49-64] weekday 51 [48-57] Saturday	59-77 54-77	59 54	70 to 80 70 to 80
F) River Weaver	58 [54-62] weekday 55 [54-59] Saturday	58-76 57-81	61 58	70 to 79 70 to 84
G) Cell 6 (Eastern Lake)	62 [59-64]	67-70	65	70 to 73
H) Cell 3 (north)	54 [53-56]	65-71	57	70 to 74
I) River Weaver	56 [54-57]	58-72	59	70 to 75
J) River Weaver	54 [52-56]	55-68	57	70 to 71

5.0 CONSTRUCTION NOISE & VIBRATION

5.1 Introduction

5.1.1 The following sets out the approach taken to the assessment of construction noise and vibration based on the application of 'best practicable means' in accordance with BS5228-1:2009+A1:2014 and restriction on construction working hours. This assessment also provides a worst-case assessment for any significant replacement campaigns during the operational period and decommissioning phase impacts, which would involve fewer activities than what has been assessed for construction.

5.2 Construction Activities

5.2.1 Initial site preparation work is likely to involve the movement of soil and piling works, which would be followed by the construction of infrastructure and installation of solar PV and BESS plant equipment. It is considered that excavators, piling rigs, front loaders, telehandlers, vehicles, dumpers, generators, cranes, compressors, concrete mixers and power tools would be required to construct the Site. The type of plant considered in the assessment is set out in **Appendix 4**.

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 nearest receptors based on vehicle movements and phased works included piling, site preparation, general site activities, infrastructure works and PV/BESS plant installation with associated plant operating at the same time at the closest location to existing residential areas.

5.3.2 The calculations use the methodology given in BS 5228: Part 1, 2009+A1:2014. 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 piling, site preparation, infrastructure, PV/BESS installation and general site activities are shown below in Table 5.1.

Table 5.1: Noise Predictions for Worst Case Construction Noise at NSR (excluding mitigation measures)

NSR Position (Refer to Figure 1)	Distance to receptor (m)	Works	Residual Noise Levels LAeq dB	Noise Level range at receptor, LAeq _{1hr} dB	BS5228 Threshold Value LAeq dB Daytime
R1. Saltworks Close/Waterside Drive	310-600	Piling (mini)	63	36-42	70
	1700-1900	Piling (BESS)	63	36-37	70
	280-600	Site Preparation	63	35-48	70
	320-600	General site activities	63	41-47	70
	350-600	Infrastructure	63	33-45	70
	310-600	PV/BESS Installation	63	43-49	70
R2. Ship Street	240-600	Piling (mini)	63	36-44	70
	1200-1500	Piling (BESS)	63	38-40	70
	220-600	Site Preparation	63	35-50	70
	230-600	General site activities	63	41-50	70
	240-600	Infrastructure	63	33-49	70
	240-600	PV/BESS Installation	63	43-51	70
R3. Wayford Mews	160-600	Piling (mini)	66	36-49	70
	1100-1400	Piling (BESS)	66	38-40	70
	150-600	Site Preparation	66	35-54	70
	210-600	General site activities	66	41-51	70
	240-600	Infrastructure	66	33-49	70
	160-600	PV/BESS Installation	66	43-56	70
R4. Rodgers Close	230-600	Piling (mini)	66	36-45	70
	900-1150	Piling (BESS)	66	40-42	70
	220-600	Site Preparation	66	35-50	70
	280-600	General site activities	66	41-48	70
	320-600	Infrastructure	66	33-46	70
	230-600	PV/BESS Installation	66	43-52	70
R5. Williams Way	270-600	Piling (mini)	63	36-43	70
	500-700	Piling (BESS)	63	44-47	70
	240-600	Site Preparation	63	35-49	70
	330-600	General site activities	63	41-46	70
	240-600	Infrastructure	63	33-49	70
	270-600	PV /BESS Installation	63	43-50	70
R6. Travellers Site	140-1400	Piling (mini)	67 ¹	29-50	70
	200-400	Piling (BESS)	67 ¹	49-56	70
	140-1400	Site Preparation	67 ¹	28-55	70
	300-800	General site activities	67 ¹	39-47	70
	200-1400	Infrastructure	67 ¹	25-51	70
	140-1400	PV/BESS Installation	67 ¹	35-57	70

¹ Estimated based on variation in distance from Motorway. Note: No screening attenuation allowed for the elevated M56 bridge structure or the elevated land on which the BESS is located.

5.3.4 This table demonstrates that at residential NSR (R1 to R6) the levels of noise are shown to fall within the guidance threshold advised by BS5228. In view of the low levels of construction noise relative to existing ambient LAeq levels (as indicated in column 5 compared with column 4) there is no specific mitigation required for

NSR although 'best practicable means' would be detailed in the associated Full CEMP.

NSER Impacts During Construction Phase Works

5.3.5 At the NSER identified in paragraph 2.4.5 and illustrated on **Figure 3**, the worst-case construction works have been assessed to test whether the highest likely predicted levels would exceed the NE threshold guidance levels of +3dB above typical L_{Aeq} and L_{Amax} levels and 70dB L_{Amax} . A variety of scenarios have been tested and the noise modelling results are illustrated in **Appendix 5**.

5.3.6 Two phases of work could potentially affect the NSER, which includes:

- i) Earthworks in the NBBMA (Cell 3)
- ii) Solar farm and BESS construction¹⁹

5.3.7 The NBBMA works in Cell 3 would involve the use of excavators towards the centre of the cell, where dump trucks would be loaded and move excavated material to the ponds to the north of Cell 3 and around the outer areas of the cell. Where appropriate a dozer or similar plant would be used to spread the fill. Other plant and machinery which may be used is likely to be less noisy than these operations.

5.3.8 Noise prediction calculations for the NSER during construction 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.

5.3.9 For the general construction works across the Solar Array Development Area, the worst-case predicted levels are based on plant detailed in **Appendix 4**.

5.3.10 The results of prediction calculations for the NBBMA Works in Cell 3 and vehicle movement, piling, site preparation, infrastructure, PV installation and general site

¹⁹ It is assumed that the solar farm construction works in the Cells adjacent to the NBBMA i.e. in Cells 1, 2 and 5, would not be undertaken until the works in the NBBMA are completed.

construction activities for the Solar and BESS plant at NSER are shown in Table 5.2. Refer to **Appendix 4** for construction plant inventory and detail of worst-case scenario plant for NBBMA works in Cell 3.

Table 5.2: Noise Predictions for Worst Case Construction Noise at NSER (excluding mitigation measures)

NSER Position (Refer to Figure 2)	Works	Typical Ambient Noise Levels Average L_{Aeq} [Range L_{AFmax}] dB	Predicted Noise Levels L_{Aeq} dB	Predicted Noise Levels L_{Amax} dB	Exceedance of NE Guidance of $L_{Aeq} +3dB$	Exceedance of NE Guidance of $L_{AFmax} +3dB$ or 70dB
E1: Cells 2 & 5 (During NBBMA works in Cell 3)	NBBMA Cell 3	51 (Sat) 56 (weekday) [54-77]	41-55	46-60	None (weekday) +1dB (Saturday)	None
E2. Cell 3 (following Completion of NBBMA)	Piling (mini) Piling (BESS) Site Preparation General site activities Infrastructure PV Installation	51 (Sat) 56 (weekday) [54-77]	33-54 43-45 42-66 47-65 34-51 44-66	41-62 53-55 48-72 52-70 44-61 54-76	None None +7dB to +12dB +6dB to +12dB None +7dB to +12dB	None None None None None None
E3. Sections of the River Weaver (north-east and east of Cell 1)	NBBMA Cell 3 Piling (mini) Piling (BESS) Site Preparation General site activities Infrastructure PV installation	55 (Sat) 58 (weekday) [57-81]	29-35 23-55 31-41 37-57 42-54 29-49 39-58	34-43 31-63 41-51 43-63 47-59 39-59 49-68	None None None None None None None	None None None None None None None
E4. Cell 6	NBBMA Cell 3 Piling (mini) Piling (BESS) Site Preparation General site activities Infrastructure PV Installation	62 [67-70]	31-47 31-47 42-48 37-56 42-54 29-55 39-56	36-55 39-55 52-58 47-66 47-59 39-65 49-66	None None None None None None None	None None None None None None None
E5. Mersey Estuary SPA, Ramsar & SSSI to north of Cell 2 & NBMAA	NBBMA Cell 3 Piling (mini) Piling (BESS) Site Preparation General site activities Infrastructure PV installation	51 (Sat) 56 (weekday) [54-84]	37-51 24-52 31-35 33-55 40-52 30-49 35-56	42-59 32-55 41-45 39-61 45-57 40-59 45-66	None None None None (+1dB Sat) None None None (+2dB Sat)	None None None None None None None

5.3.11 The predicted maximum noise level at the ecological NSER during the construction phase works using the BS5228 calculation methodology and excluding any proposed mitigation measures would not exceed the NE guidance except during the following phase of working:

- (i) During a Saturday morning period where plant activity is within 110m distance from Cell 2 or Cell 5 and mitigation measures would be required.

- (ii) Following completion of NBBMA works in Cell 3, during the Site Preparation, PV installation and General Site activities relating to the Solar array within 180m of the Cell 3 NSER, the threshold L_{Aeq} could be exceeded and mitigation measures required.
- (iii) During Site Preparation and PV Installation activities relating to the Solar array within 120m of the SSSI NSER north of cell 2 and cell 3 during a Saturday morning period, the threshold L_{Aeq} could be exceeded and mitigation measures required.

5.3.12 Mitigation measures are provided below in accordance with BS5228, which employs best practicable means to control construction noise generation.

5.3.13 On the basis of the above predictions and proposed mitigation measures in this area discussed below, the level of noise, as a result of construction, is not predicted to exceed guidance thresholds at NSER and therefore this effect would be **not significant**.

Construction Road Traffic Noise onto Local Road

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

5.3.15 The following table provides detail of the predicted impact due to the temporary increase in road traffic flow during the construction phase. The Transport Assessment [EN010153/DR/7.3] provides details of the development traffic demand during peak and general construction activities. The construction phase is expected to extend for a period of 30 months. During the peak month period of traffic movement when access tracks and the compound are being established there is expected to be a maximum of 28 HGV deliveries per day and circa 308 staff per day. The average HGV deliveries over the complete construction period are expected to be 8 vehicles per day and 112 staff. The predicted peak hour noise level increase along the local road network is provided below in Table 5.2.

For the assessment of construction traffic, the relevant NSR would relate to those properties that are adjacent to the route and as such, these would include those NSRs along Station Road and Pool Lane.

Table 5.2: Predicted Road Traffic Noise Increase at NSR During Peak Hour Traffic Flow Period for the Construction Phase

Local Road	Time Period	Baseline noise ('do nothing') LA10 _{1hr} (dB)	Road Traffic Noise LA10 _{1hr} (dB)	Baseline + Construction noise ('do something') LA10 _{1hr} (dB)	Change ¹ compared to baseline LA10 _{1hr} (dB)
Station Road	Daytime (0800-0900 hours)	52.6 ¹	46.0	53.5	+0.9
Pool Lane	Daytime (0800-0900 hours)	63.4 ²	56.2	64.2	+0.8

¹Measured baseline levels (LA10) between 0800-0900 hours during baseline sound survey in April 2021 by NVC off Station Road.

²Baseline traffic data taken from HyNet North West TA (PEIR documentation) along Pool Lane between A5117 & Stanlow site access for AM peak.

5.3.16 The impact due to the Proposed Development during peak vehicle movement during the construction phase along the local road network has been calculated using Calculation of Road Traffic Noise (CRTN) methodology and impact methodology using DMRB LA 111.

5.3.17 According to Table 3.4 the DMRB LA 111, impact assessment for existing residential receptors is shown to be a **negligible** impact during the maximum peak period. The temporary nature of the construction works and relatively short period of peak traffic flows would limit any impact. The impacts relate to local roads leading into Site and none are located close to NSER shown in **Figure 3**.

Construction Noise Mitigation Measures

5.3.18 As indicated in Table 5.3 impacts of NSR would be of negligible impact and not significant. In view of the low levels of construction noise relative to existing ambient L_{Aeq} levels at NSR there is no specific mitigation required for NSR. Mitigation measures for NSER are provided below.

5.3.19 Nonetheless, in accordance with BS5228-1:2009+A1:2014, best practicable means would be employed to control the noise generation (e.g. using equipment

that is regularly maintained, where practicable use equipment fitted with silencers or acoustic hoods).

5.3.20 An Outline Construction Environmental Management Plan (CEMP) [EN010153/DR/7.5] has been prepared as part of the DCO Application, which describes the types of noise mitigation that are likely to be required/implemented, some examples of which are described below. Post-consent, this outline CEMP will be developed into a full CEMP which must be in substantial accordance with the outline CEMP and approved by the relevant planning authority. The Proposed Development must then be constructed in accordance with that approved full CEMP. This is secured by means of a Requirement in Schedule 2 of the draft DCO. The oCEMP includes the provision of the preparation of Construction Noise Management Plan (CNMP) which would be developed in accordance with the recommendations within this report and subject to the specific requirements of the final design and approach to construction.

5.3.21 The possible range of measures that could be used to control noise during the construction period at NSR and NSER (and which would be confirmed in the detailed CEMP), may include:

- Restriction of construction hours to non-sensitive times of day (08.00 to 18.00hrs Monday to Friday and 08:00 to 13:00hrs Saturday) unless otherwise agreed by CWACC.
- Community Relations – where noise levels are likely to impact on existing residual sound levels at receptor positions, this is one of the most important aspects of mitigation, as providing the nearest sensitive receptors with clear information about the activities that would be taking place and the length of time that any peak noise levels may occur will assist in allaying people's fears. BS 5228 states *"It is suggested that good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. The person, company or organisation carrying out the work on site should appoint a responsible person to liaise with the public."*
- Sensible routing of the construction plant to minimise the effect on nearest residential properties (this involves avoiding HGV traffic routing through

Frodsham, Elton and Ince (see Transport Assessment (Ref. Outline Construction Traffic Management Plan (EN010153/DR/7.4).

- Careful choice of piling rigs to minimise noise and vibration at ecological receptors (e.g. non-percussive mini piling rigs, CFA piling at BESS and Frodsham Solar Substation).
- Use of fixed plant with acoustic enclosures where required.
- Ensure all plant is regular maintained and correctly fitted with effective silencers / any relevant acoustic hoods etc.
- Maximise distance between any significant noise source and receptor locations.
- Plant switched off when not in use.
- Use of broadband noise reverse alarms (where practicable) on mobile plant.
- Using a one-way system/turning circles and/or use of a banksman to avoid/reduce the need for reverse alarms.
- Local portable acoustic screening around the piling area or using 'soft-start' works to avoid sudden noise by gradually increasing start-up noise levels to allow birdlife to habituate to the temporary noise.
- Where considered necessary the construction activities could be phased / timed to avoid / reduce effects on sensitive ecological receptors in accordance with the requirements of the Ecological Clerk of Works. For example, in periods outside core non-breeding bird periods (November to February).
- Drivers of mobile plant instructed to avoid un-necessary banging of excavator 'buckets' and avoid un-necessary excessive revving of engines.
- Vehicles arriving or exiting site should consider the following general management procedures in accordance with the 'quiet deliveries demonstration scheme'.
- The vehicle horn is not to be used to alert the Site on arrival or waiting.
- Radios are switched off and doors not slammed when alighting the cab.
- Lorry load retaining straps/bars are carefully placed in stowage points, not dropped onto the floor.
- Minimise excessive air braking noise.
- Switch off engines for prolonged stops, but minimise unnecessary start-ups and engine revving.

- Always unload in the designated delivery area, unless instructed by the Site management to do otherwise.
- In respect of NSER (E2 and E5) i.e. Cell 3 (post NBBMA works in Cell 3) and SSSI to north of Cell 2 and Cell 3, where the works are within the separation distances and activities indicated in section 5.3.11, it may be sufficient to undertake the works outside the core non breeding bird period (Nove – Feb), alternatively use of local hoarding of works at the boundary of the NSER or local to the activities, could be used to reduce impacts during this peak noise activities. Typical height of hoarding screening would be 2.5m to 3m height .

Mitigation Measures During NBBMA Construction

- In respect of the NSER during the NBBMA construction works, the results of the 'worst case' scenario show no exceedance of NE threshold levels during weekdays at a separation distance of 80m from the NSER in Cell 2. On a Saturday morning period the separation to works should be no closer than 110m to ensure no exceedance of NE threshold.
- Timing of the works outside of the core non-breeding bird period (November to February inclusive), which has been included as a mitigation measure in the oCEMP [EN010153/DR/7.5], may be sufficient to mitigate these effects. Alternatively the measures to control noise detailed in paragraph 5.3.21 could be used e.g. provision of hoarding / screening.

Construction Noise Effects on Public Rights of Way (PROW)

5.3.22 During the construction phase works, noise levels would vary from day to day and at different times and different locations along the PROW. During some peak noise activity periods, levels along PROW may impact users, however, given the size of the Site and network of paths, this would be a transitory experience and additionally, the Site is close to other noise sources (e.g. motorway, industry, aircraft noise and wind turbines etc) so it is not considered to have a significant impact on amenity.

5.4 Construction Phase - Vibration Effects

5.4.1 The closest separation distance between the residential NSR and nearest likely vibratory plant is circa 140m to 310m.

Typical Vibration Levels

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

- Non-percussive Piling;
- Dozers;
- Vibratory rollers and compactors;
- Material offloading onto hard surfaces; and
- Concrete vibratory plant. (e.g. compound establishment, foundation works)

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 NSR and the NSER (i.e. during use of vibratory plant). Refer to **Appendix 7** for further detail on typical vibration levels from construction plant relative to distance.

Table 5.3: Daytime Construction Vibration at NSR 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. Saltworks Close	310-600	High	0	>0.3	>5.0
R2. Ship Street	240-600	High	0	>0.3	>5.0
R3. Wayford Mews	160-600	High	0	>0.3	>5.0
R4. Rodgers Close	230-600	High	0	>0.3	>5.0
R5. Williams Way	270-600	High	0	>0.3	>5.0
R6: Traveller Site	140-400	High	0	>0.3	>5.0
Ecological Receptors	30-600	High	0 to 0.3*	>0.3	>5.0

*Note: The distance range relative to all of the NSER areas is stated, as the 'worst case' and 'best case' scenario to avoid repetition i.e. 30m and 600m respectively. Closest vibratory activity is likely to be use of non-percussive piling (e.g. CFA) or vibratory compaction during the BESS compound construction and solar panel installation.

- 5.4.5 The above results show no significant vibration levels during construction and the highest likely vibration levels at residential receptors are below the level at which vibration is perceptible (refer to Tables 3.5 and 3.6). The closest approach to the NSER when using non-percussive piling techniques would produce vibration levels just below perceptibility.
- 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 Studies undertaken by NVC relative to vibration from vehicle movements on local roads does not produce any perceptible vibration at dwellings, even when close to the kerbside. The only measurable vibration occurs when roads are of poor conditions and where HGVs pass-over large pot-holes, which results in minor levels of vibration at curtilages of properties. The impact from vibration is therefore not significant.
- 5.4.8 During the use of vibratory plant at the closest approach to NSER (e.g. at 30m or greater) during the construction phase, the vibration levels would be just below perceptible levels even during operations where the highest likely effects would occur and are therefore considered to have a **negligible** impact.

6.0 PLANT NOISE LEVEL PREDICTIONS

6.1 Introduction

6.1.1 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 environment that arises from a development site will depend on a number of factors. The more significant of which are:-

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

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

6.2 Prediction Methodology

Operational Noise

6.2.1 For site operational noise the assessment used ISO9613-2 prediction modelling and CadnaA software for producing a noise map of the highest likely generated

noise during peak noise operations. The Input settings for the noise model include:

- Ground factor (G) = 0.5 (mixed ground absorption)
- Temperature = 10degC
- Relative humidity = 70%
- Receptor height = Assumed to be 1.5m above ground for daytime (0700-2300 hours) and 4m above ground for night-time periods (2300-0700 hours). For ecological receptors a height of 1.5m above ground is assumed.

6.2.2 The methodology considers source position, distance to the nearest sensitive receptors and includes any significant screening on intervening land between site and receptor (as appropriate). The noise modelling assumes that all inverters (including cooling system), battery storage and transformers are in operation and therefore the noise predictions provide an indication of the highest likely noise level.

Source Noise Levels

6.2.3 The following example of source noise levels is based on information provided by technology providers, which is typical of plant used on 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 NSR. Refer to **Appendix 8** for further detail of plant noise levels.

- a) Centralised solar inverter units with transformer noise level of 81dB $L_{Aeq15mins}$ @ 1m.
- b) Battery Storage units noise level of 65dB $L_{Aeq15mins}$ @ 1m.
- c) Switchgear noise level of 65dB $L_{Aeq15mins}$ @ 1m from container.
- d) Inverters for battery storage units 81dB $L_{Aeq15mins}$ @ 1m sound pressure level with smaller LV transformers generating 65dB $L_{Aeq15mins}$ @ 1m.
- e) Substation HV transformer noise level 55dB $L_{Aeq15mins}$ @ 10m sound pressure level.
- f) All plant to be designed to ensure no tonal character is present from the plant in operation to eliminate any perceptible tonality at NSR in accordance with BS4142:2014+A1:2019.

6.2.4 The results of the CadnaA software prediction modelling noise contours for site operations are provided in Appendix 5.

6.3 Results of Noise Predictions

Site Plant Noise Assessment:

6.3.1 Noise levels from fixed plant operating at the Site have been 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 L _{A90} dB [L _{Aeq}]	Predicted highest rating ¹ noise level L _{Aeq} (dB)	Level Difference dB(A)	Impact Magnitude BS4142:2019
Daytime					
R1. Saltworks Close	Daytime	60 [63]	39-40	-21 to -20	Low
R2. Ship Street	Daytime	60 [63]	40-43	-20 to -17	Low
R3. Wayford Mews	Daytime	64 [66]	43-44	-21 to -20	Low
R4. Rodgers Close	Daytime	64 [66]	45	-19	Low
R5. Williams Way	Daytime	61 [63]	46	-15	Low
R6. Traveller's Site	Daytime	67 [68] ²	48	-19	Low
Night-time					
R1. Saltworks Close	Night-time Sunrise	52 [56] 54 [60]	30-31 39-40	-22 to -21 -15 to -14	Low Low
R2. Ship Street	Night-time Sunrise	52 [56] 54 [60]	31-34 40-43	-21 to -18 -14 to -11	Low Low
R3. Wayford Mews	Night-time Sunrise	54 [60] 59 [63]	35-36 43-44	-19 to -18 -16 to -15	Low Low
R4. Rodgers Close	Night-time Sunrise	54 [60] 59 [63]	36-37 45	-18 to -17 -14	Low Low
R5. Williams Way	Night-time Sunrise	52 [58] 57 [62]	40-41 46	-12 to -11 -11	Low Low
R6. Traveller's Site ³	Night-time Sunrise	57 [63] ² 61 [66] ²	44 47-48	-13 -14 to -13	Low Low

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

¹ Noise characteristics at receptor locations do not include a penalty as this would be controlled by mitigation and design.

² The background and residual sound levels have been measured at position D in February 2025.

³ The noise predictions at the Traveller's Site allows for the embankment of circa 6m to the BESS location on higher ground and predicts noise to the closest option for the BESS locations.

6.3.2 Table 6.1 shows the range of predicted noise levels from the plant associated with the Proposed Development based on peak production during high ambient temperature conditions. Note: it has been assumed maximum noise conditions during the sunrise period (which in reality is unlikely to occur unless during very warm Summer periods).

- 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 5 and 6 is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019 for daytime and night-time impacts.

Daytime Operations

- 6.3.4 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude. The residual baseline levels (in terms L_{Aeq}) are also significantly higher than the Site rating levels. The predicted noise levels also fall below the limits proposed by CWACC (see table 6.2).

Night-time Operations

- 6.3.5 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate a **low** impact magnitude at sensitive residential receptors. The residual baseline levels (in terms L_{Aeq}) are significantly higher than the Proposed Development rating levels. The predicted noise levels also fall below the limits proposed by CWACC (see table 6.2).
- 6.3.6 In relation to absolute levels during night-time periods, the maximum noise levels generated by the Proposed Development 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 15dB and 23dB L_{Aeq} . This level is significantly lower than guidance limits provided within BS8233: 2014 for bedrooms of 30dB L_{Aeq} .
- 6.3.7 At the Travellers' Site, the predicted operational noise levels during the sensitive night-time period (2300-0500 hours) would be 29dB L_{Aeq} with an open window, which is still within the 30dB guidance for sleep disturbance and the ambient noise from the motorway is significantly higher by circa 19dB(A) compared with the BESS noise (assuming a conservative noise level for the plant) and therefore irrespective of the Proposed Development noise, the level inside the caravan could potentially be 48dB inside with an open window **due to road traffic noise only** from the M56. The impact would be negligible.

6.3.8 Table 6.2 provides a comparison of predicted noise levels at NSR and the proposed CWACC proposed noise threshold.

Table 6.2: Predicted Noise from Proposed Solar Farm

Receptor Position (Refer to Figure 1)	Period	CWACC Noise Threshold ¹ L _{Aeq,T} dB	Predicted highest rating ² noise level L _{Aeq} (dB)	Level Difference dB(A)
R1. Saltworks Close	Daytime	55	39-40	-16 to -15
R2. Ship Street	Daytime	55	40-43	-15 to -12
R3. Wayford Mews	Daytime	59	43-44	-16 to -15
R4. Rodgers Close	Daytime	59	45	-14
R5. Williams Way	Daytime	56	46	-10
R6. Traveller's Site	Daytime	62	48	-14
R1. Saltworks Close	Night-time Sunrise	47 49	30-31 39-40	-17 to -16 -10 to -9
R2. Ship Street	Night-time Sunrise	47 49	31-34 40-43	-16 to -13 -9 to -6
R3. Wayford Mews	Night-time Sunrise	49 54	35-36 43-44	-14 to -13 -11 to -10
R4. Rodgers Close	Night-time Sunrise	49 54	36-37 45	-13 to -12 -9
R5. Williams Way	Night-time Sunrise	47 52	40-41 46	-7 to -6 -6
R6. Traveller's Site ³	Night-time Sunrise	52 56	44 47-48	-8 -9 to -8

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

¹ Noise characteristics at receptor locations do not include a penalty as this would be controlled by mitigation and design.

² The CWACC threshold in this column relates to the representative background sound level -5dB.

6.3.9 The above table shows the rating noise level at NSR are well within representative background sound levels during daytime and night-time operating periods and also well below the CWACC noise threshold. The impact would therefore be **low** and no limits would be necessary due to the level of headroom and the changing technology that is producing lower noise levels.

Noise Levels at NSER

6.3.10 The results of prediction calculations for the fixed plant operating at the Site for the Solar and BESS plant at NSER are shown in Table 6.2.

Table 6.2: Noise Predictions for Highest Likely Operational Noise at NSER

NSER Position (Refer to Figure 2)	Operating Period	Typical Ambient Noise Levels Average L_{Aeq} [Range L_{AFmax}] dB	Predicted Noise Levels L_{Aeq} dB	Predicted Noise Levels L_{Amax} dB	Exceedance of NE Guidance of $L_{Aeq} + 3dB$	Exceedance of NE Guidance of $L_{AFmax} + 3dB$ or 70dB
E2. Cell 3 (following Completion of NBBMA)	Daytime	54 [53-84]	43-46	52-55	None	None
	Night-time (incl. sunrise hours)	48 [52-77]	34-46	52-55	None	None
E3. Sections of the River Weaver (north-east and east of Cell 1)	Daytime	56 [56-81]	47-48	56-57	None	None
	Night-time	51 [53-75]	34-48	56-57	None	None
E4. Cell 6	Daytime	62 [67-70]	45-47	54-56	None	None
	Night-time	56 ¹ [52-75] ¹	39-47	54-56	None	None
E5. Mersey Estuary SPA, Ramsar & SSSI to north of Cell 2 & NBMAA	Daytime	54 [53-84]	41-45	50-54	None	None
	Night-time	48 [52-77]	34-45	50-54	None	None

¹ Noise level at night-time estimated based on monitoring at Position D.

6.3.11 In relation to the NSER the predicted operational noise levels from the Proposed Development are shown to range between 43dB and 48dB $L_{Aeq,1hr}$, during the daytime. During night-time periods this is predicted to be between 34dB and 48dB $L_{Aeq,15mins}$ and an L_{Amax} of 43dB to 57dB.

6.3.12 Table 4.4 provides the NE guidance thresholds as detailed in 'A review of the effects of noise on Birds': 2018. The proposed thresholds include:

- Where L_{Amax} levels are likely to exceed 70dB L_{Amax} then mitigation measures should be considered.
- Where L_{Aeq} or L_{Amax} levels are likely to exceed the existing baseline levels by 3dB then mitigation measures should be considered.

6.3.13 The results of noise predictions at NSER during Site operations indicate no exceedance of either of these NE guidance thresholds.

6.3.14 The operation of the plant equipment would not produce any significant impulse noise as this is not a characteristic of the type of plant being operated. Once the plant is operational it produces a relatively constant noise source. It is well

established that a more constant source of noise is likely to have less impact on birds than one with sudden impulse noise characteristics²⁰.

6.3.15 Ambient noise levels around the Site including ecological sensitive areas are relatively high due to the influence of the M56 Motorway. Based on the existing noise conditions, the predicted noise levels and the other factors described above the impact caused by the Proposed Development on NSER during plant operations are shown to be negligible.

Operation Phase Effects on Public Rights of Way (PROW)

6.3.16 During the operational phase, noise levels would vary at locations along the PROW. Whilst there is no specific guidance on PROW levels, for amenity purposes noise levels up to circa 55dB L_{Aeq} within garden areas is considered acceptable (and has been used on other solar schemes). A level of 55dB L_{Aeq} would be reached at a distance of circa 60m from a PCU. Based on the indicative layout there are only XX number of PCUs within this distance and the extent of any operational noise is relatively short in terms of time and experience as this is a transient event. This would only be relevant to daytime periods and therefore considered less sensitive than a permanent resident. As this is a short-term transitional impact along a short section of a footpath within a large footprint, the effect is not deemed to have an appreciable effect on users of the PROW network.

Operational Road Traffic Noise

6.3.18 This type of development will attract negligible operational traffic demand and therefore **no impacts** are expected to occur.

Operational Vibration Levels

6.3.19 There is no likely vibration expected from this type of plant and therefore there will be **no impacts** associated with vibration.

²⁰ Waterbird Disturbance & Mitigation Toolkit Institute of Estuarine and Coastal Studies, University of Hull. N Cutts, K Hemingway & J Spencer v3.2 March 2013

7.0 CONCLUSIONS

- 7.1 The Proposed Development has been assessed in terms of noise impact during maximum operational conditions and during construction. This has included at the nearby Traveller Site and in relation to sensitive ecological receptors
- 7.2 The results of existing background sound measurements taken at the fixed monitoring positions relative to NSR indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 60dB and 67dB L_{A90} . During night-time periods (2300-0700 hours) the background levels were shown to vary between 52dB and 57dB L_{A90} and during sunrise hours (around 0500-0700 hours during Summer months i.e. May to September) a background level of 54dB and 61dB L_{A90} .
- 7.3 The results of monitoring at NSER locations indicate that representative background sound levels during the weekday and weekend daytime period (0700-2300 hours) vary between 51dB and 62dB L_{Aeq} . During night-time periods (2300-0700 hours) the background levels were shown to vary between 48dB and 51dB L_{Aeq} .
- 7.4 Typical site operating noise levels have been established from empirical data obtained from technology providers who supply similar plant on sites in the UK, which provided input data for the noise model. Typical construction works noise levels have been determined using library data or reference to data within standards of typical plant operating levels and predicted noise calculated using relevant British Standard prediction methodology.
- 7.5 The assessment has been based on an assumption that the appropriate noise limit for a development of this nature would be a rating level that would not exceed the representative background sound level (L_{A90}) when measured in terms of $L_{Aeq,1hr}$ (daytime) and $L_{Aeq,15mins}$ (night-time).

Construction Phase Effects

- 7.6 Predictions of construction noise would indicate a **negligible** impact at residential NSR and 'best practicable means' would be applied in accordance with BS5228-1:2009+A1:2014.

- 7.7 Prediction noise calculations relating to the temporary impact of changes in road traffic movements during the construction phase works at the nearest receptors, indicate that this would have a **negligible impact** in accordance with Government advice and guidance.
- 7.8 Maximum vibration levels during peak construction activities are predicted to be below perceptible levels of vibration at residential NSR and therefore **no impact** would occur.
- 7.9 The predicted highest likely noise level at the ecological NSER during the construction phase works show that for the vast majority of the time, the NE guidance thresholds would not be exceeded. During those limited periods when the thresholds could be exceeded the implementation of specific measures, such as avoidance of works during sensitive periods, use of quieter alternative plant / working methods or installation of screening measures would be employed.
- 7.10 A Construction Environmental Management Plan (CEMP) would be provided to the LPA prior to commencement of works for agreement. An Outline CEMP has been prepared as part of the DCO application and describes the types of noise mitigation that are likely to be required/implemented.

Construction Impacts on NSER

- 7.11 In terms of NSER, the impact from construction activity noise with the application of appropriate mitigation measures by applying a 'best practicable means' approach, peak noise levels would be minimised and enable NE guidance thresholds to be achieved. The impact would be **not significant**.
- 7.12 During the use of vibratory plant at the closest approach to NSER during the construction phase of the Proposed Development, with mitigation measures, the vibration levels would be just above perceptible levels during the highest likely conditions and therefore a **slight** impact.

Operational Phase Effects

- 7.13 The predicted noise contribution from the application sSite using ISO9613-2 methodology and CadnaA noise modelling software shows noise levels from the

Proposed Development range between 40dB and 48dB $L_{Aeq1hr/15mins}$ during daytime or sunrise maximum site operations at NSR. During night-time operational periods noise levels from Site range between 31dB and 44dB $L_{Aeq15mins}$.

- 7.14 The results show that the noise contribution from maximum site operations on residential NSR would be well below the representative background sound level during daytime periods. According to BS4142: 2014+A1:2019 the resultant assessment would conclude that noise from the Site would result in a **low impact**.
- 7.15 For night-time periods (including sunrise, around 0500-0700 hours), according to BS4142: 2014+A1:2019, the rating level would be well below the assessment background sound levels and concludes a **low impact** at NSR.
- 7.16 In relation to absolute levels during night-time periods, the maximum noise levels generated by the Proposed Development are 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 16dB and 25dB L_{Aeq} . This level is significantly lower than guidance limits provided within BS8233: 2014 for sleeping conditions within bedrooms of 30dB L_{Aeq} .
- 7.17 At the Travellers' Site, the predicted operational noise levels during the sensitive night-time period (2300-0500 hours) would be 29dB L_{Aeq} with an open window, which is still within the 30dB guidance for sleep disturbance and the ambient noise from the motorway is significantly higher (i.e. by circa 19dB(A) compared with the BESS noise, assuming a conservative noise level for the plant) and therefore irrespective of the Proposed Development noise, the level inside the caravan could potentially be 48dB inside with an open window **due to the dominance of local road traffic noise**. The impact would be negligible.
- 7.18 The results show that the Proposed Development noise contribution at NSR during night-time operating periods (i.e. 41dB to 48dB L_{Aeq}) would be below typical residual sound levels of 56dB to 63dB L_{Aeq} established during the baseline study survey.

Operation Impacts on NSER

- 7.19 In relation to the NSER the predicted operational noise levels from the Proposed Development are shown to range between 43dB and 48dB $L_{Aeq,1hr}$, during the daytime. During night-time periods this is predicted to be between 34dB and 48dB $L_{Aeq,15mins}$ and an L_{Amax} of 43dB to 57dB. The noise levels at NSER are shown to be within NE guidance threshold levels and therefore the effects would be **not significant**. Ambient noise levels from local road traffic would in any case generally produce much higher levels than those predicted for the Proposed Development.
- 7.20 The assessment concludes that the Site has been designed to be constructed and to operate (and ultimately to be decommissioned) 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 5228:2009+A1:2014 Part 1 Noise & Part 2 Vibration '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

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Department for Communities and Local Government: National Planning Policy Framework: July 2021

National Planning Practice Guidance: July 2019

Overarching National Policy Statement for Energy (EN-1) July 2011

Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) September 2021

National Policy Statement (NPS) for electricity networks infrastructure (EN-5) January 2024

Cheshire West & Chester Council – Local Plan (Part One) Strategic Policies: January 2015

Cheshire West & Chester Council – Local Plan (Part Two) Land Allocations and Detailed Policies: July 2019

Design Manual for Roads and Bridges, LA 111 'Noise and Vibration' (Rev 2) May 2020 (formerly HD 213/11)

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

FIGURES

Figure 1: Baseline Noise Measurement Locations (A, B, C and D), Receptors (R1 to R6) & Site Position (NSR)

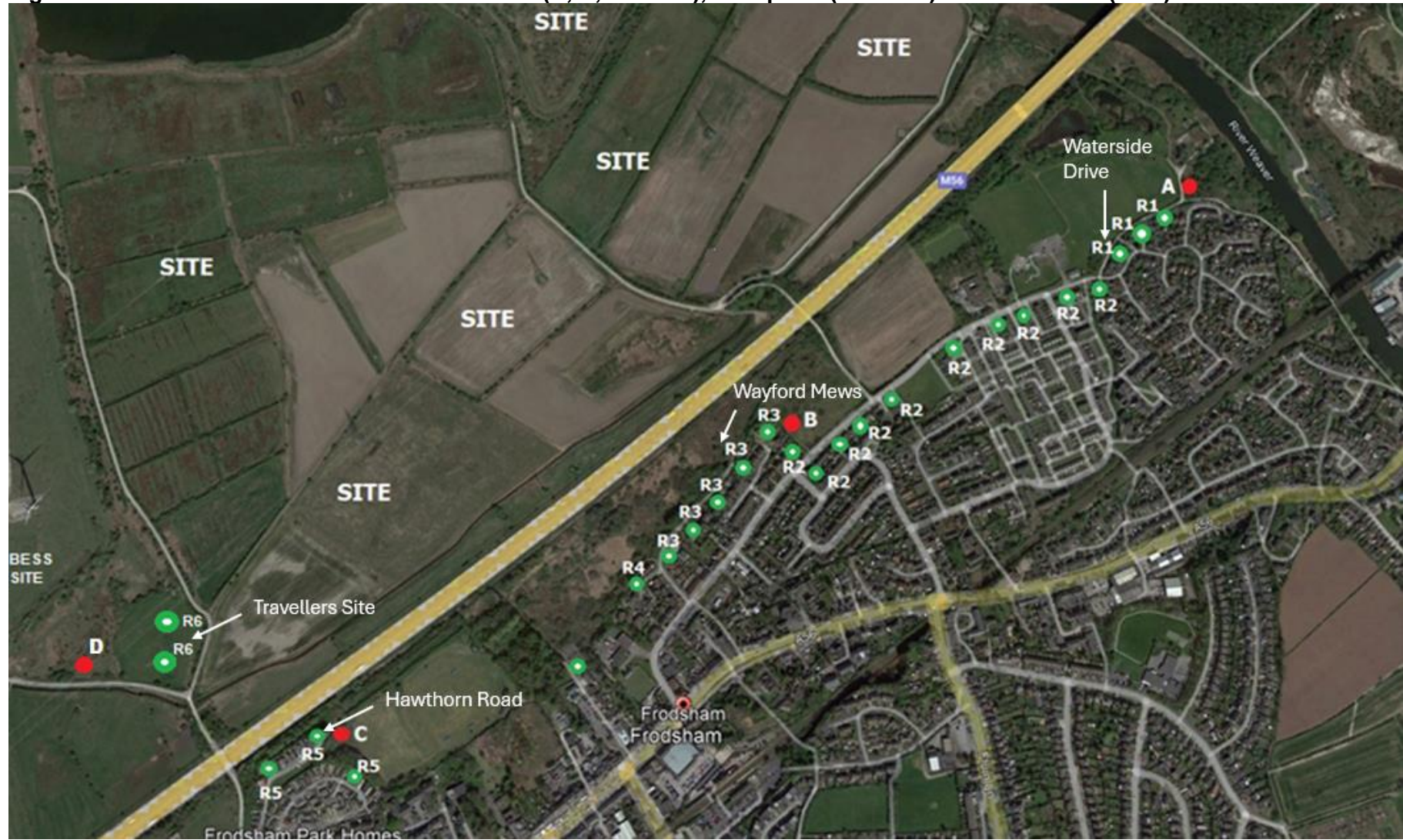
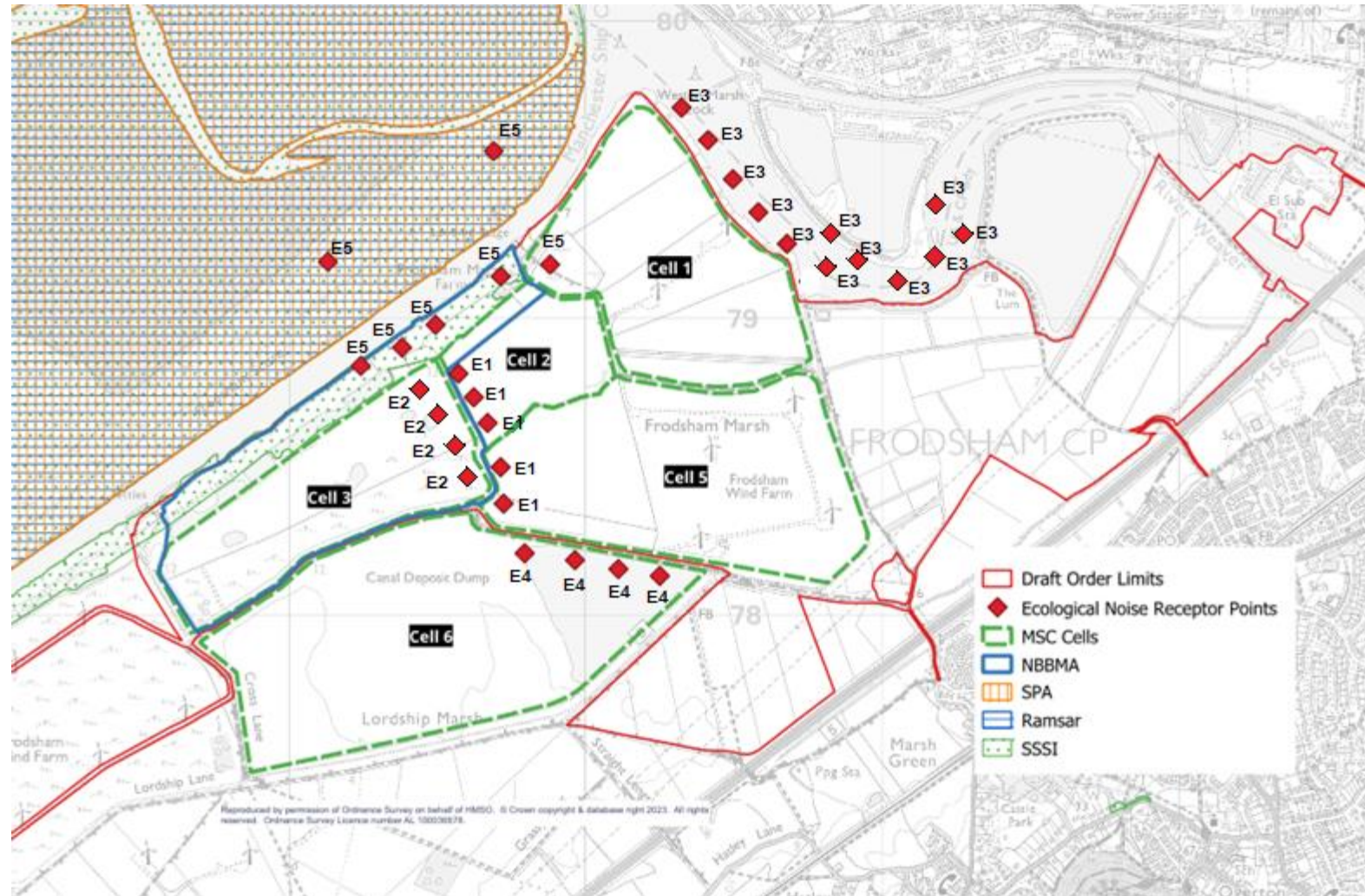


