

NOISE ASSESSMENT

**PROPOSED SOLAR PHOTOVOLTAIC FARM
AND ASSOCIATED INFRASTRUCTURE,
INCLUDING TWO CABLE ROUTE CORRIDORS
TO THE POINT OF CONNECTION
ON LAND AT HEATH ROAD AND MERRYLEES, BAGWORTH**

RENEWABLE CONNECTIONS DEVELOPMENTS LTD

JULY 2025

LF Acoustics Ltd
Pond Farm
7 High Street
Pulloxhill, Beds
MK45 5HA

t: 01525 888046
e: mail@lfacoustics.co.uk

Registered in England
Company Reg: 8434608



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Revision	Prepared By	Date
1.2	L Jephson BEng (Hons) MIOA	8/7/25

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1. Introduction

LF Acoustics Ltd have been appointed by Renewable Connections Developments Ltd to undertake an operational noise assessment for a proposed solar farm to be located on land south of Heath Road and north of Merrylees Road, Bagworth.

The solar panels within the solar farm would be linked to a series of string inverters mounted beneath the panels, which generate noise whilst the solar farm would be operational during daylight hours. A substation is also proposed to be located within the central area of the site to enable the connection to the National Grid to be made.

This report presents an assessment of the noise levels attributable to the operation of the solar farm at surrounding noise sensitive receptors.

The following section of this report presents an overview of the relevant standards and guidelines applicable when assessing noise from this type of facility. Section 3 provides a description of the site, its surroundings and proposed operation, with an assessment of the existing noise environment provided in Section 4. The calculation and assessment of noise levels associated with the operation of the solar farm is provided in Section 5. Finally, Section 6 provides a summary of the assessment.

2. Standards and Guidelines

A description of the noise units referred to in this report is provided in Appendix A.

2.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) revised in December 2024 [1], sets out the Government's planning policies for England and how these should be applied. It provides a framework upon which locally prepared plans for housing and other development can be produced.

The purpose of the planning system is to contribute to the achievement of sustainable development and at the heart of the Framework is a presumption in favour of sustainable development.

With regards noise, local planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.
- 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;
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Reference is made within the NPPF to the Noise Policy Statement for England (NPSE) within Footnote 69, which sets out the long-term vision of the Government noise policy. Further information has been provided on the assessment of noise within recent Planning Practice Guidance, updated in July 2019 and available on the Government planning web site. Whilst this guidance does not provide any objective criteria upon which to base noise assessments, the guidance provides a description of the relevant Effects Levels identified within the NPPF and NPSE and this is reproduced in Table 2.1.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect Level (NOEL)	No specific measures required
Noticeable 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	No specific measures required
		Lowest Observed Adverse Effect Level (LOAEL)	
Noticeable 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; 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level (SOAEL)	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable 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 Adverse Effect	Prevent

Table 2.1 Significance Criteria

The NPPF advises that development should seek to ensure that noise from proposed developments does not give rise to significant impacts, i.e. a level identified as a Significant Observed Adverse Effect (SOAEL), equivalent to a level where the noise would cause a material change in behaviour.

2.2. British Standard BS 4142

BS 4142 [2] is the British Standard for rating and assessing noise of a commercial or industrial nature and is relevant to the noise associated with the operation of the proposed plant.

BS 4142 is a comparative standard in which the estimated noise levels from the proposed development are compared to the representative / typical background noise level from existing uses.

BS 4142 relates the likelihood of adverse impact to the difference between the Rating Level of the noise being assessed and the background noise level.

The background noise level is the L_{A90} noise level, usually measured in the absence of noise from the source being assessed, but may include other existing industrial or commercial sounds. The background noise levels should generally be obtained from a series of measurements each of not less than 15 minute duration.

The Rating Level of the noise being assessed is defined as its L_{Aeq} noise level (the 'specific noise level'), with the addition of appropriate corrections should the noise exhibit a marked impulsive and/or tonal component or should the noise be irregular enough in character to attract attention. The extent of the correction is dependent upon the degree of tonality or character in the noise and is determined either by professional judgement, where the plant is not operational at present, or by measurement.

