

Acoustic Expert Report
Of
Ian MacArthur
Clarke Saunders Associates

In the matter of:

THE PLANNING ACT 2008 PINS Ref: EN010168
Application by Lime Down Solar Park Limited for an Order granting
Development Consent for the 'Lime Down Solar Project'

On behalf of

SLD Wiltshire Limited

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1.0 EXPERIENCE AND QUALIFICATIONS

- 1.1 I am Ian MacArthur, Associate at the consultancy practice Alan Saunders Associates Ltd, trading as Clarke Saunders Associates (CSA). I joined the practice in 2005.
- 1.2 CSA provides specialist expert advice in the fields of acoustics, noise and vibration control, and has submitted evidence on noise and vibration impacts to courts and appeal hearings of various types throughout the UK and in the Republic of Ireland. I have been involved with the study, preparation and third party review of environmental noise impact assessments for large scale development proposals, which have included residential development schemes, renewable and non-renewable power generation schemes, waste recycling, large commercial development and aircraft noise.
- 1.3 I hold a BEng (hons) in Engineering Acoustics from the University of Southampton and am a full member of the Institute of Acoustics (MIOA).

2.0 INSTRUCTIONS

- 2.1 I have been appointed by SLD Wiltshire limited to undertake a review of the noise impact assessments for the proposed Lime Down Solar project, as submitted within the Environmental Impact Assessment (EIA) to the Planning Inspectorate, and to prepare this report summarising the key findings of my review. In conducting that review of the overall EIS, I have focused upon the following documents:

- Environmental Statement Volume 1, Chapter 14: Noise and Vibration [APP-066] (the ES)
- Environmental Statement Volume 2, Figure 14-1-1: Noise Monitoring and Sensitive Receptor Location [APP-159]
- Environmental Statement Volume 2, Figure 14-2: Daytime Operational Noise Contours [APP-160]
- Environmental Statement Volume 2, Figure 14-3: Night-time Operational Noise Contours [APP-161]
- Environmental Statement Volume 3, Appendix 14-1: Noise and Vibration Legislation, Policy and Guidance [APP-234]
- Environmental Statement Volume 3, Appendix 14-2: Acoustic Terminology [APP-235]
- Environmental Statement Volume 3, Appendix 14-3: Baseline Noise Survey [APP-236]
- Environmental Statement Volume 3, Appendix 14-4: Noise Modelling [APP-237]
- Outline Construction Environmental Management Plan (OCEMP) [APP-277]
- Outline Operational Environmental Management Plan (OOEMP) [APP-278]
- Outline Decommissioning Strategy (ODS) [APP-289]
- The Applicant's Response to Relevant Representations (Part 1) [PDA-009]

3.0 OVERVIEW

- 3.1 Noise impacts due to the proposed solar project would arise during construction/decommissioning and operation.
- 3.2 Construction-related noise effects would be temporary. However, the ES recognises that there will be various noise effects in the construction period on receptors between the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL) (see ES at paras 14.10.4 and 14.10.8). The EIA identifies that night-time Horizontal Directional Drilling (HDD) activities have the potential to generate significant adverse effects (i.e. above SOAEL) at a number of sensitive receptors (see ES at para 14.10.14). While such impacts are transient and could be mitigated through temporary measures, the Outline Construction Environmental Management Plan (OCEMP) does not mandate such avoidance and mitigation. The occurrence of significant adverse effects nonetheless engages the requirement under national policy to avoid significant

adverse effects on health and quality of life. Paragraph 14.10.19 of the ES describes the identification of the likely significant effects from night-time HDD was *“precautionary as it is expected that HDD activities outside of the daytime period would only be required if there is clear and obvious benefit, such as for safety reasons or to avoid daytime disruption to many people”*

- 3.3 This statement is conflicted with by the OCEMP, which does not commit to the avoidance of night-time HDD works where possible, or identify the exact circumstances where it may be required. On the contrary, the Construction Method Statement at 1.5.4 states that continuous working (typically 1-2 days) may be required at HDD sites [APP-183]. This implies that night-time HDD operation may be likely to occur at a substantial number of HDD sites.
- 3.4 The Applicant defines an Unacceptable Adverse Effect Level (UAEL) of 65 dB $L_{Aeq,8hr}$ at night, which is proposed as a trigger for temporary rehousing. HDD works are not proposed within 80 m of residential dwellings, based on the Applicant’s prediction of where this threshold may be exceeded (OCEMP, page 44).
- 3.5 Noise emissions during the operation of the solar farms would primarily arise from:
 - Battery Energy Storage Systems (BESS)
 - Inverters/ Conversion units
 - Transformers (including substations)
- 3.6 Much of this equipment would operate continuously through the day and night, meaning any noise generated would also be continuous in character.
- 3.7 This technical review identifies that the Applicant’s noise assessment materially underestimates the likely operational noise impacts that will arise from the development. The Applicant’s baseline noise surveys confirm that the receiving environment is at times a very quiet rural area, such that even moderate levels of continuous industrial noise would be clearly audible within residential dwellings and their curtilage. This would result in a permanent change to the character of the acoustic environment for the life of the development.
- 3.8 The EIA identifies impacts at certain receptors that are at or approaching the Applicant’s adopted SOAEL. Under national policy, such SOAEL effects should be avoided, not merely controlled or accepted as tolerable design outcomes.
- 3.9 Notwithstanding this, the Applicant’s approach is to commit to apply only the minimum mitigation necessary to achieve compliance with SOAEL, rather than to mitigate and minimise noise effects as far as reasonably practicable, as required by policy and good acoustic practice.
- 3.10 Accordingly, the proposed mitigation strategy is not consistent with an application that seeks to apply the most practically effective noise mitigation available¹), nor does it demonstrate a commitment to reducing impacts in a direction towards the LOAEL or below.
- 3.11 The proposed limits and commitments to noise mitigation are not suitably robust or sufficiently precautionary, and do not represent a reasonable worst-case assessment, so as to ensure that no significant adverse effects due to noise would arise.

¹ Aligning with the principal of demonstrating the application of Best Practical Means as a means of defence against a noise nuisance as introduced within the Control of Pollution Act 1974.

4.0 ASSESSMENT METHODOLOGY – POLICY AND BASIS

Policy Context

4.1 As the Overarching National Policy Statement for Energy (NPS EN-1) recognises at para 5.12.1, excessive noise can have wide-ranging impacts on the quality of human life and health, and can also have an impact on the environment and enjoyment of areas of value such as quiet places and areas with high landscape quality.

4.2 The EIA noise assessment seeks to follow national planning policy, applying the Noise Policy Statement for England 2010 (NPSE). This is adopted as the relevant Government policy in NPS EN-1 at para 5.12.2.

4.3 The NPSE establishes a clear policy framework based on three effect levels:

NOEL (No Observed Effect Level): below which no detectable effect occurs

LOAEL (Lowest Observed Adverse Effect Level): above which adverse effects begin and should be **mitigated and minimised**

SOAEL (Significant Observed Adverse Effect Level): above which effects are significant and **should be avoided**

4.4 These principles are reinforced by NPS EN-1, which at para 5.12.17 explains for Secretary of State decision-making that: :

The Secretary of State should not grant development consent unless they are satisfied that the proposals will meet the following aims, through the effective management and control of noise:

- *avoid significant adverse impacts on health and quality of life from noise*
- *mitigate and minimise other adverse impacts on health and quality of life from noise*

4.5 where possible, contribute to improvements to health and quality of life through the effective management and control of noise. The Secretary of State is also directed to consider “including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified” (para 5.12.18).

4.6 The Applicant’s approach is inconsistent with this policy framework, in that it seeks only to demonstrate compliance with SOAEL, rather than *avoiding* significant adverse effects and *minimising* noise impacts towards LOAEL or lower. As a consequence, the assessment does not provide a sound basis for decision-making, as it fails to properly characterise the extent of adverse effects or to demonstrate policy compliance.