Figure 2: Baseline Noise Measurement Locations (NSER)



Figure 3: Ecological Sensitive Receptor Areas



Appendix 1

BASIC ACOUSTIC TERMINOLOGY

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

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

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

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

Noise Measurement

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

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

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

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

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

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

Attenuation: Noise reduction

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

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

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

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

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

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

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

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

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

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

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

Examples of typical noise levels

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

Appendix 2

Baseline Sound Survey Results – NSR (December 2022)

Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 1

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
09:15	15:00	65.7	65.7	63.6	78.8	Dominated by road traffic noise from M56 Motorway
09:30	15:00	63.0	63.9	61.3	73.6	
09:45	15:00	61.3	62.7	58.9	77.2	
10:00	15:00	62.1	64.5	59.1	69.0	
10:15	15:00	63.6	64.5	62.1	68.1	
10:30	15:00	63.2	64.2	62.0	72.0	
10:45	15:00	64.2	65.2	62.9	77.7	
11:00	15:00	65.5	65.6	61.0	80.4	
11:15	15:00	64.6	65.9	58.1	82.1	
11:30	15:00	60.3	61.8	58.1	64.7	
11:45	15:00	57.7	59.2	55.6	65.1	
12:00	15:00	57.1	58.2	55.5	64.2	
12:15	15:00	60.2	61.5	58.5	65.9	
12:30	15:00	58.5	60.3	56.3	67.8	
12:45	15:00	60.7	61.8	59.3	66.0	
13:00	15:00	61.7	62.8	60.2	65.1	
13:15	15:00	62.3	63.4	61.0	65.4	
13:30	15:00	63.3	64.4	61.9	67.7	
13:45	15:00	64.6	65.7	63.1	68.6	
14:00	15:00	65.6	66.9	64.0	69.8	
14:15	15:00	66.4	67.4	65.0	72.4	
14:30	15:00	66.6	67.6	65.4	70.5	
14:45	15:00	66.6	67.4	65.3	72.8	
Average 0915-1500		63.5	64.6	61.7	64-82	

Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 2

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	67.0	67.9	65.7	78.7	
15:15	15:00	67.0	67.9	65.8	74.2	
15:30	15:00	66.6	67.4	65.5	71.1	
15:45	15:00	65.8	66.7	64.6	73.9	
16:00	15:00	65.2	66.1	64.0	69.7	
16:15	15:00	64.9	66.2	63.2	71.9	
16:30	15:00	64.7	65.7	63.5	72.6	
16:45	15:00	65.7	66.6	64.3	69.9	
17:00	15:00	67.8	68.9	66.0	71.8	
17:15	15:00	68.3	69.4	66.9	72.4	
17:30	15:00	69.5	70.8	67.7	73.6	
17:45	15:00	68.4	69.6	66.6	72.8	
18:00	15:00	65.7	66.9	64.2	70.2	
18:15	15:00	64.9	66.1	63.6	69.1	
18:30	15:00	64.9	66.1	63.1	69.7	
18:45	15:00	63.8	64.7	62.6	68.6	
19:00	15:00	64.0	65.2	62.3	69.8	
19:15	15:00	62.7	63.9	61.1	68.0	
19:30	15:00	61.8	63.3	59.5	67.2	
19:45	15:00	62.8	63.9	61.2	68.8	
20:00	15:00	61.6	62.8	59.9	67.6	
20:15	15:00	61.3	62.8	59.4	66.7	
20:30	15:00	61.8	63.0	60.2	66.8	
20:45	15:00	63.2	64.7	61.0	69.6	
21:00	15:00	63.1	64.5	61.2	69.1	
21:15	15:00	61.6	63.4	58.7	67.8	
21:30	15:00	60.3	61.6	58.6	66.3	
21:45	15:00	61.0	62.6	59.1	66.5	
22:00	15:00	63.2	64.8	60.8	68.8	
22:15	15:00	63.4	65.4	60.8	72.0	
22:30	15:00	59.9	61.6	57.5	66.9	
22:45	15:00	59.8	61.5	57.2	66.7	
Average 1500-2300		64.8	66.0	63.2	66-79	

Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 3

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	60.3	62.3	58.0	67.2	Dominated by road traffic noise from M56 Motorway
23:15	15:00	61.0	62.8	58.5	69.5	
23:30	15:00	59.1	60.9	56.1	65.5	
23:45	15:00	58.1	59.8	55.1	68.9	
00:00	15:00	57.9	60.0	54.6	65.6	
00:15	15:00	56.4	58.3	53.4	64.9	
00:30	15:00	56.8	59.0	53.3	67.1	
00:45	15:00	56.0	58.8	51.1	66.9	
01:00	15:00	55.7	58.3	51.3	70.4	
01:15	15:00	56.0	58.3	52.3	63.2	
01:30	15:00	56.4	58.5	53.1	64.3	
01:45	15:00	57.3	59.6	51.6	67.2	
02:00	15:00	56.6	58.7	52.7	66.4	
02:15	15:00	57.6	59.9	53.1	65.0	
02:30	15:00	57.1	59.8	52.1	68.6	
02:45	15:00	59.2	61.3	55.8	69.8	
03:00	15:00	59.2	61.1	56.1	67.8	
03:15	15:00	56.9	59.4	53.2	63.7	
03:30	15:00	57.4	59.6	54.6	63.8	
03:45	15:00	58.9	60.7	55.7	64.4	
04:00	15:00	57.5	59.5	54.4	63.7	
04:15	15:00	58.8	60.5	56.1	66.2	
04:30	15:00	61.1	62.8	58.4	68.4	
04:45	15:00	61.4	63.7	58.1	67.9	
05:00	15:00	60.4	62.0	58.1	66.3	
05:15	15:00	60.3	61.7	58.3	65.3	
05:30	15:00	62.4	64.1	60.1	66.9	
05:45	15:00	63.5	64.9	61.7	69.5	
06:00	15:00	66.3	68.2	64.2	71.9	
06:15	15:00	65.2	66.5	63.6	69.3	
06:30	15:00	65.4	66.4	64.1	69.7	
06:45	15:00	63.7	65.0	61.9	68.1	
Average 2300-0700		60.5	62.2	58.1	63-72	
Average 0915-2300		64.3	65.5	62.6	64-82	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 4

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	63.3	64.1	62.3	66.1	
07:15	15:00	63.4	64.1	62.4	67.3	
07:30	15:00	63.2	64.2	61.5	66.1	
07:45	15:00	63.0	63.9	61.9	67.3	
08:00	15:00	63.3	64.2	62.1	66.1	
08:15	15:00	64.8	65.7	63.6	67.6	
08:30	15:00	67.2	68.5	65.7	70.2	
08:45	15:00	65.4	67.7	61.8	70.4	
09:00	15:00	66.6	68.4	64.4	70.6	
09:15	15:00	67.4	68.7	65.7	73.0	
09:30	15:00	67.5	69.1	64.6	76.2	
09:45	15:00	66.9	68.1	65.2	70.7	
10:00	15:00	68.3	69.7	65.9	71.4	
10:15	15:00	67.8	68.8	66.6	74.4	
10:30	15:00	64.8	67.2	60.3	69.6	
10:45	15:00	64.1	66.0	61.3	69.6	
11:00	15:00	63.0	63.6	61.9	69.7	
11:15	15:00	65.2	66.9	62.6	68.9	
11:30	15:00	66.7	68.1	64.3	73.0	
11:45	15:00	65.7	66.8	64.5	69.2	
12:00	15:00	64.8	66.3	62.8	68.6	
12:15	15:00	66.3	68.2	64.2	71.4	
12:30	15:00	66.1	67.2	64.0	71.6	
12:45	15:00	64.2	65.7	62.4	71.1	
13:00	15:00	65.5	66.7	64.1	69.4	
13:15	15:00	65.5	66.7	64.1	70.5	
13:30	15:00	65.2	66.2	63.7	75.6	
13:45	15:00	67.9	69.2	66.0	76.9	
14:00	15:00	67.9	69.4	65.8	73.3	Rain
14:15	15:00	66.4	67.5	64.9	74.2	Rain
14:30	15:00	65.0	66.8	62.9	69.6	Rain
14:45	15:00	63.7	64.9	61.7	67.5	Rain
Average 0700-1500		65.7	67.1	63.8	66-77	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 5

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	65.4	66.7	62.8	69.4	Rain
15:15	15:00	66.5	67.3	65.4	70.2	Rain
15:30	15:00	67.3	68.2	66.2	70.1	Rain
15:45	15:00	66.7	67.5	65.6	70.5	Rain
16:00	15:00	65.8	66.7	64.7	68.9	
16:15	15:00	64.0	65.4	60.7	68.2	
16:30	15:00	65.0	66.1	63.6	68.2	
16:45	15:00	64.2	65.1	63.0	72.4	
17:00	15:00	65.1	66.3	63.7	68.6	
17:15	15:00	65.7	66.7	64.4	69.5	
17:30	15:00	65.4	66.3	64.2	69.9	
17:45	15:00	65.4	66.4	64.1	68.5	
18:00	15:00	66.0	66.8	64.9	69.6	
18:15	15:00	66.5	67.3	65.5	69.1	
18:30	15:00	66.4	67.6	64.8	70.5	
18:45	15:00	65.5	66.4	64.3	68.8	
19:00	15:00	65.6	66.7	64.0	70.8	
19:15	15:00	64.7	65.8	63.2	68.4	
19:30	15:00	64.0	65.2	62.2	72.2	
19:45	15:00	64.2	65.4	62.6	68.9	
20:00	15:00	64.4	65.3	62.6	74.2	
20:15	15:00	65.3	66.8	63.0	72.1	
20:30	15:00	63.3	64.6	61.7	69.6	
20:45	15:00	62.9	64.3	60.7	68.2	
21:00	15:00	62.8	64.3	60.6	67.8	
21:15	15:00	62.4	63.9	60.0	66.6	
21:30	15:00	62.4	63.8	60.5	67.6	
21:45	15:00	61.5	63.2	59.0	66.5	
22:00	15:00	61.6	63.0	59.7	66.4	
22:15	15:00	61.2	62.7	59.1	66.0	
22:30	15:00	61.0	62.7	58.4	68.0	
22:45	15:00	61.0	62.0	57.7	75.3	
Average 1500-2300		64.3	65.4	62.7	66-75	

Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 6

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	61.3	63.2	58.6	68.1	
23:15	15:00	61.0	62.6	58.7	67.1	
23:30	15:00	60.3	62.2	57.2	67.2	
23:45	15:00	60.7	62.8	57.7	66.2	
00:00	15:00	60.8	62.9	57.8	69.6	
00:15	15:00	60.8	63.2	56.3	68.6	
00:30	15:00	59.1	61.4	55.5	66.8	
00:45	15:00	58.2	60.7	54.1	65.7	
01:00	15:00	57.0	59.3	53.0	65.9	
01:15	15:00	56.8	59.1	52.8	66.1	
01:30	15:00	55.5	58.2	50.8	65.5	
01:45	15:00	54.2	56.8	50.0	64.4	
02:00	15:00	56.7	59.7	51.1	68.5	
02:15	15:00	58.9	61.7	54.0	68.0	
02:30	15:00	59.3	62.1	53.6	67.0	
02:45	15:00	58.6	61.4	53.7	68.1	
03:00	15:00	56.9	59.5	51.9	67.2	
03:15	15:00	56.3	58.7	51.8	64.4	
03:30	15:00	56.2	58.7	52.5	62.4	
03:45	15:00	55.6	58.0	51.9	63.8	
04:00	15:00	56.5	58.7	52.9	63.7	
04:15	15:00	57.3	59.4	53.7	64.8	
04:30	15:00	57.1	59.6	52.8	64.4	
04:45	15:00	58.6	61.0	54.3	64.1	
05:00	15:00	59.7	62.3	55.1	67.8	
05:15	15:00	55.8	57.9	51.7	62.3	
05:30	15:00	56.9	58.9	53.7	62.7	
05:45	15:00	57.6	59.5	54.8	63.4	
06:00	15:00	56.5	58.6	53.7	64.3	
06:15	15:00	55.2	56.6	53.1	59.5	
06:30	15:00	55.5	57.2	53.0	60.6	
06:45	15:00	56.4	57.6	54.9	62.2	
Average 2300-0700		58.1	60.4	54.5	60-70	
Average 0700-2300		65.5	66.7	63.7	66-77	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 7

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	54.4	56.3	51.5	59.9	
07:15	15:00	54.1	55.5	51.7	61.7	
07:30	15:00	55.0	56.7	52.6	61.2	
07:45	15:00	57.3	59.1	55.2	61.8	
08:00	15:00	58.9	60.8	56.5	64.7	
08:15	15:00	59.1	60.8	56.7	64.2	
08:30	15:00	58.6	60.3	56.3	64.6	
08:45	15:00	59.7	61.3	57.3	72.5	
09:00	15:00	60.6	61.8	58.9	65.8	
09:15	15:00	61.2	62.4	59.8	64.7	
09:30	15:00	62.3	63.4	60.9	65.4	
09:45	15:00	63.2	64.7	61.3	67.0	
10:00	15:00	63.1	64.4	61.4	74.6	
10:15	15:00	63.6	64.6	62.4	67.1	
10:30	15:00	63.9	64.9	62.6	67.8	
10:45	15:00	61.6	62.5	60.4	66.9	
11:00	15:00	60.9	61.8	59.8	64.9	
11:15	15:00	58.1	59.4	56.3	60.9	
11:30	15:00	59.4	60.7	56.7	63.3	
11:45	15:00	61.8	62.9	60.2	71.2	
12:00	15:00	63.2	64.4	61.6	71.5	
12:15	15:00	63.9	64.8	62.7	68.2	
12:30	15:00	64.8	66.1	63.0	72.2	
12:45	15:00	65.4	66.5	63.8	68.7	
13:00	15:00	64.1	65.2	62.5	68.2	
13:15	15:00	61.1	62.4	59.1	71.6	
13:30	15:00	60.5	61.4	59.1	69.9	
13:45	15:00	61.3	63.1	56.7	66.1	Rain
14:00	15:00	58.3	59.6	56.5	64.9	Rain
14:15	15:00	59.0	60.2	57.2	68.3	Rain
14:30	15:00	58.2	59.4	56.6	61.6	Rain
14:45	15:00	57.7	58.7	56.3	61.9	Rain
Average 0700-1500		61.6	62.8	60.0	60-75	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 8

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	56.5	57.5	55.0	61.7	Rain
15:15	15:00	57.4	58.6	55.4	67.4	Rain
15:30	15:00	57.5	58.8	56.0	61.3	
15:45	15:00	59.0	60.0	57.6	61.8	
16:00	15:00	57.8	59.3	54.8	65.1	
16:15	15:00	56.4	57.4	55.0	63.1	
16:30	15:00	57.0	58.3	55.3	64.6	
16:45	15:00	58.4	59.9	56.3	62.7	
17:00	15:00	57.7	58.7	56.1	61.6	
17:15	15:00	55.7	56.9	54.0	59.4	
17:30	15:00	54.7	55.9	53.0	59.0	
17:45	15:00	55.5	57.0	53.1	60.8	
18:00	15:00	55.4	56.8	53.5	60.1	
18:15	15:00	55.3	56.9	53.3	59.8	
18:30	15:00	56.5	57.7	53.6	67.8	Rain
18:45	15:00	53.5	55.4	51.3	59.8	
19:00	15:00	55.3	56.9	53.2	61.3	
19:15	15:00	53.5	55.2	51.2	60.0	Rain
19:30	15:00	54.1	55.9	51.7	65.7	
19:45	15:00	54.1	56.2	51.0	60.0	
20:00	15:00	54.0	55.8	51.1	59.0	
20:15	15:00	54.0	55.9	51.2	59.8	
20:30	15:00	52.2	53.5	50.0	57.6	
20:45	15:00	54.1	56.3	51.1	59.6	
21:00	15:00	51.3	53.0	48.7	62.0	
21:15	15:00	51.8	53.5	49.6	61.4	
21:30	15:00	52.6	54.6	49.7	57.7	
21:45	15:00	53.7	55.7	50.6	61.1	
22:00	15:00	53.8	55.8	50.8	60.0	
22:15	15:00	53.9	55.8	50.6	59.2	
22:30	15:00	51.7	53.8	48.3	57.2	
22:45	15:00	50.7	53.1	46.7	57.4	
Average 1500-2300		55.2	56.7	53.0	57-66	

Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
 Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
 Calibration: 94dB

TABLE 9

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	50.4	53.1	45.8	60.1	
23:15	15:00	51.6	53.8	47.5	58.4	
23:30	15:00	54.3	56.6	50.4	61.4	
23:45	15:00	53.0	55.0	49.0	59.8	
00:00	15:00	51.4	53.7	47.9	58.5	
00:15	15:00	53.8	56.4	49.9	61.1	
00:30	15:00	53.5	56.2	47.1	60.8	
00:45	15:00	50.1	52.5	46.3	57.1	
01:00	15:00	52.4	54.4	46.0	77.5	
01:15	15:00	53.2	55.8	49.1	62.4	
01:30	15:00	51.5	54.2	44.5	63.5	
01:45	15:00	52.2	54.8	48.1	59.4	
02:00	15:00	48.6	51.7	42.5	56.4	
02:15	15:00	52.6	56.0	45.7	62.0	
02:30	15:00	54.3	57.0	49.8	61.2	
02:45	15:00	49.9	52.6	44.8	63.5	
03:00	15:00	48.5	51.8	42.4	58.5	
03:15	15:00	50.6	53.6	44.7	57.5	
03:30	15:00	50.6	53.2	45.6	57.9	
03:45	15:00	51.2	53.9	45.3	58.8	
04:00	15:00	53.0	55.6	48.5	60.2	
04:15	15:00	54.3	57.1	49.0	61.8	
04:30	15:00	54.7	57.6	47.7	63.0	
04:45	15:00	54.6	57.4	48.9	63.2	
05:00	15:00	54.3	56.7	48.6	62.9	
05:15	15:00	54.6	57.0	50.6	61.8	
05:30	15:00	58.1	60.0	54.6	64.6	
05:45	15:00	59.1	61.0	56.1	64.8	
06:00	15:00	57.7	59.6	55.0	63.0	
06:15	15:00	57.5	59.6	54.0	62.9	
06:30	15:00	55.0	57.7	51.3	62.0	
06:45	15:00	59.3	61.3	56.3	66.8	
Average 2300-0700		54.2	56.6	50.1	56-78	
Average 0700-2300		58.7	60.0	57.0	57-75	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 10

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	59.0	60.7	56.3	67.3	
07:15	15:00	57.5	59.2	54.9	64.0	
07:30	15:00	59.1	60.7	56.7	65.8	
07:45	15:00	58.9	60.4	56.2	74.2	
08:00	15:00	57.7	59.2	55.7	61.8	
08:15	15:00	59.9	61.4	57.7	65.2	
08:30	15:00	61.4	62.9	59.3	66.2	
08:45	15:00	61.3	62.8	59.1	66.1	
09:00	15:00	61.6	63.0	59.6	66.6	
09:15	15:00	62.5	63.6	60.8	66.6	
09:30	15:00	62.8	64.0	61.1	74.2	
09:45	15:00	62.1	63.5	60.4	66.1	
10:00	15:00	62.8	64.0	60.9	78.5	
10:15	15:00	60.4	61.9	58.2	64.7	
10:30	15:00	62.3	63.8	60.6	68.2	
10:45	15:00	63.7	64.6	62.4	80.2	
11:00	15:00	63.1	64.4	61.2	67.2	
11:15	15:00	58.9	60.7	57.3	65.8	
11:30	15:00	60.1	61.2	58.5	63.7	
11:45	15:00	59.0	60.2	57.5	66.0	
12:00	15:00	58.4	59.6	56.8	62.0	
12:15	15:00	57.9	59.2	56.1	63.4	
12:30	15:00	60.5	61.5	58.8	68.4	
12:45	15:00	60.2	61.2	58.8	63.3	
13:00	15:00	59.3	61.0	56.3	63.3	
13:15	15:00	59.7	61.0	58.0	63.6	
13:30	15:00	60.5	61.9	58.7	66.2	
13:45	15:00	62.2	63.7	59.7	66.8	
14:00	15:00	63.9	65.0	62.5	69.6	
14:15	15:00	64.4	65.6	62.8	72.8	
14:30	15:00	63.7	64.9	62.1	68.4	
14:45	15:00	63.5	64.4	62.4	67.8	
Average 0700-1500		61.3	62.6	59.5	62-80	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

TABLE 11

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	62.8	63.9	61.0	66.6	
15:15	15:00	63.7	64.7	62.4	66.7	
15:30	15:00	65.3	66.9	63.2	69.0	
15:45	15:00	66.6	67.6	64.5	81.1	
16:00	15:00	67.7	68.8	66.4	71.1	
16:15	15:00	66.3	67.5	64.7	70.4	
16:30	15:00	65.7	66.9	64.2	70.7	
16:45	15:00	67.3	69.1	65.1	71.8	
17:00	15:00	65.2	66.3	63.7	70.7	
17:15	15:00	63.4	64.6	61.7	70.3	
17:30	15:00	64.2	65.5	62.4	70.5	
17:45	15:00	62.8	64.4	60.3	66.4	
18:00	15:00	61.2	62.5	59.3	65.1	
18:15	15:00	61.9	63.0	60.6	65.3	
18:30	15:00	61.7	63.3	59.9	66.3	
18:45	15:00	61.3	62.6	59.7	64.7	
19:00	15:00	62.0	63.2	60.3	65.2	
19:15	15:00	63.2	64.4	61.6	66.4	
19:30	15:00	62.2	63.5	60.3	66.7	
19:45	15:00	62.1	63.3	60.7	66.7	
20:00	15:00	62.3	64.1	59.8	67.5	
20:15	15:00	60.7	61.8	59.2	64.4	
20:30	15:00	60.7	62.2	58.9	69.1	
20:45	15:00	61.2	62.9	58.9	65.1	
21:00	15:00	58.8	60.3	57.2	63.7	
21:15	15:00	59.5	61.0	57.0	64.5	
21:30	15:00	58.5	60.6	55.0	65.2	
21:45	15:00	57.0	59.2	52.7	63.4	
22:00	15:00	54.3	55.9	52.3	61.0	
22:15	15:00	55.5	57.6	52.2	62.3	
22:30	15:00	56.5	58.6	53.8	64.9	
22:45	15:00	56.0	58.1	53.1	61.9	
Average 1500-2300		62.9	64.3	61.1	61-81	

Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**
 Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)
 Calibration: 94dB

TABLE 12

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	54.9	56.9	51.7	62.5	
23:15	15:00	55.0	56.9	52.3	61.7	
23:30	15:00	53.1	55.7	49.1	60.2	
23:45	15:00	52.5	54.7	49.3	57.7	
00:00	15:00	54.4	57.4	48.4	68.2	
00:15	15:00	55.0	57.9	49.2	65.0	
00:30	15:00	53.1	56.1	47.7	63.0	
00:45	15:00	48.6	50.8	45.4	57.0	
01:00	15:00	48.7	51.3	45.1	54.9	
01:15	15:00	47.8	50.1	44.2	55.1	
01:30	15:00	46.3	48.7	42.8	57.9	
01:45	15:00	46.6	49.7	41.9	56.8	
02:00	15:00	48.0	50.7	43.2	57.1	
02:15	15:00	48.8	51.7	44.0	56.2	
02:30	15:00	48.2	51.0	43.2	58.7	
02:45	15:00	46.8	49.6	42.4	55.2	
03:00	15:00	48.2	50.8	43.4	56.4	
03:15	15:00	48.9	51.3	44.6	58.0	
03:30	15:00	50.5	52.9	46.2	57.2	
03:45	15:00	50.7	53.2	46.2	58.1	
04:00	15:00	50.5	53.2	46.0	57.3	
04:15	15:00	51.4	53.9	47.7	60.9	
04:30	15:00	52.6	54.8	49.6	58.9	
04:45	15:00	51.8	53.5	49.3	58.1	
05:00	15:00	52.7	54.5	50.3	59.0	
05:15	15:00	52.5	54.1	50.3	57.8	
05:30	15:00	53.0	54.7	50.9	59.8	
05:45	15:00	52.9	54.6	50.5	58.1	
06:00	15:00	54.2	55.7	52.2	70.4	
06:15	15:00	54.8	56.3	52.9	60.8	
06:30	15:00	55.7	57.2	53.6	61.7	
06:45	15:00	54.5	55.9	52.8	59.2	
Average 2300-0700		52.1	54.3	49.0	55-70	
Average 0700-2300		62.2	63.5	60.4	61-81	

Noise Survey Results

Date: Monday 12th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M1 - Rear of Saltworks Close**

Instrumentation: Cirrus 1710 Real Time Sound Analyser (G066350)

Calibration: 94dB

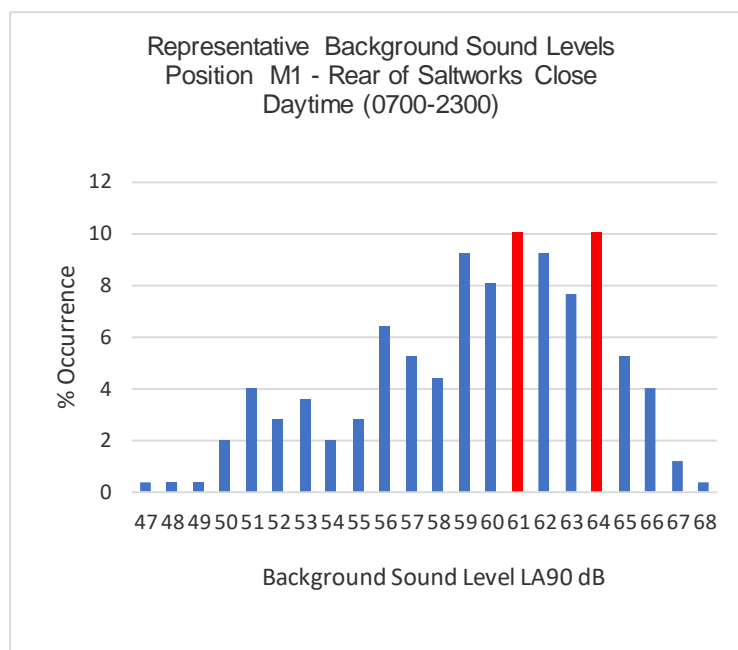
TABLE 13

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	55.5	56.6	53.9	59.3	
07:15	15:00	55.8	56.9	54.5	62.2	
07:30	15:00	54.9	56.1	53.4	63.1	
07:45	15:00	54.9	54.7	51.2	78.0	
08:00	15:00	52.3	53.8	50.3	60.7	
08:15	15:00	52.5	54.6	49.5	59.3	
08:30	15:00	54.2	55.9	51.5	60.3	
08:45	15:00	54.9	56.6	52.7	61.9	
09:00	15:00	58.4	60.2	56.3	64.7	
09:15	15:00	59.4	60.8	57.4	67.8	
09:30	15:00	57.8	59.1	56.2	65.2	
09:45	15:00	58.2	59.6	56.5	64.6	
10:00	15:00	59.3	60.4	57.5	70.4	
10:15	15:00	58.4	59.6	57.0	62.2	
10:30	15:00	57.2	58.9	54.4	68.1	
10:45	15:00	54.9	57.3	51.1	61.0	
11:00	15:00	55.0	56.7	52.1	61.2	
11:15	15:00	58.2	59.6	56.2	75.7	
Average 0700-1130		56.7	58.1	54.6	59-78	

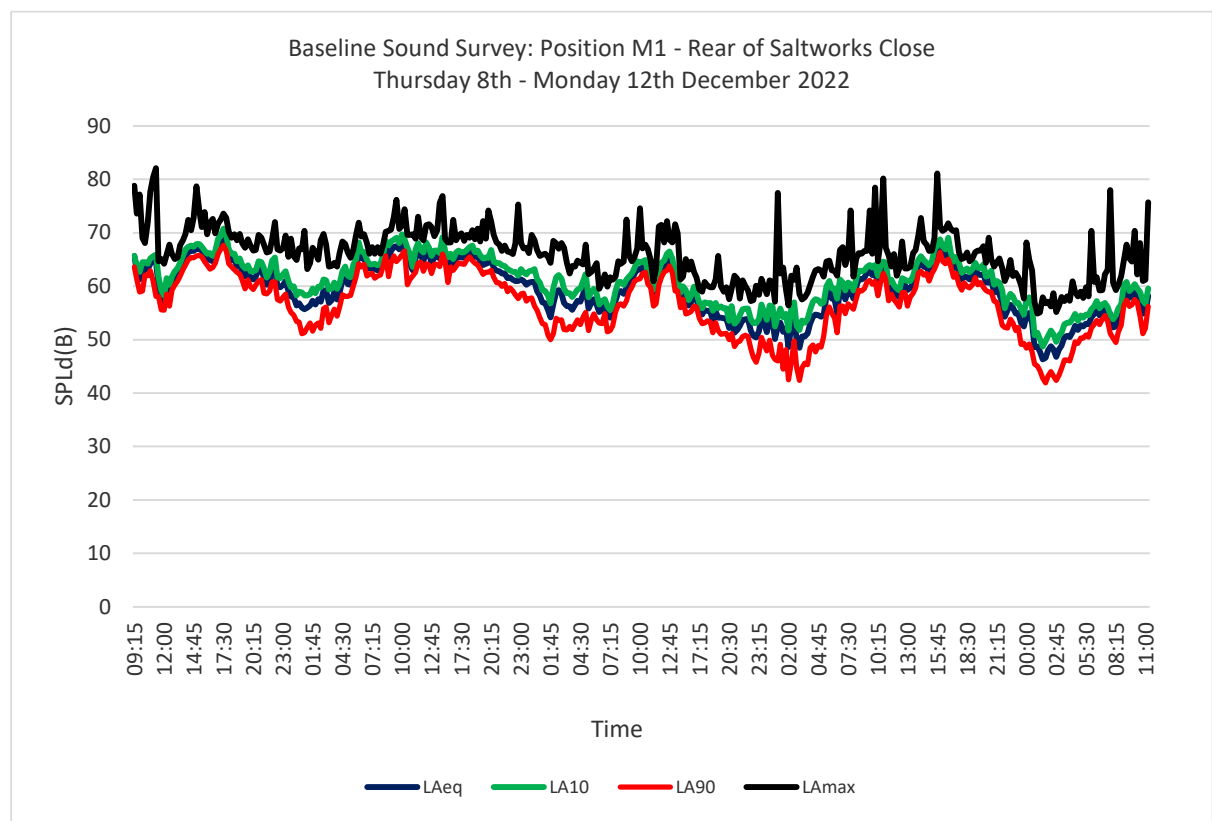
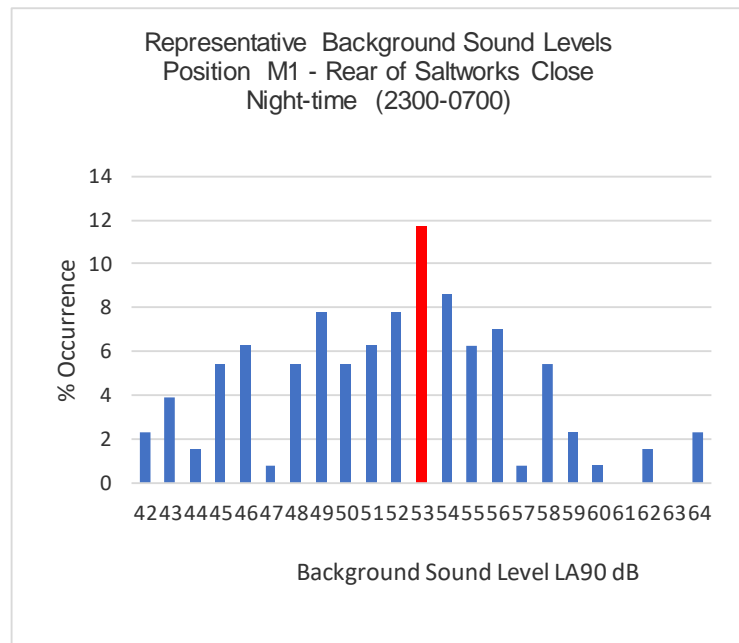
Overall Average	55.9	57.8	53.2	55-78	
Overall Average	63.0	64.2	61.2	57-82	Levels exclude rain periods

LA90 % Occurrence

47	0.4
48	0.4
49	0.4
50	2.0
51	4.0
52	2.8
53	3.6
54	2.0
55	2.8
56	6.5
57	5.2
58	4.4
59	9.3
60	8.1
61	10.1
62	9.3
63	7.7
64	10.1
65	5.2
66	4.0
67	1.2
68	0.4



LA90	% Occurrence
42	2.3
43	3.9
44	1.6
45	5.5
46	6.3
47	0.8
48	5.5
49	7.8
50	5.5
51	6.3
52	7.8
53	11.7
54	8.6
55	6.3
56	7.0
57	0.8
58	5.5
59	2.3
60	0.8
61	0.0
62	1.6
63	0.0
64	2.3



Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

TABLE 14

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
10:00	15:00	65.6	67.7	63.6	70.8	Dominated by road traffic noise from M56 Motorway
10:15	15:00	65.9	67.2	64.3	73.6	
10:30	15:00	66.1	67.3	64.4	69.3	
10:45	15:00	66.2	67.3	64.7	71.4	
11:00	15:00	66.0	67.2	64.4	70.3	
11:15	15:00	64.5	65.7	63.0	68.7	
11:30	15:00	64.8	65.9	63.1	68.6	
11:45	15:00	64.1	65.2	62.6	68.3	
12:00	15:00	64.2	65.4	62.5	68.1	
12:15	15:00	65.6	66.8	64.0	69.3	
12:30	15:00	65.5	66.6	64.0	68.2	
12:45	15:00	66.1	67.4	64.4	69.2	
13:00	15:00	66.7	67.9	65.2	70.0	
13:15	15:00	66.8	68.0	65.0	70.2	
13:30	15:00	66.6	67.9	64.7	70.1	
13:45	15:00	66.8	68.2	64.7	80.4	
14:00	15:00	68.7	69.8	67.2	72.2	
14:15	15:00	68.3	69.3	66.7	71.1	
14:30	15:00	68.4	69.3	67.1	70.7	
14:45	15:00	68.8	69.7	67.5	72.2	
Average 1000-1500		66.5	67.6	64.9	68-80	

Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

TABLE 15

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	68.9	69.9	67.6	72.0	
15:15	15:00	69.2	70.2	67.9	71.9	
15:30	15:00	69.7	70.5	68.6	72.3	
15:45	15:00	69.7	70.5	68.8	72.4	
16:00	15:00	68.9	69.8	67.9	71.7	
16:15	15:00	69.1	70.0	67.9	72.2	
16:30	15:00	68.5	69.3	67.2	71.1	
16:45	15:00	67.4	68.6	65.9	70.3	
17:00	15:00	69.0	70.1	67.6	71.7	
17:15	15:00	69.0	70.0	67.5	71.8	
17:30	15:00	68.9	69.9	67.7	72.0	
17:45	15:00	68.7	69.5	67.6	72.5	
18:00	15:00	67.8	69.1	65.9	71.0	
18:15	15:00	67.5	68.5	65.9	70.5	
18:30	15:00	67.1	68.4	65.3	70.7	
18:45	15:00	67.2	68.3	65.8	70.8	
19:00	15:00	66.0	67.2	64.3	70.8	
19:15	15:00	64.3	66.1	61.4	69.0	
19:30	15:00	64.8	66.5	62.4	69.4	
19:45	15:00	64.9	66.6	62.5	68.6	
20:00	15:00	64.3	65.9	62.2	68.1	
20:15	15:00	65.2	66.8	62.9	69.6	
20:30	15:00	63.3	65.3	60.3	69.7	
20:45	15:00	63.7	65.3	61.5	68.9	
21:00	15:00	63.5	65.5	60.9	67.8	
21:15	15:00	62.8	64.6	60.1	67.8	
21:30	15:00	62.4	64.2	59.5	67.2	
21:45	15:00	63.1	64.8	60.4	68.2	
22:00	15:00	63.0	64.9	59.9	68.5	
22:15	15:00	63.0	65.1	59.6	68.0	
22:30	15:00	62.5	64.5	59.8	67.4	
22:45	15:00	61.9	63.8	59.2	66.7	
Average 1500-2300		66.8	68.0	65.2	67-73	

Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 16

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	61.7	63.9	58.0	67.8	
23:15	15:00	62.7	64.6	59.6	67.8	
23:30	15:00	60.6	63.1	56.3	66.7	
23:45	15:00	61.2	63.6	55.6	68.4	
00:00	15:00	60.4	62.7	55.2	67.4	
00:15	15:00	60.4	63.2	54.0	67.1	
00:30	15:00	59.6	62.3	53.1	65.7	
00:45	15:00	58.4	61.5	52.6	65.6	
01:00	15:00	58.7	62.1	48.9	67.5	
01:15	15:00	58.3	61.2	52.7	65.2	
01:30	15:00	59.9	62.9	53.0	67.0	
01:45	15:00	61.0	63.8	54.4	70.7	
02:00	15:00	59.9	62.4	55.7	65.7	
02:15	15:00	60.4	63.0	54.9	67.9	
02:30	15:00	59.2	61.8	53.7	66.0	
02:45	15:00	61.3	63.4	57.6	67.7	
03:00	15:00	59.8	61.9	55.9	66.6	
03:15	15:00	60.6	63.2	55.9	66.1	
03:30	15:00	60.9	63.1	57.2	66.7	
03:45	15:00	61.2	63.3	57.4	68.1	
04:00	15:00	61.7	63.9	57.4	67.5	
04:15	15:00	61.2	63.6	57.0	66.9	
04:30	15:00	62.7	64.6	59.4	68.1	
04:45	15:00	62.6	64.7	59.4	67.4	
05:00	15:00	64.0	65.8	61.1	73.0	
05:15	15:00	63.6	65.0	61.6	67.2	
05:30	15:00	65.3	67.2	62.5	69.9	
05:45	15:00	64.3	65.8	62.1	70.9	
06:00	15:00	66.2	67.5	64.3	69.6	
06:15	15:00	66.2	67.2	64.8	69.1	
06:30	15:00	66.9	68.3	65.2	70.2	
06:45	15:00	68.2	69.2	66.7	72.4	
Average 2300-0700		62.6	64.5	59.7	65-73	
Average 1000-2300		66.7	67.9	65.1	67-80	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