Where the noise is tonal in nature, the standard imposes the following corrections when assessing the rating level:

- 2 dB for a tone which is just perceptible;
- 4 dB where the tone is clearly perceptible; and
- 6 dB where the tone is highly perceptible.

Methods for identifying whether noise is tonal in nature are provided within BS 4142.

Where noise exhibits other sound characteristics, the Standard advises a penalty of 3 dB should be applied.

During the daytime, the specified noise levels are determined over a reference time interval of 1 hour, with a 15 minute reference period adopted when assessing night-time noise.

If the Rating Level of the noise being assessed exceeds the background level by 10 dB or more BS 4142 advises that there is likely to be an indication of a significant adverse impact, depending upon context. A difference between background level and Rating Level of around 5 dB is likely to be an indication of an adverse impact, depending upon context. The lower the Rating Level is, relative to the background noise level, the less likely the specific source will have an adverse or significant adverse impact. Where the Rating Level does not exceed the background noise level is an indication of a low impact, depending upon context.

The assessment method outlined above is intended for the assessment of external noise levels and is not intended to assess the extent of impact at internal locations.

Where the initial assessment of impact, based upon an assessment of the external noise levels, needs to be modified due to the context, all pertinent factors should be taken into account, including:

- The absolute level of sound;
- 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; and
- The sensitivity of the receptor and whether the premises will already incorporate measures to ensure good internal and/or external acoustic conditions.

The current revision of BS 4142 does not define low background or rating levels. The previous 1997 revision of the Standard described very low background sounds as being less than 30 dB L_{A90} and low rating levels as being less than 35 dB $L_{Aeq,T}$. The Association of Noise Consultants have prepared a technical note to accompany the current revision of BS 4142 [3]. The document advises that it would not be unreasonable to adopt similar lower limits when assessing noise levels against the current revision of the Standard.

2.3. British Standard BS 8233

British Standard BS 8233 [4] principally provides design guidance for new buildings. For residential premises, the guidance advises for steady external noise sources, levels of noise internally not exceeding 30 dB $L_{Aeq, 8 \text{ hour}}$ within bedrooms at night are desirable, with a level of 35 dB $L_{Aeq, 16 \text{ hour}}$ representing a desirable standard of noise within living rooms and bedrooms for resting purposes during daytime periods.

Externally within gardens and amenity spaces, the guidance recommends a general limit of 50 dB $L_{Aeq, T}$.

2.4. World Health Organisation (WHO) Guidelines

The World Health Organisation guidance [5] provides additional guidance upon potential effects in relation to noise.

The guidance advises:

- few people are moderately annoyed by noise levels of below 50 dB L_{Aeq} during the daytime;
- for a good night's sleep, noise levels within bedrooms should not exceed 30 dB L_{Aeq} , with individual noise events not exceeding 45 dB L_{Amax} ; and
- special attention should be given to noise sources in an environment with low background noise levels and to noise sources with low frequency components.

Assuming an open window provides a reduction in noise levels of between 10 – 15 dB(A), during the night-time the WHO guidance indicates that external noise levels should remain below 40 – 45 dB L_{Aeq} to maintain the restorative processes of sleep.

The WHO produced additional noise guidance in relation specifically to night-time noise in 2009 [6], which is generally considered to be the most noise sensitive period. This report provides a description of the no observed adverse effect level (which is equivalent to a No Observed Effects Level, NOEL) and advises for night-time noise (which is considered to be the most sensitive period of the day) that this concept is less useful, as the adversity of effects are less clear. Instead, it advises the use of the observed effects thresholds, above which an effect starts to occur or shows itself to be dependent upon the exposure level.

The guidance is presented in terms of external and internal recommendations to minimise any potential adverse effects. Externally, the guidance advises that an average night-time noise level L_{night} (the $L_{Aeq, 8 \text{ hour}}$) of 40 dB is equivalent to the Lowest Observed Adverse Effect Level (LOAEL) and advises this guideline value is recommended for the protection of public health from night-noise. However, below this level there was no change in the small number of awakenings identified and hence a reason for considering that the NOEL was not an appropriate descriptor in noise terms for identifying adverse effects and hence recommend the use of the observed effects threshold as an appropriate descriptor to identify the potential for the onset of adverse effects.