4.7 An excerpt from the government noise exposure hierarchy table² is shown below, describing outcomes in terms of noise effects related to LOAEL and SOAEL.

² https://assets.publishing.service.gov.uk/media/5d39a87ce5274a4010e33fef/noise_exposure_hierarchy.pdf

Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid

Methodology

4.8 In simplified terms, the noise assessment methodology predicts the anticipated level of noise from the solar farm plant at noise sensitive receptors, and compares this with the existing underlying background noise level, taking any characteristics of the noise into account. This methodology aligns with BS4142:2014.³ This provides an indication of how noticeable a specific sound may be.

4.9 The ES methodology does not describe a NOEL, but adopts self-defined LOAEL and SOAEL thresholds as:

LOAEL: plant noise 5 dB below the typical background level ($L_{A90,T}$) – subject to a minimum of 30 dB $L_{A90,T}$

SOAEL: plant noise 5 dB above the typical background level ($L_{A90,T}$) – subject to a minimum of 30 dB $L_{A90,T}$

4.10 This gives rise to two materially important issues and concerns;

- The determination and description of the typical background level is critical in determining potential impacts.
- The adoption of a minimum fixed background level, irrespective of measured conditions, reduces the apparent significance of predicted impacts.

5.0 QUANTIFICATION AND DESCRIPTION OF BACKGROUND NOISE

5.1 The background noise climate has been quantified by the Applicant through surveys at a variety of locations. BS4142:2014 sets out various matters to consider when assessing background noise levels. Among other things, BS4142 provides that the assessor should “conduct background sound level measurements under weather conditions that are representative and comparable to the weather conditions when the specific sound occurs or could occur” (para 8.1.1). The standard goes on to provide that “where possible” the background level should be

³ BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

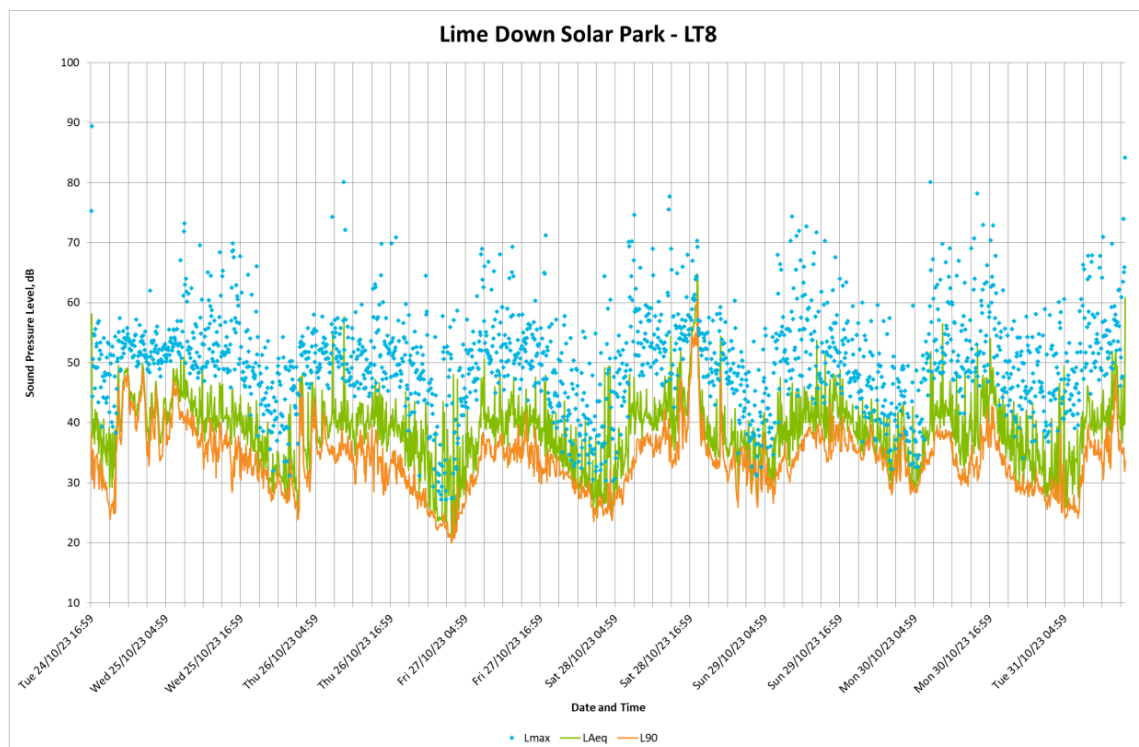
measured at the assessment location. However where “this is not possible measure at an alternative location where the residual sound is comparable to the assessment location(s)” (para 8.1.2).

- 5.2 The assessment states at para 14.4.3 of the ES that “Every effort has been made to make sure that measurements may be considered to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from a survey. A precautionary approach is adopted when analysing such data to provide a robust assessment.”
- 5.3 On the contrary, a number of inconsistencies and uncertainties are present in the data obtained, which conflict with the statements made by the Applicant regarding taking precautionary and robust approach to assessment. A specific review of the data obtained at monitoring locations LT8 and LT12 is presented below, as an example. However, it is considered that the inconsistencies and uncertainties applicable to LT8 and LT12 indicate a defect of methodology which applies to the entire range of the baseline noise evidence collected by the Applicant.

Monitoring LT8 – Analysis

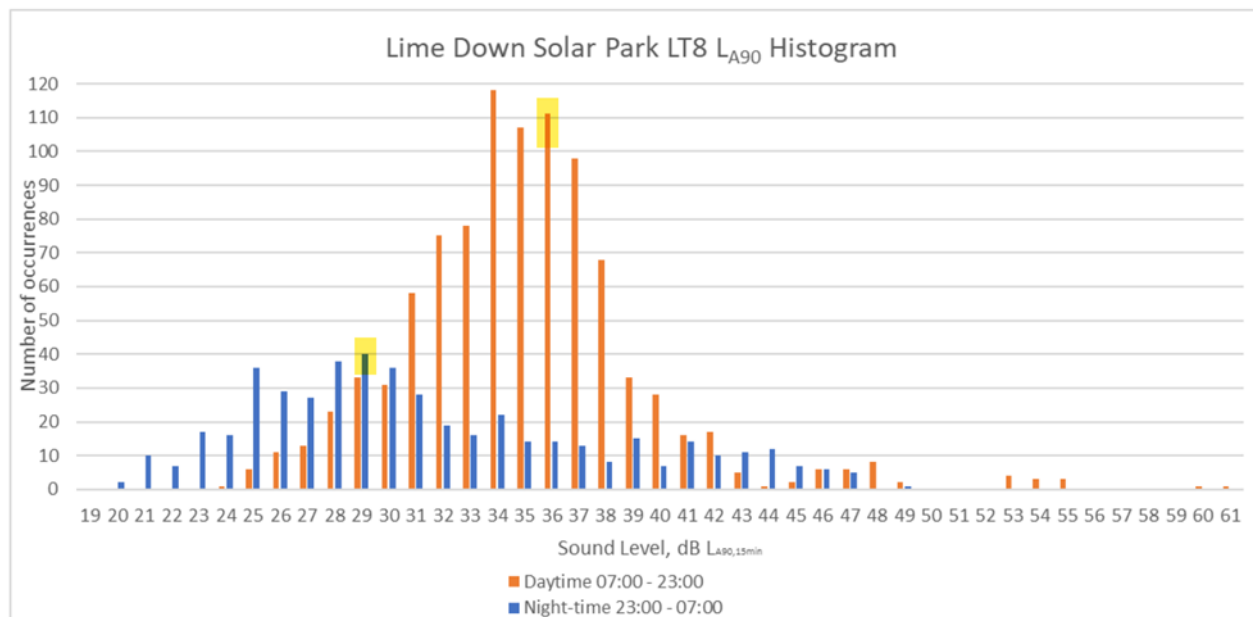
- 5.4 This monitoring location LT8 has been assigned as being representative of conditions at receptor R20, which is subject to some of the highest predicted noise levels from the development. This sensitive noise receptor is Townlease Farm, comprised of an operational farm and dwelling (see ES at para 14.6.40), located approximately 1km from the indicated location of the noise monitor.
- 5.5 The underlying background noise level is described using the L₉₀ parameter, which represents the lowest 10th percentile of fluctuating sound levels over a given time period. The background noise level varies throughout the day and night. The EIA Baseline Noise Survey [APP-236] at para 1.2.6 describes that “In line with BS 4142:2014 (Ref 2), The LA90 levels presented have been derived from the statistical analysis of the distribution of the background sound data.”
- 5.6 Table 14-17 of the ES summarises ranges of what appears to be the daily averaged measured background levels. The Baseline Noise Survey Plate 8 clearly shows that night-time levels at location LT8 can fall below 30dBL_{A90} during the day and down to 20dBL_{A90} at night.