TABLE 17

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	69.7	71.0	68.0	72.9	
07:15	15:00	69.5	70.8	67.7	73.1	
07:30	15:00	68.9	69.9	67.6	71.7	
07:45	15:00	68.8	69.6	67.8	71.3	
08:00	15:00	68.3	69.2	67.2	71.1	
08:15	15:00	67.4	68.3	66.3	69.8	
08:30	15:00	68.8	69.8	67.5	71.8	
08:45	15:00	68.0	69.1	66.4	75.1	
09:00	15:00	68.7	69.9	67.0	75.8	
09:15	15:00	69.2	70.5	67.3	73.0	
09:30	15:00	69.9	71.0	68.5	73.1	
09:45	15:00	69.9	71.0	68.5	72.9	
10:00	15:00	68.3	69.4	67.1	71.3	
10:15	15:00	68.6	69.9	66.8	72.2	
10:30	15:00	67.8	69.7	65.5	72.8	
10:45	15:00	67.3	68.8	65.5	74.3	
11:00	15:00	67.1	68.2	65.3	70.3	
11:15	15:00	68.1	69.3	66.3	71.8	
11:30	15:00	68.4	69.6	66.5	71.3	
11:45	15:00	67.4	68.4	66.0	70.8	
12:00	15:00	67.9	69.1	66.0	71.6	
12:15	15:00	69.5	70.5	68.0	72.2	
12:30	15:00	69.0	70.1	67.4	74.6	
12:45	15:00	68.4	69.6	66.7	71.3	
13:00	15:00	69.1	70.3	67.4	74.5	
13:15	15:00	69.3	70.7	67.0	78.8	
13:30	15:00	68.8	70.0	66.9	84.5	
13:45	15:00	69.9	71.1	68.3	79.5	
14:00	15:00	71.0	72.2	69.3	81.9	Rain
14:15	15:00	70.6	71.8	68.9	85.9	Rain
14:30	15:00	68.5	69.8	66.4	85.7	Rain
14:45	15:00	67.5	69.2	64.5	74.2	Rain
Average 0700-1500		68.7	69.8	67.1	70-85	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

TABLE 18

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	68.9	70.2	66.8	74.4	Rain
15:15	15:00	69.4	70.4	68.1	72.9	Rain
15:30	15:00	70.3	71.2	69.1	73.6	Rain
15:45	15:00	69.8	70.9	68.4	72.7	Rain
16:00	15:00	69.1	70.0	67.8	74.6	
16:15	15:00	67.2	68.7	64.8	70.9	
16:30	15:00	68.6	69.6	67.3	71.6	
16:45	15:00	67.7	68.7	66.4	72.1	
17:00	15:00	68.2	69.4	66.4	71.8	
17:15	15:00	68.7	69.6	67.5	72.3	
17:30	15:00	68.7	69.7	67.3	72.7	
17:45	15:00	68.6	69.7	67.3	71.7	
18:00	15:00	68.7	69.9	67.2	71.6	
18:15	15:00	69.0	70.1	67.4	74.9	
18:30	15:00	68.6	69.9	66.9	71.8	
18:45	15:00	68.2	69.4	66.4	71.8	
19:00	15:00	68.3	69.6	66.4	71.6	
19:15	15:00	67.5	68.7	65.7	71.3	
19:30	15:00	66.9	68.1	64.5	75.4	
19:45	15:00	66.9	68.3	64.7	72.0	
20:00	15:00	67.0	68.4	64.7	72.0	
20:15	15:00	67.4	69.1	64.8	72.4	
20:30	15:00	65.8	67.2	63.6	74.8	
20:45	15:00	65.3	67.0	62.5	69.3	
21:00	15:00	65.3	66.9	62.7	70.5	
21:15	15:00	65.1	66.8	62.2	78.0	
21:30	15:00	65.3	67.0	63.0	71.9	
21:45	15:00	64.8	66.8	61.8	70.8	
22:00	15:00	64.7	66.5	61.8	70.4	
22:15	15:00	64.3	66.1	61.2	69.3	
22:30	15:00	64.1	66.2	60.4	69.1	
22:45	15:00	63.4	65.8	59.1	69.5	
Average 1500-2300		67.2	68.5	65.3	69-78	

Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
 Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
 Calibration: 94dB

TABLE 19

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	63.6	65.9	58.9	68.5	
23:15	15:00	63.6	65.5	60.4	69.4	
23:30	15:00	63.0	65.2	58.3	69.1	
23:45	15:00	62.7	65.1	58.7	68.9	
00:00	15:00	62.8	65.2	57.6	68.9	
00:15	15:00	61.6	64.3	56.7	67.7	
00:30	15:00	61.3	64.0	55.4	68.8	
00:45	15:00	59.9	62.9	53.4	67.8	
01:00	15:00	60.8	63.6	53.1	67.9	
01:15	15:00	60.9	63.7	54.7	67.1	
01:30	15:00	61.3	64.4	53.2	69.2	
01:45	15:00	59.8	62.5	54.1	67.5	
02:00	15:00	60.9	63.9	54.5	69.7	
02:15	15:00	61.6	64.5	55.1	67.9	
02:30	15:00	60.5	63.7	52.3	69.3	
02:45	15:00	60.7	64.3	49.3	69.0	
03:00	15:00	59.5	62.7	50.7	66.9	
03:15	15:00	59.0	62.3	51.4	68.1	
03:30	15:00	59.3	62.3	53.3	68.8	
03:45	15:00	59.1	62.5	50.9	67.5	
04:00	15:00	59.4	62.9	52.6	69.4	
04:15	15:00	59.6	62.8	52.7	67.0	
04:30	15:00	60.6	63.4	54.0	72.5	
04:45	15:00	62.2	65.2	56.1	76.7	
05:00	15:00	61.5	64.3	54.3	77.9	
05:15	15:00	61.2	64.0	55.5	79.9	
05:30	15:00	61.7	64.7	56.6	70.0	
05:45	15:00	61.0	63.4	55.8	69.8	
06:00	15:00	61.4	63.7	57.6	67.1	
06:15	15:00	62.4	64.5	59.1	67.3	
06:30	15:00	64.6	66.6	61.6	69.2	
06:45	15:00	63.8	65.5	60.8	68.8	
Average 2300-0700		61.5	64.1	56.3	67-80	
Average 0700-2300		68.4	69.6	66.7	69-85	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 20

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	62.2	64.0	59.3	76.5	
07:15	15:00	62.7	64.6	59.7	66.8	
07:30	15:00	64.8	66.9	61.9	69.8	
07:45	15:00	63.8	65.9	60.5	72.7	
08:00	15:00	63.3	65.1	60.1	74.9	
08:15	15:00	62.5	64.6	59.4	73.4	
08:30	15:00	61.4	63.3	58.5	70.3	
08:45	15:00	62.2	64.2	59.7	71.0	
09:00	15:00	63.2	65.0	60.5	72.4	
09:15	15:00	64.0	65.4	62.0	73.7	
09:30	15:00	64.8	66.1	63.1	74.5	
09:45	15:00	65.8	67.2	63.8	74.8	
10:00	15:00	66.3	67.7	64.5	79.8	
10:15	15:00	66.6	67.8	65.0	70.7	
10:30	15:00	66.9	68.1	65.2	72.4	
10:45	15:00	65.3	66.4	63.8	68.9	
11:00	15:00	65.4	66.4	64.2	68.4	
11:15	15:00	65.5	66.6	64.0	68.9	
11:30	15:00	65.8	66.8	64.5	70.1	
11:45	15:00	66.5	67.5	65.1	69.5	
12:00	15:00	66.9	68.2	65.1	71.4	
12:15	15:00	67.4	68.6	65.7	84.4	
12:30	15:00	67.7	68.8	65.9	74.3	
12:45	15:00	68.5	69.6	67.0	71.7	
13:00	15:00	67.0	68.4	65.2	75.2	
13:15	15:00	65.5	66.9	63.7	79.3	
13:30	15:00	66.1	67.4	64.5	75.8	
13:45	15:00	66.8	68.0	65.1	70.6	Rain
14:00	15:00	66.1	67.1	64.6	74.4	Rain
14:15	15:00	65.4	66.8	63.8	77.8	Rain
14:30	15:00	65.3	66.4	63.8	81.6	Rain
14:45	15:00	65.3	66.4	63.8	71.7	Rain
Average 0700-1500		65.4	66.8	63.6	67-84	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

TABLE 21

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	63.8	64.9	62.3	67.9	Rain
15:15	15:00	64.8	65.9	63.2	69.3	Rain
15:30	15:00	65.1	66.3	63.5	69.1	
15:45	15:00	65.7	66.8	64.1	71.5	
16:00	15:00	64.8	66.0	63.2	68.2	
16:15	15:00	64.3	65.9	61.9	67.9	
16:30	15:00	64.0	65.3	62.2	67.9	
16:45	15:00	64.4	65.6	62.6	68.1	
17:00	15:00	64.3	65.5	62.6	67.8	
17:15	15:00	63.5	64.8	61.8	67.1	
17:30	15:00	63.0	64.4	61.1	66.5	
17:45	15:00	63.4	64.9	61.5	67.2	
18:00	15:00	63.1	64.5	61.2	69.5	
18:15	15:00	63.2	64.6	61.3	66.8	
18:30	15:00	63.6	65.2	60.7	72.8	Rain
18:45	15:00	62.4	63.9	60.0	67.6	
19:00	15:00	63.0	64.5	60.7	67.7	
19:15	15:00	61.9	63.6	59.3	66.4	Rain
19:30	15:00	62.4	63.8	59.9	77.4	
19:45	15:00	62.5	64.6	59.3	68.2	
20:00	15:00	62.7	64.5	59.8	67.2	
20:15	15:00	61.7	63.5	58.8	70.1	
20:30	15:00	60.8	62.5	57.9	66.0	
20:45	15:00	61.5	63.5	58.4	66.3	
21:00	15:00	58.9	61.0	55.7	64.2	
21:15	15:00	59.7	61.4	57.3	64.9	
21:30	15:00	61.0	63.2	57.1	65.5	
21:45	15:00	61.5	63.2	59.0	65.8	
22:00	15:00	60.6	62.9	57.0	66.5	
22:15	15:00	60.9	62.8	57.8	65.9	
22:30	15:00	59.2	61.5	55.1	64.1	
22:45	15:00	58.6	61.2	53.9	64.0	
Average 1500-2300		62.7	64.2	60.5	64-77	

Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
 Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
 Calibration: 94dB

TABLE 22

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	58.8	61.4	53.6	67.0	
23:15	15:00	59.0	61.3	54.8	64.9	
23:30	15:00	60.4	62.9	56.0	66.3	
23:45	15:00	60.7	62.7	57.1	66.3	
00:00	15:00	58.8	61.4	54.1	65.5	
00:15	15:00	59.6	62.1	54.6	66.1	
00:30	15:00	58.5	61.1	54.1	65.2	
00:45	15:00	57.3	60.1	52.0	63.7	
01:00	15:00	58.1	60.7	52.3	66.8	
01:15	15:00	58.0	60.9	52.3	66.0	
01:30	15:00	57.2	60.1	51.7	64.3	
01:45	15:00	57.6	60.2	53.1	63.9	
02:00	15:00	56.0	58.9	50.4	64.3	
02:15	15:00	58.4	61.0	53.6	65.8	
02:30	15:00	59.2	62.0	54.2	66.1	
02:45	15:00	57.0	60.3	50.3	65.1	
03:00	15:00	57.1	60.4	48.8	65.7	
03:15	15:00	57.9	60.9	51.1	66.2	
03:30	15:00	58.4	61.3	52.1	65.9	
03:45	15:00	58.0	61.3	47.5	67.5	
04:00	15:00	59.2	62.8	50.5	69.2	
04:15	15:00	58.4	61.7	50.1	65.2	
04:30	15:00	58.8	62.0	51.2	65.4	
04:45	15:00	57.3	60.5	49.3	64.2	
05:00	15:00	58.1	61.1	51.0	65.5	
05:15	15:00	60.0	62.6	55.8	66.6	
05:30	15:00	61.7	63.6	58.5	66.6	
05:45	15:00	61.4	63.7	57.3	66.2	
06:00	15:00	61.1	63.4	57.1	66.8	
06:15	15:00	62.6	64.6	59.5	67.8	
06:30	15:00	62.7	64.8	58.9	67.9	
06:45	15:00	63.1	65.3	59.5	69.2	
Average 2300-0700		59.4	62.0	54.7	64-69	
Average 0700-2300		63.5	65.0	61.5	64-84	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 23

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	61.8	63.8	58.7	67.4	
07:15	15:00	62.4	63.9	59.9	66.4	
07:30	15:00	63.6	65.7	60.7	68.6	
07:45	15:00	63.6	65.3	61.2	68.1	
08:00	15:00	63.1	64.7	60.9	67.5	
08:15	15:00	63.9	65.6	61.6	69.1	
08:30	15:00	64.9	66.3	62.8	70.2	
08:45	15:00	65.0	66.6	62.7	72.3	
09:00	15:00	64.8	66.1	62.9	69.1	
09:15	15:00	66.3	67.6	64.4	70.4	
09:30	15:00	66.0	67.3	64.4	69.7	
09:45	15:00	64.3	65.5	62.8	68.7	
10:00	15:00	64.6	65.8	62.9	67.5	
10:15	15:00	64.2	65.5	62.3	71.2	
10:30	15:00	65.1	66.2	63.5	68.8	
10:45	15:00	65.8	66.7	64.5	70.5	
11:00	15:00	65.5	66.6	64.0	68.8	
11:15	15:00	65.2	66.3	63.7	68.3	
11:30	15:00	66.1	67.2	64.6	69.3	
11:45	15:00	65.5	66.6	64.0	68.9	
12:00	15:00	65.9	67.0	64.2	68.8	
12:15	15:00	65.6	66.7	64.1	68.6	
12:30	15:00	66.1	67.1	64.6	70.3	
12:45	15:00	65.4	66.4	64.2	68.2	
13:00	15:00	64.7	65.7	63.2	67.7	
13:15	15:00	64.9	66.1	63.0	68.8	
13:30	15:00	66.6	68.0	64.7	69.9	
13:45	15:00	67.3	68.6	65.2	72.2	
14:00	15:00	67.6	68.8	66.0	70.5	
14:15	15:00	67.4	68.5	65.9	70.6	
14:30	15:00	66.8	67.8	65.6	69.8	
14:45	15:00	66.7	67.9	65.0	72.6	
Average 0700-1500		65.4	66.6	63.6	66-73	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 24

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	65.9	67.0	64.4	68.7	
15:15	15:00	66.3	67.4	64.8	69.4	
15:30	15:00	68.3	69.9	66.0	72.0	
15:45	15:00	68.9	70.0	67.5	76.2	
16:00	15:00	68.2	69.3	66.9	71.3	
16:15	15:00	70.3	71.7	68.0	74.8	
16:30	15:00	69.8	71.2	67.9	73.9	
16:45	15:00	70.6	71.8	69.1	73.6	
17:00	15:00	69.5	70.5	67.9	72.3	
17:15	15:00	68.2	69.5	66.7	71.7	
17:30	15:00	68.3	69.6	66.5	71.7	
17:45	15:00	67.9	69.1	66.2	71.8	
18:00	15:00	66.4	67.5	64.9	69.5	
18:15	15:00	66.5	67.7	64.9	69.6	
18:30	15:00	66.7	68.3	64.2	71.5	
18:45	15:00	66.3	68.0	64.3	70.8	
19:00	15:00	67.0	68.4	65.1	70.3	
19:15	15:00	66.0	67.2	64.5	69.8	
19:30	15:00	66.4	67.7	64.6	69.9	
19:45	15:00	64.6	65.9	62.8	68.0	
20:00	15:00	66.3	67.8	64.0	70.8	
20:15	15:00	66.6	68.2	64.3	71.0	
20:30	15:00	65.0	66.5	63.0	69.3	
20:45	15:00	64.8	66.2	62.7	68.7	
21:00	15:00	65.1	67.1	62.1	70.1	
21:15	15:00	64.6	66.3	62.4	69.4	
21:30	15:00	64.2	65.7	62.1	68.3	
21:45	15:00	63.3	65.2	60.5	67.6	
22:00	15:00	63.4	65.3	60.0	69.3	
22:15	15:00	63.6	65.8	60.0	69.1	
22:30	15:00	62.0	64.3	58.3	67.7	
22:45	15:00	61.6	63.6	58.1	67.2	
Average 1500-2300		66.9	68.2	64.9	67-76	

Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**
 Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)
 Calibration: 94dB

TABLE 25

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	61.1	63.7	56.9	67.8	
23:15	15:00	61.2	63.2	57.8	67.4	
23:30	15:00	60.0	62.7	55.1	66.4	
23:45	15:00	59.6	62.0	54.8	65.9	
00:00	15:00	58.7	61.5	53.7	64.8	
00:15	15:00	58.6	61.1	53.9	64.6	
00:30	15:00	57.8	60.8	52.7	65.3	
00:45	15:00	56.5	59.6	51.2	64.8	
01:00	15:00	56.4	59.5	49.5	66.2	
01:15	15:00	55.8	58.5	50.9	62.9	
01:30	15:00	55.1	58.2	48.3	63.5	
01:45	15:00	55.0	57.7	50.2	63.9	
02:00	15:00	55.1	58.3	48.8	63.0	
02:15	15:00	55.5	58.4	49.6	62.6	
02:30	15:00	55.3	58.4	49.7	63.5	
02:45	15:00	55.0	58.0	48.6	61.9	
03:00	15:00	55.7	58.6	49.8	65.2	
03:15	15:00	55.8	58.7	51.2	63.1	
03:30	15:00	57.2	60.0	50.9	63.7	
03:45	15:00	57.5	60.0	53.3	63.2	
04:00	15:00	57.3	59.7	53.6	63.3	
04:15	15:00	57.8	60.0	53.8	64.8	
04:30	15:00	59.3	61.2	56.5	65.5	
04:45	15:00	59.4	61.2	56.7	64.8	
05:00	15:00	59.9	61.7	57.3	64.8	
05:15	15:00	60.3	62.1	57.9	66.2	
05:30	15:00	60.6	62.3	58.1	65.5	
05:45	15:00	61.2	62.6	59.2	64.9	
06:00	15:00	62.3	64.0	60.2	66.6	
06:15	15:00	63.0	64.4	61.1	68.1	
06:30	15:00	63.3	64.6	61.7	66.6	
06:45	15:00	62.0	63.2	60.6	65.6	
Average 2300-0700		59.1	61.2	56.0	62-68	
Average 0700-2300		66.2	67.5	64.3	66-76	

Noise Survey Results

Date: Monday 12th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 26

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M2 - Adjacent to Wayford Mews**

Instrumentation: Cirrus 171A Real Time Sound Analyser (G061253)

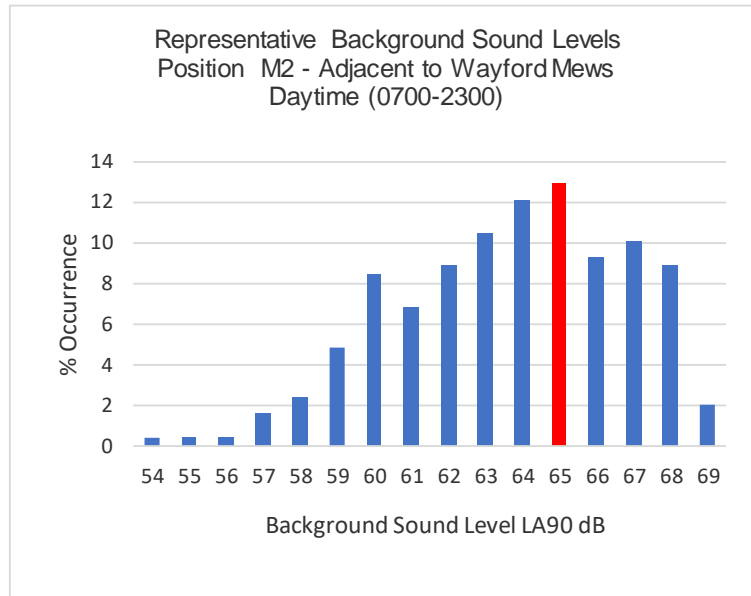
Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	61.5	62.6	60.1	65.0	
07:15	15:00	61.0	61.9	59.9	63.7	
07:30	15:00	61.7	62.7	60.5	66.1	
07:45	15:00	60.8	61.9	59.4	64.6	
08:00	15:00	60.0	61.2	58.7	63.3	
08:15	15:00	59.8	61.2	57.2	64.2	
08:30	15:00	59.8	61.0	58.3	69.3	
08:45	15:00	60.8	62.1	59.2	64.0	
09:00	15:00	63.5	64.7	62.1	66.9	
09:15	15:00	63.0	64.1	61.6	67.0	
09:30	15:00	63.6	64.8	62.1	67.7	
09:45	15:00	64.3	65.5	62.7	67.5	
10:00	15:00	64.7	65.9	63.1	68.1	
10:15	15:00	64.7	65.7	63.4	67.6	
10:30	15:00	63.7	64.9	61.8	69.1	
10:45	15:00	62.5	63.8	60.7	66.4	
11:00	15:00	62.0	63.3	60.0	65.8	
11:15	15:00	62.4	63.9	60.3	67.3	
11:30	15:00	63.4	65.0	61.0	66.9	
11:45	15:00	62.9	64.4	60.8	70.3	
12:00	15:00	62.7	63.4	61.8	64.9	
Average 0700-1215		62.5	63.7	60.9	63-70	

Overall Average	59.5	61.6	56.1	62-80	
Overall Average	66.2	67.5	64.5	64-85	Levels exclude rain periods

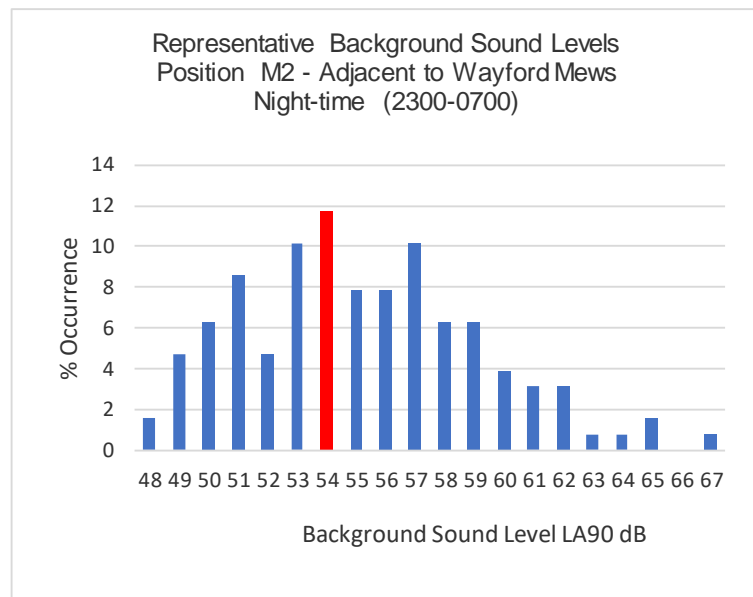
LA90 % Occurrence

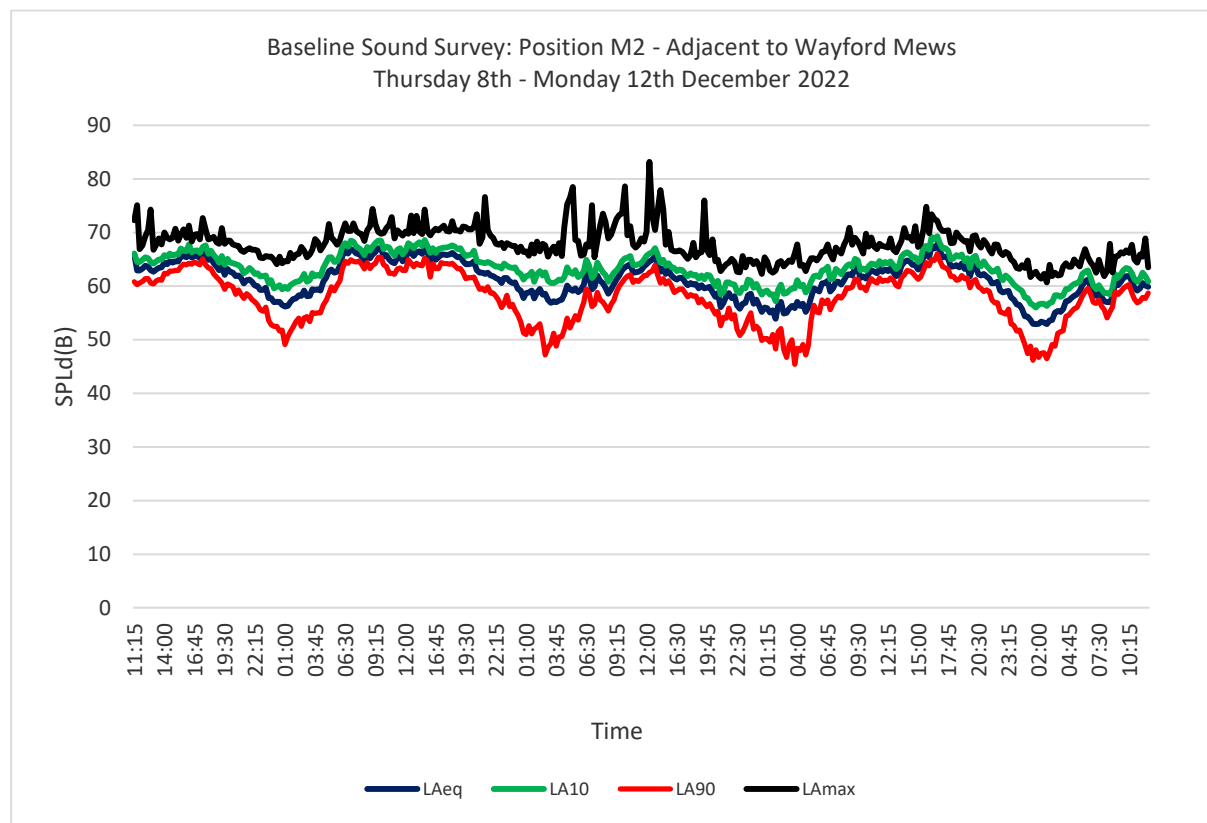
54	0.4
55	0.4
56	0.4
57	1.6
58	2.4
59	4.8
60	8.5
61	6.9
62	8.9
63	10.5
64	12.1
65	12.9
66	9.3
67	10.1
68	8.9
69	2.0



LA90 % Occurrence

48	1.6
49	4.7
50	6.3
51	8.6
52	4.7
53	10.2
54	11.7
55	7.8
56	7.8
57	10.2
58	6.3
59	6.3
60	3.9
61	3.1
62	3.1
63	0.8
64	0.8
65	1.6
66	0.0
67	0.8





Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 27

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
11:15	15:00	65.9	66.1	60.8	72.3	Dominated by road traffic noise from M56 Motorway
11:30	15:00	62.9	64.5	60.3	75.1	
11:45	15:00	62.9	64.5	60.6	66.9	
12:00	15:00	63.3	64.9	60.9	67.6	
12:15	15:00	63.8	65.4	61.4	69.3	
12:30	15:00	63.6	65.2	61.4	70.5	
12:45	15:00	63.0	64.5	60.6	74.3	
13:00	15:00	62.7	64.2	60.4	66.8	
13:15	15:00	63.1	64.6	61.0	67.7	
13:30	15:00	63.4	65.0	61.2	68.9	
13:45	15:00	63.5	65.0	61.1	67.8	
14:00	15:00	64.4	65.8	62.4	70.0	
14:15	15:00	64.1	65.5	62.3	69.0	
14:30	15:00	64.6	66.1	62.8	68.7	
14:45	15:00	64.4	65.7	62.8	69.0	
Average 1115-1500		63.7	65.1	61.4	67-75	

Noise Survey Results

Date: Thursday 8th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 28

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	64.6	65.9	62.9	70.7	
15:15	15:00	64.6	65.9	62.9	68.5	
15:30	15:00	65.5	67.0	63.6	69.6	
15:45	15:00	65.6	66.7	64.1	70.6	
16:00	15:00	65.4	66.5	64.0	69.0	
16:15	15:00	66.3	67.8	64.3	71.3	
16:30	15:00	65.3	66.3	64.1	68.3	
16:45	15:00	65.7	66.6	64.5	69.6	
17:00	15:00	65.6	66.7	64.2	69.7	
17:15	15:00	65.2	66.2	64.0	68.7	
17:30	15:00	66.3	67.3	65.1	72.7	
17:45	15:00	66.0	67.6	64.0	70.6	
18:00	15:00	64.9	66.0	63.4	68.7	
18:15	15:00	65.2	66.6	63.3	68.9	
18:30	15:00	64.3	65.8	62.3	69.2	
18:45	15:00	63.7	65.2	61.7	68.2	
19:00	15:00	63.0	64.4	61.2	67.9	
19:15	15:00	63.6	65.6	60.6	70.8	
19:30	15:00	62.1	64.0	59.4	67.9	
19:45	15:00	63.2	65.1	60.4	68.5	
20:00	15:00	62.7	64.4	60.2	68.5	
20:15	15:00	62.5	64.3	59.9	67.8	
20:30	15:00	61.9	64.1	58.5	67.6	
20:45	15:00	62.0	63.9	59.3	67.5	
21:00	15:00	61.5	63.5	58.5	66.7	
21:15	15:00	60.5	62.4	57.7	66.4	
21:30	15:00	61.1	62.8	58.6	66.8	
21:45	15:00	61.2	63.4	58.1	67.1	
22:00	15:00	60.8	63.0	57.5	66.8	
22:15	15:00	60.1	62.3	57.1	66.8	
22:30	15:00	60.0	62.4	56.5	66.6	
22:45	15:00	59.3	61.8	55.6	65.3	
Average 1500-2300		63.8	65.3	61.9	65-73	

Noise Survey Results

Date: Thursday 8th - Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 29

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	59.3	61.9	55.3	65.2	
23:15	15:00	59.7	62.0	56.1	65.6	
23:30	15:00	57.8	60.5	53.6	65.5	
23:45	15:00	57.8	61.1	52.8	65.5	
00:00	15:00	57.0	59.6	52.5	64.9	
00:15	15:00	57.1	59.9	52.5	64.1	
00:30	15:00	57.1	60.2	51.6	65.5	
00:45	15:00	56.5	59.4	51.8	64.3	
01:00	15:00	56.2	59.9	49.1	64.7	
01:15	15:00	56.3	59.5	50.6	64.6	
01:30	15:00	57.0	60.2	51.5	66.2	
01:45	15:00	57.6	60.5	52.4	65.2	
02:00	15:00	57.7	60.8	53.4	65.9	
02:15	15:00	58.3	60.9	54.0	66.0	
02:30	15:00	58.2	61.3	52.5	67.3	
02:45	15:00	59.2	62.3	54.1	66.6	
03:00	15:00	58.1	60.8	54.3	65.4	
03:15	15:00	58.2	61.1	53.4	65.9	
03:30	15:00	59.4	62.4	55.1	66.8	
03:45	15:00	59.3	61.9	54.9	68.8	
04:00	15:00	59.4	62.1	55.0	68.2	
04:15	15:00	59.2	61.9	55.0	66.7	
04:30	15:00	60.8	63.4	56.5	67.5	
04:45	15:00	61.6	64.4	57.3	68.4	
05:00	15:00	62.8	65.4	58.6	71.6	
05:15	15:00	63.1	65.4	59.9	69.1	
05:30	15:00	62.5	64.5	59.1	68.5	
05:45	15:00	62.7	64.6	60.2	67.7	
06:00	15:00	63.8	65.8	61.0	68.6	
06:15	15:00	65.7	67.4	63.3	70.2	
06:30	15:00	66.6	68.0	64.6	71.7	
06:45	15:00	66.1	67.4	64.3	70.3	
Average 2300-0700		60.8	63.1	57.6	65-72	
Average 1115-2300		63.8	65.3	61.7	65-75	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 30

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	66.9	68.5	64.9	70.3	
07:15	15:00	66.7	68.3	64.6	71.7	
07:30	15:00	66.1	67.4	64.5	70.3	
07:45	15:00	66.0	67.1	64.7	69.9	
08:00	15:00	65.5	66.7	64.1	69.7	
08:15	15:00	64.6	65.8	63.2	68.4	
08:30	15:00	66.0	67.3	64.4	70.4	
08:45	15:00	65.2	66.6	63.3	71.2	
09:00	15:00	65.9	67.4	63.9	74.4	
09:15	15:00	66.4	68.0	64.2	71.6	
09:30	15:00	67.1	68.5	65.4	70.1	
09:45	15:00	67.1	68.5	65.4	69.8	
10:00	15:00	65.5	66.9	64.0	69.9	
10:15	15:00	65.8	67.4	63.7	70.8	
10:30	15:00	65.0	67.2	62.4	71.4	
10:45	15:00	64.5	66.3	62.4	72.9	
11:00	15:00	64.3	65.7	62.2	68.9	
11:15	15:00	65.3	66.8	63.2	70.4	
11:30	15:00	65.6	67.1	63.4	69.9	
11:45	15:00	64.6	65.9	62.9	69.4	
12:00	15:00	65.1	66.6	62.9	70.2	
12:15	15:00	66.7	68.0	64.9	69.8	
12:30	15:00	66.2	67.6	64.3	73.2	
12:45	15:00	65.6	67.1	63.6	69.9	
13:00	15:00	66.3	67.8	64.3	73.1	
13:15	15:00	66.5	68.2	63.9	70.2	
13:30	15:00	66.0	67.5	63.8	69.7	
13:45	15:00	67.1	68.6	65.2	74.3	
14:00	15:00	68.2	69.7	66.2	80.5	Rain
14:15	15:00	67.8	69.3	65.8	84.5	Rain
14:30	15:00	65.7	67.3	63.3	84.3	Rain
14:45	15:00	64.7	66.7	61.4	72.8	Rain
Average 0700-1500		65.9	67.3	64.0	68-74	

Noise Survey Results

Date: Friday 9th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 31

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	66.1	67.7	63.7	73.0	Rain
15:15	15:00	66.6	67.9	65.0	71.5	Rain
15:30	15:00	67.5	68.7	66.0	72.2	Rain
15:45	15:00	67.0	68.4	65.3	71.3	Rain
16:00	15:00	66.3	67.5	64.7	70.2	
16:15	15:00	64.4	66.2	61.7	69.5	
16:30	15:00	65.8	67.1	64.2	70.2	
16:45	15:00	64.9	66.2	63.3	70.7	
17:00	15:00	65.4	66.9	63.3	70.4	
17:15	15:00	65.9	67.1	64.4	70.9	
17:30	15:00	65.9	67.2	64.2	71.3	
17:45	15:00	65.8	67.2	64.2	70.3	
18:00	15:00	65.9	67.4	64.1	70.2	
18:15	15:00	66.2	67.6	64.3	72.1	
18:30	15:00	65.8	67.4	63.8	70.4	
18:45	15:00	65.4	66.9	63.3	70.4	
19:00	15:00	65.5	67.1	63.3	70.2	
19:15	15:00	64.7	66.2	62.6	71.1	
19:30	15:00	64.1	65.6	61.4	71.0	
19:45	15:00	64.1	65.8	61.6	70.6	
20:00	15:00	64.2	65.9	61.6	70.6	
20:15	15:00	64.6	66.6	61.7	71.0	
20:30	15:00	63.0	64.7	60.5	73.4	
20:45	15:00	62.5	64.5	59.4	67.9	
21:00	15:00	62.5	64.4	59.6	69.1	
21:15	15:00	62.3	64.3	59.1	76.6	
21:30	15:00	62.5	64.5	59.9	70.5	
21:45	15:00	62.0	64.3	58.7	69.4	
22:00	15:00	61.9	64.0	58.7	69.0	
22:15	15:00	61.5	63.6	58.1	67.9	
22:30	15:00	61.3	63.7	57.3	67.7	
22:45	15:00	60.6	63.3	56.0	68.1	
Average 1500-2300		64.4	66.0	62.2	68-77	

Noise Survey Results

Date: Friday 9th - Saturday 10th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility

TABLE 32

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	61.5	64.2	56.8	67.1	
23:15	15:00	61.5	63.8	58.3	68.0	
23:30	15:00	60.9	63.5	56.2	67.7	
23:45	15:00	60.6	63.4	56.6	67.5	
00:00	15:00	60.7	63.5	55.5	67.5	
00:15	15:00	59.5	62.6	54.6	66.3	
00:30	15:00	59.2	62.3	53.3	67.4	
00:45	15:00	57.8	61.2	51.3	66.4	
01:00	15:00	58.7	61.9	51.0	66.5	
01:15	15:00	58.8	62.0	52.6	65.7	
01:30	15:00	59.2	62.7	51.1	67.8	
01:45	15:00	57.7	60.8	52.0	66.1	
02:00	15:00	58.8	62.2	52.4	68.3	
02:15	15:00	59.5	62.8	53.0	66.5	
02:30	15:00	58.4	62.0	50.2	67.9	
02:45	15:00	58.6	62.6	47.2	67.6	
03:00	15:00	57.4	61.0	48.6	65.5	
03:15	15:00	56.9	60.6	49.3	66.7	
03:30	15:00	57.2	60.6	51.2	67.4	
03:45	15:00	57.0	60.8	48.8	66.1	
04:00	15:00	57.3	61.2	50.5	68.0	
04:15	15:00	57.5	61.1	50.6	65.6	
04:30	15:00	58.5	61.7	51.9	71.1	
04:45	15:00	60.1	63.5	54.0	75.3	
05:00	15:00	59.4	62.6	52.2	76.5	
05:15	15:00	59.1	62.3	53.4	78.5	
05:30	15:00	59.6	63.0	54.5	68.6	
05:45	15:00	58.9	61.7	53.7	68.4	
06:00	15:00	59.3	62.0	55.5	65.7	
06:15	15:00	60.3	62.8	57.0	65.9	
06:30	15:00	62.5	64.9	59.5	67.8	
06:45	15:00	61.7	63.8	58.7	67.4	
Average 2300-0700		59.4	62.4	54.2	66-79	
Average 0700-2300		65.6	67.1	63.6	68-77	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 33

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	59.4	61.5	56.2	75.1	
07:15	15:00	59.9	62.1	56.6	65.4	
07:30	15:00	62.0	64.4	58.8	68.4	
07:45	15:00	61.0	63.4	57.4	71.3	
08:00	15:00	60.5	62.6	57.0	73.5	
08:15	15:00	59.7	62.1	56.3	72.0	
08:30	15:00	58.6	60.8	55.4	68.9	
08:45	15:00	59.4	61.7	56.6	69.6	
09:00	15:00	60.4	62.5	57.4	71.2	
09:15	15:00	61.2	62.9	58.9	72.5	
09:30	15:00	62.0	63.6	60.0	73.3	
09:45	15:00	63.0	64.7	60.7	73.6	
10:00	15:00	63.5	65.2	61.4	78.6	
10:15	15:00	63.8	65.3	61.9	69.5	
10:30	15:00	64.1	65.6	62.1	71.2	
10:45	15:00	62.5	63.9	60.7	67.7	
11:00	15:00	62.6	63.9	61.1	67.2	
11:15	15:00	62.7	64.1	60.9	67.7	
11:30	15:00	63.0	64.3	61.4	68.9	
11:45	15:00	63.7	65.0	62.0	68.3	
12:00	15:00	64.1	65.7	62.0	70.2	
12:15	15:00	64.6	66.1	62.6	83.2	
12:30	15:00	64.9	66.3	62.8	73.1	
12:45	15:00	65.7	67.1	63.9	70.5	
13:00	15:00	64.2	65.9	62.1	74.0	
13:15	15:00	62.7	64.4	60.6	77.9	
13:30	15:00	63.3	64.9	61.4	74.4	
13:45	15:00	64.0	65.5	62.0	69.2	Rain
14:00	15:00	63.3	64.6	61.5	73.0	Rain
14:15	15:00	62.6	64.3	60.7	76.4	Rain
14:30	15:00	62.5	63.9	60.7	78.5	Rain
14:45	15:00	62.5	63.9	60.7	70.3	Rain
Average 0700-1500		62.6	64.3	60.5	65-83	

Noise Survey Results

Date: Saturday 10th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 34

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	61.0	62.4	59.2	66.5	Rain
15:15	15:00	62.0	63.4	60.1	67.9	Rain
15:30	15:00	62.3	63.8	60.4	67.7	
15:45	15:00	62.9	64.3	61.0	70.1	
16:00	15:00	62.0	63.5	60.1	66.8	
16:15	15:00	61.5	63.4	58.8	66.5	
16:30	15:00	61.2	62.8	59.1	66.5	
16:45	15:00	61.6	63.1	59.5	66.7	
17:00	15:00	61.5	63.0	59.5	66.4	
17:15	15:00	60.7	62.3	58.7	65.7	
17:30	15:00	60.2	61.9	58.0	65.1	
17:45	15:00	60.6	62.4	58.4	65.8	
18:00	15:00	60.3	62.0	58.1	68.1	
18:15	15:00	60.4	62.1	58.2	65.4	
18:30	15:00	60.8	62.7	57.6	71.4	Rain
18:45	15:00	59.6	61.4	56.9	66.2	
19:00	15:00	60.2	62.0	57.6	66.3	
19:15	15:00	59.1	61.1	56.2	65.0	Rain
19:30	15:00	59.6	61.3	56.8	76.0	
19:45	15:00	59.7	62.1	56.2	66.8	
20:00	15:00	59.9	62.0	56.7	65.8	
20:15	15:00	58.9	61.0	55.7	68.7	
20:30	15:00	58.0	60.0	54.8	64.6	
20:45	15:00	58.7	61.0	55.3	64.9	
21:00	15:00	56.1	58.5	52.6	62.8	
21:15	15:00	56.9	58.9	54.2	63.5	
21:30	15:00	58.2	60.7	54.0	64.1	
21:45	15:00	58.7	60.7	55.9	64.4	
22:00	15:00	57.8	60.4	53.9	65.1	
22:15	15:00	58.1	60.3	54.7	64.5	
22:30	15:00	56.4	59.0	52.0	62.7	
22:45	15:00	55.8	58.7	50.8	62.6	
Average 1500-2300		59.9	61.7	57.4	63-76	

Noise Survey Results

Date: Saturday 10th - Sunday 11th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
 Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
 Calibration: 94dB