The guidance, however, advises that an external night-time noise level of 30 $L_{Aeq, 8 \text{ hour}}$ would be equivalent to the NOEL, as their research indicated that there were no detectable effects on sleep observed below this level.

The potential for SOAEL were identified to occur at levels considerably above 40 dB $L_{Aeq, 8 \text{ hour}}$.

3. Site Description and Identification of Potentially Affected Noise Sensitive Receptors

The location of the site and its surroundings is indicated on Figure 1, with the layout of the proposed solar farm indicated on Figure 2.

The panels would be linked to string inverters positioned beneath the solar panels around the site, as indicated on Figure 2.

The inverters would be operational during daylight periods when the solar panels were generating electricity. The inverters would be actively cooled using small fans within the equipment. The operation of the fans is temperature controlled and would only operate at full speed (i.e. generating the highest levels of noise) during summer months, when the temperatures were high, which would occur during the middle of the day when solar generation was at a peak. During the early morning and late evening periods, when solar energy was lower, the fans would generally either be not operating or be running at a lower speed, thus generating lower levels of noise.

A DNO and customer substation would be located within the central area of the site.

There are a number of noise sensitive properties surrounding the Proposed Development, as indicated on Figure 1, which have been considered within this assessment. The closest properties were identified to be:

- Dwellings along Heath Road to the north of the site;
- Dwellings along Bagworth Road to the west; and
- Dwellings along Merrylees Road to the south.

4. Baseline Noise Assessment

The proposed solar farm would be located on land to the south of Heath Road and North of Merrylees Road.

The closest noise sensitive receptors would be properties to the north, along Heath Road and to the south west, along Merrylees Road and Bagworth Road. The properties would be at least 250 metres from the operational site boundaries.

The site is in a semi-rural location. The main sources of noise within the area are attributable to road traffic noise on the surrounding road network. Noise from the operation of the brickworks to the north are also likely to influence the noise environment, particularly at the properties along Heath Road.

For the purposes of this preliminary assessment, noise levels at the surrounding properties have been assumed to be low, with background noise levels anticipated to be of the order of 30 - 35 dB L_{A90} during the daytime period and potentially of the order of 30 dB L_{A90} during the early morning / evening periods, when the solar farm would be operational. These levels of noise are considered low, taking account of the ANC technical guidance accompanying BS 4142.

Section 11 of BS 4142 provides useful information in relation to areas where background noise levels are low. In these areas, the Standard advises that an assessment of the absolute levels of noise might be as, or more, relevant than the margin by which the rating level exceeds the background, which is especially true at night.

Taking this guidance into account, it has been considered appropriate to assess the noise level attributable to the operation of the plant against other appropriate absolute noise standards, principally World Health Organisation (WHO) guidelines, as described in Section 2.4, to determine the potential adverse impacts associated with the operation of the solar farm. Adopting this approach will ensure that the operation of the solar farm would not result in any adverse noise impacts and achieve a standard below that which would represent the Lowest Observed Effects Level [LOAEL] during the most sensitive early morning and evening periods.

On the basis of the WHO guidance and the Association of Noise Consultants (ANC) technical guidance attached to BS 4142, a rating level of 35 dB $L_{Aeq, T}$ has therefore been adopted for this assessment, which seeks to ensure the operation of the plant does not result in adverse impacts.

5. Calculation and Assessment of Noise from the Operation of the Solar Farm

5.1. Proposed Plant and Equipment

The solar panels would be connected to a number of small string inverters located around the site, positioned beneath the solar panels, at positions where appropriate connections could be made to the solar arrays, whilst maximising separation to neighbouring properties. The string inverters would connect into a number of power stations distributed around the site, which would house a transformer.

A substation also housing transformers would be located within the central area of the site, where connections from the power stations would be made.

The indicative locations of the inverters and substation are indicated on Figure 2.

Source term noise levels for the proposed plant have been obtained from manufacturers' specifications and are provided in Table 5.1 below.