Plate 8: LT8 Measurement Time History (Solar PV Sites)



- 5.7 The statistical distribution of background levels at location LT8 is presented as a histogram in the Baseline Noise Survey Plate 36, as shown below. This clearly shows the actual ranges of background levels measured during the survey. Highlighted in yellow are the Applicant's selected single-figure daytime and night-time background values for subsequent use in the assessment. The rationale or justification for selection of these values is not explained within the ES, and it is not defined whether they are mean, median or other value. Inspection suggests that quite simply, the mean (average) value from the dataset has been used. The Applicant's Response to Relevant Representations (Part 1) at [PDA-009] SLD-096 suggest they have simply used '*professional judgement*' which '*are close to but not always the modal levels*'; regardless of the approach adopted, these comments still apply.
- 5.8 The applicant has selected a single figure background level of 36dB_{LA90} during the day and 29dB_{LA90} at night to represent the 'typical' background.

Plate 36: LT8 LA90 Histograms (Solar PV Sites)



- 5.9 It is clear that background levels during the survey period were below the selected daytime value for more than 50% of the time, falling up to 11dB lower. It is noted that the use of the absolute lowest levels is not always appropriate, although it would represent a 'precautionary' approach which may be appropriate in varying circumstances. A reasonably robust assessment approach, given the limited survey duration, would be to select a value representative of the *lower range* of background levels measured during that limited period – in this instance, a value in the range 23-25dB_{LA90} at night, and around 30dB_{LA90} during the daytime could be judged to provide a more reasonable and robust representation of typical background levels for the assessment at this location based on this limited sample dataset.
- 5.10 This aligns with BS4142 and the ANC BS4142 guidance note.⁴ As the Applicant references at SLD-096 of its Response to Relevant Representations (Part 1) [PDA-009], the introductory notes to para 8.1 of BS4142 explain that "*the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods*". The standard goes on to explain at explanatory note 1 to para 8.1.4 that "*a representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value*". Assistance can be drawn from the example given in note 4 and figure 4 to the BS, of an example where a background level was chosen.⁵ Annex B (informative) of the Standard goes on to explain at B.1 that "*an appropriate consideration of uncertainty based on professional judgment can enable an informed decision to be made regarding the likely significance of the impact of sound, whilst considering the range of likely levels and context of the assessment*".

⁴ Association of Noise Consultants – BS4142:2014+A1:2019 Technical Note March 2020

⁵ Further guidance examples are also provided in section 8 of the ANC BS4142 guidance.

- 5.11 Thus, the guidance describes making appropriate professional judgement, particularly where there is a large range in measured background levels, rather than simply judging the minimum, mean or modal values as being “typical”. Where there is a range in background levels, this should ideally be treated as a point of uncertainty if selecting a single figure value, with the resultant uncertainty of assessment outcomes (i.e. significance of impact) approached accordingly. Where the range is large, uncertainty in the outcome of assessments of significance can be reduced by selecting a single figure background level towards the lower end of the range.
- 5.12 The survey was undertaken over a period of one week at the end of October 2023. While this duration is generally sufficient for capturing a representative range of background levels (depending on weather conditions), the dataset should be interpreted with appropriate caution when defining a level which would be considered ‘typical’ at all times.
- 5.13 The flaw in the Applicant’s approach here, for example in respect of the daytime range, is that selecting a value which is apparently above the median, mean and mode does not properly account for the range of background noise, nor does such a background figure have regard to the overall likely significance of the impact for a large proportion of the time. An inappropriately high background selection minimises noise effects of development without justification, leading to a conclusion disregarding the lower range of figures and pointing to unlikely outcomes.
- 5.14 Further, I have investigated weather records from a nearby weather station. The historical data shows that there was significant rainfall on Saturday 28th October 2023, likely to have resulted in the a-typical spike in levels above 50dB_{LA90} as seen in the centre of the time history chart. These periods do not appear to have been discounted when presenting the statistical distribution of background noise levels.
- 5.15 The Applicant’s Response to Relevant Representations (Part 1) at SLD-099 [PDA-009] states *“The Applicant accepts that data from 28 October 2023 should be discounted from the analysis of the background levels due to adverse weather conditions. However, the purpose of the analysis of such levels is to discount such outliers in the data. As such the Applicant does not consider this to have had a material effect on the background levels used in the assessment.”*
- 5.16 I disagree, in that the Applicant has determined 36dB_{LA90} as single figure daytime background level from the statistical distribution shown above, the selection of which clearly sits above a median or modal value of the normal distribution and has clearly been skewed by the infrequent higher values. In their response, the Applicant does not explain what their professional judgement basis was for selection of this value, or how this is appropriate to represent the ‘typical’ background noise level at the receptor at all times. It does not have regard to what BS4142 and the guidance direct attention to in identifying likely significance of noise effects and reflecting the range of background noise outcomes.
- 5.17 In contrast, the appropriate background noise level values from this dataset I have suggested above are further justified by the exclusion of the outlier data from 28 October 2023. Were 30dB _{LA90} during the daytime and 25dB _{LA90} at night to be applied to the Applicant’s assessment of prospective noise effects (respectively, Tables 8 and 9 of the Applicant’s Noise Modelling), the exceedance would be 7dB in the daytime (a predicted rating level of 37dB_{LA_r, Tr}) and 10dB in the nighttime (a predicted rating level of 35dB_{LA_r, Tr}). For R20 this would result in SOAEL effects in both the daytime and night-time, and for this sensitive residential/agricultural receptor (applying the Applicant’s own matrixes), a major/moderate effect in EIA terms in the daytime (2dB exceedance of the SOAEL) and a major effect in EIA terms in the night-time (5 dB exceedance of the SOAEL).

LT12 – Analysis

- 5.18 The Applicant’s background noise surveys used a monitor installed at location LT12 to inform the baseline levels at Bradfield Manor (receptor R10). Bradfield Manor is a particularly sensitive receptor, being both a residential dwelling but also a Grade I listed heritage asset.
- 5.19 This monitoring position is shown to have been located very close to the road (Bradfield Cottages), which would therefore measure significantly higher average and maximum noise levels from road traffic than would be

experienced at Bradfield Manor, which is situated at least 100m from the road. Such a selection of location fails properly to consider BS4142:2014 which provides that, where assessment at the relevant assessment location is not possible, “measure at an alternative location where the residual sound is comparable to the assessment location(s)” (para 8.1.2).

5.20 Any reference to the ambient noise levels (L_{Aeq} , L_{Amax}) as measured at this location being representative of receptors located further from the road are not therefore appropriate to describe the ambient climate at Bradfield Manor. That is because any such average would take into account the close proximity of vehicles travelling on the road. This is particularly relevant to the Construction Phase LOAEL noise threshold adopted by the Applicant at R10, which has been set to equal the average ambient level as measured at LT12.