TABLE 35

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	56.7	59.7	51.5	65.6	
23:15	15:00	56.9	59.6	52.7	63.5	
23:30	15:00	58.3	61.2	53.9	64.9	
23:45	15:00	58.6	61.0	55.0	64.9	
00:00	15:00	56.7	59.7	52.0	64.1	
00:15	15:00	57.5	60.4	52.5	64.7	
00:30	15:00	56.4	59.4	52.0	63.8	
00:45	15:00	55.2	58.4	49.9	62.3	
01:00	15:00	56.0	59.0	50.2	65.4	
01:15	15:00	55.9	59.2	50.2	64.6	
01:30	15:00	55.1	58.4	49.6	62.9	
01:45	15:00	55.5	58.5	51.0	62.5	
02:00	15:00	53.9	57.2	48.3	62.9	
02:15	15:00	56.3	59.3	51.5	64.4	
02:30	15:00	57.1	60.3	52.1	64.7	
02:45	15:00	54.9	58.6	48.2	63.7	
03:00	15:00	55.0	58.7	46.7	64.3	
03:15	15:00	55.8	59.2	49.0	64.8	
03:30	15:00	56.3	59.6	50.0	64.5	
03:45	15:00	55.9	59.6	45.4	66.1	
04:00	15:00	57.1	61.1	48.4	67.8	
04:15	15:00	56.3	60.0	48.0	63.8	
04:30	15:00	56.7	60.3	49.1	64.0	
04:45	15:00	55.2	58.8	47.2	62.8	
05:00	15:00	56.0	59.4	48.9	64.1	
05:15	15:00	57.9	60.9	53.7	65.2	
05:30	15:00	59.6	61.9	56.4	65.2	
05:45	15:00	59.3	62.0	55.2	64.8	
06:00	15:00	59.0	61.7	55.0	65.4	
06:15	15:00	60.5	62.9	57.4	66.4	
06:30	15:00	60.6	63.1	56.8	66.5	
06:45	15:00	61.0	63.6	57.4	67.8	
Average 2300-0700		57.3	60.3	52.6	62-68	
Average 0700-2300		60.7	62.5	58.4	63-83	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

TABLE 36

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	59.0	61.3	55.6	66.0	
07:15	15:00	59.6	61.4	56.8	65.0	
07:30	15:00	60.8	63.2	57.6	67.2	
07:45	15:00	60.8	62.8	58.1	66.7	
08:00	15:00	60.3	62.2	57.8	66.1	
08:15	15:00	61.1	63.1	58.5	67.7	
08:30	15:00	62.1	63.8	59.7	68.8	
08:45	15:00	62.2	64.1	59.6	70.9	
09:00	15:00	62.0	63.6	59.8	67.7	
09:15	15:00	63.5	65.1	61.3	69.0	
09:30	15:00	63.2	64.8	61.3	68.3	
09:45	15:00	61.5	63.0	59.7	67.3	
10:00	15:00	61.8	63.3	59.8	66.1	
10:15	15:00	61.4	63.0	59.2	69.8	
10:30	15:00	62.3	63.7	60.4	67.4	
10:45	15:00	63.0	64.2	61.4	69.1	
11:00	15:00	62.7	64.1	60.9	67.4	
11:15	15:00	62.4	63.8	60.6	66.9	
11:30	15:00	63.3	64.7	61.5	67.9	
11:45	15:00	62.7	64.1	60.9	67.5	
12:00	15:00	63.1	64.5	61.1	67.4	
12:15	15:00	62.8	64.2	61.0	67.2	
12:30	15:00	63.3	64.6	61.5	68.9	
12:45	15:00	62.6	63.9	61.1	66.8	
13:00	15:00	61.9	63.2	60.1	66.3	
13:15	15:00	62.1	63.6	59.9	67.4	
13:30	15:00	63.8	65.5	61.6	68.5	
13:45	15:00	64.5	66.1	62.1	70.8	
14:00	15:00	64.8	66.3	62.9	69.1	
14:15	15:00	64.6	66.0	62.8	69.2	
14:30	15:00	64.0	65.3	62.5	68.4	
14:45	15:00	63.9	65.4	61.9	71.2	
Average 0700-1500		62.6	64.1	60.5	65-71	

Noise Survey Results

Date: Sunday 11th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

Calibration: 94dB

TABLE 37

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	63.1	64.5	61.3	67.3	
15:15	15:00	63.5	64.9	61.7	68.0	
15:30	15:00	65.5	67.4	62.9	70.6	
15:45	15:00	66.1	67.5	64.4	74.8	
16:00	15:00	65.4	66.8	63.8	69.9	
16:15	15:00	67.5	69.2	64.9	73.4	
16:30	15:00	67.0	68.7	64.8	72.5	
16:45	15:00	67.8	69.3	66.0	72.2	
17:00	15:00	66.7	68.0	64.8	70.9	
17:15	15:00	65.4	67.0	63.6	70.3	
17:30	15:00	65.5	67.1	63.4	70.3	
17:45	15:00	65.1	66.6	63.1	70.4	
18:00	15:00	63.6	65.0	61.8	68.0	
18:15	15:00	63.7	65.2	61.8	68.1	
18:30	15:00	63.9	65.8	61.1	70.0	
18:45	15:00	63.5	65.5	61.2	69.3	
19:00	15:00	64.2	65.9	62.0	68.8	
19:15	15:00	63.2	64.7	61.4	68.3	
19:30	15:00	63.6	65.2	61.5	68.4	
19:45	15:00	61.8	63.4	59.7	66.5	
20:00	15:00	63.5	65.3	60.9	69.3	
20:15	15:00	63.8	65.7	61.2	69.5	
20:30	15:00	62.2	64.0	59.9	67.8	
20:45	15:00	62.0	63.7	59.6	67.2	
21:00	15:00	62.3	64.6	59.0	68.6	
21:15	15:00	61.8	63.8	59.3	67.9	
21:30	15:00	61.4	63.2	59.0	66.8	
21:45	15:00	60.5	62.7	57.4	66.1	
22:00	15:00	60.6	62.8	56.9	67.8	
22:15	15:00	60.8	63.3	56.9	67.7	
22:30	15:00	59.2	61.8	55.2	66.3	
22:45	15:00	58.8	61.1	55.0	65.8	
Average 1500-2300		64.1	65.7	61.8	66-75	

Noise Survey Results

Date: Sunday 11th - Monday 12th December 2022
 Location: Mersey Estuary, Frodsham, Runcorn, Cheshire
 Client: Axis
 Project: Solar Farm & BESS Facility
 Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**
 Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)
 Calibration: 94dB

TABLE 38

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	59.0	62.0	54.8	66.4	
23:15	15:00	59.1	61.5	55.7	66.0	
23:30	15:00	57.9	61.0	53.0	65.0	
23:45	15:00	57.5	60.3	52.7	64.5	
00:00	15:00	56.6	59.8	51.6	63.4	
00:15	15:00	56.5	59.4	51.8	63.2	
00:30	15:00	55.7	59.1	50.6	63.9	
00:45	15:00	54.4	57.9	49.1	63.4	
01:00	15:00	54.3	57.8	47.4	64.8	
01:15	15:00	53.7	56.8	48.8	61.7	
01:30	15:00	53.0	56.5	46.2	62.3	
01:45	15:00	52.9	56.0	48.1	62.7	
02:00	15:00	53.0	56.6	46.7	61.8	
02:15	15:00	53.4	56.7	47.5	61.4	
02:30	15:00	53.2	56.7	47.6	62.3	
02:45	15:00	52.9	56.3	46.5	60.7	
03:00	15:00	53.6	56.9	47.7	64.0	
03:15	15:00	53.7	57.0	49.1	61.9	
03:30	15:00	55.1	58.3	48.8	62.5	
03:45	15:00	55.4	58.3	51.2	62.0	
04:00	15:00	55.2	58.0	51.5	62.1	
04:15	15:00	55.7	58.3	51.7	63.6	
04:30	15:00	57.2	59.5	54.4	64.3	
04:45	15:00	57.3	59.5	54.6	63.6	
05:00	15:00	57.8	60.0	55.2	63.6	
05:15	15:00	58.2	60.4	55.8	65.0	
05:30	15:00	58.5	60.6	56.0	64.3	
05:45	15:00	59.1	60.9	57.1	63.7	
06:00	15:00	60.2	62.3	58.1	65.4	
06:15	15:00	60.9	62.7	59.0	66.9	
06:30	15:00	61.2	62.9	59.6	65.4	
06:45	15:00	59.9	61.5	58.5	64.4	
Average 2300-0700		57.0	59.5	53.9	61-67	
Average 0700-2300		63.4	65.0	61.2	65-75	

Noise Survey Results

Date: Monday 12th December 2022

Location: Mersey Estuary, Frodsham, Runcorn, Cheshire

Client: Axis

Project: Solar Farm & BESS Facility

Data: **Baseline Sound Survey: Position M3 - Adjacent to Williams Way**

Instrumentation: Cirrus 171B Real Time Sound Analyser (G056142)

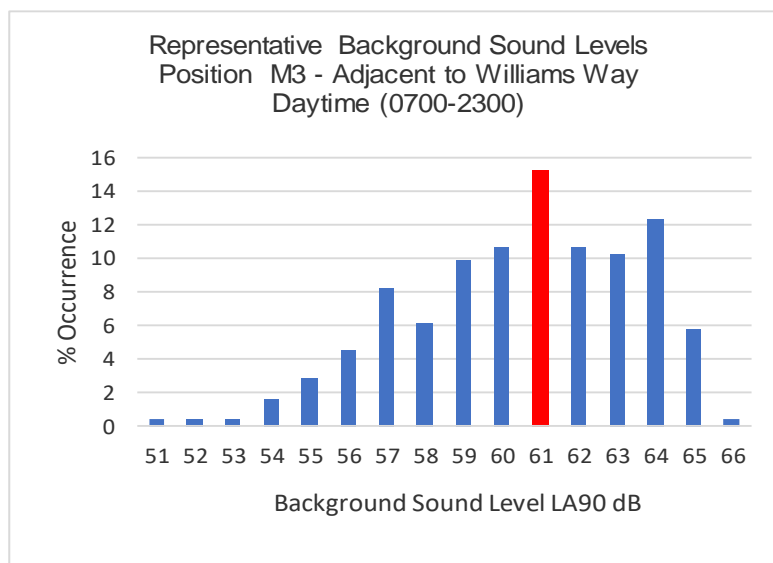
Calibration: 94dB

TABLE 39

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	58.7	60.1	57.0	63.8	
07:15	15:00	58.2	59.4	56.8	62.5	
07:30	15:00	58.9	60.2	57.4	64.9	
07:45	15:00	58.0	59.4	56.3	63.2	
08:00	15:00	57.2	58.7	55.6	61.9	
08:15	15:00	57.0	58.7	54.1	62.8	
08:30	15:00	57.0	58.5	55.2	67.9	
08:45	15:00	58.0	59.6	56.1	62.6	
09:00	15:00	60.7	62.2	59.0	65.5	
09:15	15:00	60.2	61.6	58.5	65.6	
09:30	15:00	60.8	62.3	59.0	66.3	
09:45	15:00	61.5	63.0	59.6	66.1	
10:00	15:00	61.9	63.4	60.0	66.7	
10:15	15:00	61.9	63.2	60.3	66.2	
10:30	15:00	60.9	62.4	58.7	67.7	
10:45	15:00	59.7	61.3	57.6	65.0	
11:00	15:00	59.2	60.8	56.9	64.4	
11:15	15:00	59.6	61.4	57.2	65.9	
11:30	15:00	60.6	62.5	57.9	65.5	
11:45	15:00	60.1	61.9	57.7	68.9	
12:00	15:00	59.9	60.9	58.7	63.5	
Average 0700-1215		59.7	61.2	57.8	62-69	
Overall Average		57.6	60.1	54	61-79	
Overall Average		63.4	65.0	61.3	63-83	Levels exclude rain periods

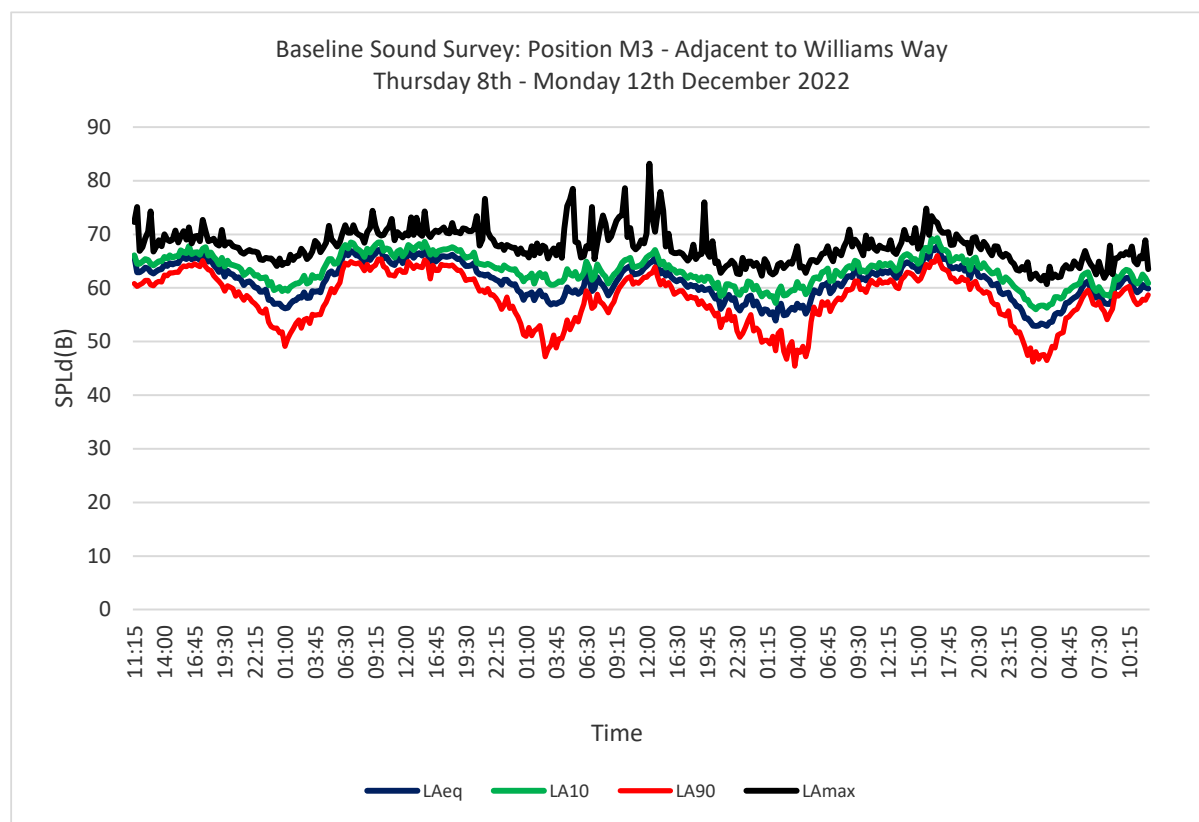
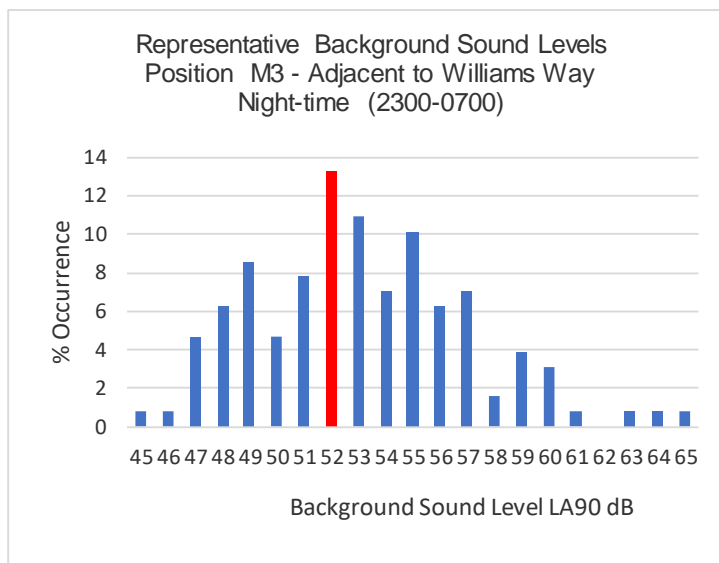
LA90 % Occurrence

51	0.4
52	0.4
53	0.4
54	1.6
55	2.9
56	4.5
57	8.2
58	6.2
59	9.9
60	10.7
61	15.2
62	10.7
63	10.3
64	12.3
65	5.8
66	0.4



LA90 % Occurrence

45	0.8
46	0.8
47	4.7
48	6.3
49	8.6
50	4.7
51	7.8
52	13.3
53	10.9
54	7.0
55	10.2
56	6.3
57	7.0
58	1.6
59	3.9
60	3.1
61	0.8
62	0.0
63	0.8
64	0.8
65	0.8



M1 = Rear of Saltworks Close

M2 = Adjacent to Wayford Mews

M3 = Adjacent to Williams Way

	M1 Day time	M1 Night-time	M2 Day time	M2 Night-time	M3 Day time	M3 Night-time
Total number of values	248	128	248	128	243	128
Number of excluded values	0	0	0	0	0	0
Number of binned values	248	128	248	128	243	128
Minimum	47	42	54	48	51	45
25% Percentile	56.25	48	61	52	59	50
Median	60	52	64	55	61	53
75% Percentile	63	55	66	58	63	55.75
Maximum	68	64	69	67	66	65
Most common place (I mode)	61	53	65	54	61	52
Mean	60	52	64	55	61	53
Std. Deviation	4.5	4.9	3.1	4.0	3.0	3.9
Std. Error of Mean	0.3	0.4	0.2	0.4	0.2	0.3
Lower 95% CI of mean	58.9	50.8	63.3	54.5	60.1	52.4
Upper 95% CI of mean	60.1	52.5	64.0	55.9	60.9	53.8

Weather Conditions During Baseline Survey

		Temp	Wind	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
08/12/2022	11:30	1.6	0.4	SW	772.6	0
08/12/2022	11:40	1.6	0	---	772.5	0
08/12/2022	11:50	1.5	0.5	ESE	772.5	0
08/12/2022	12:00	1.1	0.3	E	772.5	0
08/12/2022	12:10	1.1	0	---	772.5	0
08/12/2022	12:20	1.7	0	---	772.5	0
08/12/2022	12:30	2.2	0	---	772.4	0
08/12/2022	12:40	2.4	0	---	772.3	0
08/12/2022	12:50	2.6	0	---	772.2	0
08/12/2022	13:00	2.8	0	---	772.2	0
08/12/2022	13:10	2.2	0.4	SW	772.2	0
08/12/2022	13:20	2.1	0.4	NNW	772.1	0
08/12/2022	13:30	2.1	0	---	772.1	0
08/12/2022	13:40	1.9	0	---	772	0
08/12/2022	13:50	2	0	---	771.8	0
08/12/2022	14:00	2.1	0.6	ESE	771.7	0
08/12/2022	14:10	2.1	0.4	E	771.6	0
08/12/2022	14:20	2.1	0.7	E	771.5	0
08/12/2022	14:30	2.1	0	---	771.8	0
08/12/2022	14:40	2.1	0.4	NE	771.5	0
08/12/2022	14:50	1.9	0	---	771.4	0
08/12/2022	15:00	2	0.9	WSW	771.3	0
08/12/2022	15:10	2.4	1.8	S	771.2	0
08/12/2022	15:20	2.4	0.4	ESE	771.2	0
08/12/2022	15:30	2.2	0.2	SE	771.1	0
08/12/2022	15:40	2.1	0	---	771.1	0
08/12/2022	15:50	2	0.3	E	771	0
08/12/2022	16:00	1.6	0	---	771.2	0
08/12/2022	16:10	1.2	0	---	771.2	0
08/12/2022	16:20	1.1	0	---	771.1	0
08/12/2022	16:30	1.1	0	---	771.1	0
08/12/2022	16:40	1.1	0	---	771	0
08/12/2022	16:50	0.9	0	---	771.2	0
08/12/2022	17:00	0.7	0	---	771.2	0
08/12/2022	17:10	0.7	0	---	771.2	0
08/12/2022	17:20	-0.2	0	---	771.2	0
08/12/2022	17:30	-0.4	0	---	771.2	0
08/12/2022	17:40	-0.3	0	---	771.3	0
08/12/2022	17:50	-0.7	0	---	771.4	0
08/12/2022	18:00	-0.7	0	---	771.5	0
08/12/2022	18:10	-0.4	0	---	771.4	0
08/12/2022	18:20	-0.9	0	---	771.4	0
08/12/2022	18:30	-0.5	0	---	771.4	0
08/12/2022	18:40	-0.2	0	---	771.4	0
08/12/2022	18:50	0	0	---	771.4	0
08/12/2022	19:00	0.2	0	---	771.4	0
08/12/2022	19:10	0.4	0	---	771.3	0
08/12/2022	19:20	0.2	0	---	771.4	0

		Temp	Wind	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
08/12/2022	19:30	0.3	0	---	771.3	0
08/12/2022	19:40	0.3	0	---	771.3	0
08/12/2022	19:50	0.2	0	---	771.3	0
08/12/2022	20:00	0.1	0	---	771.2	0
08/12/2022	20:10	0.3	0	---	771.1	0
08/12/2022	20:20	0.2	0	---	771.3	0
08/12/2022	20:30	0.3	0	---	771.3	0
08/12/2022	20:40	0.2	0	---	771.3	0
08/12/2022	20:50	0.3	0	---	771.5	0
08/12/2022	21:00	0.7	0.6	SSW	771.5	0
08/12/2022	21:10	0.6	0	---	771.4	0
08/12/2022	21:20	0.4	0	---	771.4	0
08/12/2022	21:30	0.3	0	---	771.3	0
08/12/2022	21:40	-0.1	0.5	NW	771.5	0
08/12/2022	21:50	-0.2	0	---	771.5	0
08/12/2022	22:00	-0.2	0	---	771.5	0
08/12/2022	22:10	-0.1	0	---	771.6	0
08/12/2022	22:20	0.2	0	---	771.6	0
08/12/2022	22:30	0.4	0	---	771.5	0
08/12/2022	22:40	0.2	0	---	771.5	0
08/12/2022	22:50	0.3	0	---	771.5	0
08/12/2022	23:00	0.3	0	---	771.4	0
08/12/2022	23:10	0.4	0.4	NW	771.5	0
08/12/2022	23:20	0.5	0	---	771.4	0
08/12/2022	23:30	0.6	0	---	771.3	0
08/12/2022	23:40	0.8	0.3	NE	771.4	0
08/12/2022	23:50	0.5	0.2	E	771.4	0
09/12/2022	00:00	0.3	0	---	771.4	0
09/12/2022	00:10	0.5	0.3	ESE	771.3	0
09/12/2022	00:20	1.3	0	---	771.4	0
09/12/2022	00:30	1.3	0	---	771.4	0
09/12/2022	00:40	1.5	0.1	NNW	771.3	0
09/12/2022	00:50	1.6	0	---	771.3	0
09/12/2022	01:00	1.7	0	---	771.3	0
09/12/2022	01:10	1.3	0	---	771.2	0
09/12/2022	01:20	1.2	0.5	E	771.3	0
09/12/2022	01:30	0.9	0	---	771.3	0
09/12/2022	01:40	0.8	0.6	ESE	771.3	0
09/12/2022	01:50	1	0.7	ESE	771.3	0
09/12/2022	02:00	1.1	0	---	771.2	0
09/12/2022	02:10	0.9	0.4	NE	771.1	0
09/12/2022	02:20	0.9	0.5	NNW	771.1	0
09/12/2022	02:30	0.9	0.9	N	771	0
09/12/2022	02:40	0.8	0	---	771	0
09/12/2022	02:50	0.9	0.4	E	771.1	0
09/12/2022	03:00	0.6	0.3	ESE	771.1	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
09/12/2022	03:10	0.4	0.4	ENE	771	0
09/12/2022	03:20	0.1	0.6	ENE	771	0
09/12/2022	03:30	-0.6	0.3	ENE	771	0
09/12/2022	03:40	-0.8	0	---	771	0
09/12/2022	03:50	-1	0	---	771	0
09/12/2022	04:00	-1	0	---	770.9	0
09/12/2022	04:10	-1	0.4	ENE	770.8	0
09/12/2022	04:20	-1.5	0	---	770.8	0
09/12/2022	04:30	-1.9	0	---	770.8	0
09/12/2022	04:40	-2	0.3	ENE	770.8	0
09/12/2022	04:50	-1.9	0.4	ENE	770.8	0
09/12/2022	05:00	-2.2	0.5	SE	770.8	0
09/12/2022	05:10	-2.6	0	---	770.9	0
09/12/2022	05:20	-2.9	0	---	770.9	0
09/12/2022	05:30	-3	0	---	770.8	0
09/12/2022	05:40	-3.2	0	---	770.7	0
09/12/2022	05:50	-3.5	0	---	770.7	0
09/12/2022	06:00	-3.6	0	---	770.7	0
09/12/2022	06:10	-3.1	0.5	SSW	770.7	0
09/12/2022	06:20	-2.3	0.7	SW	770.7	0
09/12/2022	06:30	-2	0.8	SW	770.7	0
09/12/2022	06:40	-2.6	0	---	770.6	0
09/12/2022	06:50	-2.9	0	---	770.6	0
09/12/2022	07:00	-3.2	0	---	770.7	0
09/12/2022	07:10	-3.7	0	---	770.7	0
09/12/2022	07:20	-3.9	0	---	770.6	0
09/12/2022	07:30	-3.7	0	---	770.6	0
09/12/2022	07:40	-4	0	---	770.6	0
09/12/2022	07:50	-4.3	0	---	770.7	0
09/12/2022	08:00	-4.4	0	---	770.7	0
09/12/2022	08:10	-4.2	0	---	770.7	0
09/12/2022	08:20	-4.1	0	---	770.7	0
09/12/2022	08:30	-4	0	---	770.7	0
09/12/2022	08:40	-4.2	0	---	770.6	0
09/12/2022	08:50	-4.2	0	---	770.6	0
09/12/2022	09:00	-4.3	0	---	770.5	0
09/12/2022	09:10	-4.1	0.9	SSW	770.5	0
09/12/2022	09:20	-2.4	1.3	SW	770.5	0
09/12/2022	09:30	-2.6	0	---	770.5	0
09/12/2022	09:40	-2.9	0	---	770.5	0
09/12/2022	09:50	-2.7	0	---	770.5	0
09/12/2022	10:00	-2.5	0	---	770.5	0
09/12/2022	10:10	-1.9	0.4	SW	770.6	0
09/12/2022	10:20	-1.5	0.5	SSW	770.6	0
09/12/2022	10:30	-0.8	0	---	770.3	0
09/12/2022	10:40	-0.2	1.8	S	770.2	0
09/12/2022	10:50	0.1	0.4	S	770.3	0
09/12/2022	11:00	0.1	0	---	770.2	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
09/12/2022	11:10	0.4	0.4	ESE	770.2	0
09/12/2022	11:20	0.8	0.9	ESE	770.4	0
09/12/2022	11:30	0.7	1.8	E	770.3	0.4
09/12/2022	11:40	0.7	0.4	ESE	770.1	0.6
09/12/2022	11:50	0.9	0.3	ESE	770.1	0.2
09/12/2022	12:00	1.3	0	---	770.1	0
09/12/2022	12:10	2.4	0.3	NW	770.1	0
09/12/2022	12:20	2.3	0.5	NW	769.8	0
09/12/2022	12:30	1.9	0	---	769.8	0
09/12/2022	12:40	2.2	0	---	769.7	0
09/12/2022	12:50	3.1	0.4	ENE	769.8	0
09/12/2022	13:00	3.3	0.2	E	769.5	0
09/12/2022	13:10	3.4	0.9	ESE	769.8	0
09/12/2022	13:20	3.3	0.6	E	769.6	0
09/12/2022	13:30	3.2	0.4	E	769.6	0
09/12/2022	13:40	3.2	0.9	ENE	769.7	0
09/12/2022	13:50	2.9	0.8	E	769.5	0
09/12/2022	14:00	2.9	0	---	769.5	0
09/12/2022	14:10	2.9	0.3	E	769.3	0.2
09/12/2022	14:20	2.7	0	---	769.3	0.2
09/12/2022	14:30	2.6	0.1	E	769.3	0.6
09/12/2022	14:40	2.2	0	---	769.4	0.4
09/12/2022	14:50	2.1	0.4	ESE	769.5	0.4
09/12/2022	15:00	2.1	0.9	ESE	769.6	0.2
09/12/2022	15:10	1.8	1.3	ESE	769.6	0.8
09/12/2022	15:20	1.4	0.9	ENE	769.6	0.8
09/12/2022	15:30	1.3	0.4	E	769.6	0.8
09/12/2022	15:40	1.2	1.3	E	769.5	0.6
09/12/2022	15:50	1.1	1.2	S	769.4	0.2
09/12/2022	16:00	1.1	1.1	S	769.4	0
09/12/2022	16:10	1	1	SE	769.4	0
09/12/2022	16:20	0.9	0.9	NE	769.3	0
09/12/2022	16:30	0.7	0.7	W	769.3	0
09/12/2022	16:40	0.5	0	---	769.3	0
09/12/2022	16:50	0.4	0	---	769.5	0
09/12/2022	17:00	0.6	0.5	ENE	769.4	0
09/12/2022	17:10	0.7	0.6	E	769.5	0
09/12/2022	17:20	0.8	0.6	W	769.5	0
09/12/2022	17:30	0.7	0.8	WSW	769.4	0
09/12/2022	17:40	0.5	0.4	E	769.4	0
09/12/2022	17:50	0.7	0.9	E	769.4	0
09/12/2022	18:00	0.6	0.7	WNW	769.5	0
09/12/2022	18:10	0.3	0.7	ESE	769.3	0
09/12/2022	18:20	0.2	0.6	NE	769.4	0
09/12/2022	18:30	-0.1	0.4	NE	769.3	0
09/12/2022	18:40	-0.1	0.9	ENE	769.3	0
09/12/2022	18:50	-0.2	0	---	769.3	0
09/12/2022	19:00	-0.5	0.4	SE	769.3	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
09/12/2022	19:10	-0.7	0	---	769.4	0
09/12/2022	19:20	-0.6	0.5	SE	769.4	0
09/12/2022	19:30	-0.7	0.5	ESE	769.5	0
09/12/2022	19:40	-0.5	0.4	E	769.4	0
09/12/2022	19:50	-0.5	0	---	769.4	0
09/12/2022	20:00	-0.6	0.7	ENE	769.4	0
09/12/2022	20:10	-0.7	0	---	769.4	0
09/12/2022	20:20	-0.7	0	---	769.4	0
09/12/2022	20:30	-0.8	0	---	769.4	0
09/12/2022	20:40	-0.8	0.3	ENE	769.4	0
09/12/2022	20:50	-0.7	0	---	769.4	0
09/12/2022	21:00	-0.8	0	---	769.4	0
09/12/2022	21:10	-0.9	0	---	769.4	0
09/12/2022	21:20	-1.1	0.4	ENE	769.5	0
09/12/2022	21:30	-1	0.5	ENE	769.5	0
09/12/2022	21:40	-1.3	0	---	769.6	0
09/12/2022	21:50	-1.4	0	---	769.6	0
09/12/2022	22:00	-1.5	0	---	769.6	0
09/12/2022	22:10	-1.6	0	---	769.5	0
09/12/2022	22:20	-1	0.3	ENE	769.6	0
09/12/2022	22:30	-0.4	0	---	769.6	0
09/12/2022	22:40	-0.3	0.4	W	769.6	0
09/12/2022	22:50	-0.1	0	---	769.6	0
09/12/2022	23:00	-0.1	0.3	ENE	769.6	0
09/12/2022	23:10	-0.1	0.4	NE	769.6	0
09/12/2022	23:20	0.1	0.6	E	769.6	0
09/12/2022	23:30	0	0	---	769.4	0
09/12/2022	23:40	-0.2	0	---	769.4	0
09/12/2022	23:50	-0.1	0.7	ENE	769.4	0
10/12/2022	00:00	-0.3	0.5	ENE	769.4	0
10/12/2022	00:10	-0.4	0.4	ENE	769.5	0
10/12/2022	00:20	-0.6	0	---	769.6	0
10/12/2022	00:30	-0.6	0	---	769.5	0
10/12/2022	00:40	-0.7	0	---	769.4	0
10/12/2022	00:50	-0.9	0	---	769.5	0
10/12/2022	01:00	-1.1	0	---	769.5	0
10/12/2022	01:10	-1.2	0	---	769.3	0
10/12/2022	01:20	-0.7	0	---	769.5	0
10/12/2022	01:30	-0.7	0	---	769.5	0
10/12/2022	01:40	-0.4	0	---	769.5	0
10/12/2022	01:50	-0.3	0	---	769.5	0
10/12/2022	02:00	-0.2	0.2	ENE	769.4	0
10/12/2022	02:10	-0.1	0	---	769.4	0
10/12/2022	02:20	-0.1	0	---	769.3	0
10/12/2022	02:30	-0.1	0	---	769.4	0
10/12/2022	02:40	-0.2	0	---	769.4	0
10/12/2022	02:50	-0.1	0.2	NE	769.4	0
10/12/2022	03:00	-0.2	0	---	769.4	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
10/12/2022	03:10	-0.3	0.3	ESE	769.4	0
10/12/2022	03:20	-0.4	0	---	769.4	0
10/12/2022	03:30	-0.5	0.3	ESE	769.4	0
10/12/2022	03:40	-0.3	0	---	769.5	0
10/12/2022	03:50	-0.1	0.3	W	769.5	0
10/12/2022	04:00	0.3	0.4	WNW	769.4	0
10/12/2022	04:10	0.3	0	---	769.4	0
10/12/2022	04:20	0.3	0	---	769.4	0
10/12/2022	04:30	0.4	0	---	769.3	0
10/12/2022	04:40	0.4	0	---	769.2	0
10/12/2022	04:50	0.5	0	---	769.1	0
10/12/2022	05:00	0.4	0	---	769.1	0
10/12/2022	05:10	0.4	0	---	769.2	0
10/12/2022	05:20	0.5	0	---	769.2	0
10/12/2022	05:30	0.4	0	---	769.2	0
10/12/2022	05:40	0.6	0	---	769.2	0
10/12/2022	05:50	0.6	0.5	ENE	769.2	0
10/12/2022	06:00	0.6	0.9	E	769.2	0
10/12/2022	06:10	0.7	0.9	E	769.2	0
10/12/2022	06:20	0.6	0	---	769.1	0
10/12/2022	06:30	0.6	0	---	769.1	0
10/12/2022	06:40	0.5	0	---	769	0
10/12/2022	06:50	0.4	0	---	769	0
10/12/2022	07:00	0.6	0	---	768.9	0
10/12/2022	07:10	0.7	0	---	768.9	0
10/12/2022	07:20	0.8	0.5	NW	768.9	0
10/12/2022	07:30	0.8	0	---	768.9	0
10/12/2022	07:40	0.7	0.6	SSW	768.9	0
10/12/2022	07:50	0.6	0.6	S	768.9	0
10/12/2022	08:00	0.6	0.7	S	768.9	0
10/12/2022	08:10	0.6	0.7	S	768.9	0
10/12/2022	08:20	0.6	0	---	768.9	0
10/12/2022	08:30	0.6	0	---	769	0
10/12/2022	08:40	0.6	0.8	S	769.1	0
10/12/2022	08:50	0.6	0.9	SSW	769.1	0
10/12/2022	09:00	0.4	0.7	ENE	769.1	0
10/12/2022	09:10	0.4	0.7	E	769.1	0
10/12/2022	09:20	0.4	0.8	E	769.1	0
10/12/2022	09:30	0.3	0.6	W	769.1	0
10/12/2022	09:40	0.3	0.6	NW	769	0
10/12/2022	09:50	0.3	0	---	769.1	0
10/12/2022	10:00	0.4	0.5	ENE	769.1	0
10/12/2022	10:10	0.4	0	---	769.1	0
10/12/2022	10:20	0.6	0.4	ESE	769	0
10/12/2022	10:30	0.6	0.5	SW	768.9	0
10/12/2022	10:40	0.7	0	---	768.9	0
10/12/2022	10:50	0.8	0.4	E	769.1	0
10/12/2022	11:00	0.8	0.3	ESE	769.1	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
10/12/2022	11:10	0.9	0.3	N	769.2	0
10/12/2022	11:20	0.9	0.2	E	769.2	0
10/12/2022	11:30	1.1	0	---	769.2	0
10/12/2022	11:40	1.1	0	---	769.2	0
10/12/2022	11:50	1.1	0.2	ENE	769.2	0
10/12/2022	12:00	1.2	0	---	769.2	0
10/12/2022	12:10	1.4	0	---	769.1	0
10/12/2022	12:20	1.6	0.1	NW	769.1	0
10/12/2022	12:30	1.8	0.3	WNW	769.1	0
10/12/2022	12:40	1.9	0.4	SE	769	0
10/12/2022	12:50	2.2	0.5	ESE	769	0
10/12/2022	13:00	2.1	0.6	ESE	769	0
10/12/2022	13:10	2	0.6	ENE	769.1	0
10/12/2022	13:20	1.9	0.7	E	768.9	0
10/12/2022	13:30	1.7	0.8	ENE	769	0
10/12/2022	13:40	1.5	0.9	ENE	769.1	0
10/12/2022	13:50	1.4	0.9	E	769	0.2
10/12/2022	14:00	1.3	2.2	E	769.1	0.2
10/12/2022	14:10	1.1	0	---	769.1	0.4
10/12/2022	14:20	0.9	0	---	769.1	0.4
10/12/2022	14:30	0.8	0.4	NW	769	0.4
10/12/2022	14:40	0.9	0	---	769	0.3
10/12/2022	14:50	1.1	0	---	769	0.2
10/12/2022	15:00	1.1	0	---	768.9	0.2
10/12/2022	15:10	1.1	0.9	WSW	768.9	0.2
10/12/2022	15:20	1.3	0.9	WSW	769	0.2
10/12/2022	15:30	1.3	0.9	WSW	769	0
10/12/2022	15:40	1.2	0.9	WSW	769.1	0
10/12/2022	15:50	1.3	0.9	WSW	769.2	0
10/12/2022	16:00	1.3	0.9	SW	769.1	0
10/12/2022	16:10	1.3	0	---	769.1	0
10/12/2022	16:20	1.2	0	---	769.2	0
10/12/2022	16:30	1.2	0.9	WSW	769.2	0
10/12/2022	16:40	1.1	1.8	WSW	769.2	0
10/12/2022	16:50	1	1.3	WSW	769.3	0
10/12/2022	17:00	1	1.3	WSW	769.3	0
10/12/2022	17:10	0.9	1.8	WSW	769.3	0
10/12/2022	17:20	1.1	0.9	WSW	769.3	0
10/12/2022	17:30	1	1.3	SW	769.3	0
10/12/2022	17:40	1	0.9	SW	769.2	0
10/12/2022	17:50	0.9	1.8	WSW	769.2	0
10/12/2022	18:00	0.9	1.3	SW	769.2	0
10/12/2022	18:10	0.9	0.9	SW	769.3	0
10/12/2022	18:20	0.9	0.6	WSW	769.2	0
10/12/2022	18:30	0.9	0.7	WSW	769.3	0.2
10/12/2022	18:40	0.9	0.5	WSW	769.3	0
10/12/2022	18:50	0.9	0.9	SW	769.4	0
10/12/2022	19:00	1	1.3	WSW	769.4	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
10/12/2022	19:10	1	0.4	W	769.4	0
10/12/2022	19:20	0.9	0.9	WSW	769.3	0.2
10/12/2022	19:30	0.9	0.7	WSW	769.4	0
10/12/2022	19:40	0.9	0	---	769.4	0
10/12/2022	19:50	0.9	0.8	WSW	769.3	0
10/12/2022	20:00	0.9	0.5	WSW	769.4	0
10/12/2022	20:10	0.7	0.5	WSW	769.4	0
10/12/2022	20:20	0.4	0	---	769.3	0
10/12/2022	20:30	0.3	0.6	WSW	769.4	0
10/12/2022	20:40	0.3	0.4	WSW	769.5	0
10/12/2022	20:50	0.4	0.5	SSW	769.5	0
10/12/2022	21:00	0.4	0.6	SSW	769.5	0
10/12/2022	21:10	0.4	0.7	SSW	769.5	0
10/12/2022	21:20	0.6	0.4	SSW	769.6	0
10/12/2022	21:30	0.6	0	---	769.6	0
10/12/2022	21:40	0.7	0	---	769.5	0
10/12/2022	21:50	0.7	0	---	769.5	0
10/12/2022	22:00	0.7	0	---	769.6	0
10/12/2022	22:10	0.8	0	---	769.6	0
10/12/2022	22:20	0.9	0.9	SSW	769.5	0
10/12/2022	22:30	1.1	1	SW	769.6	0
10/12/2022	22:40	1.1	1.1	SW	769.8	0
10/12/2022	22:50	0.9	1.3	WSW	769.8	0
10/12/2022	23:00	0.9	0.9	WSW	769.8	0
10/12/2022	23:10	0.9	0.7	WSW	769.8	0
10/12/2022	23:20	0.8	0	---	769.8	0
10/12/2022	23:30	0.8	0	---	769.9	0
10/12/2022	23:40	0.9	0	---	769.8	0
10/12/2022	23:50	0.9	0	---	769.7	0
11/12/2022	00:00	0.9	0	---	769.8	0
11/12/2022	00:10	0.9	0	---	769.8	0
11/12/2022	00:20	0.9	0	---	769.7	0
11/12/2022	00:30	0.9	0	---	769.8	0
11/12/2022	00:40	0.8	0	---	769.7	0
11/12/2022	00:50	0.7	0	---	769.7	0
11/12/2022	01:00	0.7	0	---	769.7	0
11/12/2022	01:10	0.6	0	---	769.8	0
11/12/2022	01:20	0.4	0	---	769.9	0
11/12/2022	01:30	0.4	0	---	769.8	0
11/12/2022	01:40	0.4	0	---	769.8	0
11/12/2022	01:50	0.5	0	---	770	0
11/12/2022	02:00	0.6	0	---	770.1	0
11/12/2022	02:10	0.6	0	---	770	0
11/12/2022	02:20	0.6	0	---	769.9	0
11/12/2022	02:30	0.7	0.9	SW	769.7	0
11/12/2022	02:40	0.6	0.7	SW	769.7	0
11/12/2022	02:50	0.7	0.9	SW	769.8	0
11/12/2022	03:00	0.7	0	---	769.8	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
11/12/2022	03:10	0.6	0	---	769.9	0
11/12/2022	03:20	0.7	0	---	769.9	0
11/12/2022	03:30	0.8	0.5	WSW	769.8	0
11/12/2022	03:40	0.6	0	---	769.8	0
11/12/2022	03:50	0.4	0	---	769.7	0
11/12/2022	04:00	0.2	0	---	769.7	0
11/12/2022	04:10	0.4	0	---	769.8	0
11/12/2022	04:20	0.5	0	---	769.6	0
11/12/2022	04:30	0.5	0	---	769.7	0
11/12/2022	04:40	0.3	0	---	769.5	0
11/12/2022	04:50	0.3	0	---	769.6	0
11/12/2022	05:00	0.3	0	---	769.5	0
11/12/2022	05:10	0.1	0	---	769.6	0
11/12/2022	05:20	-0.1	0	---	769.7	0
11/12/2022	05:30	-0.2	0	---	769.7	0
11/12/2022	05:40	-0.1	0	---	769.7	0
11/12/2022	05:50	-0.1	0	---	769.7	0
11/12/2022	06:00	0	0	---	769.7	0
11/12/2022	06:10	0.1	0	---	769.6	0
11/12/2022	06:20	0.2	0	---	769.6	0
11/12/2022	06:30	0.2	0	---	769.5	0
11/12/2022	06:40	0.2	0	---	769.5	0
11/12/2022	06:50	0.2	0	---	769.6	0
11/12/2022	07:00	0.2	0	---	769.6	0
11/12/2022	07:10	0.2	0	---	769.6	0
11/12/2022	07:20	0.3	0	---	769.5	0
11/12/2022	07:30	0.4	0	---	769.6	0
11/12/2022	07:40	0.4	0	---	769.6	0
11/12/2022	07:50	0.3	0	---	769.7	0
11/12/2022	08:00	0.3	0	---	769.7	0
11/12/2022	08:10	0.3	0	---	769.7	0
11/12/2022	08:20	0.3	0	---	769.7	0
11/12/2022	08:30	0.3	0	---	769.7	0
11/12/2022	08:40	0.3	0	---	769.6	0
11/12/2022	08:50	0.2	0	---	769.7	0
11/12/2022	09:00	0.1	0	---	769.8	0
11/12/2022	09:10	0.4	0.4	WSW	769.7	0
11/12/2022	09:20	0.5	0.6	WSW	769.8	0
11/12/2022	09:30	0.6	0.9	W	769.8	0
11/12/2022	09:40	0.6	1.3	WSW	769.8	0
11/12/2022	09:50	0.6	2.2	WSW	769.8	0
11/12/2022	10:00	0.6	1.8	WSW	769.8	0
11/12/2022	10:10	0.4	1.8	WSW	769.9	0
11/12/2022	10:20	0.3	2.2	WSW	769.8	0
11/12/2022	10:30	0.2	1.8	WSW	770	0
11/12/2022	10:40	0.3	1.3	WSW	769.9	0
11/12/2022	10:50	0.4	0.9	WSW	769.9	0
11/12/2022	11:00	0.5	0.9	WSW	769.9	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
11/12/2022	11:10	0.6	1.3	WSW	769.9	0
11/12/2022	11:20	0.7	0.9	WSW	769.9	0
11/12/2022	11:30	0.7	0.7	SW	769.9	0
11/12/2022	11:40	0.8	0.6	WSW	769.8	0
11/12/2022	11:50	0.8	1.3	WSW	769.8	0
11/12/2022	12:00	0.9	0.4	WSW	769.8	0
11/12/2022	12:10	0.9	1	WSW	769.6	0
11/12/2022	12:20	1.2	0.9	WSW	769.6	0
11/12/2022	12:30	1.2	1.1	WSW	769.6	0
11/12/2022	12:40	1.1	0.6	WSW	769.6	0
11/12/2022	12:50	1.3	0	---	769.5	0
11/12/2022	13:00	1.3	0	---	769.4	0
11/12/2022	13:10	1.2	0	---	769.4	0
11/12/2022	13:20	1.1	0	---	769.3	0
11/12/2022	13:30	1.2	0	---	769.4	0
11/12/2022	13:40	1.1	0	---	769.4	0
11/12/2022	13:50	1.1	0	---	769.4	0
11/12/2022	14:00	1.2	0	---	769.4	0
11/12/2022	14:10	1.3	0	---	769.4	0
11/12/2022	14:20	1.2	0	---	769.5	0
11/12/2022	14:30	1.3	0	---	769.5	0
11/12/2022	14:40	1.4	0	---	769.5	0
11/12/2022	14:50	1.6	0	---	769.4	0
11/12/2022	15:00	1.8	0.7	E	769.4	0
11/12/2022	15:10	1.8	0.9	E	769.4	0
11/12/2022	15:20	1.7	0.5	E	769.4	0
11/12/2022	15:30	1.6	0	---	769.4	0
11/12/2022	15:40	1.1	0	---	769.4	0
11/12/2022	15:50	0.5	0	---	769.4	0
11/12/2022	16:00	0.1	0	---	769.4	0
11/12/2022	16:10	-0.3	0	---	769.4	0
11/12/2022	16:20	-0.7	0	---	769.5	0
11/12/2022	16:30	-0.7	0	---	769.6	0
11/12/2022	16:40	-0.7	0	---	769.6	0
11/12/2022	16:50	-0.7	0	---	769.5	0
11/12/2022	17:00	-0.7	0	---	769.5	0
11/12/2022	17:10	-0.8	0	---	769.5	0
11/12/2022	17:20	-0.9	0	---	769.6	0
11/12/2022	17:30	-1.1	0	---	769.6	0
11/12/2022	17:40	-1	0	---	769.5	0
11/12/2022	17:50	-1.4	0	---	769.5	0
11/12/2022	18:00	-1.6	0	---	769.6	0
11/12/2022	18:10	-1.7	0	---	769.6	0
11/12/2022	18:20	-1.9	0	---	769.6	0
11/12/2022	18:30	-2.1	0	---	769.6	0
11/12/2022	18:40	-2.1	0	---	769.6	0
11/12/2022	18:50	-2.3	0	---	769.5	0
11/12/2022	19:00	-2.2	0	---	769.7	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
11/12/2022	19:10	-2.2	0	---	769.7	0
11/12/2022	19:20	-1.9	0	---	769.6	0
11/12/2022	19:30	-2.3	0	---	769.6	0
11/12/2022	19:40	-2.7	0	---	769.7	0
11/12/2022	19:50	-2.8	0	---	769.7	0
11/12/2022	20:00	-2.9	0	---	769.7	0
11/12/2022	20:10	-3.3	0	---	769.8	0
11/12/2022	20:20	-3.1	0	---	769.8	0
11/12/2022	20:30	-3.3	0	---	769.8	0
11/12/2022	20:40	-3.5	0	---	769.8	0
11/12/2022	20:50	-3.4	0	---	769.7	0
11/12/2022	21:00	-3.4	0	---	769.8	0
11/12/2022	21:10	-3.6	0	---	769.9	0
11/12/2022	21:20	-3.8	0	---	769.9	0
11/12/2022	21:30	-3.7	0	---	769.9	0
11/12/2022	21:40	-3.8	0	---	769.9	0
11/12/2022	21:50	-4.3	0	---	769.9	0
11/12/2022	22:00	-4.5	0	---	769.9	0
11/12/2022	22:10	-4.6	0	---	770	0
11/12/2022	22:20	-5	0	---	769.9	0
11/12/2022	22:30	-4.7	0	---	770.1	0
11/12/2022	22:40	-4.3	0	---	770.1	0
11/12/2022	22:50	-3.9	0	---	770.2	0
11/12/2022	23:00	-4.1	0	---	770.2	0
11/12/2022	23:10	-4.2	0	---	770.3	0
11/12/2022	23:20	-4.4	0	---	770.3	0
11/12/2022	23:30	-4	0	---	770.2	0
11/12/2022	23:40	-4	0	---	770.2	0
11/12/2022	23:50	-4.5	0	---	770.3	0
12/12/2022	00:00	-4.7	0	---	770.3	0
12/12/2022	00:10	-4.4	0	---	770.2	0
12/12/2022	00:20	-4.4	0	---	770.3	0
12/12/2022	00:30	-4.1	0	---	770.4	0
12/12/2022	00:40	-4.1	0	---	770.4	0
12/12/2022	00:50	-4.1	1.3	SW	770.4	0
12/12/2022	01:00	-4.2	1.3	SW	770.4	0
12/12/2022	01:10	-4.3	0.4	SW	770.5	0
12/12/2022	01:20	-4.4	0	---	770.5	0
12/12/2022	01:30	-4.8	0	---	770.5	0
12/12/2022	01:40	-5.1	0	---	770.5	0
12/12/2022	01:50	-5.1	0.4	SSW	770.6	0
12/12/2022	02:00	-4.6	0.9	SW	770.5	0
12/12/2022	02:10	-4.7	2.2	SW	770.6	0
12/12/2022	02:20	-4.8	2.2	SW	770.6	0
12/12/2022	02:30	-4.9	1.8	SW	770.5	0
12/12/2022	02:40	-4.9	0.9	SSW	770.6	0
12/12/2022	02:50	-4.8	2.2	SW	770.6	0
12/12/2022	03:00	-4.9	1.8	SW	770.6	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
12/12/2022	03:10	-4.9	1.8	WSW	770.7	0
12/12/2022	03:20	-4.9	1.3	SW	770.7	0
12/12/2022	03:30	-4.9	0.4	W	770.7	0
12/12/2022	03:40	-4.8	1.3	SW	770.7	0
12/12/2022	03:50	-4.8	1.8	SW	770.7	0
12/12/2022	04:00	-4.8	1.8	SW	770.6	0
12/12/2022	04:10	-4.8	2.2	SW	770.5	0
12/12/2022	04:20	-4.9	0.4	W	770.7	0
12/12/2022	04:30	-4.9	0.4	WSW	770.7	0
12/12/2022	04:40	-4.9	0.4	SW	770.6	0
12/12/2022	04:50	-4.8	0.9	SW	770.6	0
12/12/2022	05:00	-4.8	1.8	SW	770.5	0
12/12/2022	05:10	-4.7	1.8	SW	770.5	0
12/12/2022	05:20	-4.9	0.4	W	770.6	0
12/12/2022	05:30	-4.9	1.3	WSW	770.6	0
12/12/2022	05:40	-4.9	1.3	WSW	770.7	0
12/12/2022	05:50	-4.9	0.9	SW	770.7	0
12/12/2022	06:00	-5	0.9	W	770.8	0
12/12/2022	06:10	-5.1	0.7	WNW	770.8	0
12/12/2022	06:20	-5	0.8	SW	770.8	0
12/12/2022	06:30	-5.1	0.6	SW	770.8	0
12/12/2022	06:40	-5.1	0.5	W	770.7	0
12/12/2022	06:50	-5.1	0.4	W	770.6	0
12/12/2022	07:00	-5	1	SW	770.6	0
12/12/2022	07:10	-5	0.4	SSW	770.7	0
12/12/2022	07:20	-5	1.1	WSW	770.6	0
12/12/2022	07:30	-5.2	0.9	W	770.7	0
12/12/2022	07:40	-5.2	0.8	SW	770.6	0
12/12/2022	07:50	-5.1	0.9	SW	770.6	0
12/12/2022	08:00	-5.1	0.4	WSW	770.6	0
12/12/2022	08:10	-5	0.5	WSW	770.7	0
12/12/2022	08:20	-4.9	0.4	W	770.6	0
12/12/2022	08:30	-4.9	0.6	W	770.6	0
12/12/2022	08:40	-4.8	0.5	W	770.6	0
12/12/2022	08:50	-4.7	0.6	W	770.6	0
12/12/2022	09:00	-4.9	0.9	WSW	770.7	0
12/12/2022	09:10	-4.9	0.4	W	770.7	0
12/12/2022	09:20	-4.8	0.9	W	770.8	0
12/12/2022	09:30	-4.6	0.5	W	770.7	0
12/12/2022	09:40	-4.5	0.4	WSW	770.8	0
12/12/2022	09:50	-4.4	0.3	W	770.9	0
12/12/2022	10:00	-4.2	0.2	SW	771.1	0
12/12/2022	10:10	-3.9	0.3	WSW	770.9	0
12/12/2022	10:20	-3.7	0.4	WSW	770.9	0
12/12/2022	10:30	-3.6	0.6	SW	771	0
12/12/2022	10:40	-3.4	0.4	WNW	771	0
12/12/2022	10:50	-3.2	0	---	771.1	0
12/12/2022	11:00	-2.9	0	---	771.1	0

