enzygo
environmental consultants

Noise Impact Assessment

Proposed Solar PC Scheme Development, Brailsford, Derbyshire.

BSR Energy Limited

SHF.3087.016.NO.R.006

'Experience and expertise working in union'

enzygo.com

Contact Details:

Enzygo Ltd.
Samuel House,
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
email: acoustics@enzygo.com
www: enzygo.com

Proposed Solar PV Scheme Development, Brailsford, Derbyshire

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Author:	Darren Lafon-Anthony MSc MIOA FIQ
Reviewer	Aaron Andrews MEng MIOA

Contents

Tables & Figures

1 Introduction

1.1 Project Introduction

1.1.1 Enzygo Limited has been commissioned by BSR Energy Limited to undertake a noise impact assessment to support a planning application for their proposed Solar PV Scheme on land at Brailsford, Derbyshire.

1.1.2 The noise assessment has been undertaken to assess the potential impacts, in accordance with the relevant standards and guidance, at the nearest noise-sensitive properties to the site and to provide outline mitigation advice if considered necessary.

1.1.3 Details of the assessment methodology employed, together with the results of the noise predictions, assessment and conclusions are presented within this report.

1.2 Site Description

1.2.1 The proposed solar farm development is located on land near Brailsford, Derbyshire. The site is located to the north and south of the A52 Ashbourne Road and is located at grid reference SK 26669 41710 approximately.

1.2.2 The site is bounded by open countryside/farmland to the north, east and south with the village of Brailsford to the west. The most significant existing noise sources are the A52 Ashbourne Road and farming activities. There are several Public Rights of Way (PRoW) crossing the proposed development site.

1.2.3 The nearest identified noise-sensitive residential properties to the proposed development site are shown in Figure 1-1, namely:

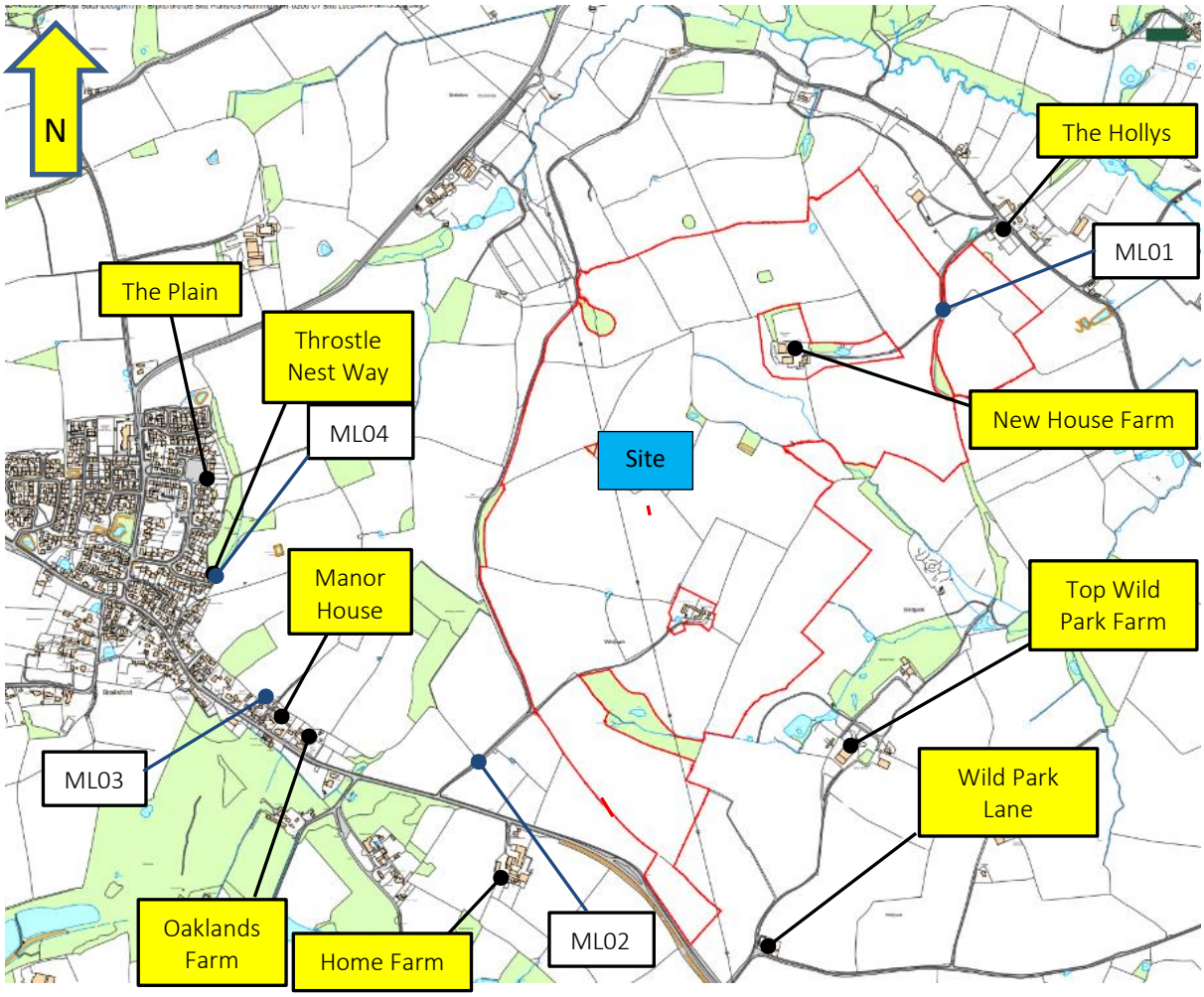
1. Home Farm
2. Manor House
3. New House Farm
4. Oaklands Farm
5. The Hollys
6. The Plain
7. Throstle Nest Way
8. Top Wild Park Farm
9. Wild Park Lane