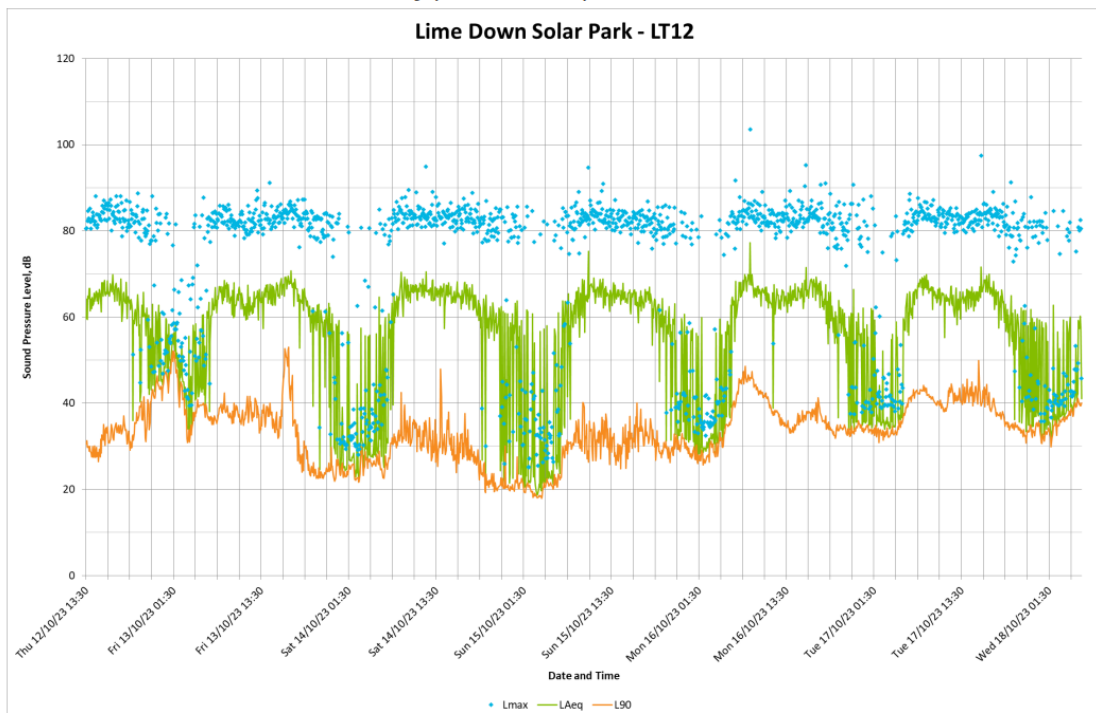
5.21 However, given the likely low flow of road traffic on this road, the underlying background levels (L_{A90}) between vehicle movements is unlikely to be substantially in excess of those at the nearby residential receptors.



5.22 The baseline noise levels were obtained in Autumn 2023, between the 12th and the 18th of October.

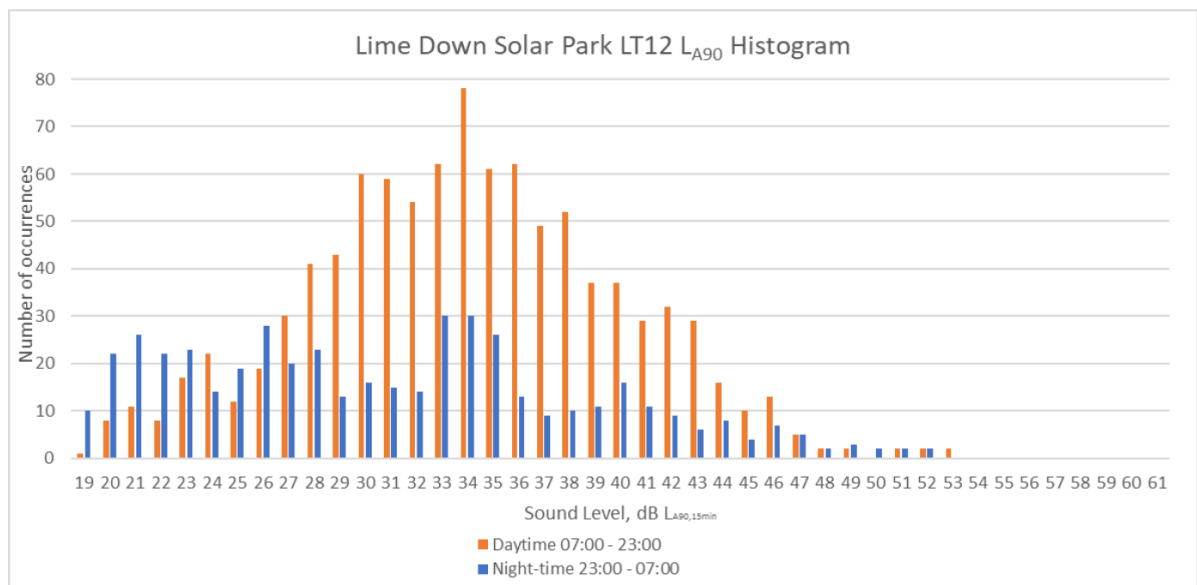
5.23 The time-history trace of the measured data is shown in Plate 12 as below. The key parameter is the background noise level, L_{A90} , shown as an orange line.

Plate 12: LT12 Measurement Time History (Solar PV Sites)



- 5.24 The weather during this survey was not reported or seemingly monitored by the Applicant at or near the monitoring location. From sourced weather data nearby, there is evidence that the area was influenced by raised winds over 5m/s and periods of rainfall on the 12th and 13th of October. The 14th and 15th may have had periods of rain, but low winds. The 16th to 18th were likely influenced by wind speeds over 5m/s.
- 5.25 Wind speeds over 5m/s are pertinent as BS4142 explains at para 6.3 that precautions against interference in measurement should be taken. One possible step to avoid such interference is to use an effective windshield however, the explanatory note to that section explains that “windshields are generally effective up to windspeeds of 5m/s”. Para 6.4 of the standard goes on to set out that an assessor should “exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5m/s”. Note 1 to that paragraph explains that “weather conditions can affect sound levels by influencing sound propagation or generating sound which can be pertinent to assessment”. As I highlighted above, a BS4142 assessment should be conducted “under weather conditions that are representative and comparable to the weather conditions when the specific sound occurs” and which could be determined to be typically representative. The Applicant has subsequently recognised the need to exclude some outlier weather conditions in relation to LT8.
- 5.26 During this calmer period between the 14th and 15th, it can be seen that daytime background levels typically fluctuate around 30dB_{LA90}, but can fall to the low 20s during daytime periods. At night, the background is shown to be around 20dB_{LA90}.
- 5.27 This level would equate to a background level below 10dB_{LA90} within bedrooms, when windows are open for ventilation, when taking the reduction through a partially open window to be 10dB⁶. This is a level below the measurement sensitivity of most sound level meters, and could be considered effectively silent baseline.

Plate 40: LT12 LA90 Histograms (Solar PV Sites)



- 5.28 The Applicant’s statistical analysis of the background levels for the monitoring period is shown above. In the background summary table, they have selected a ‘typical’ background level of 34dB_{LA90} during the daytime and 30dB_{LA90} during the night for the location. This appears to be a simple selection of the mean values and there is no justification for selection of these values being representative of a ‘typical’ scenario, as background levels are shown to be lower for at least 50% of the limited duration of the survey.
- 5.29 They do not represent typical background condition that could be expected at Bradfield Manor on a typical day with relatively low winds and no precipitation. During periods of calmer weather, it is clear that the background levels at this location vary around 30dB_{LA90} during the daytime, and around 20dB_{LA90} at night. The resultant effect

⁶ 10dB loss through a partially open window is the assumption adopted by the applicant, which is consistent with historical guidance and is a commonly used approximation.

of the Applicant selecting higher background levels on the assessment outcomes is considered in more detail in section 6 below.