		Temp	Hi	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
12/12/2022	11:10	-2.7	0	---	771	0
12/12/2022	11:20	-2.6	0.5	SW	770.9	0
12/12/2022	11:30	-2.3	0.7	SW	770.8	0
12/12/2022	11:40	-2.1	0.8	NW	770.8	0
12/12/2022	11:50	-2.1	0.9	N	771	0
12/12/2022	12:00	-2.1	0.5	WNW	770.9	0
12/12/2022	12:10	-2.1	0.6	WNW	770.8	0
12/12/2022	12:20	-1.9	0.5	NW	770.7	0
12/12/2022	12:30	-1.8	0.4	NNW	770.6	0

Appendix 3

Baseline Sound Survey Results – NSR (February 2025) & NSER (February 2025)

NSR

Noise Survey Results

Date: Friday 14th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

Client: Axis

Project: Solar & BESS Facility

Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**

Instrumentation: Cirrus 171A Real Time Analyser (G304789)

Calibration: 94dB

TABLE 1

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:15	15:00	68.4	68.8	66.2	73.5	Noise dominated by M56 Motorway traffic noise, and intermittent aircraft noise
07:30	15:00	67.8	68.7	66.6	72.7	
07:45	15:00	67.9	69.0	66.6	73.6	
08:00	15:00	68.5	69.5	67.2	72.0	
08:15	15:00	68.2	69.3	66.8	72.7	
08:30	15:00	67.8	69.0	66.2	74.1	
08:45	15:00	67.9	68.9	66.5	71.4	
09:00	15:00	67.4	68.6	65.8	72.8	
09:15	15:00	67.2	68.3	65.7	70.6	
09:30	15:00	67.6	68.8	66.0	72.8	
09:45	15:00	68.5	69.7	66.8	73.6	
10:00	15:00	68.3	69.4	66.8	72.1	
10:15	15:00	68.4	69.6	66.7	73.3	
10:30	15:00	68.9	70.0	67.5	72.5	
10:45	15:00	69.3	70.4	67.7	75.3	
11:00	15:00	69.2	70.6	67.4	73.1	
11:15	15:00	69.7	71.0	68.1	73.4	
11:30	15:00	70.3	71.4	69.0	73.8	
11:45	15:00	70.1	71.2	68.6	76.3	
12:00	15:00	69.8	70.9	68.5	76.1	
12:15	15:00	69.3	70.8	67.1	74.4	
12:30	15:00	70.6	71.7	69.3	76.4	
12:45	15:00	70.0	70.9	68.9	73.4	
13:00	15:00	70.4	71.6	68.8	74.2	
13:15	15:00	70.5	71.5	69.2	73.4	
13:30	15:00	70.4	71.4	69.2	73.9	
13:45	15:00	70.3	71.4	68.9	74.0	
14:00	15:00	70.6	71.5	69.3	73.6	
14:15	15:00	70.3	71.2	69.0	75.0	
14:30	15:00	69.9	70.9	68.6	77.7	
14:45	15:00	69.7	70.7	68.5	74.2	
Average 0715-1500		69.2	70.3	67.8	71-78	

Noise Survey Results

Date: Friday 14th February 2025

TABLE 2

Location: Moorditch Lane, Frodsham Marsh, Frodsham

Client: Axis

Project: Solar & BESS Facility

Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**

Instrumentation: Cirrus 171A Real Time Analyser (G304789)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	69.9	70.7	68.7	78.9	
15:15	15:00	69.9	70.7	68.8	72.9	
15:30	15:00	69.9	71.0	68.5	74.1	
15:45	15:00	70.2	71.1	69.0	73.5	
16:00	15:00	69.7	70.8	68.2	73.2	
16:15	15:00	68.6	69.7	66.9	72.6	
16:30	15:00	65.9	68.1	62.1	71.2	
16:45	15:00	68.1	69.0	66.9	71.8	
17:00	15:00	68.8	70.1	67.1	73.0	
17:15	15:00	69.2	70.1	67.9	76.8	
17:30	15:00	69.1	70.1	67.7	73.8	
17:45	15:00	69.1	70.0	68.0	75.1	
18:00	15:00	68.5	69.6	67.1	72.6	
18:15	15:00	68.5	69.5	67.1	74.9	
18:30	15:00	68.3	69.4	66.8	71.8	
18:45	15:00	68.1	69.2	66.6	71.7	
19:00	15:00	68.3	69.4	66.7	74.7	
19:15	15:00	67.5	68.6	66.0	71.6	
19:30	15:00	67.4	68.5	65.9	71.4	
19:45	15:00	66.5	67.8	64.7	70.2	
20:00	15:00	66.6	67.8	65.0	70.0	
20:15	15:00	65.5	66.9	63.6	69.7	
20:30	15:00	65.2	66.7	63.1	69.8	
20:45	15:00	64.9	66.8	62.5	70.0	
21:00	15:00	64.6	66.3	62.3	69.5	
21:15	15:00	64.6	66.2	62.5	70.2	
21:30	15:00	64.0	65.8	61.1	72.6	
21:45	15:00	64.4	66.1	62.0	69.6	
22:00	15:00	64.0	65.6	61.9	69.7	
22:15	15:00	63.3	65.2	60.8	69.4	
22:30	15:00	63.5	65.2	61.0	68.9	
22:45	15:00	63.2	64.9	60.8	67.9	
Average 1500-2300		67.5	68.7	66.0	68-79	

Noise Survey Results

Date: Friday 14th - Saturday 15th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
 Instrumentation: Cirrus 171A Real Time Analyser (G304789)
 Calibration: 94dB

TABLE 3

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	62.9	64.6	60.3	68.0	
23:15	15:00	62.2	64.1	59.2	68.5	
23:30	15:00	62.2	64.0	59.5	67.3	
23:45	15:00	62.2	64.2	59.2	67.8	
00:00	15:00	61.0	63.1	57.8	66.2	
00:15	15:00	60.5	62.7	57.4	69.5	
00:30	15:00	61.0	63.5	56.7	67.3	
00:45	15:00	61.2	63.4	57.8	68.6	
01:00	15:00	61.5	63.9	57.6	68.5	
01:15	15:00	61.4	63.9	57.2	70.9	
01:30	15:00	59.9	63.0	54.2	68.2	
01:45	15:00	58.2	61.4	51.2	67.8	
02:00	15:00	59.1	62.3	52.0	67.5	
02:15	15:00	60.4	62.8	55.6	69.3	
02:30	15:00	58.6	61.1	53.6	66.7	
02:45	15:00	60.0	62.8	53.8	67.6	
03:00	15:00	60.0	62.6	54.9	68.2	
03:15	15:00	60.3	62.9	55.3	68.5	
03:30	15:00	60.3	62.6	56.4	68.4	
03:45	15:00	60.7	63.5	55.9	67.3	
04:00	15:00	60.8	63.3	56.8	68.5	
04:15	15:00	61.6	64.0	57.8	70.3	
04:30	15:00	61.8	64.2	57.0	69.0	
04:45	15:00	63.0	65.5	58.8	69.9	
05:00	15:00	63.2	65.2	60.1	70.1	
05:15	15:00	63.2	65.1	60.6	68.4	
05:30	15:00	64.2	66.0	61.5	69.2	
05:45	15:00	63.8	65.5	61.1	68.1	
06:00	15:00	64.3	66.0	61.7	69.4	
06:15	15:00	64.9	66.7	62.2	73.4	
06:30	15:00	65.3	66.9	62.8	70.5	
06:45	15:00	65.2	66.6	63.1	70.2	
Average 2300-0700		62.1	64.2	58.7	66-73	
Average 0900-2300		68.0	69.0	66.5	68-79	

Noise Survey Results

Date: Saturday 15th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

Client: Axis

Project: Solar & BESS Facility

Data: Baseline Sound Survey: Position D (Proximity to Traveller's Site)

Instrumentation: Cirrus 171A Real Time Analyser (G304789)

Calibration: 94dB

TABLE 4

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	65.1	66.7	62.8	74.2	
07:15	15:00	67.0	68.4	64.8	76.7	
07:30	15:00	66.3	67.5	64.9	69.9	
07:45	15:00	66.3	67.6	64.4	75.0	
08:00	15:00	66.2	67.3	64.6	69.8	
08:15	15:00	67.4	68.6	65.8	71.7	
08:30	15:00	66.7	67.9	65.0	70.0	
08:45	15:00	67.4	68.6	65.5	84.4	
09:00	15:00	66.4	67.6	64.6	70.5	
09:15	15:00	67.3	68.5	65.7	76.2	
09:30	15:00	67.7	68.8	66.4	77.5	
09:45	15:00	67.7	68.5	66.4	74.6	
10:00	15:00	67.7	68.7	66.5	70.8	
10:15	15:00	68.5	69.6	67.1	75.6	
10:30	15:00	68.8	69.8	67.6	77.6	
10:45	15:00	68.4	69.4	67.0	73.9	
11:00	15:00	68.8	69.7	67.5	77.6	
11:15	15:00	68.6	69.5	67.3	74.9	
11:30	15:00	68.0	69.0	66.6	76.3	
11:45	15:00	68.0	69.0	66.4	76.5	
12:00	15:00	67.6	68.6	66.3	70.6	
12:15	15:00	68.3	69.3	67.0	72.2	
12:30	15:00	68.1	69.2	66.5	74.5	
12:45	15:00	68.1	69.1	66.9	72.5	
13:00	15:00	68.6	69.5	67.3	73.1	
13:15	15:00	68.1	69.2	66.9	75.5	
13:30	15:00	67.4	68.6	65.8	74.5	
13:45	15:00	68.2	69.4	66.9	72.2	
14:00	15:00	68.7	69.7	67.3	78.1	
14:15	15:00	69.2	70.2	67.8	72.7	
14:30	15:00	68.3	69.4	66.7	78.0	
14:45	15:00	68.5	69.3	67.4	73.4	
Average 0700-1500		67.8	68.8	66.3	70-84	

Noise Survey Results

Date: Saturday 15th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
Instrumentation: Cirrus 171A Real Time Analyser (G304789)
Calibration: 94dB

TABLE 5

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	67.7	68.7	66.3	72.4	
15:15	15:00	68.0	68.9	66.7	71.7	
15:30	15:00	67.9	68.7	66.6	70.1	
15:45	15:00	68.7	70.0	67.3	74.6	
16:00	15:00	68.2	69.2	66.9	75.1	
16:15	15:00	68.6	69.6	67.3	72.5	
16:30	15:00	68.5	69.5	67.3	73.8	
16:45	15:00	68.5	69.4	67.3	72.2	
17:00	15:00	68.7	69.7	67.1	74.2	
17:15	15:00	68.2	69.3	66.9	74.6	
17:30	15:00	67.6	68.5	66.3	70.6	
17:45	15:00	67.4	68.4	66.0	70.8	
18:00	15:00	67.5	68.6	66.0	70.6	
18:15	15:00	67.7	68.8	66.1	70.7	
18:30	15:00	67.1	68.2	65.7	71.1	
18:45	15:00	66.6	67.7	65.3	69.5	
19:00	15:00	66.3	67.4	64.7	70.5	
19:15	15:00	64.9	66.3	63.0	68.9	
19:30	15:00	64.6	66.0	62.5	71.0	
19:45	15:00	64.2	65.8	61.8	68.9	
20:00	15:00	64.3	65.8	62.1	70.3	
20:15	15:00	64.7	65.9	62.9	69.1	
20:30	15:00	64.5	66.1	62.2	68.7	
20:45	15:00	62.6	64.2	60.2	67.9	
21:00	15:00	62.5	64.1	60.5	67.5	
21:15	15:00	62.4	64.1	60.2	69.5	
21:30	15:00	62.6	64.3	60.0	67.9	
21:45	15:00	61.9	63.8	59.2	67.7	
22:00	15:00	62.4	64.2	59.7	68.6	
22:15	15:00	62.4	64.3	59.2	67.7	
22:30	15:00	61.7	63.6	58.6	67.9	
22:45	15:00	61.9	64.0	58.7	68.0	
Average 1500-2300		66.3	67.4	64.7	68-75	

Noise Survey Results

Date: Saturday 15th - Sunday 16th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
 Instrumentation: Cirrus 171A Real Time Analyser (G304789)
 Calibration: 94dB

TABLE 6

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	61.4	63.5	58.2	68.4	
23:15	15:00	61.7	63.6	58.6	67.5	
23:30	15:00	61.3	63.4	58.1	67.8	
23:45	15:00	61.5	63.4	58.7	67.5	
00:00	15:00	61.1	63.2	57.6	66.9	
00:15	15:00	60.7	62.9	56.8	67.3	
00:30	15:00	60.2	62.7	56.7	68.6	
00:45	15:00	58.6	61.3	53.7	68.3	
01:00	15:00	60.0	63.1	54.4	67.8	
01:15	15:00	59.6	62.3	55.1	67.2	
01:30	15:00	59.2	61.9	53.5	68.4	
01:45	15:00	58.2	61.3	52.1	67.1	
02:00	15:00	59.1	62.0	52.9	67.0	
02:15	15:00	57.8	61.1	52.2	67.9	
02:30	15:00	60.0	62.9	55.2	68.7	
02:45	15:00	59.9	62.8	55.0	69.4	
03:00	15:00	58.4	61.3	53.2	67.2	
03:15	15:00	58.2	61.1	51.6	67.2	
03:30	15:00	58.9	61.8	52.1	67.3	
03:45	15:00	60.5	63.0	55.7	68.7	
04:00	15:00	59.9	62.7	54.3	68.0	
04:15	15:00	61.1	63.5	57.0	68.6	
04:30	15:00	61.0	63.7	55.0	68.1	
04:45	15:00	59.9	62.5	53.6	67.5	
05:00	15:00	61.5	63.9	57.4	68.9	
05:15	15:00	62.2	64.4	58.5	69.5	
05:30	15:00	61.7	64.2	57.4	68.1	
05:45	15:00	62.3	64.3	58.9	68.6	
06:00	15:00	63.3	65.3	60.2	68.5	
06:15	15:00	63.7	65.4	61.0	69.9	
06:30	15:00	63.9	65.6	61.1	69.9	
06:45	15:00	64.0	66.0	60.9	69.3	
Average 2300-0700		60.9	63.3	57.0	67-70	
Average 0700-2300		67.1	68.2	65.6	68-84	

Noise Survey Results

Date: Sunday 16th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
Instrumentation: Cirrus 171A Real Time Analyser (G304789)
Calibration: 94dB

TABLE 7

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:00	15:00	64.9	67.0	61.8	70.2	
07:15	15:00	66.0	67.6	63.7	70.9	
07:30	15:00	66.2	67.8	63.7	72.3	
07:45	15:00	66.3	67.9	64.2	71.2	
08:00	15:00	66.7	68.2	64.4	72.3	
08:15	15:00	67.1	68.7	64.6	74.7	
08:30	15:00	66.8	68.2	64.7	71.7	
08:45	15:00	68.0	69.4	65.9	72.9	
09:00	15:00	68.3	69.7	66.3	73.5	
09:15	15:00	68.6	69.7	67.0	72.2	
09:30	15:00	69.3	70.4	67.8	74.5	
09:45	15:00	69.3	70.5	67.7	73.4	
10:00	15:00	69.4	70.6	68.0	77.0	
10:15	15:00	70.1	71.1	68.9	73.3	
10:30	15:00	70.3	71.4	68.7	73.8	
10:45	15:00	70.1	71.1	68.9	74.3	
11:00	15:00	70.4	71.6	68.9	74.8	
11:15	15:00	70.5	71.6	68.9	73.4	
11:30	15:00	70.6	71.6	69.0	80.8	
11:45	15:00	70.4	71.4	69.0	75.4	
12:00	15:00	70.5	71.5	69.2	73.8	
12:15	15:00	70.3	71.2	69.2	76.5	
12:30	15:00	70.3	71.3	69.1	73.2	
12:45	15:00	70.5	71.5	69.1	74.0	
13:00	15:00	70.7	71.7	69.5	74.6	
13:15	15:00	70.0	71.0	68.6	75.7	
13:30	15:00	70.1	71.1	68.8	73.5	
13:45	15:00	70.2	71.2	68.8	73.2	
14:00	15:00	70.1	71.0	68.8	73.4	
14:15	15:00	70.0	71.1	68.7	73.8	
14:30	15:00	69.5	70.6	68.0	73.1	
14:45	15:00	69.5	70.5	68.2	72.3	
Average 0700-1500		69.3	70.4	67.8	70-81	

Noise Survey Results

Date: Sunday 16th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
 Instrumentation: Cirrus 171A Real Time Analyser (G304789)
 Calibration: 94dB

TABLE 8

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
15:00	15:00	69.7	70.8	68.3	73.1	
15:15	15:00	68.3	70.0	64.8	72.6	
15:30	15:00	68.6	70.1	65.8	73.1	
15:45	15:00	69.5	70.5	68.2	74.9	
16:00	15:00	69.6	70.6	68.1	75.9	
16:15	15:00	69.5	70.5	68.2	74.8	
16:30	15:00	69.3	70.3	68.0	72.8	
16:45	15:00	69.6	70.5	68.4	73.6	
17:00	15:00	69.2	70.2	68.0	72.3	
17:15	15:00	69.1	70.0	68.0	71.8	
17:30	15:00	68.4	69.4	66.9	71.5	
17:45	15:00	67.8	68.8	66.4	75.9	
18:00	15:00	67.9	69.1	66.4	72.1	
18:15	15:00	67.9	69.0	66.3	79.8	
18:30	15:00	67.6	68.6	66.3	70.7	
18:45	15:00	67.6	68.8	66.0	71.5	
19:00	15:00	67.5	68.6	65.8	71.5	
19:15	15:00	67.7	69.1	65.8	75.7	
19:30	15:00	66.9	68.1	65.3	72.9	
19:45	15:00	66.6	68.0	64.7	70.4	
20:00	15:00	66.9	68.2	65.1	73.4	
20:15	15:00	66.7	68.1	64.9	70.8	
20:30	15:00	66.1	67.4	64.1	70.1	
20:45	15:00	65.8	67.2	63.8	77.3	
21:00	15:00	65.2	66.6	63.2	69.8	
21:15	15:00	64.5	65.9	62.5	68.5	
21:30	15:00	64.1	65.8	61.6	69.3	
21:45	15:00	63.8	65.3	61.7	69.9	
22:00	15:00	63.7	65.5	61.2	69.4	
22:15	15:00	63.8	65.5	61.2	68.4	
22:30	15:00	63.2	65.0	60.4	70.0	
22:45	15:00	63.8	65.5	61.3	69.5	
Average 1500-2300		67.4	68.6	65.8	68-80	

Noise Survey Results

Date: Sunday 16th - Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
Instrumentation: Cirrus 171A Real Time Analyser (G304789)
Calibration: 94dB

TABLE 9

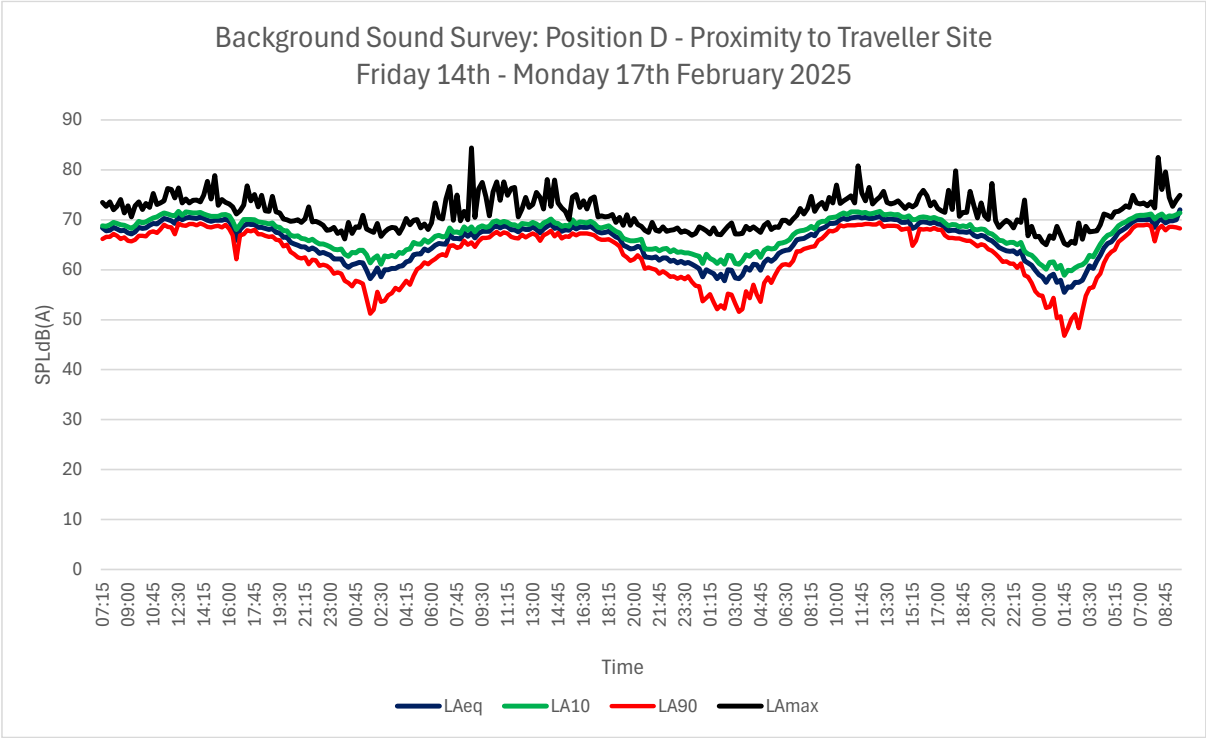
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
23:00	15:00	61.8	63.7	58.9	74.0	
23:15	15:00	61.4	63.2	58.6	66.8	
23:30	15:00	60.9	62.9	57.4	68.7	
23:45	15:00	59.9	62.2	55.7	66.6	
00:00	15:00	59.0	61.3	54.9	66.7	
00:15	15:00	58.6	60.8	54.8	65.6	
00:30	15:00	57.5	60.1	52.4	65.0	
00:45	15:00	58.7	61.5	52.6	66.8	
01:00	15:00	59.1	61.6	54.4	66.3	
01:15	15:00	57.5	60.2	50.3	68.7	
01:30	15:00	57.9	60.9	50.7	67.0	
01:45	15:00	55.5	58.9	46.8	65.3	
02:00	15:00	56.6	59.9	48.3	64.9	
02:15	15:00	56.5	59.8	50.1	65.7	
02:30	15:00	57.5	60.4	51.1	65.3	
02:45	15:00	57.5	60.8	48.3	69.4	
03:00	15:00	57.9	61.0	51.8	66.1	
03:15	15:00	59.3	61.6	54.8	68.7	
03:30	15:00	60.8	62.9	56.3	67.6	
03:45	15:00	60.3	62.6	56.5	67.7	
04:00	15:00	61.8	63.9	58.4	67.8	
04:15	15:00	62.9	65.1	59.2	69.0	
04:30	15:00	64.4	66.2	61.4	71.2	
04:45	15:00	65.3	66.9	62.8	70.9	
05:00	15:00	65.6	67.2	63.6	70.5	
05:15	15:00	66.4	67.9	64.0	71.6	
05:30	15:00	67.5	68.8	65.6	71.7	
05:45	15:00	67.9	69.3	66.2	72.2	
06:00	15:00	68.4	69.6	66.8	72.8	
06:15	15:00	69.0	70.1	67.4	72.5	
06:30	15:00	69.6	70.4	68.4	74.9	
06:45	15:00	70.0	70.8	68.9	73.4	
Average 2300-0700		63.9	65.4	61.7	65-75	
Average 0700-2300		68.5	69.6	66.9	68-81	

Noise Survey Results

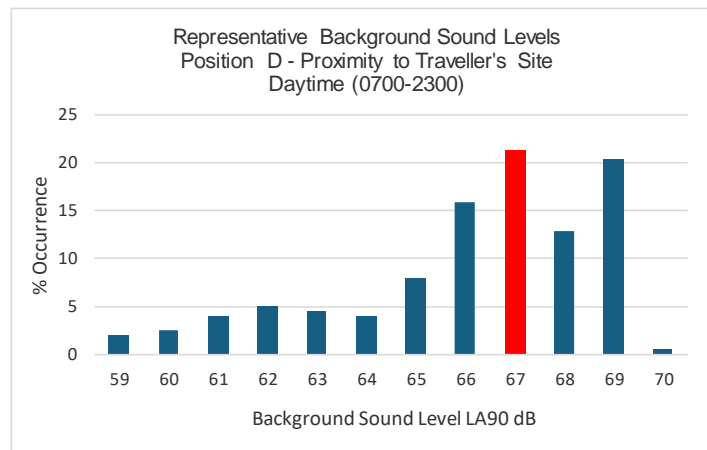
Date: Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position D (Proximity to Traveller's Site)**
Instrumentation: Cirrus 171A Real Time Analyser (G304789)
Calibration: 94dB

TABLE 10

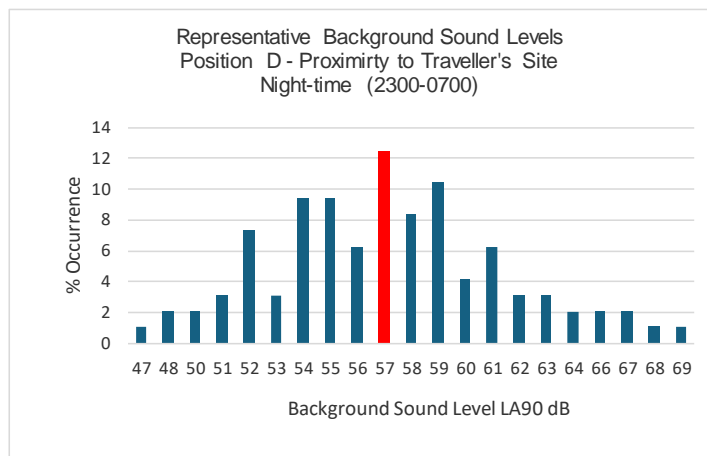
Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	70.0	70.9	68.9	73.2	
07:15	15:00	70.0	70.9	68.9	73.4	
07:30	15:00	70.1	71.0	69.1	72.8	
07:45	15:00	70.1	71.2	68.7	73.6	
08:00	15:00	68.5	70.2	65.7	72.4	
08:15	15:00	69.9	70.8	68.2	82.5	
08:30	15:00	70.1	71.2	68.8	76.1	
08:45	15:00	69.4	70.4	67.9	79.6	
09:00	15:00	69.8	70.8	68.6	74.5	
09:15	15:00	69.8	70.7	68.6	72.7	
09:30	15:00	70.0	71.0	68.5	73.9	
09:45	15:00	72.0	71.4	68.3	74.9	
Average 0700-1000		70.0	70.8	68.4	57-71	
Overall Average		62.5	64.4	59.6	65-75	
Overall Average		68.2	69.3	66.7	57-85	
Average 0500-0700 hours		65.7	67.2	63.7	68-75	



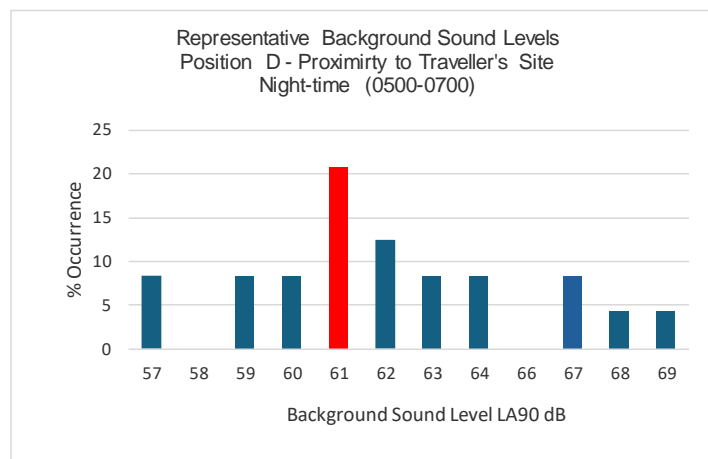
LA90	% Occurrence
59	2.0
60	2.5
61	4.0
62	5.0
63	4.5
64	4.0
65	7.9
66	15.8
67	21.3
68	12.9
69	20.3
70	0.5



LA90	% Occurrence
1.0	
2.1	
2.1	
3.1	
7.3	
3.1	
9.4	
9.4	
6.3	
12.5	
8.3	
10.4	
4.2	
6.3	
3.1	
3.1	
2.1	
2.1	
2.1	
1.0	
1.0	



LA90	% Occurrence
57	8.3
58	0.0
59	8.3
60	8.3
61	20.8
62	12.5
63	8.3
64	8.3
66	0.0
67	8.3
68	4.2
69	4.2



Noise Survey Results

Date: Friday 14th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
 Instrumentation: Cirrus 171A Real Time Analyser (G061253)
 Calibration: 94dB