Plant	Sound Power Level SWL [dB(A)]	Octave Band Sound Power Level SWL [dB]							
		63	125	250	500	1k	2k	4k	8k
String Inverter	82	76	77	82	80	79	74	69	62
Substation Transformer	84	73	88	87	85	71	63	57	57
Power Stations	78	67	82	81	79	65	57	51	51

Table 5.1 Source Term Noise Levels

5.2. Calculation of Noise Levels

As indicated above, the main noise generating element of the proposed development would be attributable to the operation of the inverters. The inverters have been positioned within the site to maximise separation to neighbouring properties, whilst allowing appropriate connections to be made.

Calculations have been made using SoundPlan, which implements the calculation methodology from ISO 9613-2. The calculations have taken account of the topography around the site based upon Lidar mapping.

The inverters and transformers have been modelled as point sources within the model, assuming standard hemispherical radiation.

Calculations have been prepared on the basis of all plant fully operational, which represents the likely worst-case conditions during the peak summer daytime periods. This approach will provide an overestimate of the noise levels during the early morning and evening periods whilst the solar inverters would be operating at a lower power.

The operation of the cooling fans within the solar inverters is temperature controlled. During the early morning periods, when temperatures are lower and solar energy low, it is less likely that the fans would need to operate and if so, they would only operate at low speed, thus generating lower levels of noise. The fans would be most likely to operate at full speed during the mid part of a hot summers day when the sun is at its highest level and thus generating the maximum

energy. During the evening periods, the output from the solar panels would reduce as the sun sets and thus the requirement for the cooling fans to operate would gradually reduce later into the evening. As indicated previously, the plant would not be operational overnight and during hours of darkness.

Noise levels have been calculated on the basis of the site layout indicated on Figure 2.

Figure 3 presents the worst-case calculated daytime operational noise levels in graphical format and additionally provides the daytime calculated façade noise levels in numerical format at the properties potentially most likely to be affected by the operation of the site. The calculated noise levels at the potentially most affected properties are additionally summarised in Table 5.2 below.

Location	Distance to Operational Site Boundary [m]	Calculated Noise Level [dB L _{Aeq,T}]
Properties Along Heath Road to the North (Woodside Farm)	250	30
Properties Along Merrylees Road to the south west (Chater Farm and Halifax Farm)	400	27
Properties Along Bagworth Road to the west (Heath Lodge Farm)	750	20

Table 5.2 Noise Levels Generated by Operation of Proposed Solar Farm

5.3. Assessment Criteria

As indicated previously, background noise levels at the surrounding properties are low, given the rural location away from any major noise sources, such as main roads.

The solar panels and inverters would only be operational during daylight hours, typically between 06:00 – 21:00 hours during summer months, when the days are longest.

To provide a worst-case assessment therefore, the noise levels attributable to the peak summer daytime operation have been assessed, when the fans on the inverters would be more likely to be running at full speed.

Based upon the low assumed background noise levels, it has been considered appropriate to assess the noise levels attributable to the operation of the site against absolute noise criteria in accordance with the guidance contained in BS 4142. The assessment has been based upon adopting limits which seek to ensure the operation would not result in adverse noise impacts at surrounding properties and thus comply with the requirements of the NPPF.

To provide an initial assessment, operational noise levels have been assessed against a criteria of 35 dB L_{Aeq,T}, which seeks to ensure no adverse noise impacts, for the surrounding properties, which is considered most applicable for the daytime operation, when the plant is most likely to be operating at full capacity.

Consideration has also been given to criteria contained within BS 8233 and within the WHO night-time noise guidance, which provides guidance on absolute noise levels to ensure potential adverse impacts are minimised.

BS 8233 advises for steady state external noise sources, such as those associated with the operation of the solar farm, it is desirable that the internal ambient noise level does not exceed a level of 35 dB $L_{Aeq,16 \text{ hour}}$ during the daytime period within living rooms and bedrooms and 30 dB $L_{Aeq, 8 \text{ hour}}$ within bedrooms at night (representative of the early morning periods during summer months when the panels would start to operate). On the basis of an open window typically providing a sound reduction of between 10 – 15 dB(A), equivalent external levels below 45 dB $L_{Aeq, 16 \text{ hour}}$ daytime and 40 dB $L_{Aeq, 8 \text{ hour}}$ night-time, would ensure an acceptable noise environment was maintained within the surrounding properties and seek to minimise any potential adverse noise impacts.