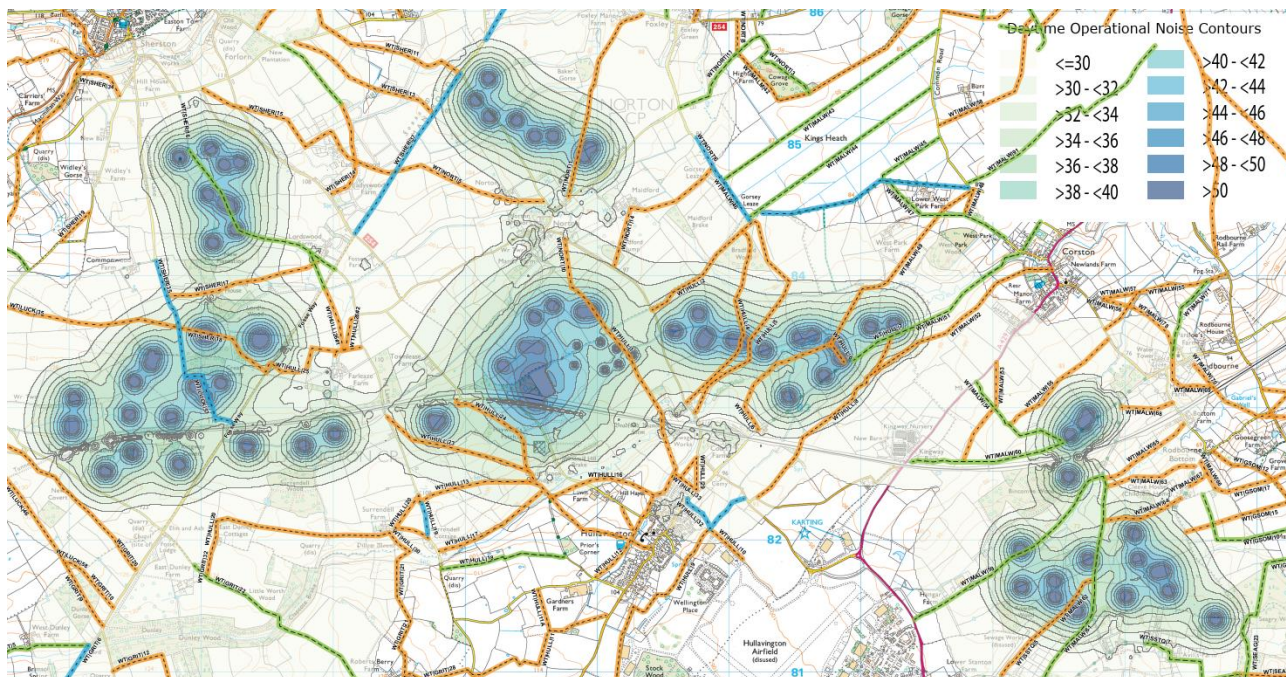
- 5.30 Bradfield Manor would currently experience very low background noise levels during the daytime and night-time periods, characterised by the absence of industrial noise sources.

Public Rights of Way (ProW Network) – Ambient and Background levels

- 5.31 The majority of monitoring locations were located in relative close proximity to roads. The monitoring positions not in close proximity to roads, for example LT3, showed low average L_{Aeq} levels ranging between 35-45 $dBL_{Aeq,T}$ during the daytime. This is representative of ambient L_{Aeq} levels away from transportation networks, as would be the case for the majority of bridleways and the ProW network in the area.
- 5.32 The EIS did not assess potential noise impacts or changes to the ambient noise climate on the ProW network and scoped it out with the following justification in the ES (para 14.6.49) *“given the linear nature of ProW, the range of noise impacts along them forming the ambient noise environment, and the transient usage of a ProW, a material change in the experience of using the ProW as a whole as a result of noise emissions from the Scheme, which could affect ProW users long-term health or quality of life, is not anticipated. Consequently, no significant adverse effects on ProW users have been identified as arising from the Scheme and a detailed assessment of noise and vibration effects on ProW users is scoped out.”*
- 5.33 NPS-EN-1 recognises at para 5.11.30 that *“Public Rights of way, National Trails, and other rights of access to land are important recreational facilities for example for walkers, cyclists and horse riders. The Secretary of State should expect applicants to take appropriate mitigation measures to address adverse effects...”*. Similarly NPS EN-3 at para 2.10.42 provides that applicants *“are encouraged to design the layout and appearance of the site to ensure continued recreational use of public rights of way where possible during construction, and in particular during operation of the site”*. Layout of the site is clearly pertinent to where noise-emitting infrastructure is placed.
- 5.34 It is noted that the applicants RR response WBA-018 provides statements that indicate noise levels from inverter units *“with silencers”* would always be below 52dB on ProW. As is addressed below, the assessment in the EIS has been conducted with a limited number of silencers and thus it is currently unclear whether this is secured in any way.
- 5.35 The response WBA-018 *“Operational noise associated with the Scheme would be between 20 and 52 dB on bridleways. These levels are below WHO guidelines on moderate community annoyance and are akin to the existing ambient sound environment in the area as evidenced by the baseline sound survey results given in Table 1 of ES Volume 3, Appendix 14-3: Baseline Noise Survey [APP-236]. As such the enjoyment of bridleways, and ProW in general, with respect to the sound level experienced, is not expected to be significantly adversely affected by the operation of the Scheme.”*
- 5.36 With reference to the ambient levels on ProW and Bridleways likely to be in the range between 35-45dB L_{Aeq} and being formed by only natural sounds, the projected industrial noise levels at up to 52 dBL_{Aeq} from the development sources would be significantly above, and incongruous with the existing ambient and background noise levels. Other anthropogenic noise sources that can be expected at times in this type of setting, such as from agricultural activity, tend to be transient and variable over time, rather than a permanent continuous hum. The resultant effect would be adverse, in that it would significantly reduce tranquillity, use and enjoyment of these areas of value. The ISEP (formerly IEAMA) guidance suggests that a relative change in L_{Aeq} ambient noise levels of more than 5dB could represent a moderate degree of adverse effect to a receptor of some sensitivity, with a substantial effect to receptors of medium or high sensitivity.
- 5.37 It is not clear what specific WHO guideline is being referred to, however, it appears likely the Applicant is citing the 1999 *WHO guidelines for community noise* which provided, for “Outdoor living areas”, a guideline level of 50 dBL_{Aeq} to protect the majority of people from moderate annoyance, and 55dB $L_{Aeq,16hr}$ to protect against serious annoyance. The same guidelines details for “Outdoors in parkland and conservation areas” (which may be more

relevant to ProW) that “existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low.”

- 5.38 Noise levels over 50dB_{L_{Aeq}} from the development would therefore fall into the category of ‘moderate annoyance’, if compared to this guideline, and, as levels could be significantly above the ambient L_{Aeq} levels, would not satisfy the guideline to preserve the currently low ratio of intruding noise to natural background sound.
- 5.39 An overlay of the ProW network on the proposed daytime noise contours (limited to 50dB_{L_{Aeq}}) is shown in the figure below. This figure is also included as Annex A to this report.