TABLE 11

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
09:30	15:00	54.4	54.8	47.1	76.5	Noise generally formed by distant road traffic noise & bird call, with intermittent aircraft noise
09:45	15:00	52.5	53.8	46.4	66.2	
10:00	15:00	52.1	53.7	47.0	62.1	
10:15	15:00	56.2	60.2	47.3	71.0	
10:30	15:00	52.9	54.7	46.6	68.3	
10:45	15:00	56.7	59.9	47.9	71.1	
11:00	15:00	53.4	56.5	46.8	65.1	
11:15	15:00	61.6	65.7	47.5	75.8	
11:30	15:00	64.2	68.0	50.0	76.4	
11:45	15:00	59.2	62.9	47.6	73.0	
12:00	15:00	58.3	62.4	46.8	75.6	
12:15	15:00	61.2	65.2	47.9	72.8	
12:30	15:00	58.6	62.3	47.7	72.5	
12:45	15:00	56.9	61.1	46.9	71.3	
13:00	15:00	56.3	59.6	46.7	71.1	
13:15	15:00	55.9	60.0	46.9	70.8	
13:30	15:00	55.8	59.6	47.2	71.2	
13:45	15:00	58.5	62.4	47.2	72.6	
14:00	15:00	57.4	61.0	47.3	72.4	
14:15	15:00	54.5	57.9	46.8	68.8	
14:30	15:00	55.5	55.2	46.9	75.1	
14:45	15:00	53.1	55.0	46.4	66.6	
Average 0930-1500		57.8	61.4	47.2	62-77	

Noise Survey Results

Date: Friday 14th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
Instrumentation: Cirrus 171A Real Time Analyser (G061253)
Calibration: 94dB

TABLE 12

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	52.1	54.5	46.3	63.3	
15:15	15:00	52.3	53.8	46.6	65.8	
15:30	15:00	51.7	52.8	48.6	64.0	
15:45	15:00	54.2	54.9	45.6	75.0	
16:00	15:00	51.3	53.2	44.9	65.3	
16:15	15:00	50.8	52.5	45.0	62.3	
16:30	15:00	49.8	51.0	48.0	62.7	
16:45	15:00	50.0	50.6	47.7	65.1	
17:00	15:00	53.0	51.8	48.5	73.1	
17:15	15:00	54.8	52.6	46.7	75.3	
17:30	15:00	50.7	52.1	46.5	59.4	
17:45	15:00	54.2	53.1	49.5	75.0	
18:00	15:00	50.5	51.6	48.9	58.5	
18:15	15:00	50.1	51.2	48.8	56.3	
18:30	15:00	49.8	50.9	48.0	58.3	
18:45	15:00	50.4	51.6	47.3	66.5	
19:00	15:00	54.4	51.7	48.7	76.8	
19:15	15:00	50.7	51.8	49.5	60.8	
19:30	15:00	50.5	51.5	49.1	55.8	
19:45	15:00	50.1	50.8	48.7	63.6	
20:00	15:00	50.5	51.7	48.4	61.7	
20:15	15:00	50.3	50.8	47.9	68.2	
20:30	15:00	52.2	53.4	48.2	73.1	
20:45	15:00	49.9	51.1	48.0	62.2	
21:00	15:00	49.1	50.2	47.6	56.4	
21:15	15:00	49.2	50.2	48.1	57.7	
21:30	15:00	53.5	50.6	47.3	74.4	
21:45	15:00	48.7	49.8	47.4	57.7	
22:00	15:00	49.2	49.9	47.2	65.9	
22:15	15:00	48.0	48.7	46.1	63.7	
22:30	15:00	47.2	48.2	45.7	58.5	
22:45	15:00	47.3	48.8	45.2	58.2	
Average 1500-2300		51.2	51.7	47.6	56-77	

Noise Survey Results

Date: Friday 14th - Saturday 15th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
 Instrumentation: Cirrus 171A Real Time Analyser (G061253)
 Calibration: 94dB

TABLE 13

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	46.9	48.2	45.1	63.1	
23:15	15:00	46.4	47.5	44.6	58.4	
23:30	15:00	46.3	47.3	45.0	56.6	
23:45	15:00	46.9	48.7	44.0	59.0	
00:00	15:00	46.0	47.5	43.9	57.1	
00:15	15:00	45.4	46.8	43.6	55.0	
00:30	15:00	46.1	47.5	44.1	61.1	
00:45	15:00	45.8	47.5	43.6	54.8	
01:00	15:00	45.9	47.2	44.2	52.7	
01:15	15:00	45.6	47.1	43.4	55.8	
01:30	15:00	44.5	46.3	42.2	53.2	
01:45	15:00	43.6	45.3	41.1	53.4	
02:00	15:00	44.8	46.2	41.8	66.9	
02:15	15:00	45.4	45.7	42.8	66.5	
02:30	15:00	44.4	45.2	41.8	67.1	
02:45	15:00	45.0	45.9	42.5	65.6	
03:00	15:00	44.2	45.7	42.1	51.9	
03:15	15:00	44.5	45.6	42.3	60.2	
03:30	15:00	45.2	46.4	43.1	60.1	
03:45	15:00	45.9	47.5	43.7	60.9	
04:00	15:00	45.1	47.0	42.9	55.6	
04:15	15:00	44.8	46.2	43.1	57.7	
04:30	15:00	44.9	46.4	43.0	54.9	
04:45	15:00	46.2	47.4	44.6	53.3	
05:00	15:00	46.5	48.1	44.2	55.7	
05:15	15:00	46.7	48.0	44.8	55.2	
05:30	15:00	46.7	48.1	45.0	52.4	
05:45	15:00	50.5	48.7	45.5	70.5	
06:00	15:00	47.4	48.5	46.0	59.7	
06:15	15:00	52.2	48.9	46.2	72.6	
06:30	15:00	51.0	50.8	46.8	71.2	
06:45	15:00	50.3	52.4	47.4	62.2	
Average 2300-0700		46.8	47.6	44.1	52-73	
Average 0930-2300		51.6	54.7	45.9	54-77	

Noise Survey Results

Date: Saturday 15th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
 Instrumentation: Cirrus 171A Real Time Analyser (G061253)
 Calibration: 94dB

TABLE 14

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	54.7	52.6	47.4	75.3	
07:15	15:00	56.8	52.0	48.3	76.9	
07:30	15:00	49.4	50.3	48.1	55.5	
07:45	15:00	53.1	51.8	48.0	73.0	
08:00	15:00	50.5	53.0	47.9	69.5	
08:15	15:00	49.9	51.1	48.1	61.3	
08:30	15:00	49.4	50.2	48.2	60.3	
08:45	15:00	52.3	51.3	48.3	68.7	
09:00	15:00	49.6	50.5	48.2	63.6	
09:15	15:00	49.3	50.4	47.7	62.8	
09:30	15:00	49.2	50.1	48.1	53.6	
09:45	15:00	48.7	49.5	47.6	58.2	
10:00	15:00	48.5	49.2	47.5	53.8	
10:15	15:00	50.1	51.0	48.7	63.3	
10:30	15:00	52.0	54.0	49.8	63.5	
10:45	15:00	50.9	51.1	48.8	66.7	
11:00	15:00	50.3	51.5	48.9	55.3	
11:15	15:00	49.2	49.9	48.4	53.9	
11:30	15:00	48.8	49.8	47.3	58.0	
11:45	15:00	52.3	50.9	47.4	72.4	
12:00	15:00	48.1	49.1	46.8	54.1	
12:15	15:00	49.0	49.8	47.6	61.0	
12:30	15:00	49.4	50.4	48.2	55.1	
12:45	15:00	50.0	50.7	48.2	76.8	
13:00	15:00	50.6	51.5	49.1	61.7	
13:15	15:00	49.2	50.5	47.5	54.7	
13:30	15:00	49.4	50.4	47.1	61.6	
13:45	15:00	49.1	50.0	48.0	56.5	
14:00	15:00	50.0	50.9	48.1	62.0	
14:15	15:00	51.0	51.6	49.2	64.0	
14:30	15:00	57.8	53.2	48.6	76.3	
14:45	15:00	52.9	55.4	48.4	69.5	
Average 0700-1500		51.4	51.3	48.1	54-77	

Noise Survey Results

Date: Saturday 15th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
Instrumentation: Cirrus 171A Real Time Analyser (G061253)
Calibration: 94dB

TABLE 15

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmaz (dB)	Observations
15:00	15:00	52.0	53.9	47.4	68.7	
15:15	15:00	49.8	51.4	47.4	69.2	
15:30	15:00	48.0	48.8	46.8	64.1	
15:45	15:00	52.6	50.2	47.6	72.6	
16:00	15:00	53.5	54.0	47.2	71.2	
16:15	15:00	49.4	51.1	47.5	56.2	
16:30	15:00	49.5	50.4	48.1	57.6	
16:45	15:00	48.4	49.1	47.4	52.8	
17:00	15:00	49.3	50.0	47.9	64.6	
17:15	15:00	50.1	50.4	47.6	67.2	
17:30	15:00	52.7	50.0	47.6	70.6	
17:45	15:00	49.7	50.4	47.9	65.4	
18:00	15:00	49.8	50.6	48.6	64.8	
18:15	15:00	49.7	50.7	48.5	55.9	
18:30	15:00	49.8	50.5	48.5	60.4	
18:45	15:00	49.7	50.1	48.4	64.2	
19:00	15:00	50.2	50.1	47.7	64.0	
19:15	15:00	48.2	49.1	47.1	53.8	
19:30	15:00	48.2	49.2	46.8	59.4	
19:45	15:00	52.7	48.5	45.7	74.0	
20:00	15:00	47.4	48.2	46.3	57.3	
20:15	15:00	48.2	49.1	46.9	55.4	
20:30	15:00	47.8	48.7	46.7	58.4	
20:45	15:00	47.2	48.1	46.0	54.4	
21:00	15:00	47.5	48.5	46.2	57.6	
21:15	15:00	45.9	47.0	44.6	58.3	
21:30	15:00	46.0	47.1	44.7	53.0	
21:45	15:00	45.9	46.8	44.3	58.9	
22:00	15:00	46.0	46.9	44.9	53.1	
22:15	15:00	46.0	46.8	44.6	57.2	
22:30	15:00	45.8	46.6	44.6	54.0	
22:45	15:00	45.9	46.9	44.5	56.6	
Average 1500-2300		49.4	49.7	46.9	53-74	

Noise Survey Results

Date: Saturday 15th - Sunday 16th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
 Instrumentation: Cirrus 171A Real Time Analyser (G061253)
 Calibration: 94dB

TABLE 16

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	46.0	46.5	44.0	63.4	
23:15	15:00	45.3	46.4	44.0	55.8	
23:30	15:00	45.3	46.3	43.7	59.1	
23:45	15:00	46.6	47.4	44.7	57.6	
00:00	15:00	46.9	47.4	44.3	60.5	
00:15	15:00	45.9	47.5	43.8	54.8	
00:30	15:00	45.6	47.0	43.4	56.3	
00:45	15:00	46.0	47.6	40.6	60.9	
01:00	15:00	45.8	47.8	41.7	61.0	
01:15	15:00	46.4	48.5	41.2	60.8	
01:30	15:00	45.4	47.7	40.0	59.8	
01:45	15:00	46.3	48.5	39.9	69.2	
02:00	15:00	49.0	52.1	40.9	64.3	
02:15	15:00	49.4	52.9	40.9	63.1	
02:30	15:00	50.3	53.8	42.1	66.2	
02:45	15:00	49.7	52.8	41.3	64.7	
03:00	15:00	48.8	50.7	40.9	65.1	
03:15	15:00	45.7	47.8	40.8	61.9	
03:30	15:00	46.3	48.8	40.7	59.6	
03:45	15:00	46.2	48.1	41.2	60.7	
04:00	15:00	44.7	46.3	42.2	54.2	
04:15	15:00	47.8	48.0	43.6	70.7	
04:30	15:00	46.9	48.6	41.9	64.3	
04:45	15:00	46.3	48.0	42.4	61.8	
05:00	15:00	47.9	50.4	41.6	61.1	
05:15	15:00	47.1	49.2	41.6	59.5	
05:30	15:00	46.8	49.0	42.2	56.8	
05:45	15:00	47.3	49.2	42.6	57.2	
06:00	15:00	48.5	49.5	43.6	77.2	
06:15	15:00	48.6	50.0	43.8	65.4	
06:30	15:00	48.8	50.7	43.3	63.0	
06:45	15:00	50.5	52.8	44.1	69.8	
Average 2300-0700		47.4	49.5	42.4	54-77	
Average 0700-2300		50.5	50.6	47.5	53-77	

Noise Survey Results

Date: Sunday 16th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
Instrumentation: Cirrus 171A Real Time Analyser (G061253)
Calibration: 94dB

TABLE 17

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	51.3	53.8	44.1	65.6	
07:15	15:00	59.3	64.1	46.0	73.4	
07:30	15:00	60.8	65.4	48.8	72.7	
07:45	15:00	65.7	69.5	52.1	75.4	
08:00	15:00	64.6	68.4	51.4	76.3	
08:15	15:00	63.4	67.1	49.9	74.9	
08:30	15:00	55.7	59.7	44.8	70.0	
08:45	15:00	51.9	53.9	44.9	66.1	
09:00	15:00	52.0	53.0	45.3	74.9	
09:15	15:00	50.7	52.0	46.3	61.5	
09:30	15:00	51.4	52.9	46.3	64.5	
09:45	15:00	55.1	59.2	46.1	69.6	
10:00	15:00	54.2	58.3	44.9	68.7	
10:15	15:00	53.0	55.0	46.2	74.6	
10:30	15:00	54.9	58.5	46.4	75.9	
10:45	15:00	53.0	54.4	45.5	76.9	
11:00	15:00	52.1	53.4	46.4	65.0	
11:15	15:00	52.6	55.3	45.8	65.2	
11:30	15:00	52.9	54.9	46.1	66.4	
11:45	15:00	51.8	54.4	45.4	62.9	
12:00	15:00	53.8	57.0	46.0	68.4	
12:15	15:00	52.7	55.8	45.8	66.0	
12:30	15:00	51.8	54.2	45.6	63.3	
12:45	15:00	53.7	56.6	46.0	69.3	
13:00	15:00	53.0	56.1	46.3	66.3	
13:15	15:00	50.5	51.8	46.1	63.9	
13:30	15:00	51.3	52.9	46.4	63.9	
13:45	15:00	50.9	52.4	46.9	61.7	
14:00	15:00	50.8	52.1	47.5	61.8	
14:15	15:00	51.2	52.6	46.1	66.8	
14:30	15:00	50.3	51.5	46.2	62.5	
14:45	15:00	50.4	51.7	45.7	61.7	
Average 0700-1500		56.9	60.5	46.9	62-77	

Noise Survey Results

Date: Sunday 16th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
 Instrumentation: Cirrus 171A Real Time Analyser (G061253)
 Calibration: 94dB

TABLE 18

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	52.1	54.6	45.2	68.1	
15:15	15:00	50.2	50.8	47.8	68.7	
15:30	15:00	49.9	50.9	47.3	65.6	
15:45	15:00	50.3	51.5	48.2	62.3	
16:00	15:00	50.4	52.0	48.0	61.2	
16:15	15:00	50.5	51.6	48.2	62.0	
16:30	15:00	50.4	51.6	48.0	60.5	
16:45	15:00	50.5	51.3	48.8	63.0	
17:00	15:00	50.0	51.0	48.7	54.6	
17:15	15:00	49.8	50.6	48.8	54.6	
17:30	15:00	49.9	50.6	48.5	60.8	
17:45	15:00	49.8	50.6	48.6	59.4	
18:00	15:00	51.8	51.5	48.9	70.2	
18:15	15:00	49.5	50.6	47.9	58.2	
18:30	15:00	49.8	50.7	48.5	64.1	
18:45	15:00	49.7	50.5	48.4	59.7	
19:00	15:00	49.7	50.8	48.2	60.4	
19:15	15:00	49.6	51.0	47.4	61.1	
19:30	15:00	49.5	50.5	47.1	65.1	
19:45	15:00	47.9	48.8	46.9	56.9	
20:00	15:00	48.0	48.9	46.9	54.0	
20:15	15:00	48.9	49.9	46.9	61.2	
20:30	15:00	49.0	50.7	45.4	60.7	
20:45	15:00	49.2	50.4	45.4	63.0	
21:00	15:00	48.5	50.4	44.6	61.7	
21:15	15:00	47.8	49.4	45.4	58.5	
21:30	15:00	47.0	48.8	44.6	56.4	
21:45	15:00	47.1	49.1	44.1	56.9	
22:00	15:00	47.4	48.9	43.8	69.4	
22:15	15:00	48.6	50.9	44.4	64.4	
22:30	15:00	48.7	51.0	44.3	60.6	
22:45	15:00	47.0	48.8	44.4	60.4	
Average 1500-2300		49.5	50.7	47.1	54-70	

Noise Survey Results

Date: Sunday 16th - Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm**
Instrumentation: Cirrus 171A Real Time Analyser (G061253)
Calibration: 94dB

TABLE 19

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	45.6	47.3	43.3	56.5	
23:15	15:00	46.0	47.7	43.3	59.3	
23:30	15:00	45.8	47.4	43.4	57.7	
23:45	15:00	48.2	51.4	43.5	61.0	
00:00	15:00	46.0	47.3	43.7	58.7	
00:15	15:00	45.7	47.2	43.6	55.0	
00:30	15:00	44.5	45.8	42.6	53.0	
00:45	15:00	46.5	47.9	43.5	61.6	
01:00	15:00	46.4	47.7	44.6	53.6	
01:15	15:00	46.0	47.6	43.4	57.9	
01:30	15:00	46.0	47.8	42.7	55.3	
01:45	15:00	44.7	46.6	41.9	54.6	
02:00	15:00	45.6	47.3	42.9	59.2	
02:15	15:00	46.2	48.0	43.6	56.0	
02:30	15:00	47.8	49.3	44.4	70.5	
02:45	15:00	48.6	51.4	44.6	60.2	
03:00	15:00	46.2	47.7	44.0	52.4	
03:15	15:00	47.0	48.4	44.4	61.5	
03:30	15:00	48.3	49.5	44.0	60.9	
03:45	15:00	47.3	48.4	45.7	56.5	
04:00	15:00	48.0	49.4	45.5	59.5	
04:15	15:00	48.5	50.3	44.2	59.2	
04:30	15:00	48.8	50.2	45.2	57.8	
04:45	15:00	50.1	51.5	44.8	67.6	
05:00	15:00	50.0	51.6	45.2	60.8	
05:15	15:00	50.4	51.7	47.7	60.8	
05:30	15:00	52.4	54.3	47.8	67.9	
05:45	15:00	52.5	54.0	46.6	66.6	
06:00	15:00	53.3	54.3	46.6	74.5	
06:15	15:00	53.1	54.5	47.3	67.8	
06:30	15:00	52.3	54.6	46.9	60.1	
06:45	15:00	53.5	55.4	47.6	63.4	
Average 2300-0700		49.0	50.7	44.9	52-75	
Average 0700-2300		54.6	57.9	47.0	54-77	

Noise Survey Results

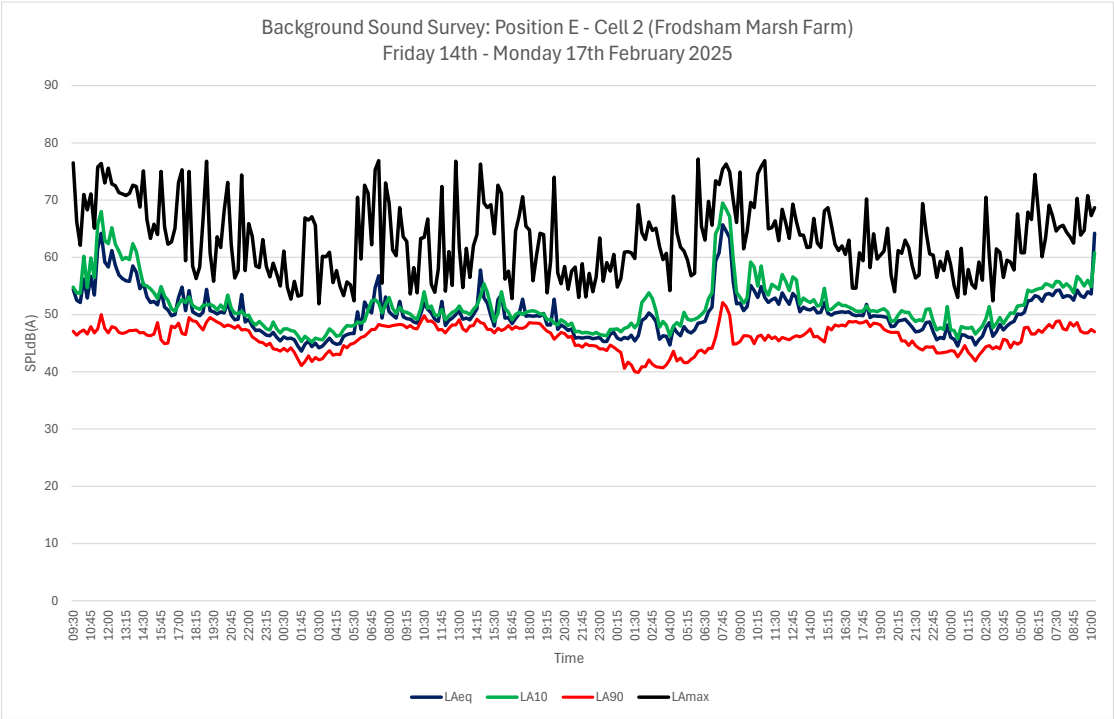
Date: Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: Baseline Sound Survey: Position E (Cell 2) Frodsham Marsh Farm
Instrumentation: Cirrus 171A Real Time Analyser (G061253)
Calibration: 94dB

TABLE 20

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	53.7	55.2	48.3	69.1	
07:15	15:00	53.3	54.8	47.7	67.2	
07:30	15:00	54.2	55.8	48.8	64.6	
07:45	15:00	54.3	55.7	48.9	65.3	
08:00	15:00	53.0	54.8	47.5	65.6	
08:15	15:00	53.3	55.4	47.3	64.4	
08:30	15:00	53.2	54.8	48.6	63.6	
08:45	15:00	52.5	53.8	48.0	62.5	
09:00	15:00	54.3	56.7	48.6	70.3	
09:15	15:00	53.3	56.0	47.1	63.9	
09:30	15:00	53.0	55.0	46.8	64.7	
09:45	15:00	54.0	56.0	46.8	70.8	
10:00	15:00	53.6	54.9	47.4	67.3	
10:15	15:00	64.2	60.8	47.0	68.7	
Average 0700-1030		55.9	56.0	47.8	63-71	

Overall Average	47.8	49.4	43.9	52-77
Overall Average	53.9	56.5	47.4	53-77

Av. Weekday 0700-1800	56.4	59	47.4	59-77
Range	49-64			
Av. Saturday 0700-1300	51	51	48.1	54-77
Range	48-57			



Noise Survey Results

Date: Friday 14th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
 Instrumentation: Cirrus 171A Real Time Analyser (G066350)
 Calibration: 94dB

TABLE 21

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
11:45	15:00	61.5	59.9	56.9	72.3	Noise generally formed by distant road traffic noise & bird call, with intermittent aircraft noise and low level wind turbine noise
12:00	15:00	57.7	58.7	56.4	61.5	
12:15	15:00	57.6	59.0	55.9	68.7	
12:30	15:00	59.0	59.7	57.2	74.1	
12:45	15:00	58.2	59.1	56.7	63.3	
13:00	15:00	58.1	59.0	56.9	61.9	
13:15	15:00	58.4	59.3	57.2	62.2	
13:30	15:00	58.6	59.7	57.3	64.1	
13:45	15:00	58.0	58.9	57.0	67.2	
14:00	15:00	58.3	59.3	57.1	71.3	
14:15	15:00	58.0	58.9	56.9	63.1	
14:30	15:00	58.5	58.8	56.9	72.8	
14:45	15:00	56.7	57.6	55.5	63.7	
Average 1145-1500		58.5	59.1	56.7	62-74	

Noise Survey Results

Date: Friday 14th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 22

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	56.9	57.9	55.7	61.0	
15:15	15:00	57.1	57.9	56.1	67.2	
15:30	15:00	57.2	58.3	55.8	63.6	
15:45	15:00	57.6	57.8	55.3	74.5	
16:00	15:00	56.6	57.5	55.5	59.6	
16:15	15:00	55.1	56.1	53.8	58.8	
16:30	15:00	54.2	55.4	52.7	58.4	
16:45	15:00	55.2	56.1	53.7	72.0	
17:00	15:00	56.3	57.2	54.1	72.0	
17:15	15:00	57.4	56.6	54.7	76.4	
17:30	15:00	55.7	56.7	54.5	61.2	
17:45	15:00	57.8	57.9	55.4	74.3	
18:00	15:00	55.7	56.5	54.7	60.7	
18:15	15:00	55.3	56.3	53.9	59.7	
18:30	15:00	54.9	55.9	53.7	58.2	
18:45	15:00	55.1	56.1	53.6	63.8	
19:00	15:00	57.7	56.6	54.1	77.0	
19:15	15:00	55.3	56.2	54.2	59.6	
19:30	15:00	55.8	56.6	54.8	59.0	
19:45	15:00	55.1	56.1	53.2	71.4	
20:00	15:00	54.6	55.7	53.2	61.9	
20:15	15:00	54.1	55.3	52.7	59.3	
20:30	15:00	55.1	56.8	53.0	70.2	
20:45	15:00	54.4	55.8	52.5	60.5	
21:00	15:00	53.8	55.0	52.4	60.7	
21:15	15:00	54.2	55.3	52.8	58.7	
21:30	15:00	54.5	55.0	51.7	68.6	
21:45	15:00	53.8	55.0	52.4	65.7	
22:00	15:00	53.1	54.1	51.7	59.4	
22:15	15:00	52.1	53.3	50.7	58.6	
22:30	15:00	52.3	53.5	50.8	58.2	
22:45	15:00	51.8	53.0	50.2	57.1	
Average 1500-2300		55.4	56.2	53.8	57-77	

Noise Survey Results

Date: Friday 14th - Saturday 15th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
 Instrumentation: Cirrus 171A Real Time Analyser (G066350)
 Calibration: 94dB

TABLE 23

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	51.3	52.4	50.0	56.8	
23:15	15:00	50.9	52.2	49.1	56.8	
23:30	15:00	51.1	52.6	49.3	57.6	
23:45	15:00	50.8	52.1	48.8	61.0	
00:00	15:00	49.8	51.1	48.1	55.4	
00:15	15:00	49.5	50.6	48.1	56.6	
00:30	15:00	49.9	51.3	48.1	55.4	
00:45	15:00	50.2	51.5	48.5	55.2	
01:00	15:00	50.8	52.2	48.9	56.7	
01:15	15:00	50.1	51.5	48.1	58.4	
01:30	15:00	48.8	50.5	45.9	56.6	
01:45	15:00	49.5	49.6	46.2	69.8	
02:00	15:00	48.3	50.2	45.6	56.1	
02:15	15:00	49.2	50.8	47.0	61.0	
02:30	15:00	48.1	49.7	45.9	53.7	
02:45	15:00	48.6	50.2	46.5	57.8	
03:00	15:00	48.8	50.3	46.6	53.8	
03:15	15:00	48.7	50.2	46.5	55.2	
03:30	15:00	48.7	50.3	46.8	54.7	
03:45	15:00	50.4	52.1	47.7	65.9	
04:00	15:00	49.5	51.1	47.1	55.2	
04:15	15:00	49.6	51.3	47.7	56.2	
04:30	15:00	49.3	51.0	47.2	55.4	
04:45	15:00	50.5	52.1	48.3	57.7	
05:00	15:00	50.5	52.1	48.5	56.6	
05:15	15:00	51.2	52.5	49.2	56.3	
05:30	15:00	51.8	53.4	49.9	57.0	
05:45	15:00	52.2	53.2	49.8	65.1	
06:00	15:00	52.3	53.5	50.7	57.0	
06:15	15:00	54.1	54.1	50.8	70.9	
06:30	15:00	54.5	55.4	51.6	68.8	
06:45	15:00	53.6	54.7	51.8	62.5	
Average 2300-0700		50.7	51.9	48.5	54-71	
Average 1145-2300		54.6	55.6	53.3	57-77	

Noise Survey Results

Date: Saturday 15th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
 Instrumentation: Cirrus 171A Real Time Analyser (G066350)
 Calibration: 94dB

TABLE 24

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	56.8	55.6	52.2	76.2	
07:15	15:00	59.1	56.4	53.3	80.6	
07:30	15:00	54.2	55.2	53.0	58.0	
07:45	15:00	55.8	55.9	52.7	72.2	
08:00	15:00	53.9	54.9	52.7	58.2	
08:15	15:00	54.4	55.6	53.0	59.2	
08:30	15:00	54.1	55.1	52.7	67.0	
08:45	15:00	54.9	56.0	53.4	65.8	
09:00	15:00	54.2	55.3	52.9	60.9	
09:15	15:00	54.5	55.5	53.2	63.8	
09:30	15:00	55.1	55.8	53.5	73.1	
09:45	15:00	54.2	55.1	53.1	57.3	
10:00	15:00	55.4	55.7	53.4	77.4	
10:15	15:00	55.6	56.5	54.1	67.2	
10:30	15:00	56.4	57.3	55.0	64.9	
10:45	15:00	55.7	56.6	54.1	75.9	
11:00	15:00	55.2	56.1	54.0	61.0	
11:15	15:00	54.9	55.8	53.8	58.9	
11:30	15:00	54.8	55.3	53.3	76.1	
11:45	15:00	55.8	55.4	52.6	73.0	
12:00	15:00	53.9	54.8	52.8	64.9	
12:15	15:00	54.1	54.9	53.1	61.4	
12:30	15:00	55.5	55.7	53.5	77.0	
12:45	15:00	54.8	55.7	53.7	67.3	
13:00	15:00	55.2	56.1	54.1	70.6	
13:15	15:00	55.0	55.9	53.8	62.3	
13:30	15:00	54.1	55.6	52.2	62.2	
13:45	15:00	54.0	54.9	52.9	68.6	
14:00	15:00	55.3	56.4	53.8	62.3	
14:15	15:00	56.0	56.9	54.3	70.3	
14:30	15:00	58.2	56.4	53.6	77.2	
14:45	15:00	54.9	56.0	53.3	64.5	
Average 0700-1500		55.3	55.8	53.3	57-81	

Noise Survey Results

Date: Saturday 15th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 25

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	53.5	54.5	52.0	62.7	
15:15	15:00	54.4	55.6	52.9	62.4	
15:30	15:00	53.4	54.2	52.3	57.6	
15:45	15:00	55.8	55.4	51.9	74.7	
16:00	15:00	56.5	55.7	53.0	71.6	
16:15	15:00	54.8	55.7	53.8	59.4	
16:30	15:00	55.5	56.5	54.3	59.7	
16:45	15:00	55.3	56.2	54.1	59.6	
17:00	15:00	55.1	56.2	53.6	60.9	
17:15	15:00	54.4	55.2	53.3	62.9	
17:30	15:00	54.4	55.0	52.9	64.4	
17:45	15:00	54.8	55.7	53.8	59.0	
18:00	15:00	54.8	55.9	53.4	59.0	
18:15	15:00	55.0	55.9	53.9	61.1	
18:30	15:00	54.8	55.9	53.3	60.5	
18:45	15:00	54.7	55.5	53.5	58.2	
19:00	15:00	54.4	54.9	52.7	68.6	
19:15	15:00	52.5	53.7	50.9	57.4	
19:30	15:00	52.8	53.9	51.4	57.7	
19:45	15:00	53.3	53.6	51.1	69.7	
20:00	15:00	52.3	53.4	50.8	60.0	
20:15	15:00	53.3	54.3	51.9	65.4	
20:30	15:00	52.7	53.9	51.0	64.2	
20:45	15:00	54.3	52.4	49.5	76.3	
21:00	15:00	51.1	52.4	49.4	57.4	
21:15	15:00	50.7	51.9	49.1	62.1	
21:30	15:00	51.0	52.3	49.5	62.0	
21:45	15:00	50.7	52.0	49.0	56.3	
22:00	15:00	51.1	52.3	49.4	57.3	
22:15	15:00	50.8	52.0	49.3	60.2	
22:30	15:00	50.8	52.0	49.0	60.4	
22:45	15:00	50.6	51.9	48.9	55.6	
Average 1500-2300		53.7	54.5	52.0	56-76	

Noise Survey Results

Date: Saturday 15th - Sunday 16th February 2025
 Location: Moorditch Lane, Frodsham Marsh, Frodsham
 Client: Axis
 Project: Solar & BESS Facility
 Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
 Instrumentation: Cirrus 171A Real Time Analyser (G066350)
 Calibration: 94dB

TABLE 26

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	50.0	51.4	48.1	60.0	
23:15	15:00	50.2	51.7	48.2	55.7	
23:30	15:00	50.2	51.6	48.5	56.4	
23:45	15:00	50.8	52.1	48.7	59.7	
00:00	15:00	50.5	51.7	48.6	59.9	
00:15	15:00	49.8	51.5	47.4	59.4	
00:30	15:00	49.3	50.8	47.4	57.5	
00:45	15:00	51.0	50.2	46.0	75.2	
01:00	15:00	49.4	51.0	47.4	56.8	
01:15	15:00	48.9	50.4	47.2	62.8	
01:30	15:00	48.3	50.0	46.2	59.0	
01:45	15:00	49.2	50.5	47.5	62.8	
02:00	15:00	49.7	51.1	47.9	65.3	
02:15	15:00	49.9	51.0	48.4	64.9	
02:30	15:00	51.7	53.1	49.8	63.0	
02:45	15:00	50.8	51.9	49.2	64.8	
03:00	15:00	48.8	50.0	46.9	71.4	
03:15	15:00	47.4	48.7	45.8	54.3	
03:30	15:00	48.0	49.7	45.9	55.7	
03:45	15:00	49.7	51.0	47.4	63.9	
04:00	15:00	48.9	50.7	46.3	56.2	
04:15	15:00	49.4	51.0	47.3	55.8	
04:30	15:00	49.7	51.6	46.5	57.0	
04:45	15:00	49.1	50.6	46.6	58.1	
05:00	15:00	50.5	52.0	48.1	66.6	
05:15	15:00	51.2	52.6	49.3	56.5	
05:30	15:00	50.2	51.9	48.3	56.0	
05:45	15:00	51.1	52.5	49.2	56.5	
06:00	15:00	51.7	53.0	49.9	57.1	
06:15	15:00	52.6	53.6	50.9	64.7	
06:30	15:00	52.6	53.8	51.1	56.9	
06:45	15:00	52.7	53.9	51.1	71.1	
Average 2300-0700		50.2	51.6	48.2	54-75	
Average 0700-2300		54.6	55.2	52.7	56-81	

Noise Survey Results

Date: Sunday 16th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 27

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	53.3	54.8	51.2	60.4	
07:15	15:00	54.5	55.5	53.3	59.6	
07:30	15:00	55.5	56.6	54.0	63.6	
07:45	15:00	56.1	57.4	54.1	65.9	
08:00	15:00	55.5	56.6	53.9	69.5	
08:15	15:00	55.8	56.9	54.4	63.3	
08:30	15:00	55.3	56.3	53.8	71.0	
08:45	15:00	56.1	57.1	54.6	66.9	
09:00	15:00	55.8	56.8	54.5	60.2	
09:15	15:00	55.8	56.6	54.5	69.2	
09:30	15:00	56.2	57.0	55.2	65.7	
09:45	15:00	57.1	57.5	55.3	76.7	
10:00	15:00	56.2	57.2	54.9	60.3	
10:15	15:00	57.0	57.9	55.9	64.7	
10:30	15:00	57.0	57.9	55.8	63.2	
10:45	15:00	56.1	57.1	54.9	61.8	
11:00	15:00	57.0	58.0	55.8	65.2	
11:15	15:00	57.1	58.0	56.0	66.4	
11:30	15:00	57.5	58.4	56.2	69.6	
11:45	15:00	57.3	58.1	56.2	70.0	
12:00	15:00	57.2	58.0	56.1	65.6	
12:15	15:00	57.0	57.8	55.9	60.2	
12:30	15:00	56.7	57.7	55.4	62.7	
12:45	15:00	57.0	57.9	56.0	60.6	
13:00	15:00	56.7	57.6	55.6	62.1	
13:15	15:00	56.3	57.4	54.7	60.6	
13:30	15:00	57.2	58.0	56.1	60.6	
13:45	15:00	56.5	57.5	55.4	60.2	
14:00	15:00	56.7	57.7	55.5	62.6	
14:15	15:00	56.4	57.4	55.2	63.7	
14:30	15:00	55.7	56.5	54.6	59.6	
14:45	15:00	55.8	56.8	54.6	60.7	
Average 0700-1500		56.3	57.3	55.0	60-77	

Noise Survey Results

Date: Sunday 16th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 28

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
15:00	15:00	56.1	57.2	54.9	60.9	
15:15	15:00	55.3	56.7	53.7	62.5	
15:30	15:00	55.5	56.8	53.8	59.9	
15:45	15:00	55.4	56.4	54.0	62.1	
16:00	15:00	56.1	56.8	54.8	68.9	
16:15	15:00	56.5	57.3	55.4	65.3	
16:30	15:00	56.2	57.1	55.0	61.0	
16:45	15:00	56.2	57.2	55.0	63.1	
17:00	15:00	55.7	56.7	54.6	59.6	
17:15	15:00	55.3	56.2	54.1	58.7	
17:30	15:00	55.5	56.3	54.4	60.1	
17:45	15:00	55.5	56.4	54.1	70.2	
18:00	15:00	55.5	56.5	54.1	61.8	
18:15	15:00	54.7	55.6	53.6	58.6	
18:30	15:00	55.1	56.0	54.1	59.5	
18:45	15:00	55.0	55.8	53.9	64.0	
19:00	15:00	55.2	56.2	53.7	63.0	
19:15	15:00	54.9	56.2	53.3	67.6	
19:30	15:00	54.8	55.5	53.0	67.1	
19:45	15:00	53.8	55.1	52.4	60.1	
20:00	15:00	53.8	54.7	52.7	59.2	
20:15	15:00	53.8	54.9	52.4	58.7	
20:30	15:00	56.3	54.2	52.0	79.5	
20:45	15:00	53.6	54.8	52.1	58.9	
21:00	15:00	53.3	54.5	51.9	59.3	
21:15	15:00	52.2	53.1	51.0	59.3	
21:30	15:00	51.5	52.8	50.0	57.4	
21:45	15:00	51.8	52.7	50.4	66.4	
22:00	15:00	51.0	52.3	49.1	55.9	
22:15	15:00	51.2	52.8	48.8	62.0	
22:30	15:00	51.9	53.1	50.2	60.3	
22:45	15:00	51.0	52.1	49.5	56.1	
Average 1500-2300		54.6	55.5	53.2	56-80	

Noise Survey Results

Date: Sunday 16th - Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: **Baseline Sound Survey: Position F (Cell 1) River Weaver**
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 29

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
23:00	15:00	49.4	50.7	47.9	55.8	
23:15	15:00	49.7	51.1	47.8	59.8	
23:30	15:00	49.7	51.3	47.7	59.3	
23:45	15:00	50.9	53.8	46.9	62.5	
00:00	15:00	49.8	51.3	47.7	55.6	
00:15	15:00	49.0	50.6	46.6	56.3	
00:30	15:00	47.5	49.1	45.2	55.5	
00:45	15:00	48.2	50.4	44.9	55.8	
01:00	15:00	48.4	50.0	46.1	55.1	
01:15	15:00	47.7	49.4	45.7	57.2	
01:30	15:00	48.0	49.6	45.8	54.2	
01:45	15:00	46.3	48.3	43.4	53.3	
02:00	15:00	47.3	48.9	45.1	52.7	
02:15	15:00	47.9	49.5	45.9	54.2	
02:30	15:00	48.9	50.4	46.8	60.2	
02:45	15:00	48.6	50.6	45.5	55.3	
03:00	15:00	48.3	50.3	45.2	55.4	
03:15	15:00	49.7	51.3	47.4	57.2	
03:30	15:00	51.4	53.0	49.1	56.0	
03:45	15:00	50.7	52.1	48.7	58.9	
04:00	15:00	51.0	52.3	49.3	57.7	
04:15	15:00	51.4	52.7	50.0	56.1	
04:30	15:00	53.0	54.2	51.5	59.2	
04:45	15:00	53.5	54.7	51.9	58.2	
05:00	15:00	53.6	54.7	52.3	59.0	
05:15	15:00	54.7	55.9	52.9	60.1	
05:30	15:00	55.9	56.9	54.5	65.2	
05:45	15:00	56.0	57.2	54.6	60.2	
06:00	15:00	56.7	57.6	55.5	66.4	
06:15	15:00	57.3	58.2	56.0	63.9	
06:30	15:00	57.1	57.9	56.1	62.0	
06:45	15:00	58.1	58.9	57.1	61.5	
Average 2300-0700		52.5	53.7	50.9	53-66	
Average 0700-2300		55.6	56.5	54.2	54-77	