Additionally, for steady state noise as associated with the operation of the proposed equipment, the WHO night-noise guidance advises that an external level of 40 dB $L_{Aeq, 8 \text{ hour}}$ represents the Lowest Observed Adverse Effect Level (LOAEL) overnight (thus representative of the early morning operation), which is equivalent to the BS 8233 guidance for night noise, assuming an open window, with a level of 30 dB $L_{Aeq,8 \text{ hour}}$ externally representing a NOEL.

Given that the plant would operate during the early morning periods before 07:00, it is appropriate to base the assessment upon night-time criteria to ensure that the operation did not result in adverse impacts. Meeting these criteria would ensure that the operation during the daytime periods, when background noise levels would be higher, did not result in adverse impacts.

5.4. Assessment of Noise Levels at Neighbouring Properties

As indicated previously, noise would only be generated from the operation of the equipment during daylight hours, when the panels are producing electricity.

The highest noise levels, which have been calculated and presented in Table 5.2, would only occur during the mid-daytime summer periods whilst the solar panels were operating at full capacity and ambient temperatures were high, and an assessment made on this basis therefore represents worst-case conditions for early morning / evening periods.

With the exception of areas very close to the inverters (typically, within 25 metres), where high frequency noise from their operation is likely to be clearly audible, the noise generated by the inverters would be principally associated with the operation of the cooling fans, which generate noise which is not tonal in nature. At the relatively large distances between the inverters and neighbouring properties, any high frequency components of the noise would be effectively mitigated, as the higher frequencies attenuate at a higher rate over distance compared to lower frequencies.

On this basis, and the fact that the plant would generate low levels of noise, no corrections have therefore been considered when assessing the noise levels against the BS 4142 methodology to determine the rating level of noise.

Uncertainties in the calculations have been considered. Given that the assessment has been based upon all plant and equipment fully operational, which is considered unlikely, particularly during the most sensitive early morning periods, the calculations are likely to have overestimated the noise levels at the dwellings and thus cover any uncertainty in the noise levels attributable to the operation of the plant or within the calculation methodology. It is additionally noted that the source data used represents the maximum design level for the plant.

The calculations indicate noise levels at the surrounding properties, would be very low, when considered against the absolute noise standards.

5.4.1. Assessment of Noise Levels at Properties Along Heath Road

The highest noise levels have been calculated at the properties to the north of the solar farm, where a rating level of up to 30 dB $L_{Aeq,T}$ has been predicted at the neighbouring properties.

Based upon the indicative layout of the plant, noise levels at the properties would not exceed the proposed impact threshold of 35 dB $L_{Aeq,T}$, which represents a low noise level, when considered against the technical guidance which accompanies BS 4142, particularly during the daytime periods when the solar farm would be operational. The noise levels are additionally 10 dB(A) below the WHO night-time criteria of 40 dB $L_{Aeq,T}$, which represents the Lowest Observed Adverse Effects Level (LOAEL) when considering the most sensitive early morning periods, thus ensuring noise from the operation of the proposed plant and equipment remained acceptable and commensurate with the No Observed Effect Level for this period.

Internal noise levels within the neighbouring properties associated with the operation of the plant would not exceed a level of 15 dB $L_{Aeq,T}$ assuming windows open (on the basis of a 15 dB(A) reduction for an open window, as advised in BS 8233), which is at least 15 dB(A) below the criteria representing a good standard of noise for bedrooms, specified within BS 8233.

The operation of the solar farm at these properties would therefore not result in a potential for adverse noise impacts.

5.4.2. Assessment of Noise Levels at Properties Along Merrylees Road

The calculations indicate noise levels of up to 27 dB $L_{Aeq,T}$ at Chater Farm and Halifax Farm, based upon likely worst-case operating conditions.

Based upon the indicative layout of the plant, noise levels at the properties would not exceed the proposed noise limit of 35 dB $L_{Aeq,T}$, which seeks to ensure that noise levels remained below the proposed impact threshold of 35 dB $L_{Aeq,T}$, which represents a low noise level, when considered against the technical guidance which accompanies BS 4142. The noise levels are additionally more than 10 dB(A) below the WHO night-time criteria of 40 dB $L_{Aeq,T}$, which represents the Lowest Observed Adverse Effects Level (LOAEL) when considering the most sensitive early morning periods, thus ensuring noise from the operation of the proposed plant and equipment remained acceptable and commensurate with the No Observed Effect Level for this period.