- 5.40 From analysis of this figure, the following eleven bridleways, footpaths or byways have initially been identified as being subject to plant noise levels over 50dB_{L_{Aeq}}: SHER16, NORT1, SHER18, LUCK57, NORT1, 10, HULL 1,2,4,5,6,7 and MALW59.
- 5.41 The project area falls within an area on the boundary of the Cotswolds National Landscape and has a high valued tranquillity score identified by the CPRE mapping⁷. A number of these routes are also likely to be part of routes that those travelling to and from the National Landscape may use.
- 5.42 The National Planning Policy Framework (NPPF) echoes the NPS-EN-1 policy regarding recreational areas at paragraph 198:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;”

⁷ www.CPRE.org.uk

- 5.43 Also relevant is part 105 of NPPF which provides *that “decisions should protect and enhance public rights of way and access”*.
- 5.44 The Applicant’s assertion that such noise produced by the development would be “akin” to existing conditions is not supported by the evidence and fails to recognise the importance of tranquillity as a material planning consideration, or provide any protection or commitment to minimise noise emissions in affected areas.
- 5.45 The Applicants failure to assess the extent, magnitude or potential impacts of noise emissions on these areas does not enable decision makers to take into account the likely adverse effects and whether or not appropriate reasonable steps have been taken to mitigate and minimise noise as well as to avoid significant impacts..

Background noise summary

- 5.46 The EIS noise assessment relies on averaged statistical values that obscure quieter conditions during daytime and night-time periods and do not follow industry best practice guidance. These averages appear likely to have included periods during monitoring where the background levels were raised due to adverse weather conditions. The single figure values judged by the applicant to be representative of the ‘typical’ conditions at sensitive receptors are not sufficiently robust given the monitoring periods, weather conditions and locations of monitors.
- 5.47 Effectively, the approach ignores the much-valued quieter periods and also means that indicated noise impacts at dwellings could be greater than indicated for at least 50% of the time.
- 5.48 Ambient average noise levels monitored close to roads are not representative of the quieter noise environments at sensitive receptors at greater distances from these roads. This includes consideration of the noise impacts on the ProW network, for which the Applicant has scoped out any assessment of noise effects, in part using this incorrect assumption of ambient noise levels. Such an approach does not appear to meet the relevant policy.

6.0 OPERATIONAL NOISE IMPACT

- 6.1 As referred to above the Applicant has adopted BS4142:2014+A1:2019 as the primary methodology to assess the likely impact of operational noise from industrial and commercial plant on nearby sensitive receptors. This standard provides a framework for assessing the significance of sound based on both level and context, including the relationship between the specific sound and the existing background sound climate.
- 6.2 Under BS4142, the Specific Sound Level is determined by measurement or prediction of the plant noise at the receptor, taking account of environmental factors such as distance attenuation, screening, and propagation effects.
- 6.3 A Rating Level is then obtained by applying relevant penalty corrections to the Specific Sound Level for tonality, impulsivity, intermittency, and any other characteristic which could make the noise source more distinguishable at the receptor. This is described in section 9 of the standard.
- 6.4 The Rating Level is assessed against the measured Background Sound Level, with the difference between the two providing an indication of the likelihood of adverse impact, depending on the context. It should be noted that the context is a key consideration of any BS4142 assessment.
- 6.5 Typically, the greater this difference, the greater the magnitude of the impact. This is addressed in section 11 of the standard in the following terms:

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

- 6.6 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. This guidance is apparently taken into account in the ES in Table 14-10, which addresses the magnitude of impact of operational noise in EIA terms.
- 6.7 The EIS in the Noise Modelling appendix [APP-237] presents the measured summary of Background Sound Levels ($L_{A90,T}$) and the predicted Rating Levels.
- 6.8 Notwithstanding the above, the Applicant has departed from the core BS4142 approach by introducing in the EIS assessment a fixed minimum background level of 30 dBL_{A90}.
- 6.9 This approach effectively decouples the assessment from the measured background noise climate in locations where actual background levels fall below 30dB L_{A90}.
- 6.10 The ES justifies this at para 14.6.33 referencing BS4142 statement, *“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background”*. This guidance is, however, qualified and context-dependent, and does not support the wholesale replacement of background comparison by applying fixed absolute thresholds.
- 6.11 Although described in historical, superseded versions of BS4142, the definition of 30dBL_{A90} as a ‘very low’ background level was removed and is not supported by the current version of the standard.
- 6.12 This does not mean that low background noise levels should be discounted from assessment, but a consideration of the absolute sound level may be relevant when discussing the context of any initial assessment outcomes.
- 6.13 By imposing a fixed lower bound of 30dBL_{A90}, the Applicant has artificially elevated the baseline, thereby reducing the calculated rating level difference and understated the magnitude of impact. That effect arises because raising the baseline in this way modifies the relevant thresholds for the LOAEL and the SOAEL (which are derived from the background noise levels), which themselves then inform the assessment of significance in EIA terms (which is derived from the LOAEL and SOAEL).
- 6.14 In reality, at receptors where background levels fall to approximately 20dBL_{A90}, predicted Rating Levels of 35dBL_{A,r,T} would represent a +15 dB exceedance, which BS4142 identifies as likely to indicate a *‘significant adverse impact, depending on the context’*. This reflects the fact that, if one were to apply the Applicant’s unmodified approach to calculating the SOAEL, the SOAEL in this instance would be a rating noise level of 25dBL_{A,r,T}. The rating level of 35dBL_{A,r,T} would therefore be a significant effect in EIA terms.
- 6.15 The approach adopted by the Applicant disregards the measured background sound climate and treats a Rating Level of 35 dB L_{A,r,T} as inherently acceptable design target, despite it being at the adopted SOAEL in many instances and applies this threshold irrespective of local acoustic sensitivity.
- 6.16 This is a misinterpretation of BS4142, which requires both absolute and relative levels to be considered together, not in substitution. That is apparent from the commentary to assessment of impacts in section 11 of the standard, which explains *“the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs / will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context”*.
- 6.17 Section 11 then goes on to explain *“where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into account, including the following”*. It sets out three considerations, being *“absolute level of sound”*, *“character and level of the residual sound compared to the character and level of the specific sound”* and *“sensitivity of the receptor including whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions”*. In respect of *“absolute level of sound”* it says:

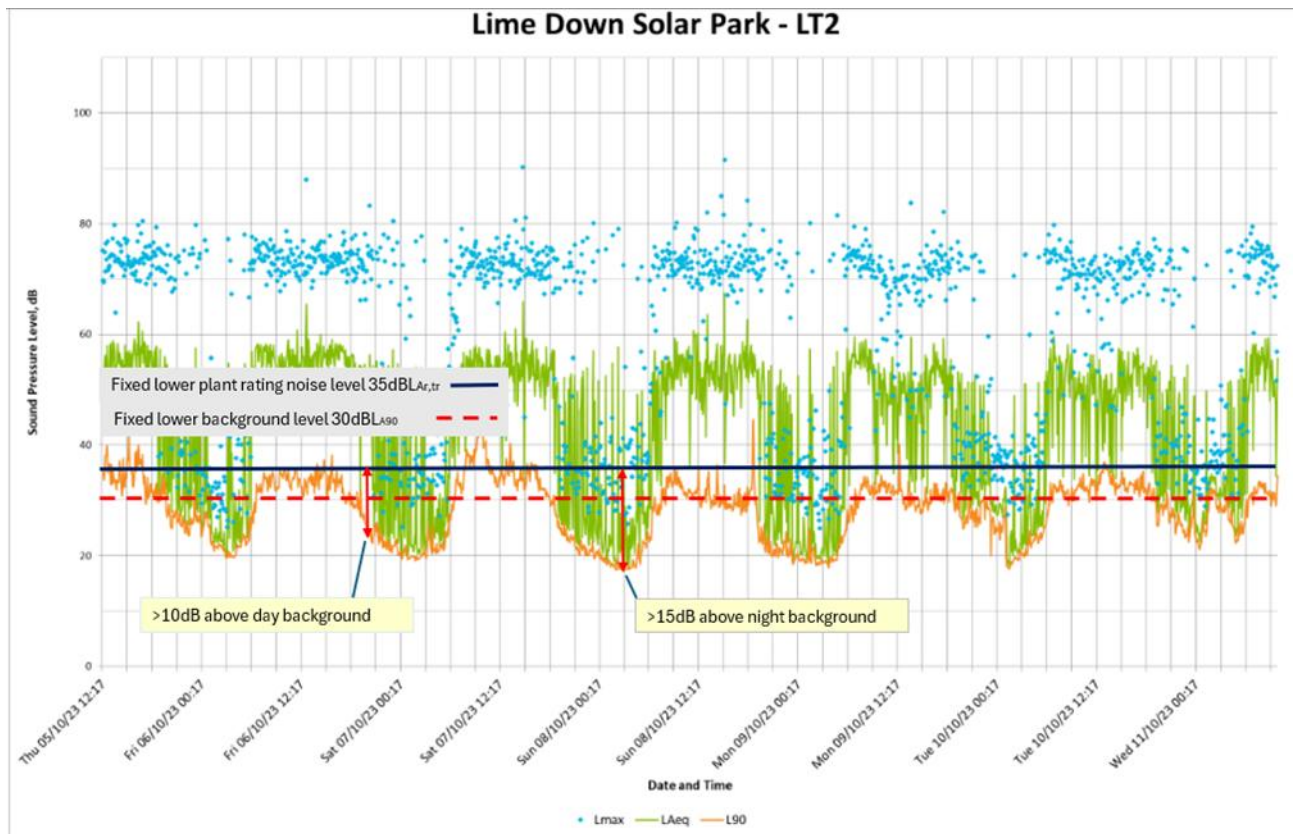
“The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