Noise Survey Results

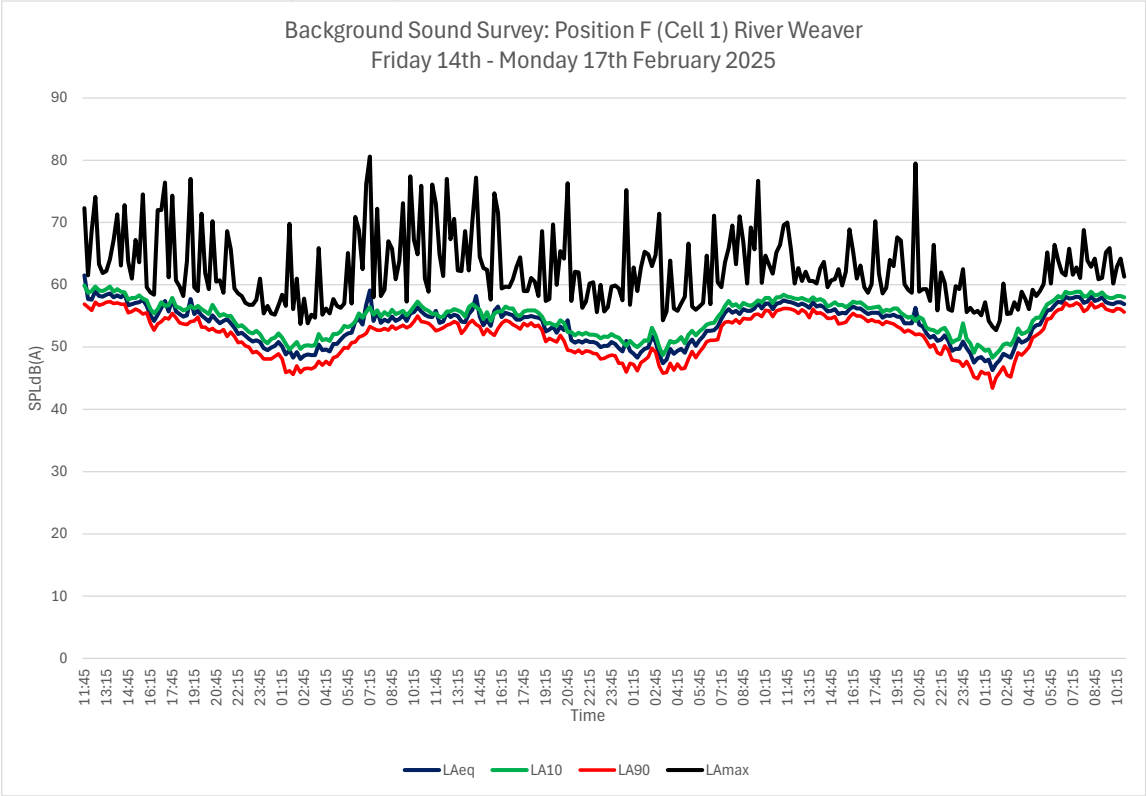
Date: Monday 17th February 2025
Location: Moorditch Lane, Frodsham Marsh, Frodsham
Client: Axis
Project: Solar & BESS Facility
Data: Baseline Sound Survey: Position F (Cell 1) River Weaver
Instrumentation: Cirrus 171A Real Time Analyser (G066350)
Calibration: 94dB

TABLE 30

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmix (dB)	Observations
07:00	15:00	57.8	58.6	56.6	65.8	
07:15	15:00	57.9	58.7	56.7	61.6	
07:30	15:00	58.1	58.9	57.1	62.8	
07:45	15:00	58.0	58.9	56.8	61.1	
08:00	15:00	57.1	58.1	55.7	68.8	
08:15	15:00	57.3	58.2	56.1	63.9	
08:30	15:00	58.2	58.9	57.1	62.9	
08:45	15:00	57.4	58.3	56.3	64.2	
09:00	15:00	57.6	58.4	56.5	60.9	
09:15	15:00	58.0	58.8	56.9	61.1	
09:30	15:00	57.2	58.1	56.1	65.2	
09:45	15:00	57.0	57.9	55.9	65.9	
10:00	15:00	56.9	57.9	55.7	60.2	
10:15	15:00	57.2	58.2	56.2	62.9	
10:30	15:00	57.2	58.2	56.1	64.2	
10:45	15:00	56.9	58.0	55.6	61.3	
Average 0700-1100		57.5	58.3	56.3	60-69	

Overall Average	51.3	52.5	49.4	53-75
Overall Average	55.7	56.6	54.3	56-81

Av. Weekday 0700-1800	57.6	58.3	56.1	58-76
Range	54-62			
Av. Saturday 0700-1300	54.9	55.7	53.4	57-81
Range	54-59			



Spot Roaming Position Measurements at NSER

Noise Survey Results

Date: Friday 14th& Monday 17th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

TABLE 31

Client: Axis

Project: Solar & BESS Facility

Data: **Background Sound Survey: Position G (Cell 6 Eastern Lake)**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
07:45	15:00	60.1	61.5	58.2	69.0	Distant road traffic noise & occasional aircraft noise
08:00	15:00	60.8	62.3	59.1	70.0	
08:15	15:00	59.1	60.4	57.6	69.4	
08:30	15:00	59.9	60.9	58.5	70.2	
09:00	15:00	62.1	63.3	60.6	67.5	Distant road traffic noise & occasional aircraft noise
09:15	15:00	62.3	63.5	61.2	66.8	
09:30	15:00	62.2	63.4	61.0	67.8	
09:45	15:00	63.8	64.2	61.1	69.4	
Range		59-64	60-64	58-61	67-70	
Average		61.5	62.6	59.8	68.8	

Noise Survey Results

Date: Friday 14th& Monday 17th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

TABLE 32

Client: Axis

Project: Solar & BESS Facility

Data: **Background Sound Survey: Position H (Cell 3)**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
09:45	15:00	53.1	54.3	47.3	68.4	Distant road traffic noise & occasional aircraft noise & birdcall
10:00	15:00	52.5	53.8	47.4	64.6	
10:15	15:00	56.4	60.4	47.8	70.6	
10:30	15:00	53.2	54.4	46.8	69.1	
07:30	15:00	54.5	56.2	48.5	67.4	Distant road traffic noise & occasional aircraft noise & birdcall
07:45	15:00	54.6	55.9	49.1	66.8	
09:00	15:00	53.7	55.2	47.9	69.2	
08:15	15:00	53.5	55.5	47.3	65.6	
Range		53-56	54-60	47-49	65-71	
Average		54	56.2	47.8	67.7	

Noise Survey Results

Date: Friday 14th& Monday 17th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

TABLE 33

Client: Axis

Project: Solar & BESS Facility

Data: **Background Sound Survey: Position I (River Weaver)**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
11:30	15:00	55.3	56.3	53.3	71.2	Distant road traffic noise & occasional aircraft noise, distant wind turbine noise
11:45	15:00	54.2	55.1	53.1	59.8	
12:00	15:00	54.8	55.9	53.6	58.4	
12:15	15:00	55.2	56.4	54.0	59.0	
10:15	15:00	56.2	57.8	53.4	71.7	Distant road traffic noise & occasional aircraft noise, distant wind turbine noise
10:30	15:00	55.6	56.7	54.5	58.5	
10:45	15:00	54.7	55.7	53.6	57.6	
11:00	15:00	57.4	56.3	54.2	75.7	
Range		54-57	55-58	53-55	58-72	
Average		55.5	56.3	53.7	64.0	

Noise Survey Results

Date: Friday 14th& Monday 17th February 2025

Location: Moorditch Lane, Frodsham Marsh, Frodsham

TABLE 34

Client: Axis

Project: Solar & BESS Facility

Data: **Background Sound Survey: Position J (River Weaver)**

Instrumentation: Norsonic 140 Real Time Analyser (1405418)

Calibration: 94dB

Start Time	Run Time (mins.)	LAeq (dB)	LA10 (dB)	LA90 (dB)	LAmx (dB)	Observations
12:45	15:00	55.2	57.4	51.8	63.8	Distant road traffic noise & occasional aircraft noise, distant wind turbine noise
13:00	15:00	52.1	53.1	51.0	55.2	
13:15	15:00	51.8	52.8	50.6	56.6	
13:30	15:00	52.8	53.8	51.1	64.8	
11:30	15:00	55.5	57.6	52.1	65.6	Distant road traffic noise & occasional aircraft noise, distant wind turbine noise
11:45	15:00	53.7	54.1	51.7	59.4	
12:00	15:00	54.2	55.6	51.2	64.3	
12:15	15:00	54.2	56.1	52.0	67.9	
Range		52-56	53-58	51-52	55-68	
Average		53.8	55.4	51.4	62.2	

Weather Conditions – February 2025

		Temp	Wind	Wind		
Date	Time	Out	Speed	Dir	Bar	Rain
14/02/2025	08:00	3.2	4.1	E	1037.2	0
14/02/2025	08:30	3.2	3.8	E	1041.3	0
14/02/2025	09:00	3.4	3.7	E	1041.6	0
14/02/2025	09:30	3.4	3.8	E	1041.3	0
14/02/2025	10:00	3.8	3.9	E	1041.9	0
14/02/2025	10:30	3.8	4	E	1041	0
14/02/2025	11:00	4.3	4	E	1041	0
14/02/2025	11:30	4	4	ESE	1040.8	0
14/02/2025	12:00	4.5	3.8	ESE	1040.3	0
14/02/2025	12:30	4.3	3.7	ESE	1040.2	0
14/02/2025	13:00	4.3	4.2	SE	1040	0
14/02/2025	13:30	4.7	3.7	ESE	1039.8	0
14/02/2025	14:00	5.1	3.7	ESE	1039.2	0
14/02/2025	14:30	5	4.0	ESE	1039	0
14/02/2025	15:00	4.8	4.1	ESE	1038.6	0
14/02/2025	15:30	4.4	3.8	ESE	1038.5	0
14/02/2025	16:00	4.6	4.2	ESE	1038.3	0
14/02/2025	16:30	4.7	3.9	ESE	1038.4	0
14/02/2025	17:00	4.6	3.6	SE	1038.6	0
14/02/2025	17:30	4.2	3.6	SE	1038.6	0
14/02/2025	18:00	3.8	3.8	SE	1038.6	0
14/02/2025	18:30	3.5	3.6	SE	1039.1	0
14/02/2025	19:00	3.3	3.8	SE	1038.9	0
14/02/2025	19:30	3.2	3.9	SE	1039.3	0
14/02/2025	20:00	3.2	4.0	SE	1039.3	0
14/02/2025	20:30	3.1	4.1	ESE	1038.9	0
14/02/2025	21:00	3	4.2	ESE	1038.7	0
14/02/2025	21:30	2.9	4.2	ESE	1038.5	0
14/02/2025	22:00	2.7	4.2	ESE	1038.5	0
14/02/2025	22:30	2.7	3.9	ESE	1038.3	0
14/02/2025	23:00	2.9	3.8	ESE	1038.5	0
14/02/2025	23:30	3.2	3.7	ESE	1038.4	0
15/02/2025	00:00	3.2	3.8	ESE	1038.2	0

		Temp	Wind	Wind		
Date	Time	Out	Run	Dir	Bar	Rain
15/02/2025	00:30	3.3	3.7	ESE	1038.2	0
15/02/2025	01:00	3.3	3.8	ESE	1038.1	0
15/02/2025	01:30	3.1	3.8	ESE	1038.1	0
15/02/2025	02:00	3.1	3.8	ESE	1037.8	0
15/02/2025	02:30	2.9	3.7	ESE	1037.7	0
15/02/2025	03:00	2.9	3.7	ESE	1037.3	0
15/02/2025	03:30	2.9	3.6	ESE	1037	0
15/02/2025	04:00	2.9	4.0	ESE	1036.6	0
15/02/2025	04:30	2.8	3.2	ESE	1036.4	0
15/02/2025	05:00	2.8	2.4	ESE	1036	0
15/02/2025	05:30	2.9	3.2	ESE	1036.1	0
15/02/2025	06:00	2.8	3.2	ESE	1036	0
15/02/2025	06:30	2.8	4.0	ESE	1035.7	0
15/02/2025	07:00	2.8	4.0	ESE	1035.5	0
15/02/2025	07:30	2.7	4.0	ESE	1035.4	0
15/02/2025	08:00	2.7	4.0	ESE	1035.3	0
15/02/2025	08:30	2.7	3.2	ESE	1035.3	0
15/02/2025	09:00	2.9	2.4	ESE	1035.5	0
15/02/2025	09:30	3.1	2.4	ESE	1035.5	0
15/02/2025	10:00	3.2	3.2	ESE	1035.5	0
15/02/2025	10:30	3.2	3.2	ESE	1035.2	0
15/02/2025	11:00	3.3	2.4	ESE	1035.3	0
15/02/2025	11:30	3.4	4.0	ESE	1034.6	0
15/02/2025	12:00	3.7	4.0	ESE	1034.4	0
15/02/2025	12:30	4	3.2	ESE	1034.7	0
15/02/2025	13:00	4.2	3.2	ESE	1034.4	0
15/02/2025	13:30	4.3	3.2	ESE	1034.2	0
15/02/2025	14:00	4.3	3.2	E	1033.9	0
15/02/2025	14:30	4.3	3.2	ESE	1033.5	0
15/02/2025	15:00	4.7	3.2	ESE	1033.3	0
15/02/2025	15:30	4.9	3.2	SE	1033.3	0
15/02/2025	16:00	4.9	2.4	ESE	1033.5	0
15/02/2025	16:30	4.9	1.6	ESE	1033.6	0
15/02/2025	17:00	4.8	1.6	E	1033.4	0
15/02/2025	17:30	4.6	1.6	E	1033.3	0
15/02/2025	18:00	4.4	2.4	E	1033.2	0
15/02/2025	18:30	4.3	2.4	E	1033.5	0
15/02/2025	19:00	4.2	2.4	E	1033.5	0
15/02/2025	19:30	4.2	3.2	E	1033.4	0
15/02/2025	20:00	4.2	3.2	E	1033.4	0
15/02/2025	20:30	4.2	2.4	E	1033.6	0
15/02/2025	21:00	4.1	2.4	E	1033.6	0
15/02/2025	21:30	4.1	3.2	E	1033.6	0
15/02/2025	22:00	4.1	2.4	E	1033.5	0
15/02/2025	22:30	4.1	2.4	ENE	1033.5	0
15/02/2025	23:00	4.1	2.4	ENE	1033.6	0
15/02/2025	23:30	4.1	2.4	E	1033.8	0
16/02/2025	00:00	4	2.4	E	1033.9	0

		Temp	Wind	Wind		
Date	Time	Out	Run	Dir	Bar	Rain
16/02/2025	00:30	4	3.2	ENE	1034.1	0
16/02/2025	01:00	3.9	3.2	ENE	1034.1	0
16/02/2025	01:30	3.9	3.2	E	1034	0
16/02/2025	02:00	3.9	4.0	E	1034.2	0
16/02/2025	02:30	3.9	4.0	E	1034.2	0
16/02/2025	03:00	3.7	3.6	E	1034.1	0
16/02/2025	03:30	3.5	3.4	E	1034	0
16/02/2025	04:00	3.5	3.4	E	1034	0
16/02/2025	04:30	3.4	3.6	E	1034.1	0
16/02/2025	05:00	3.3	3.5	E	1034.2	0
16/02/2025	05:30	3.2	3.5	E	1034.4	0
16/02/2025	06:00	3.1	3.7	E	1034.8	0
16/02/2025	06:30	2.9	3.6	E	1034.9	0
16/02/2025	07:00	2.8	3.8	E	1035.4	0
16/02/2025	07:30	2.6	3.5	E	1035.4	0
16/02/2025	08:00	2.5	3.6	E	1035.6	0
16/02/2025	08:30	2.4	3.4	E	1035.7	0
16/02/2025	09:00	2.6	3.9	E	1035.8	0
16/02/2025	09:30	2.7	3.5	E	1036.2	0
16/02/2025	10:00	2.8	3.4	E	1036.6	0
16/02/2025	10:30	3.2	3.4	ESE	1036.9	0
16/02/2025	11:00	3.7	3.4	ESE	1036.9	0
16/02/2025	11:30	3.7	4.0	ESE	1037.3	0
16/02/2025	12:00	3.9	4.0	ESE	1037.5	0
16/02/2025	12:30	3.8	4.0	ESE	1037.6	0
16/02/2025	13:00	3.9	4.0	ESE	1037.7	0
16/02/2025	13:30	4.3	4.1	ESE	1037.4	0
16/02/2025	14:00	4.2	4.2	ESE	1037.5	0
16/02/2025	14:30	4.3	4.2	ESE	1037.7	0
16/02/2025	15:00	4.4	4.2	ESE	1037.6	0
16/02/2025	15:30	4.5	3.4	ESE	1037.5	0
16/02/2025	16:00	4.6	3.4	ESE	1037.5	0
16/02/2025	16:30	4.6	2.6	ESE	1037.5	0
16/02/2025	17:00	4.5	2.6	ESE	1037.4	0
16/02/2025	17:30	4.2	2.6	ESE	1037.5	0
16/02/2025	18:00	3.9	3.4	ESE	1037.7	0
16/02/2025	18:30	3.8	1.8	ESE	1037.6	0
16/02/2025	19:00	3.7	3.2	ESE	1038	0
16/02/2025	19:30	3.4	4.0	ESE	1038	0
16/02/2025	20:00	3.4	4.0	ESE	1038	0
16/02/2025	20:30	3.3	3.8	ESE	1038	0
16/02/2025	21:00	3.3	4.0	ESE	1038	0
16/02/2025	21:30	3.1	3.8	ESE	1038	0
16/02/2025	22:00	2.9	3.4	ESE	1038.2	0
16/02/2025	22:30	2.9	3.4	ESE	1038.4	0
16/02/2025	23:00	2.7	3.6	ESE	1038.5	0
16/02/2025	23:30	2.4	3.6	ESE	1038.9	0
17/02/2025	00:00	1.7	3.6	ESE	1039	0

		Temp	Wind	Wind		
Date	Time	Out	Run	Dir	Bar	Rain
17/02/2025	00:30	1.3	3.8	ESE	1039.3	0
17/02/2025	01:00	0.9	3.0	ESE	1039.2	0
17/02/2025	01:30	1.1	3.0	E	1039.2	0
17/02/2025	02:00	1	3.2	ESE	1039	0
17/02/2025	02:30	0.8	3.0	ESE	1038.8	0
17/02/2025	03:00	0.7	2.8	E	1038.6	0
17/02/2025	03:30	0.5	2.8	E	1038.5	0
17/02/2025	04:00	0.6	2.5	E	1038.3	0
17/02/2025	04:30	0.6	2.5	E	1038.2	0
17/02/2025	05:00	0.8	2.4	ESE	1038	0
17/02/2025	05:30	1.2	2.6	ESE	1038.1	0
17/02/2025	06:00	1.2	2.7	ESE	1038	0
17/02/2025	06:30	1.2	3.1	ESE	1038	0
17/02/2025	07:00	1.2	3.0	ESE	1037.8	0
17/02/2025	07:30	1.1	3.1	ESE	1037.9	0
17/02/2025	08:00	1.2	3.2	ESE	1038	0
17/02/2025	08:30	1.3	2.8	ESE	1038.1	0
17/02/2025	09:00	1.6	2.7	ESE	1038.1	0
17/02/2025	09:30	1.8	2.4	ESE	1038.6	0
17/02/2025	10:00	2.1	2.6	ESE	1038.8	0
17/02/2025	10:30	2.3	2.4	ESE	1038.7	0

Appendix 4

Construction Plant Inventory

Assumed Plant Noise Levels for Solar/BESS Construction

Piling

Item	BS5228 ref	Sound Power Level dB(A)
BESS Piling	C3-3&4	105-116
Mini Piling (solar panels)	C3-17	104
HGVs	Library	103

Site Preparation

Item	BS5228 ref	Sound Power Level dB(A)
22-ton excavators	C4.63	108
Bomag D211 D-5 roller	C2-40	101.5
Bowser	LIBRARY	107
HGV Tipper Lorries	LIBRARY	104

Infrastructure

Item	BS5228 ref	Sound Power Level dB(A)
Concrete mixer trucks	C4.18	103
Concrete pump/poker vibrator	C3.25	106
Excavator	C4.63	103
Site forklift / telehandler	LIBRARY	102
HGVs	LIBRARY	103

General Works

Item	BS5228 ref	Sound Power Level dB(A)
Dump Truck	C4.06	107
Front Loader	LIBRARY	105
Compressor	C5.5	93
Generator	C4.78	94
HGVs	LIBRARY	103

PV Installation

Item	BS5228 ref	Sound Power Level dB(A)
Mobile crane	C4.41	99
Steelwork erection	C4.93	108
Disc cutters	C4.72	107
Concrete pump/concrete vibrator	C3.25	103
Excavator	C4.63	103
Site forklift / telehandler	C2.35	99
Mobile generator	C3.32	101

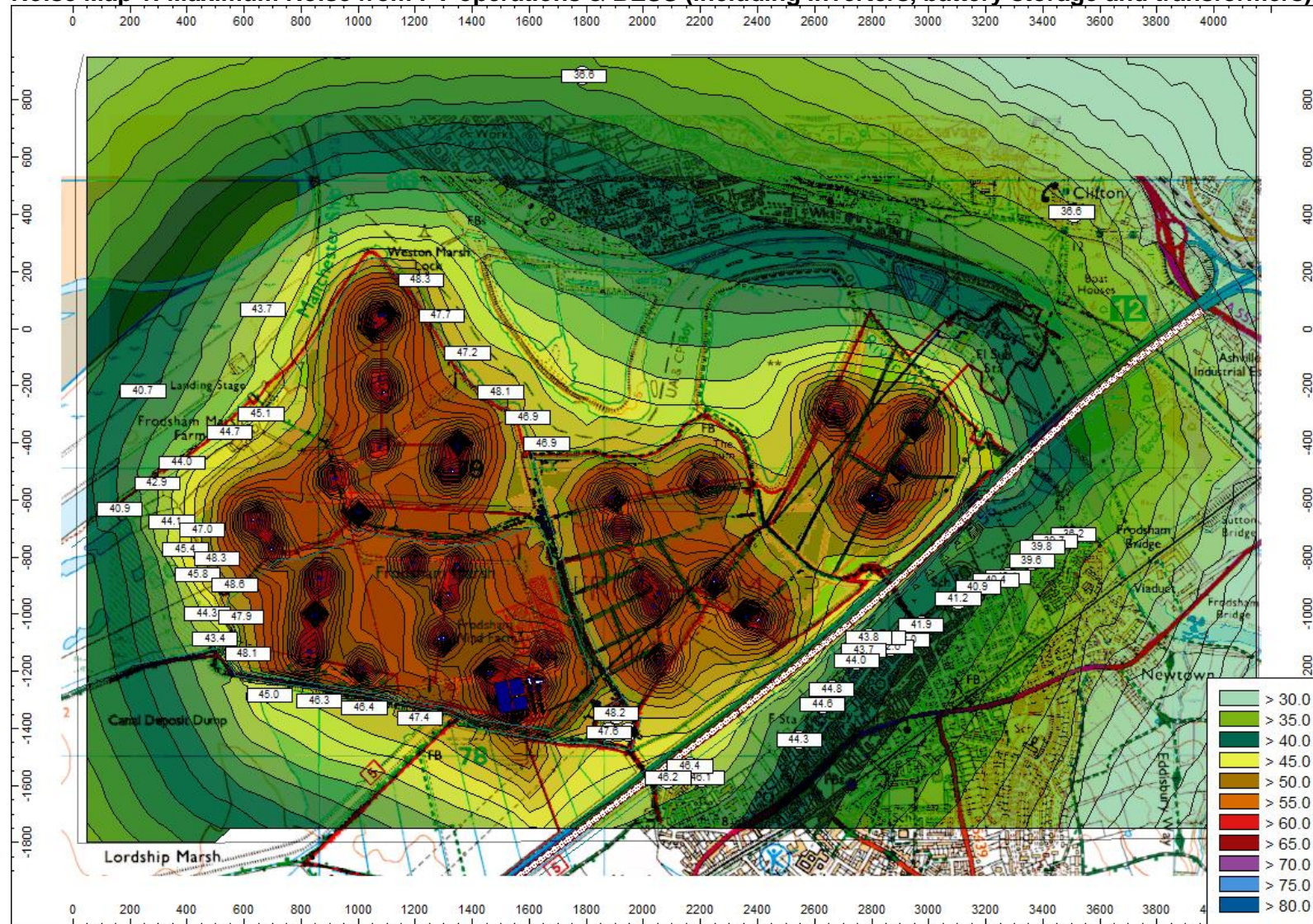
Cell 3 Mitigation Works NBBMA Works Assumed Plant Activity (worst case activity)

Item	Number of Plant	Sound Power Level dB(A)
Tracked conveyors (drive units)	16	99-105
Tracked Excavators	6	108
Water Pumps	4	93
Tractor & Lime Spreader	1	107-108
Dozers	8	109
Tractor & Bowser	1	107-108
Dump Truck	1	109
Front Loader	1	105

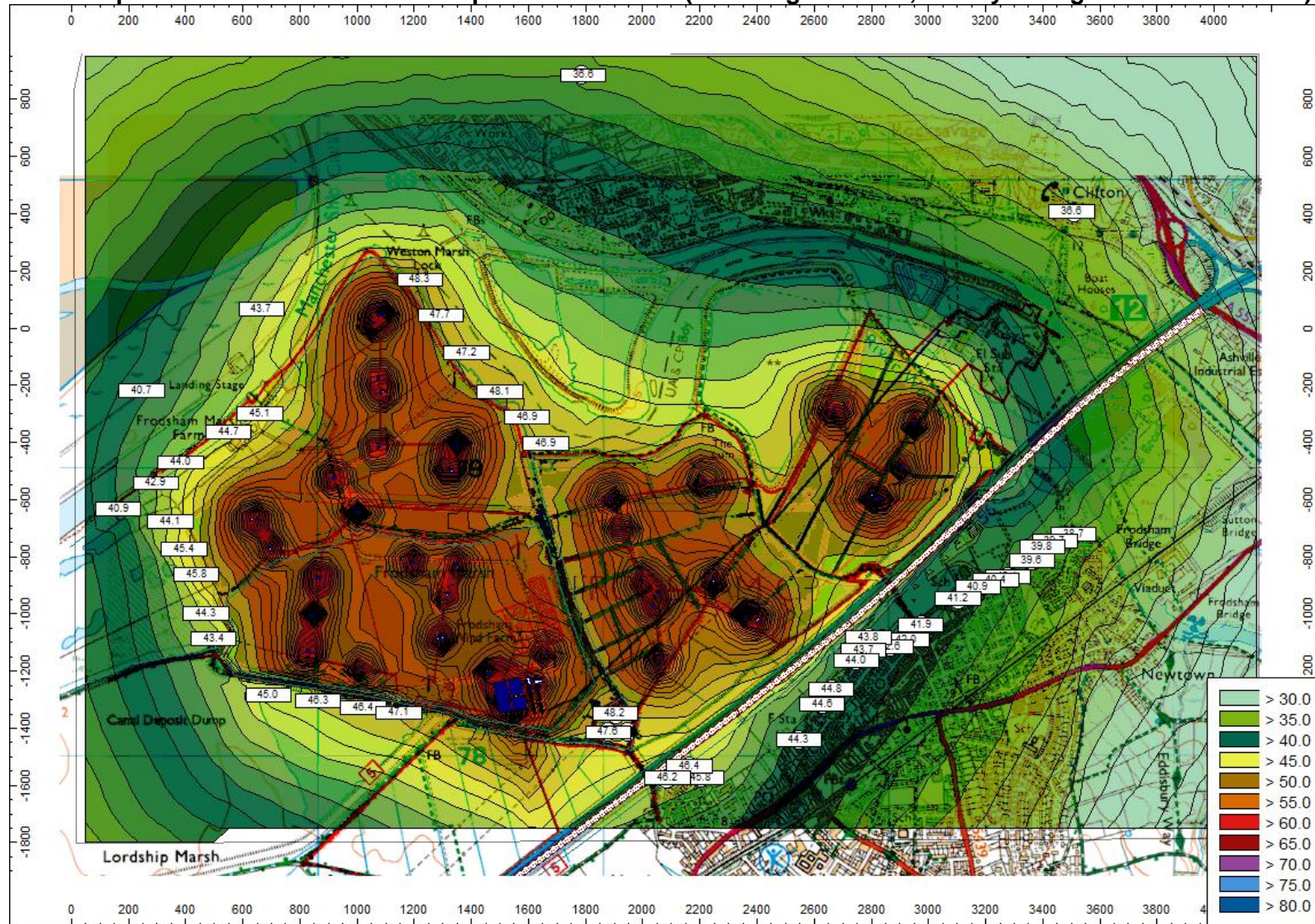
Appendix 5

Noise Mapping Results

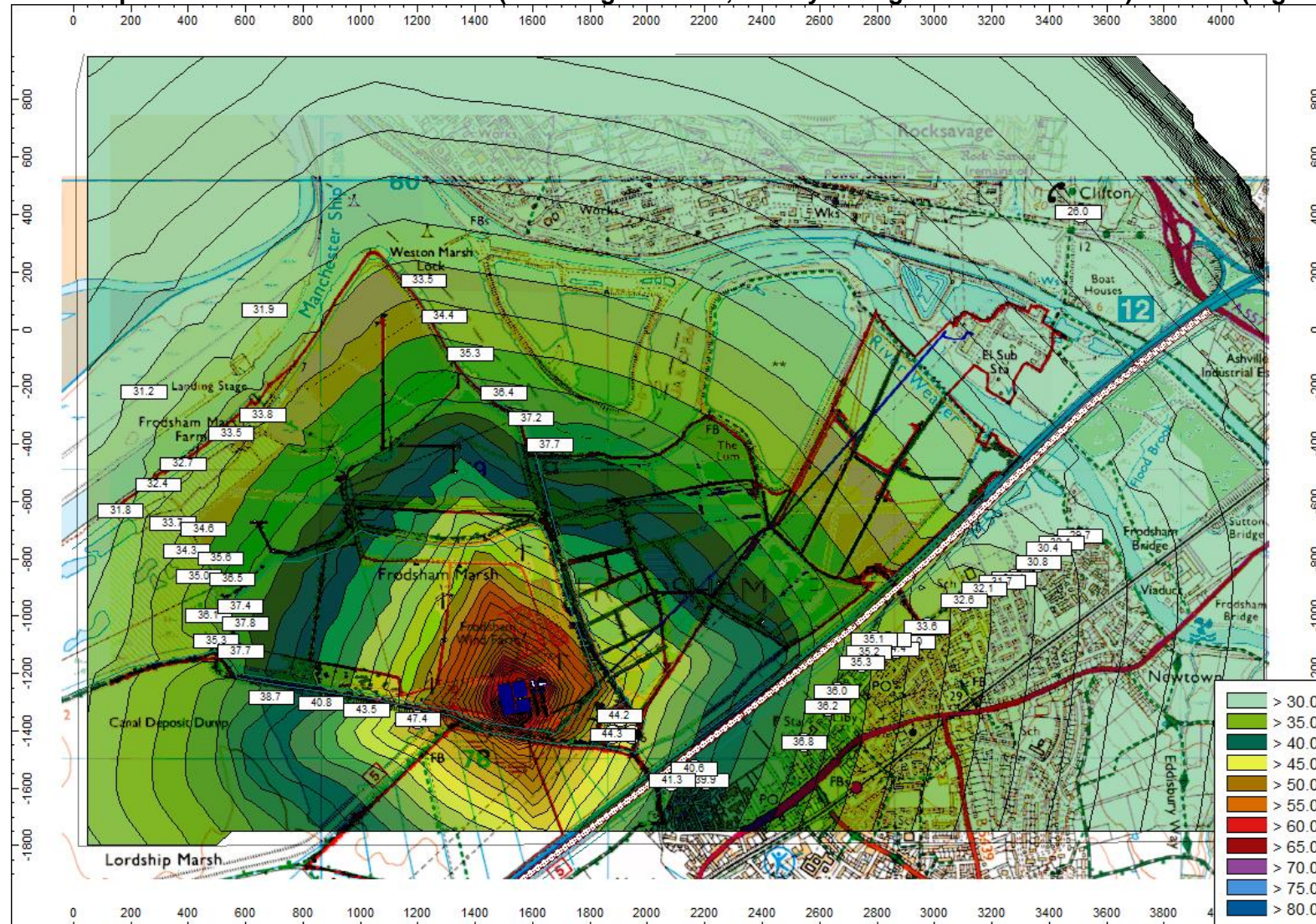
Noise Map 1: Maximum Noise from PV operations & BESS (including inverters, battery storage and transformers) 1.5m AGL (Daytime)



Noise Map 2: Maximum Noise from PV operations & BESS (including inverters, battery storage and transformers) 4m AGL (Sunrise)

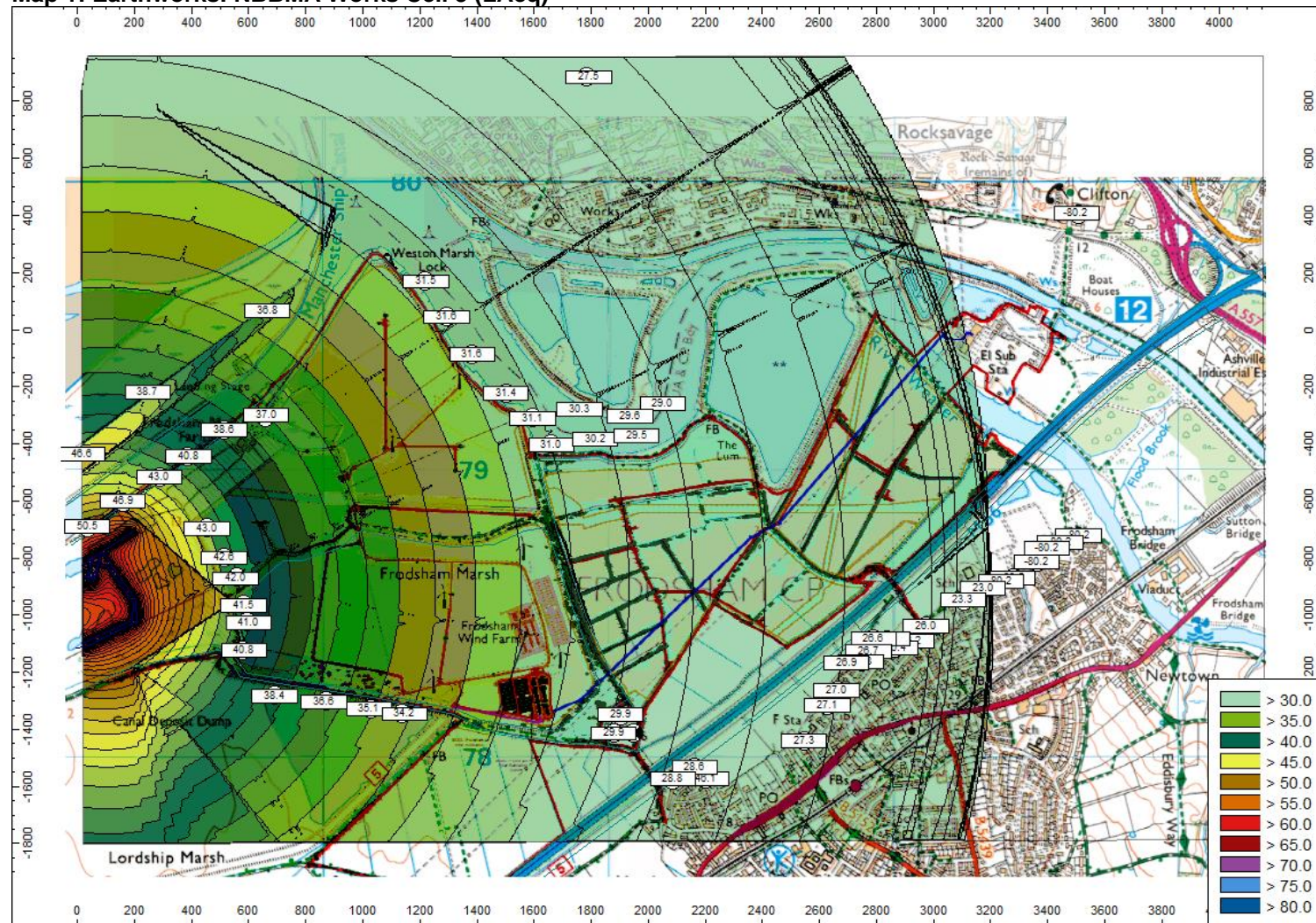


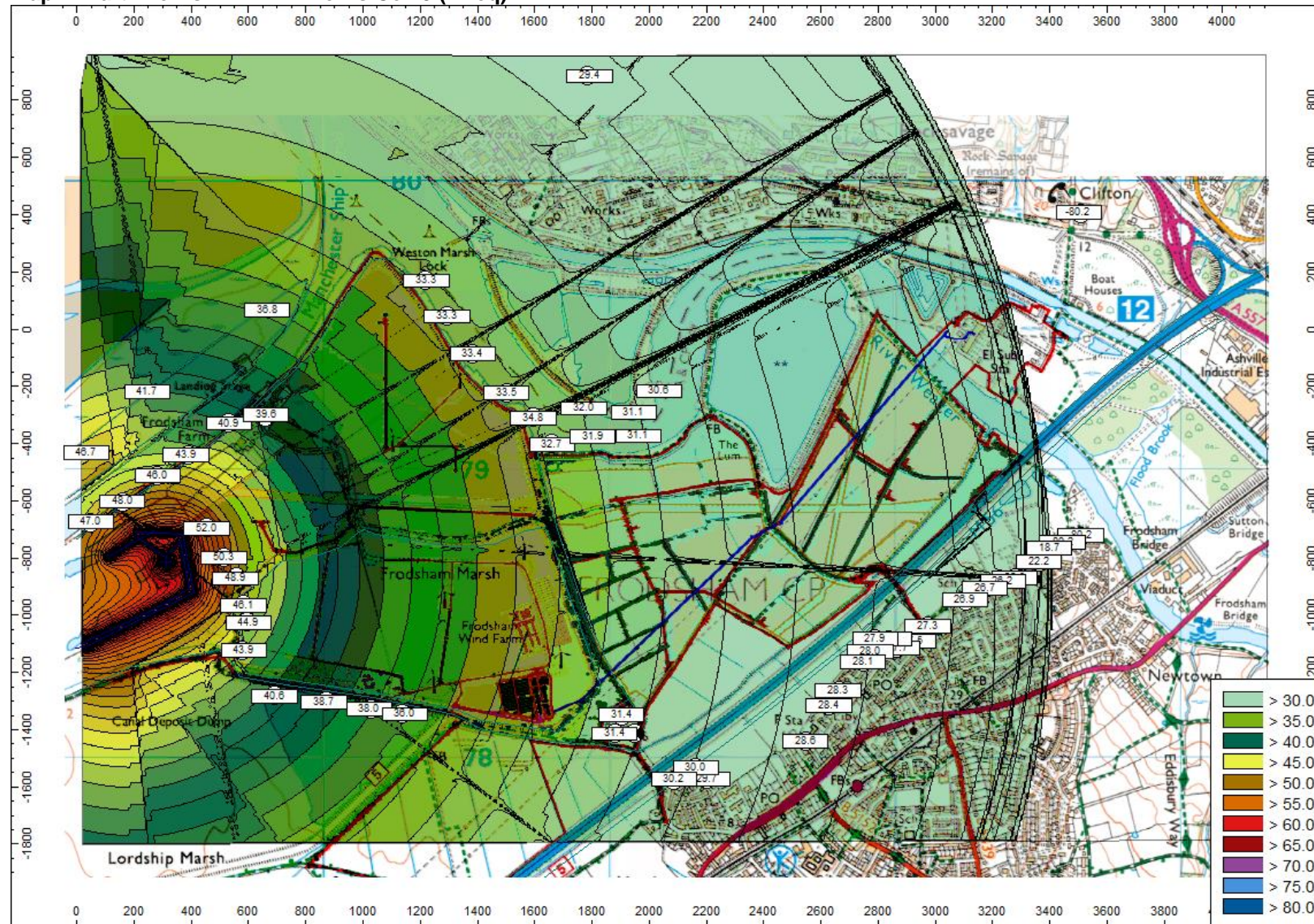
Noise Map 3: Maximum Noise from BESS (including inverters, battery storage and transformers) 4m AGL (night-time)



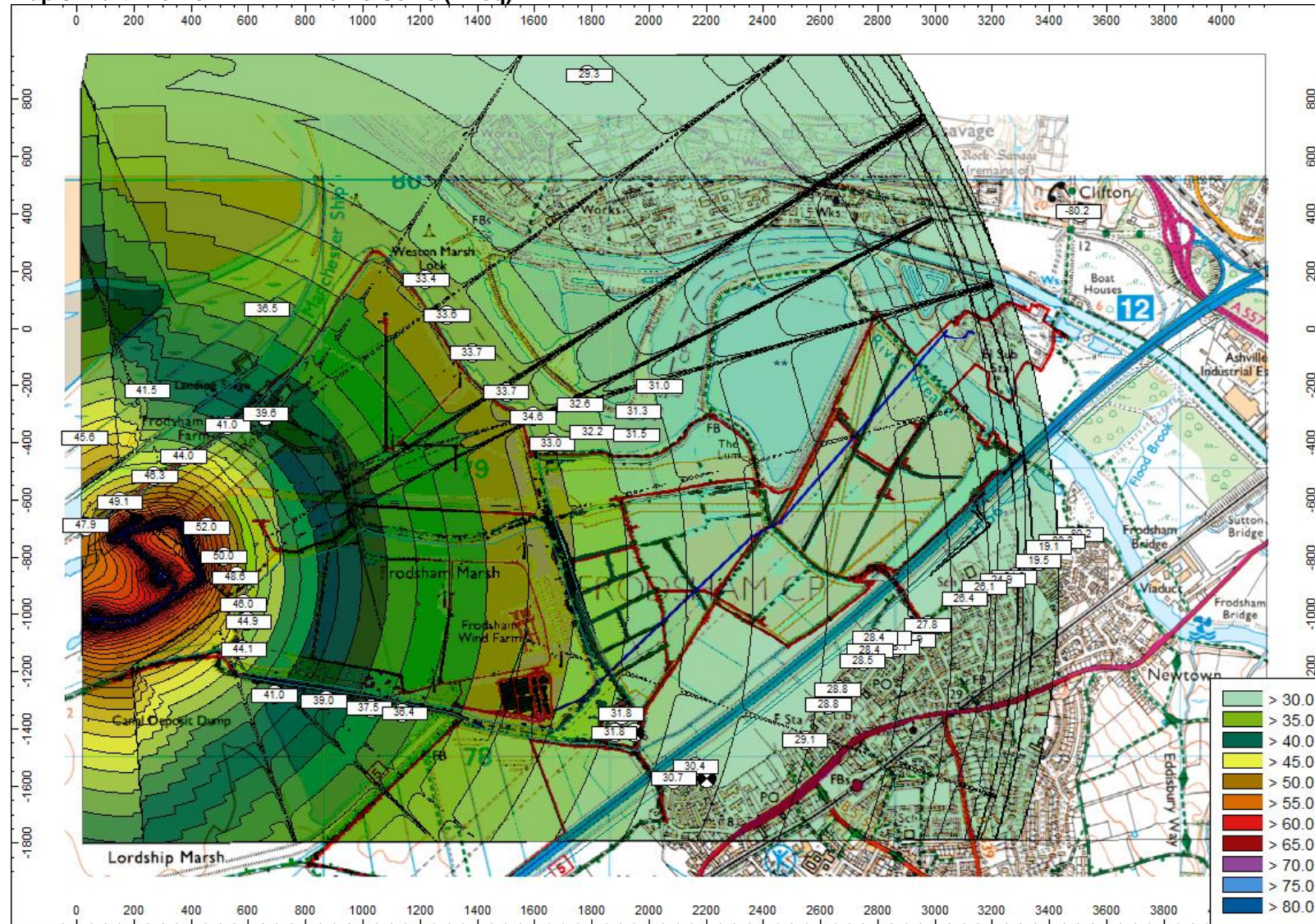
Construction Noise Maps – Ecological Receptor Areas