1.3 Proposed Development

1.3.1 The proposed Solar PV Scheme site will consist of the following:

- Solar Inverter Stations
- Solar arrays
- Spares, comms and welfare and harmonics containers
- Auxiliary LV Switch-room
- 132kV HV Substation Compound
- CCTV Towers
- Comms Tower
- Fire Hydrant

Figure 1-1: Site Location



1.4 Noise Assessment Methodology

1.4.1 A noise assessment for the current proposals has been undertaken in accordance with the guidance contained in British Standard 4142:2014+A1:2019 *Method for rating and assessing industrial and commercial sound* (BS4142) with reference made to the internal noise criteria outlined in British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings* (BS8233).

1.4.2 Noise levels generated by the proposed development have been predicted to the nearest noise-sensitive receptors, using the calculation methodology outlined in ISO9613:2024 '*Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering methods of the prediction of sound pressure levels outdoors* (ISO9613) using the proprietary noise modelling software CadnaA®.

1.4.3 The assessment is based upon the results of baseline noise surveys undertaken at locations representative of the nearest residential receptors to the site over representative daytime and night-time periods.

2 Standards and Guidance

2.1 Planning Practice Guidance: Noise

2.1.1 The Planning Practice Guidance: Noise is the Government's online guidance on managing potential noise impacts from new developments.

2.1.2 The guidance includes a noise exposure hierarchy table which relates response to noise and example outcomes to effect levels. The hierarchy table also identifies actions required for each effect level.

2.1.3 Particularly relevant to this assessment are the No Observed Effect Level (NOEL) and the No Observed Adverse Effect Level (NOAEL) to which the guidance states:

Table 2-1: Noise Hierarchy Table Excerpt

Response	Example of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required

2.2 British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

2.2.1 BS4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

- Sound from industrial and manufacturing processes.
- Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises

2.2.2 Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

2.2.3 The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background noise level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound

under consideration. This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically "*the greater this difference, the greater the magnitude of the impact*". This difference is then considered as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending upon context; and,
- 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.