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

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.”

- 6.18 Neither BS4142:2014 nor national policy defines $35\text{dB}_{\text{LA},\text{T}}$ as a universally acceptable external plant noise level; on the contrary, such levels at night would be intrusive in a very quiet rural environment. The introduction of a continuous industrial noise source at this level would represent a material change in acoustic character. It is quite clear from the above that BS4142 is not advocating the adoption of a fixed minimum for all areas, but rather a context-driven assessment of various considerations, including (importantly) both absolute and relative sound levels. That is clearly why Wiltshire Council’s comments (recited in table 14-2 at page 4 of the ES) are appropriately conditional on contextual reasoning, robust assessment, and acceptance of a one size fits all approach not being appropriate.⁸
- 6.19 With reference to the ANC guidance note to BS4142, the working group within the association of noise consultants made comment in the guidance note to BS4142 which discusses the aspect of ‘low’ rating noise levels, with no definitive conclusion. They went on to explain *“it is for the assessor to justify and modifications to the initial estimate of impact”*. . The applicant has not provided sufficient justification, and in the Response to Relevant Representations (Part 1) at [PDA-009] SLD-103 suggest that the absolute levels representing those *“which is no louder than a household refrigerator”*. This is not an appropriate or accurate justification for description of external noise levels.
- 6.20 The adopted approach enabled the Applicant to establish a fixed allowable plant rating noise level of $35\text{dB}_{\text{LA},\text{T}}$ at residential properties without undertaking a correct initial estimate of impact, that would subsequently appear to fall between the adopted LOAEL and SOAEL thresholds, no matter what the background level is, leading to an EIS assessment outcome of ‘Not Significant’ across all receptors.
- 6.21 The assessment outcome is essentially pre-determined by the methodology adopted, rather than arising from a purely objective analysis of background noise levels and predicted noise levels. It is a “one size fits all” approach to when background levels fall below $30\text{dB}_{\text{LA}90}$.
- 6.22 Completely dispensing with any comparison against background levels and relying solely on these absolute thresholds renders the background noise survey, which quantifies the very quiet nature of the setting and, therefore context, entirely redundant.
- 6.23 The anticipated significant changes in background noise level and character, based on the comparison provided, show significant potential to cause an adverse or significant adverse impact on residents.
- 6.24 The figure below illustrates how the adopted fixed plant noise assessment threshold would sit against the background noise measurements from monitoring location LT2.

⁸ Contrary to the suggestion otherwise at the Applicant’s Response to Relevant Representations (Part 1) [PDA-009] at SLD-098, Wiltshire Council appear to take a nuanced approach and have not accepted a one size fits all approach to the identification of background noise.



6.25 As noise from the development will be generally continuous, the background noise levels (orange line), ambient and maximum would therefore be permanently raised toward the dark blue line.

Example – Receptor R10 (Bradfield Manor)

6.26 As a further example, the predicted noise level at R10 (Bradwell Manor) is $32\text{dB}_{\text{LAeq}}$, during both daytime and night-time. This level equates to a BS4142 rating level of $35\text{dB } L_{\text{Ar,T}}$ when the 3dB character penalty is applied.

6.27 It is evident from the noise contours, and confirmed in the Applicant's Response to Relevant Representations (Part 1) [PDA-009] WC-283, that the BESS container area is the dominant noise source affecting receptor R10.

6.28 When compared with the reported typical background level of $30\text{dB}_{\text{LA90}}$, this is shown to be +5dB above the background level, which is at the Significant Adverse Effect Level (SOAEL) threshold adopted by the applicant.

6.29 When compared to a more representative evening or night-time background level of $20\text{dB}_{\text{LA90}}$, the exceedance would be +15dB above the background level, which BS4142 identifies as a "significant adverse impact, depending on the context" Similarly, in EIA terms and applying the Applicant's methodology, that would be a major adverse effect (as it would be a high sensitivity receptor experiencing a high magnitude of impact).

6.30 The predicted noise from the BESS container area would be clearly distinguishable and perceptible in the grounds of Bradfield Manor as a continuous industrial sound (described as a hum by the Applicant).

6.31 Internally, with windows open to provide ventilation, levels of predicted industrial noise would be anticipated to be in the low to mid 20dB range. The sound would represent the dominant audible noise internally as a continuous low-level hum.

6.32 Despite being a low absolute level, in the absence of any other level of sound, this would be the only noise audible within the bedrooms at night and would represent inescapable intrusion without closing windows.

6.33 With regard to this specific receptor, the Applicant only commits within the amended outline OEMP to maintain noise emissions to decimal points below the adopted SOAEL. They have indicated in the Applicant's Response to

Relevant Representations (Part 1) [PDA-009] WC-283 that additional mitigation would actually be required to the BESS containers to reduce levels below the SOAEL, but they will not commit to the explicit specific additional mitigation identified in their response. As detailed above, targeting the SOAEL as an acceptable outcome is not in line with national policy framework, in that significant adverse effects should be avoided, and other adverse effects minimise as far as reasonably practical.

6.34 Finally, Bradfield Manor also reflects another difficulty of the Applicant's approach. In the Applicant's EIA Methodology [APP-058], the Applicant set as the standard level at which the output of a significance matrix would identify a Significant effect in EIA terms to include those "moderate significance" and above (see Table 6-4). In contrast, in the ES noise chapter the Applicant has set Significant to be "major/moderate" rather than include "moderate" (para 14.6.44). The effect of this is that an effect which is above LOAEL and below SOAEL can never be Significant in EIA terms. However, for assets such as Bradfield Manor which are not only a dwelling with minimum scope to mitigate noise effects through changes to its own property (due to its listing), but also because it is a Grade 1 listed building, such effects might properly be significant. Thus, the Applicant's approach to assessment has (by, for example, putting all dwellings into the same category) failed properly to reflect the granularity of the sensitivity of assets such as this.⁹

Noise Character and Uncertainty

6.35 The noise chapter and modelling appendix suggest that a tonality correction has not been applied due to the "tonal noise from the transformers not being the dominant source at receptors location" (para 14.6.29 of the ES).

6.36 The continuous nature described of the proposed plant does suggest that it is unlikely to have significant impulsive or intermittent characteristics. BESS and solar inverter fans speeds will, however, vary throughout the operational periods due to changes in operational loads and there is, therefore potential for some intermittent plant characteristics which may not have been properly accounted for within the assessment. There is also potential for the plant, particularly substations and transformers, to be tonal in nature, which could be more noticeable if closer and attract a higher BS4142 acoustic feature penalty.