Internal noise levels within the neighbouring properties associated with the operation of the plant would not exceed a level of 20 dB $L_{Aeq,T}$ assuming windows open (on the basis of a 15 dB(A) reduction for an open window, as advised in BS 8233), which is at least 10 dB(A) below the criteria representing a good standard of noise for bedrooms, specified within BS 8233.

The operation of the solar farm at these properties would therefore not result in a potential for adverse noise impacts.

5.4.3. Assessment of Noise Levels at Properties Along Bagworth Road

The calculations indicate noise levels of 20 dB $L_{Aeq,T}$ at the properties to the south west, based upon likely worst-case operating conditions.

Based upon the indicative layout of the plant, noise levels would remain substantially below the proposed impact threshold of 35 dB $L_{Aeq,T}$, which represents a low noise level, when considered against the technical guidance which accompanies BS 4142. The noise levels are additionally 20 dB(A) below the WHO night-time criteria of 40 dB $L_{Aeq,T}$, which represents the Lowest Observed Adverse Effects Level (LOAEL) when considering the most sensitive early morning periods, thus ensuring noise from the operation of the proposed plant and equipment remained acceptable and commensurate with the No Observed Effect Level for this period.

Internal noise levels within the properties associated with the operation of the plant would remain very low assuming windows open and substantially below the criterion representing a good standard of noise for bedrooms, specified within BS 8233.

The operation of the solar farm at this location would therefore not result in a potential for adverse noise impacts.

In summary, the operation of the solar farm would generate low levels of noise at the surrounding properties. The noise levels generated would be equivalent to a No Observed Effects Level, when assessed against stringent WHO night-noise guidance, thus ensuring the operation fully complied with the requirements of the NPPF.

6. Summary

LF Acoustics Ltd were appointed by Renewable Connections Developments Ltd to undertake an operational noise assessment for a proposed solar farm to be located on land south of Heath Road and north of Merrylees Road, Bagworth.

An indicative layout for the proposed solar farm has been prepared to accompany the application. With regards noise, this layout provides the likely worst-case scenario.

This report has presented calculations and an assessment of the noise levels to be generated by the operation of the solar farm based upon worst-case operating conditions.