Map 1: Earthworks: NBBMA Works Cell 3 (LAeq)

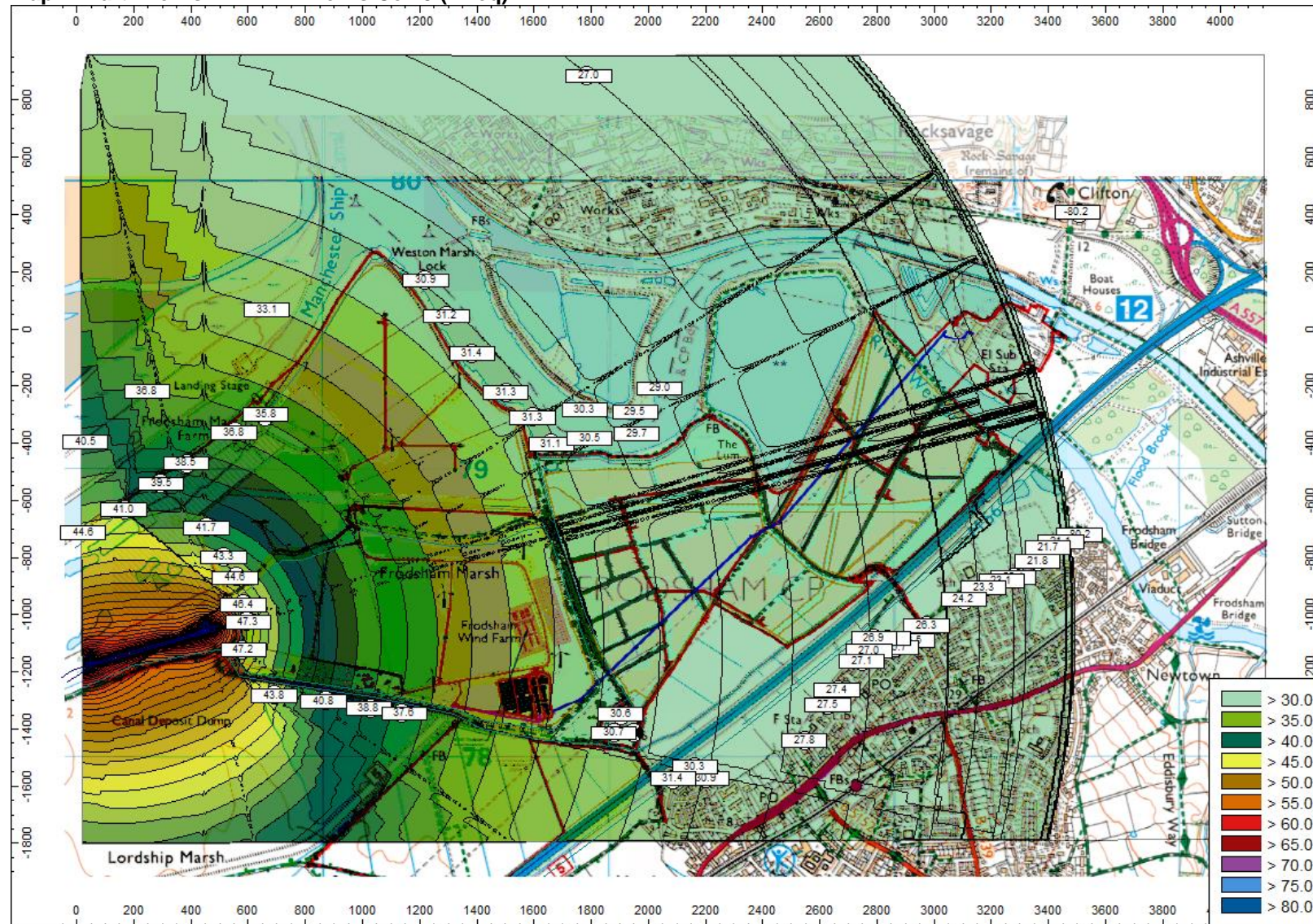




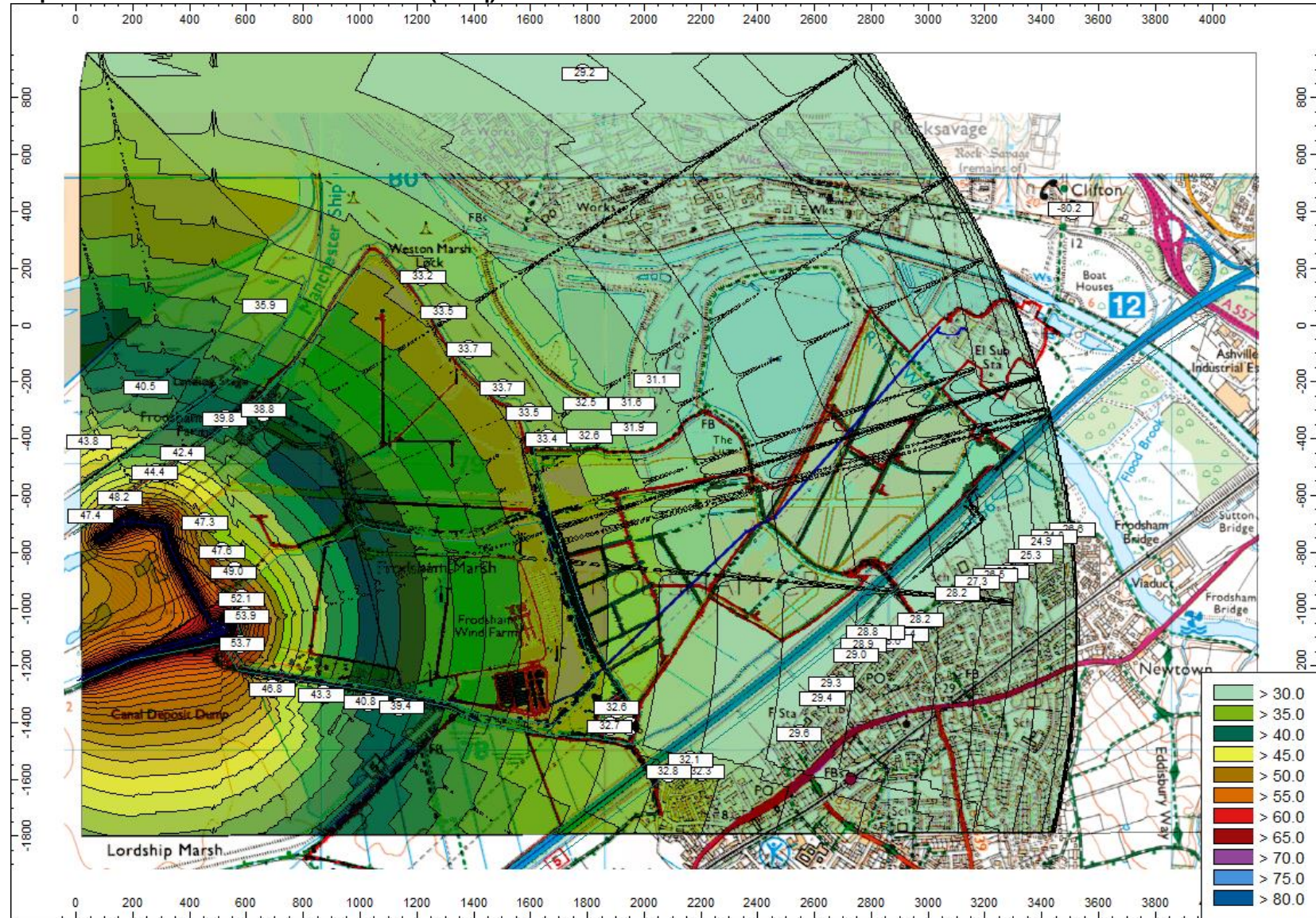
Map 3: Earthworks: NBBMA Works Cell 3 (LAeq)



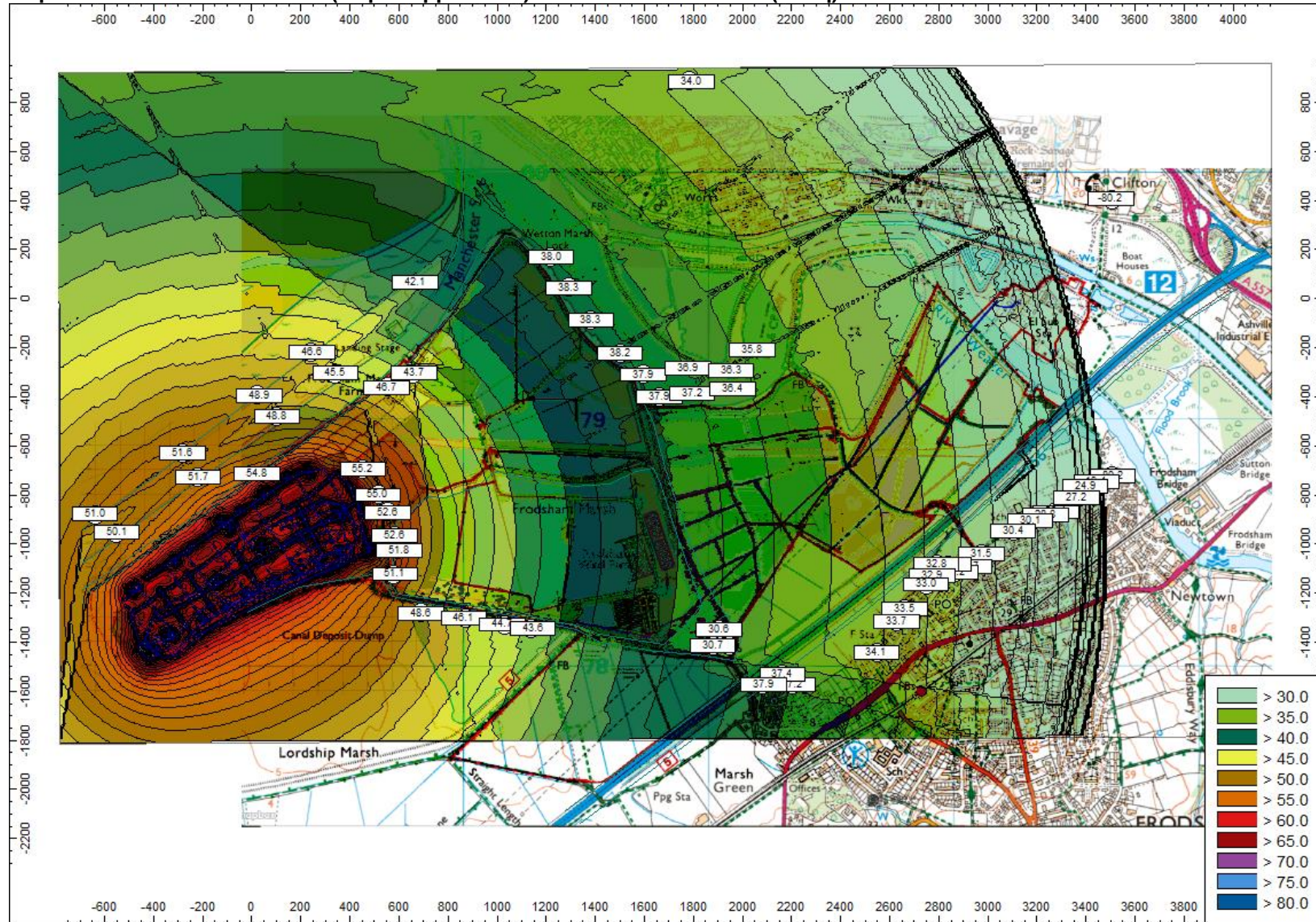
Map 4: Earthworks: NBBMA Works Cell 3 (LAeq)



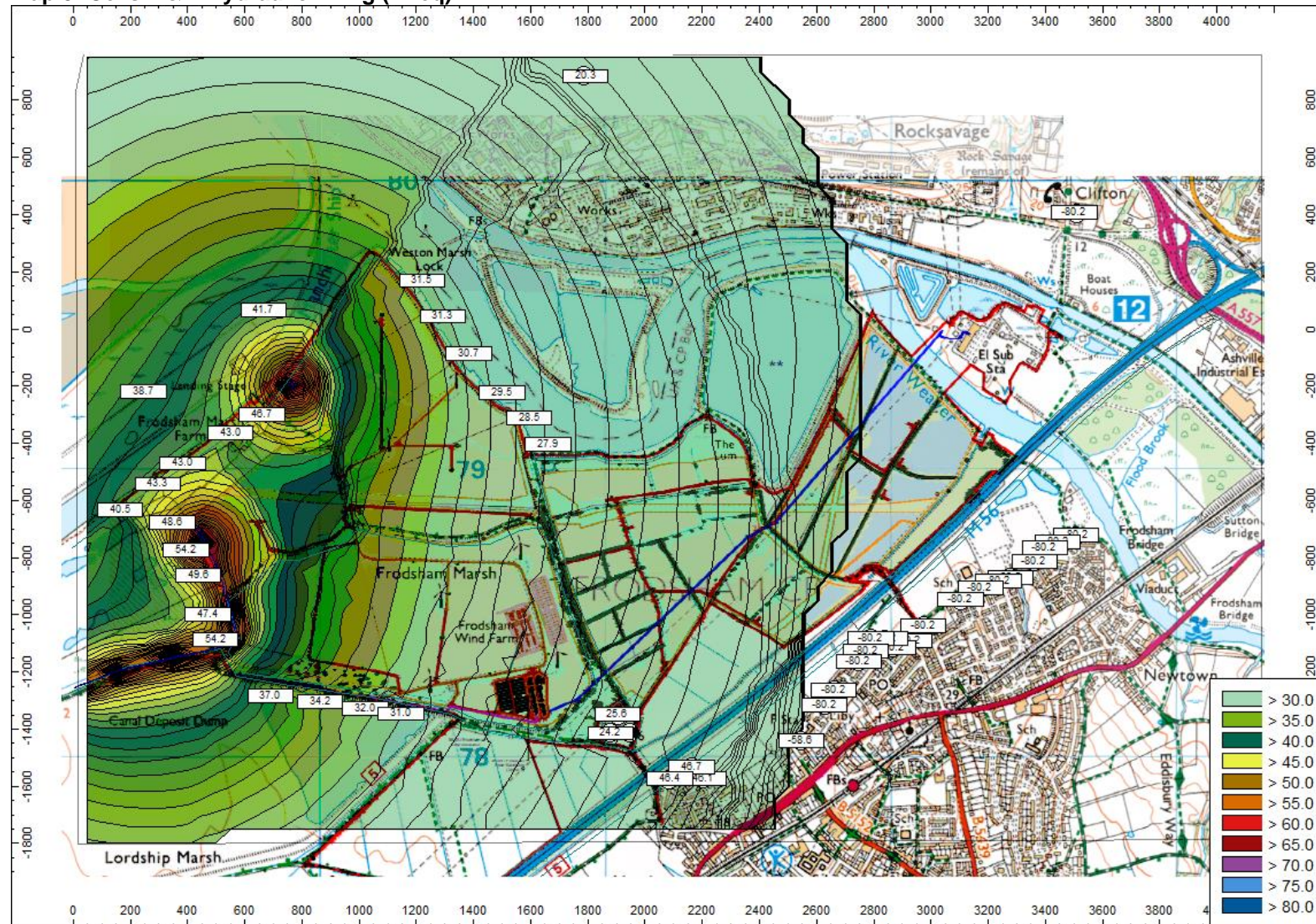
Map 5: Earthworks: NBBMA Works Cell 3 (LAeq)



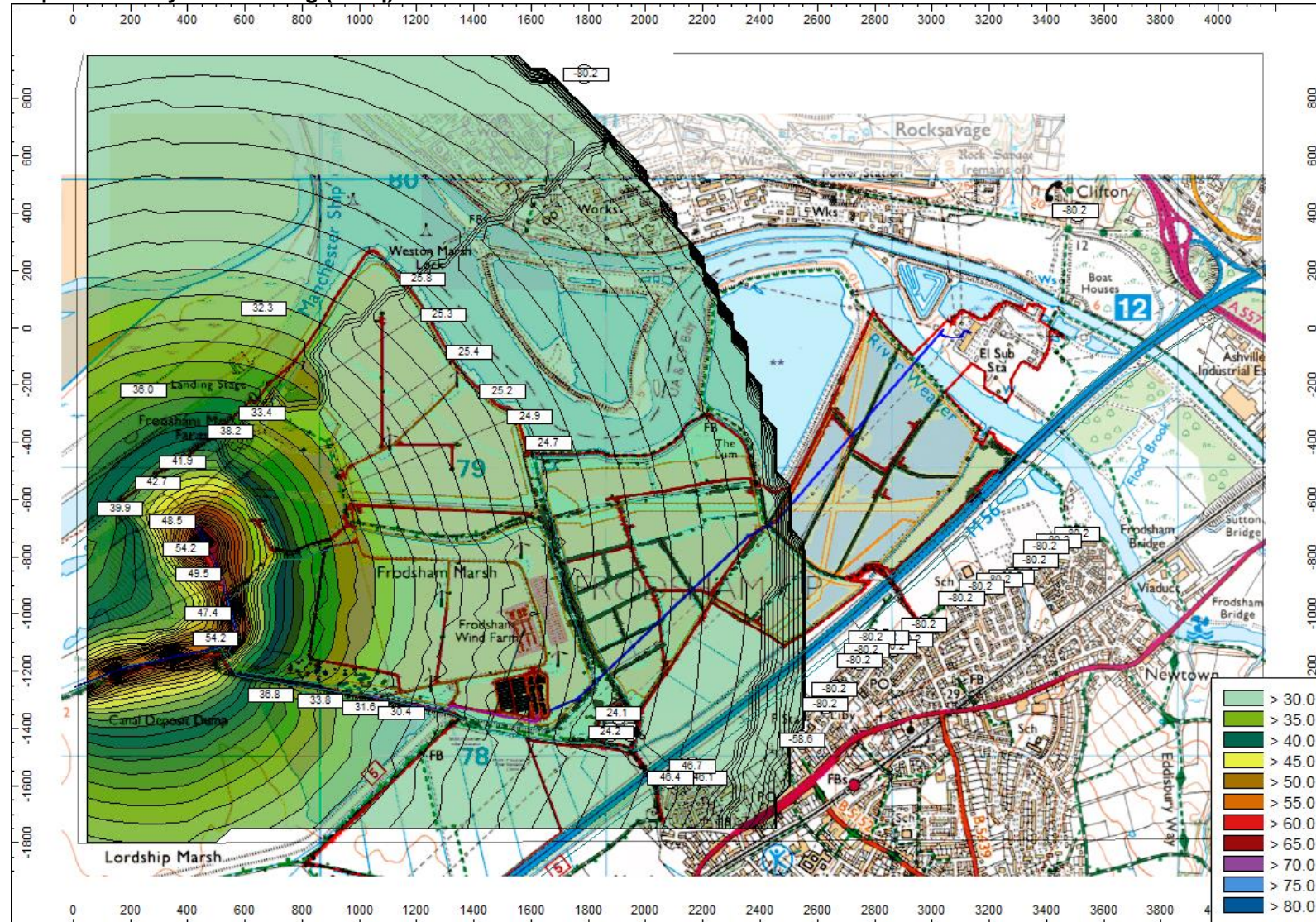
Map 6: Worst Case Earthworks (as per Appendix 4) - NBBMA Works Cell 3 (LAeq)



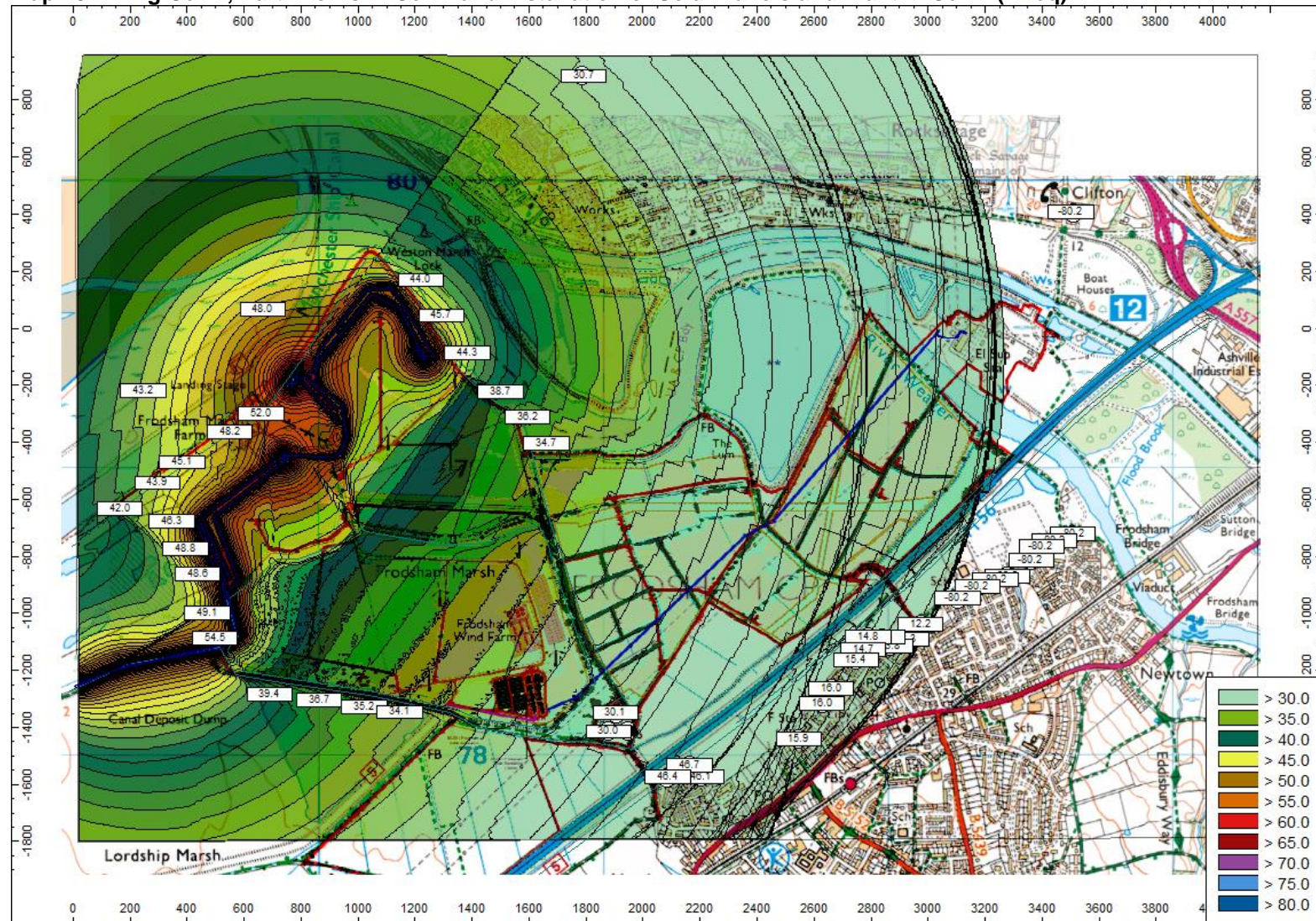
The map displays the topography of the Frodsham Marsh area. Key features include the Frodsham Marsh, Lordship Marsh, and the Frodsham Wind Farm. The map shows contour lines and elevation data points. A color-coded legend on the right indicates elevation ranges from > 30.0 to > 80.0. The map is overlaid with a coordinate grid.



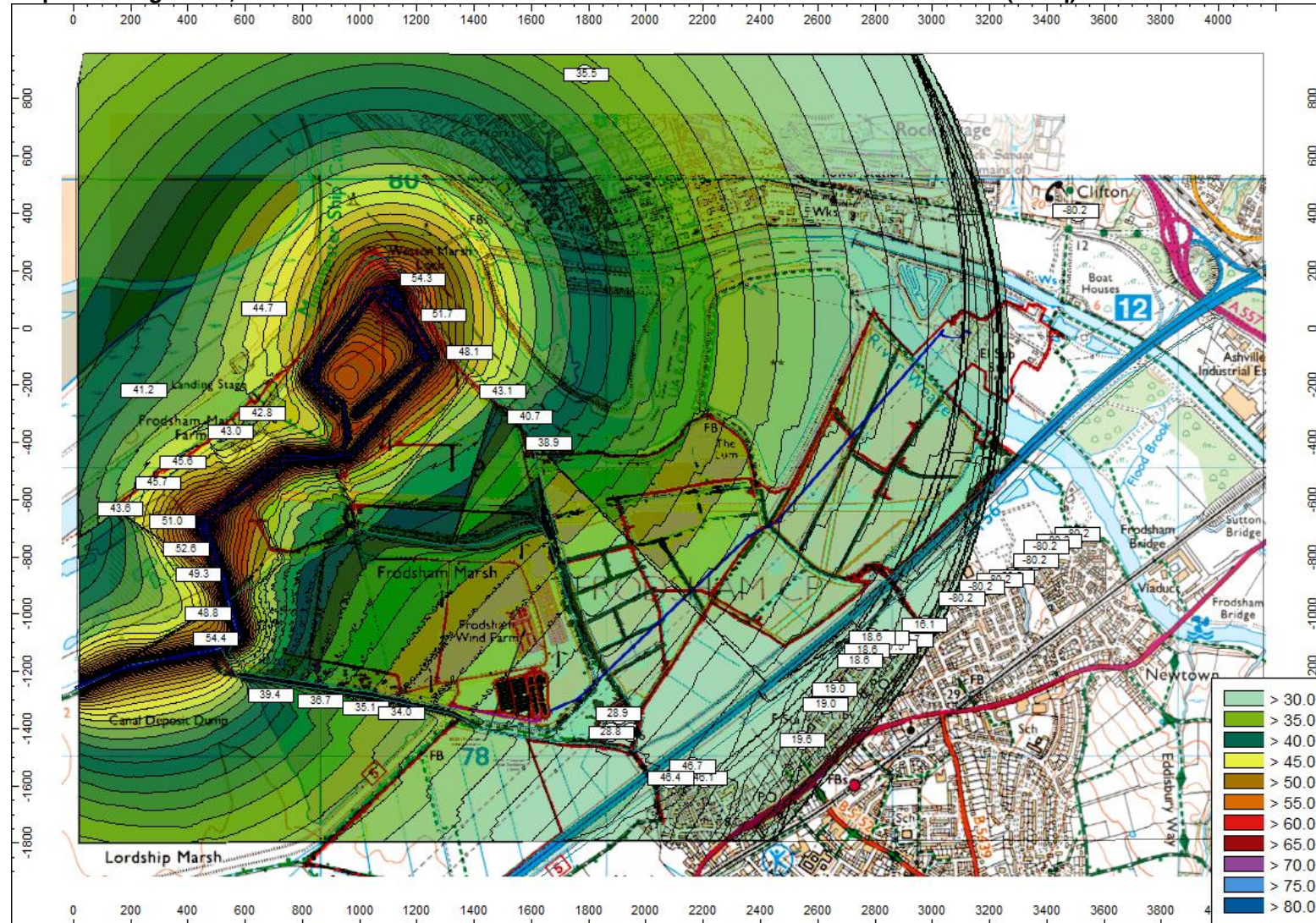
Map 9: Cell 2 Hydraulic Piling (LAeq)



Map 10: Piling Cell 1, Earthworks in Cell 2 and Installation of Solar Panels and Plant in Cell 1 (LAeq)



Map 11: Piling Cell 1, Earthworks in Cell 2 and Installation of Solar Panels and Plant in Cell 1 (LAeq)

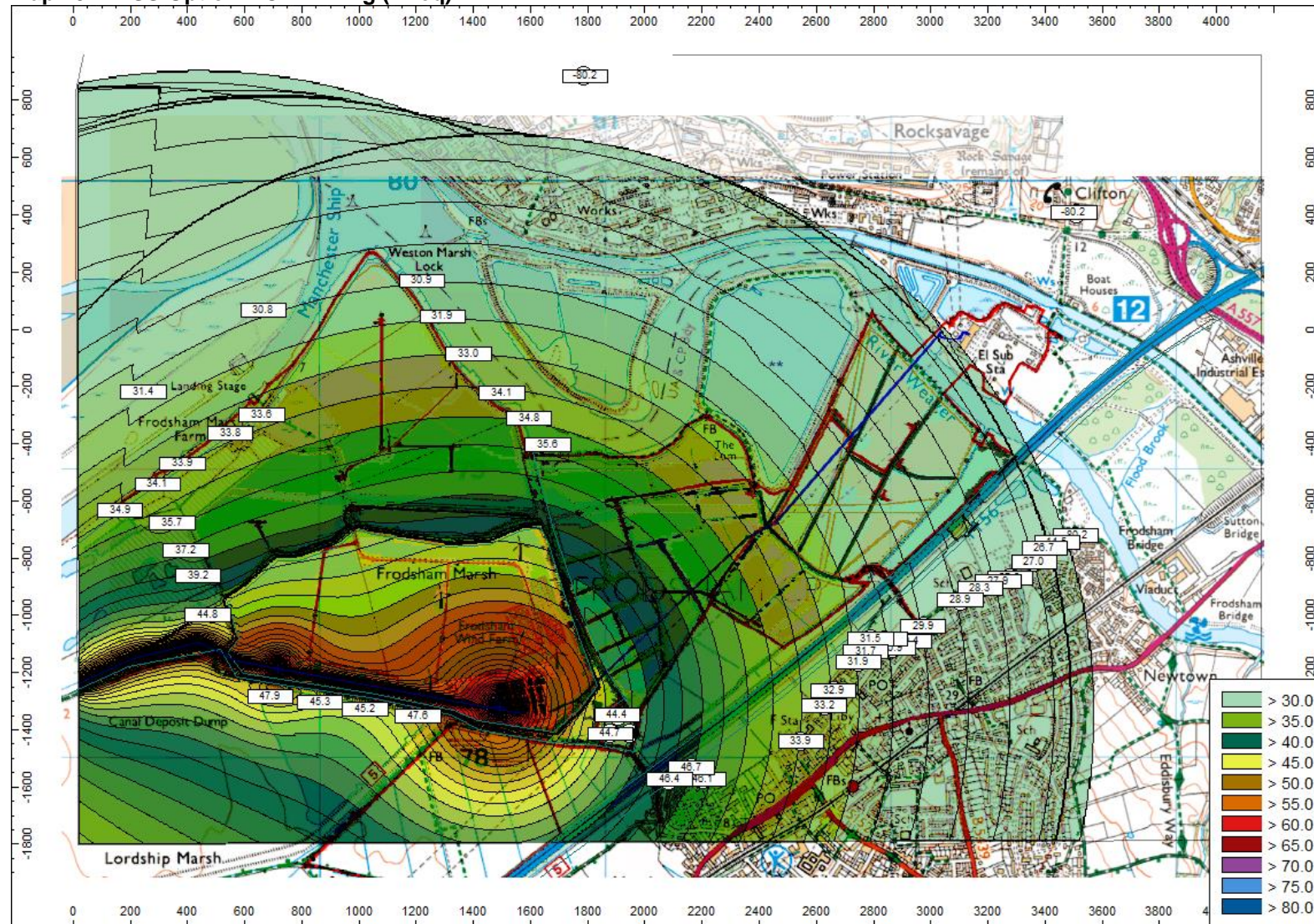


The map displays the Clifton area with various landmarks and infrastructure. Key features include:

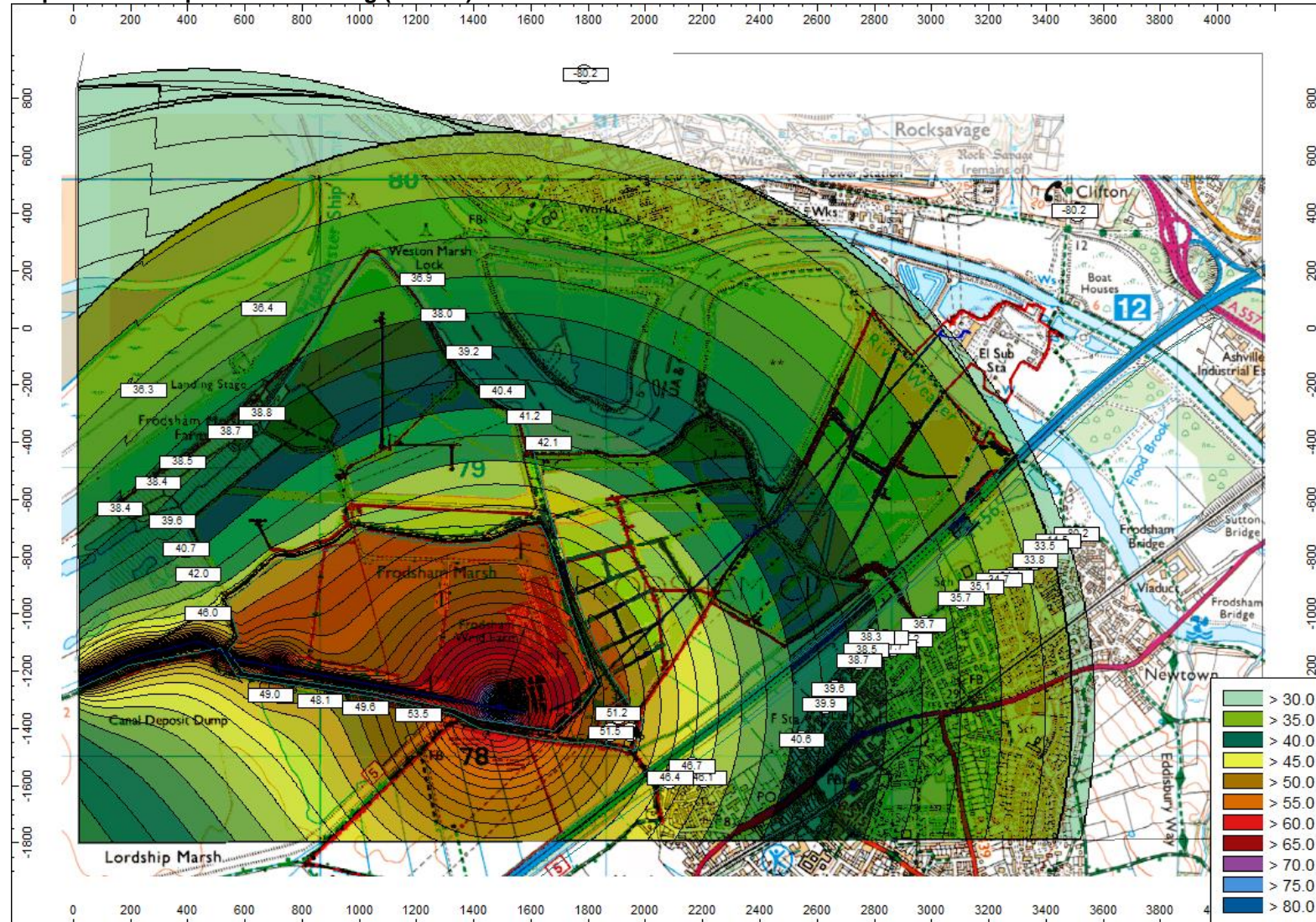
- Landmarks:** Lordship Marsh, Frodsham Marsh, Clifton, Ashville Industrial Estate, Sutton Bridge, Frodsham Bridge, Viaduct, Newtown, Eddisbury Way, and the Canal Deposit Dump.
- Infrastructure:** Roads (A557, A56), bridges (Sutton Bridge, Frodsham Bridge), and a viaduct.
- Elevation:** The map uses a color-coded elevation system, with a legend on the right indicating ranges from > 30.0 (green) to > 80.0 (blue).
- Grid:** The map is overlaid with a grid showing coordinates from 0 to 4000 on the x-axis and -1800 to 800 on the y-axis.

[illegible]

Map 15: BESS Option 1 CFA Piling (LAeq)



Map 16: BESS Option 1 CFA Piling (LAm_{max})



Appendix 6

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:

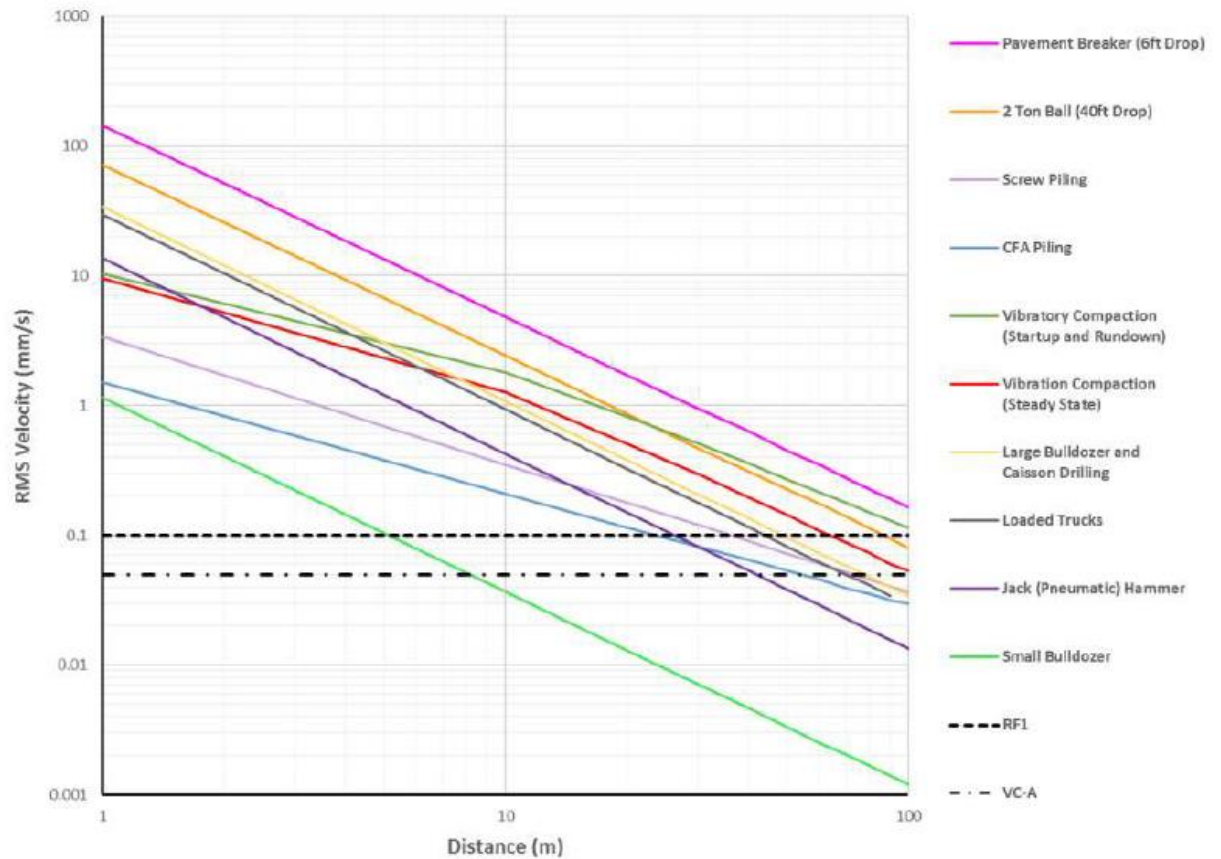
- a) **Velocity** – how fast the particles move when they are oscillating. Since the velocity of these particles continually change as the pressure wave passes the most useful value that is often reported is the maximum or peak particle velocity (PPV). PPVs are usually expressed in terms of ms^{-1} or 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 7

Vibration Levels from a Range of Construction Activities



Appendix 8

Plant Noise Levels

Assumed Noise Levels for Site Plant

Plant Type	Highest Likely Sound Pressure Level LAeq [dB]	Assumed % Operating Time	Example of mitigation	Period of Operation
Battery Storage Units	65 @ 1m	100	Silencing of vent openings or design	Daytime & Night-time
Inverters for Batteries Transformers (with inverters)	81 @ 1m 65 @ 1m	100	Design of plant or plant mounted inside acoustic enclosure	Daytime & Night-time
Solar Inverters/transformers	81 @ 1m	100	Design of plant or plant mounted inside acoustic enclosure	Daytime & Sunrise hours
Switchgear	65 @ 1m	100	Design of plant or mounted inside enclosure	Daytime & Night-time
HV Transformer	55 @ 10m	100	Design of plant or plant mounted inside enclosure	Daytime & Night-time

Appendix 9

Consultant's Experience & Qualifications

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

Précis

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

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

Relevant Work Experience

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

Qualifications and Education

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

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