6.37 The Applicant's Response to Relevant Representations [PDA-009] at SLD-095 states that "The change to the background sound climate or existing soundscape is acknowledged in paragraph 14.6.28 of ES Volume 1, Chapter 14: Noise and Vibration [APP-066] and a 3 dB penalty to noise levels from the Scheme has been applied to associated calculations as a result."

6.38 The application of the BS4142 feature rating takes into account the character of the noise, which may make it more noticeable, thereby indicating a slightly higher rating level. It does not account for, justify or address the wholesale change from a quiet rural environment to one of continuous industrial noise, which has shown to be far in excess of the low background noise levels which currently occur.

6.39 The indicative plant selections and mitigation scheme suggest the transformers will be housed in enclosures. The noise data within Table 6 of the Noise Modelling does not provide sufficient data to demonstrate there would be no tonal content, however the data does suggest they would be at a relative low noise output. The noise management plan does appear to commit to providing enclosures, although the wording is relatively loose and refers to providing them "where required" rather than having a commitment to ensuring no audible tonal noise at receptors from the development.

6.40 Investigation of the noise data in Table 6 indicates that the frequency spectrum data provided for the Conversion units shows them to be significantly louder with the silencers installed. A-weighting the spectral data shows mitigated conversion units to have individual overall sound power level of 93dB_{LWA}, with un-silenced units at a level of be 83.7dB_{LWA}. It is anticipated that this is a typographical error, however, the 93dB_{LWA} figure is still 2dB higher than the overall unsilenced output as is summarised in Table 5. Given that only seven of the 166

⁹ In contrast, other EIA noise assessments have set typical dwellinghouses to medium sensitivity (and considered "moderate effects" to be significant – see the Stonestreet Solar DCO) and/or provided for a "very high" category of sensitivity (and considered "moderate" effects to be significant where a very high sensitivity receptor experiences a low magnitude of impact – see the Sunnica Energy Farm DCO).

Conversion units will be fitted with silencers (i.e. there are 159 proposed unsilenced conversion units), this remains a significant point of uncertainty into the robustness of the predictions.

- 6.41 Given potential errors in relation to the actual noise source levels, the (unreported) inherent noise modelling uncertainty, there is potential for actual noise levels to be higher.

Noise Mitigation and Control

- 6.42 There are no practicable options for mitigation of external noise levels available to residential dwellings affected from noise from the development.

- 6.43 For residents, mitigating internal noise levels would require keeping windows closed, and having to find provision of other means of providing ventilation or alleviation of overheating in summer months.

- 6.44 The noise assessment describes an operational management plan (OEMP) that commits the Scheme to achieving to the *“resulting levels”* (i.e. the noise levels as calculated within the ES Noise Chapter) at properties *“to provide reassurance that the Scheme as built will not lead to significant effects from noise”*. At these committed levels, however, noise from the development will be clearly audible for much of the time, with the associated permanent loss of very quiet background noise levels that are a characteristic of the area. This would, therefore, result in a permanent change in the soundscape.

- 6.45 The Applicant states that *“all reasonable measures to reduce operational noise levels at receptors to a minimum have been taken into account”*, but this does not appear to be the case. The Applicant’s noise modelling contains little detail in relation to the embedded mitigation measures, stating only that *“all reasonable measures to reduce operational noise levels at receptors to a minimum have been taken into account”*. This is inconsistent with the statement in the assessment that *“only 7 of the 166 conversion units have been allocated silencers within the assessment”*.

- 6.46 The Response to Relevant Representations [PDA -009]R at SLD-102 states *“The Outline OEMP [APP-278] purposely does not commit to specific plant mitigation to allow for design flexibility, given the technological changes affecting noise emission levels that may occur between the time of the assessment and operation of the Scheme.”*

- 6.47 The OEMP does not secure specific plant and required plant noise mitigation, it allows for design flexibility at the expense of environmental protection, which is not consistent with the need for certainty in the assessment of likely significant effects.

- 6.48 A level of uncertainty remains as to whether additional mitigation measures (i.e. barriers, enclosures, further equipment silencing) have been considered by the Applicant.

- 6.49 The proposed noise sources generally consist of electrical plant that can be enclosed, with ventilation fans that can be attenuated. Practical noise control measures to significantly eliminate noise emissions are likely to be available and viable to be capable of achieving noise emissions at or below the LOAEL threshold.

- 6.50 This project’s nature differs from large scale transportation based infrastructure projects (i.e. road schemes etc.) where opportunities for noise mitigation are often constrained and subject to inherent limitations in effectiveness. In contrast, the nature of the proposed smaller plant-based development provides greater scope for source control and mitigation, and this should be fully explored and secured as part of the assessment of likely significant effects.

- 6.51 By not describing available noise mitigation measures that have been considered, the Applicant has not shown whether there has been a balance or trade off considered between the adverse noise impacts (i.e. those between LOAEL and SOAEL) and any burden of unsustainability of noise mitigation solutions that can be put in place to minimise the identified adverse noise impacts.

- 6.52 Without this information, there is risk that if the project built and shown to be causing adverse impacts and harm at or above the SOAEL thresholds, there may be no practicable mitigation options available to the operator to reduce noise levels. Retrospective noise control is always less efficient in terms of cost, sustainability and efficacy than robust design from the outset.
- 6.53 The DCO consent would provide defence to proceedings in respect of statutory nuisance s if (in the context of proceedings) the defendant shows that the *“nuisance is a consequence of the use of the authorised development and that it cannot be reasonably avoided”*. It is therefore critical that assessments are undertaken using a sufficiently robust approach, and that adverse effects are mitigated and minimised, and significant effects avoided at the DCO stage.

7.0 CONCLUSIONS

- 7.1 The Applicant’s noise assessment is based on a methodology that understates and fails to clearly define the likely significant effects arising from the development. As a result, it does not provide a robust or reliable basis for the assessment of the potential adverse noise impacts.
- 7.2 The Applicant’s own baseline survey data demonstrates that the area is very quiet and rural in character. In this context, even moderate levels of continuous industrial noise would be clearly perceptible at and within nearby residential receptors and would result in a material and permanent change to the existing acoustic environment and rural character.
- 7.3 The adoption of fixed raised background noise levels in the assessment prioritises development feasibility and flexibility over preserving quiet rural amenity. In a quiet rural countryside environment, this effectively permits noticeable intrusion where residents and visitors value natural quiet as an environmental amenity.
- 7.4 The Applicant’s commitments to limit noise emissions to the levels predicted within the assessment are insufficient to provide adequate protection. They rely on constraining impacts to levels marginally below an adopted threshold of Significant Impact, rather than securing avoidance and meaningful minimisation of identified adverse effects, contrary to the principles of the NPSE, NPS-EN-1 and NPPF.
- 7.5 Further scheme mitigation is likely to be available and practicable to reduce some of the operational noise emissions from the development. A commitment to delivering lower noise emissions and targets, taking proper account of the very quiet rural nature of the area, and potential adverse effects on residences and higher sensitivity receptors, would be required to deliver the stated goal of minimising adverse noise impacts.
- 7.6 Decision makers should be properly informed and made aware of these issues, to be able to make appropriate decisions with regard to balancing of any unavoidable adverse effects shown against the scheme benefits.

8.0 EXPERT'S DECLARATION

- 8.1 I, Ian MacArthur, declare that:
- 8.2 I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer.
- 8.3 I have endeavoured in my reports and in my opinions to be accurate and to have covered all relevant issues concerning the matters stated, which I have been asked to address, and the opinions expressed represent my true and complete professional opinion;
- 8.4 I will notify those instructing me immediately and confirm in writing if, for any reason, my existing report or opinion requires any correction or qualification.

- 8.5 I confirm that I have not entered into any arrangement whereby the amount or payment of my fees, charges or expenses is in any way dependent upon the outcome of this case.

Ian MacArthur, Tuesday, 28 April 2026