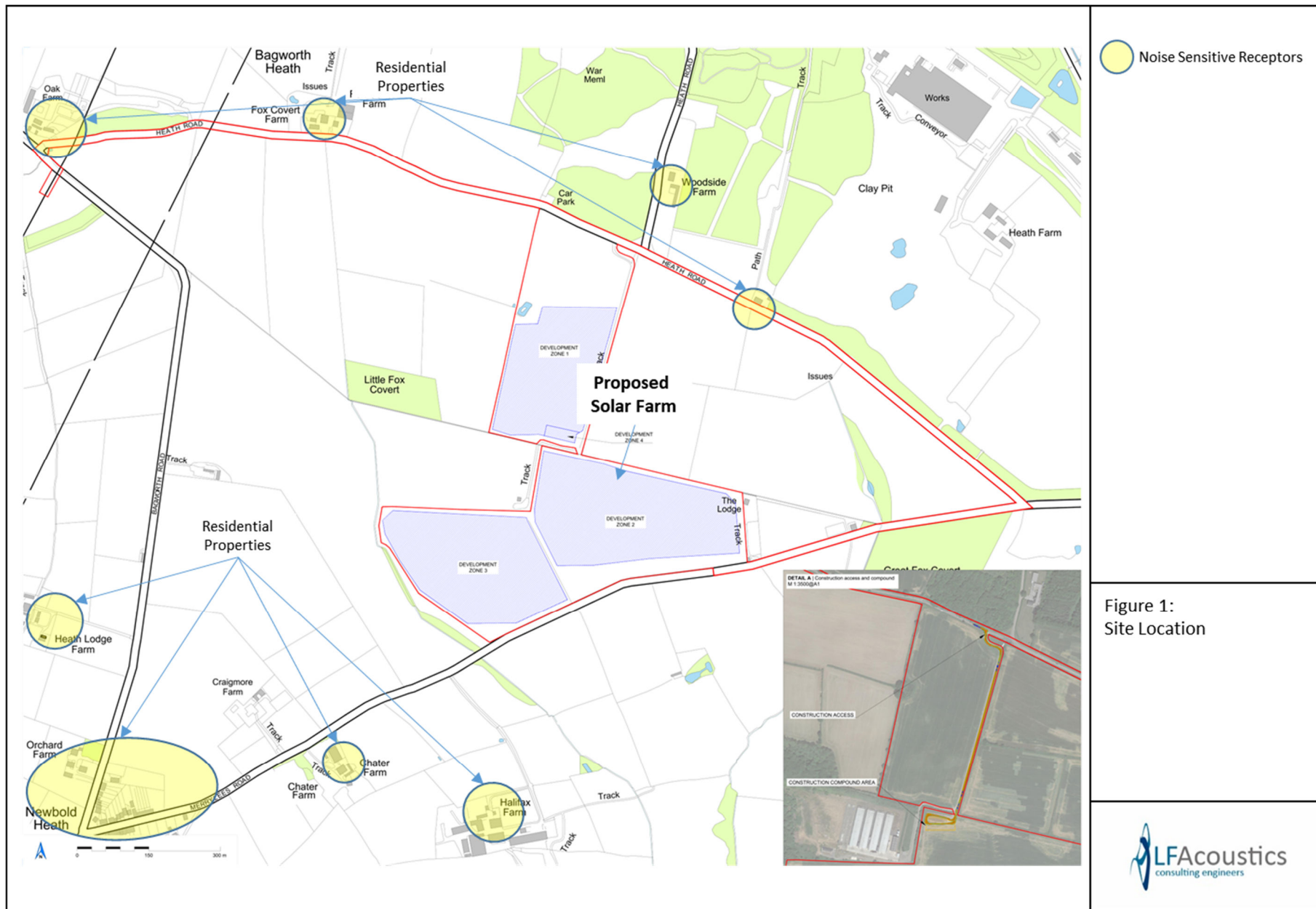
The calculated noise levels have been assessed against relevant standards and guidance, to ensure that the operation of the plant required within the solar farm does not result in occupants of nearby properties being unacceptably affected by levels of noise.

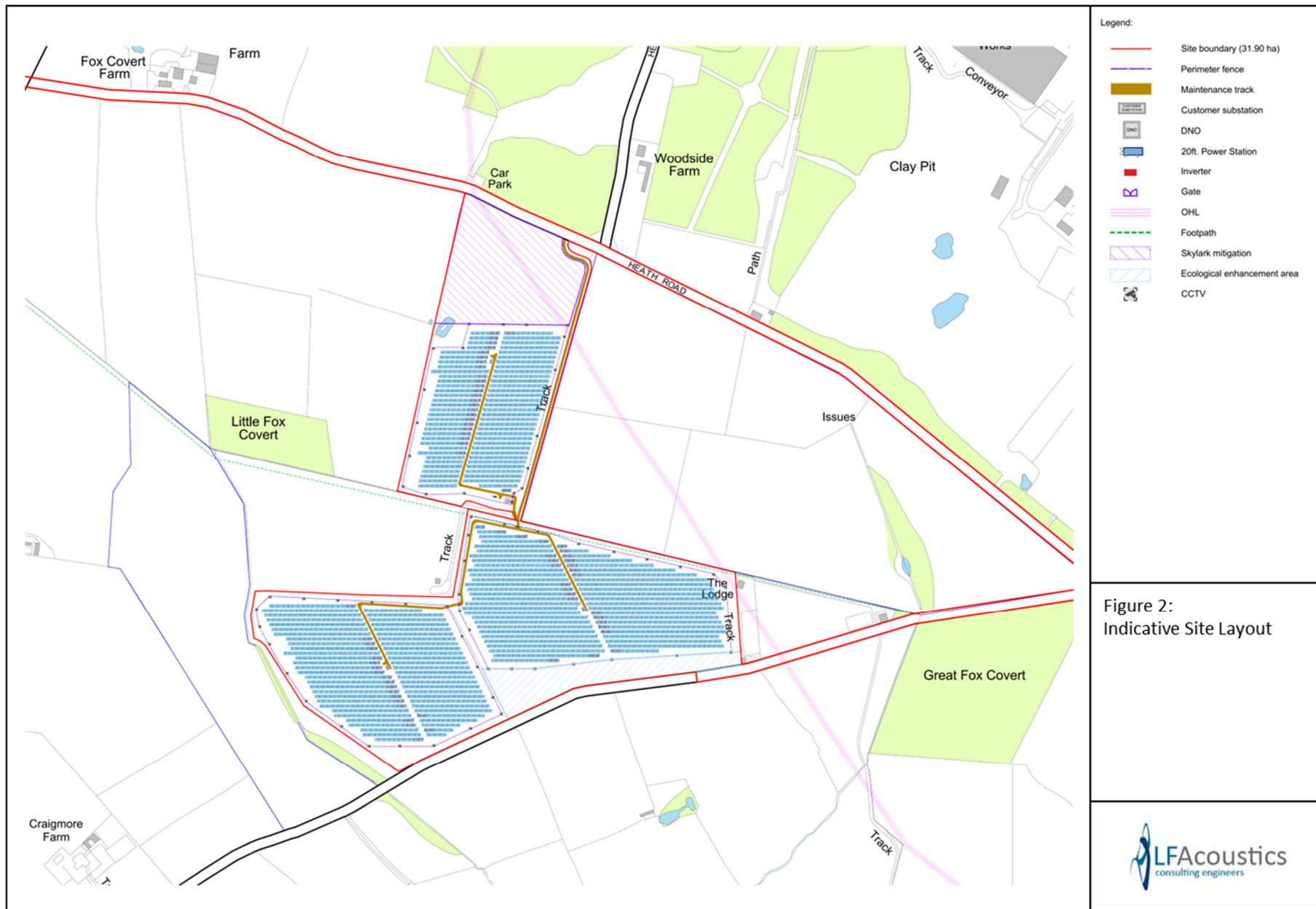
The assessment concluded that the operation of the solar farm would generate very low noise levels at surrounding properties throughout the day. Assessing the noise levels against relevant standards and guidance concluded that the operation of the plant would result in a low impact with noise levels not exceeding a level which would represent a No Observed Effects Level, thus ensuring that the operation did not result in unacceptable levels of noise and thus ensuring full compliance with the requirements of the NPPF.

References

1. Ministry of Housing, Communities and Local Government. National Planning Policy Framework. December 2024.
2. British Standards Institute. Methods for Rating and Assessing Industrial and Commercial Sound. BS 4142:2014 +A1:2019.
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4. British Standards Institute. Guidance on Sound Insulation and Noise Reduction in Buildings. BS 8233: 2014.
5. World Health Organisation. Guidelines for Community Noise. 1999. WHO Geneva.
6. World Health Organisation. Night Noise Guidelines for Europe. 2009.

Figures







Appendix A

Noise Units

Decibels (dB)

Noise can be defined as unwanted sound. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.

The dynamic range of the auditory system is generally taken to be 0 dB to 140 dB. Generally, the addition of noise from two sources producing the same sound pressure level, will lead to an increase in sound pressure level of 3 dB. A 3 dB noise change is generally considered to be just noticeable and a 10 dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness. A 5 dB change is generally considered to be clearly discernible.

A-weighting

The bandwidth of the frequency response of the ear is usually taken to be from about 18 Hz to 18,000 Hz. The auditory system is not equally sensitive throughout this frequency range. This is taken into account when making acoustic measurements by the use of A-weighting, a filter circuit which has a frequency response similar to the human auditory system.

Units Used to Describe Noises Which Change Their Level with Time

The Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$) is the principal measurement index for environmental noise. The $L_{Aeq,T}$ is defined as the A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.

The L_{A90} is the noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise which is present even during the quieter parts of the measurement period.

The L_{Amax} is the single maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax S}$, or Slow, is averaged over 1 second. The measured L_{Amax} noise levels in this assessment are Fast.