2.2.4 BS4142 further states that "*where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact*" again depending upon the specific context of the site. The Standard further qualifies the assessment protocol by outlining conditions to the comparative assessment and stating that "*not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact*", thus implying that all sites should be assessed on their own merits and specifics.

2.2.5 The Standard quantifies the typical reference periods to be used in the assessment of noise, namely:

Typical Daytime	07:00 – 23:00	1-hr assessment period
Typical Night-time	23:00 – 07:00	15-min assessment period

2.2.6 The Standard outlines methods for defining appropriate "*character corrections*" within the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. These are a) the Subjective Method, b) the Objective Methods for tonality and c) the Reference Method. It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the specific level.

2.2.7 The Subjective Method is based on the following corrections:

Table 2-2: BS4142 Subjective Method Rating Corrections

Level of Perceptibility	Tonal Correction	Impulsivity Correction	Correction for "Other sound characteristics"	Intermittency Correction
No Perceptibility	+0 dB	+0 dB	Where neither tonal nor Impulsive but clearly identifiable +3 dB	If intermittency is readily identifiable +3 dB
Just Perceptible	+2 dB	+3 dB		
Clearly Perceptible	+4 dB	+6 dB		
Highly Perceptible	+6 dB	+9 dB		

2.3 British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings*

2.3.1 BS8233 provides guidance and recommendations for the control of noise from outside sources to maintain an internal acoustic environment appropriate for the intended use. The Standard suggests appropriate criteria and limits for differing situations which are, primarily, intended

to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes to the external noise climate. However, it is considered that the guidance provides suitable criteria for the assessment of internal noise levels in this instance.

2.3.2 The Standard suggests suitable guidance values for residential dwellings shown in Table 2-3.

Table 2-3: BS8233 Indoor Ambient Noise Levels for Dwellings

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

2.3.3 Whilst it is considered desirable to achieve these internal noise levels with the windows open, it is not stipulated within the Standard which states:

"*If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.*"

2.3.4 The Standard suggests that the level of noise reduction provided by a partially open window would be approximately 15dB.

2.3.5 BS8233 also sets out a design-criteria for external noise in external amenity spaces such as gardens and patios stating:

"*it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.*"

2.3.6 These guideline design-criteria values are meant for new residential development rather than for assessing new noisy development being introduced into a residential area. However, the guideline values provide good noise limits to attain in this instance.

2.4 ISO9613 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors*

2.4.1 The noise levels generated by the operation of the proposed development have been predicted using the calculation methodology set out in ISO9613-2. The methodology considers the distance between the sources and the receptors and applies the amount of attenuation due to atmospheric absorption and other site-specific characteristics.

The methodology assumes downwind propagation, i.e., a wind direction that assists the propagation of noise from the source to all receptors.

3 Baseline Survey Information & Results

3.1 Baseline Noise Survey

3.1.1 Baseline noise surveys were undertaken on Wednesday 21st and Thursday 22nd May 2025 to gather background and ambient noise levels at locations representative of the nearest noise-sensitive receptors to the proposed development site.

3.1.2 The monitoring locations used for the survey are shown in Figure 1-1 and detailed in Table 3-1 below. The measurement microphone was mounted on a tripod with a windshield approximately 1.5m above the ground in free-field conditions.

Table 3-1: Noise Monitoring Locations

Monitoring Location	Approx. Distance from Site	Reflecting Surfaces between Source & Receptor	Topography of Intervening Ground	Justification for Choice of Measurement Location
ML01	Adjacent	None	Mainly open undulating farmland with local roads and properties/farm buildings	Nearest safe and secure monitoring positions close to the receptors
ML02				
ML03	225m			
ML04	195m			

3.2 Weather Conditions

3.2.1 Weather condition during both surveys were suitable for environmental noise monitoring. Figures 3-1 and 3-2 below show the historical weather data for the May and July surveys respectively. The data is taken from that published on www.timeanddate.com.

3.3 Measuring Equipment

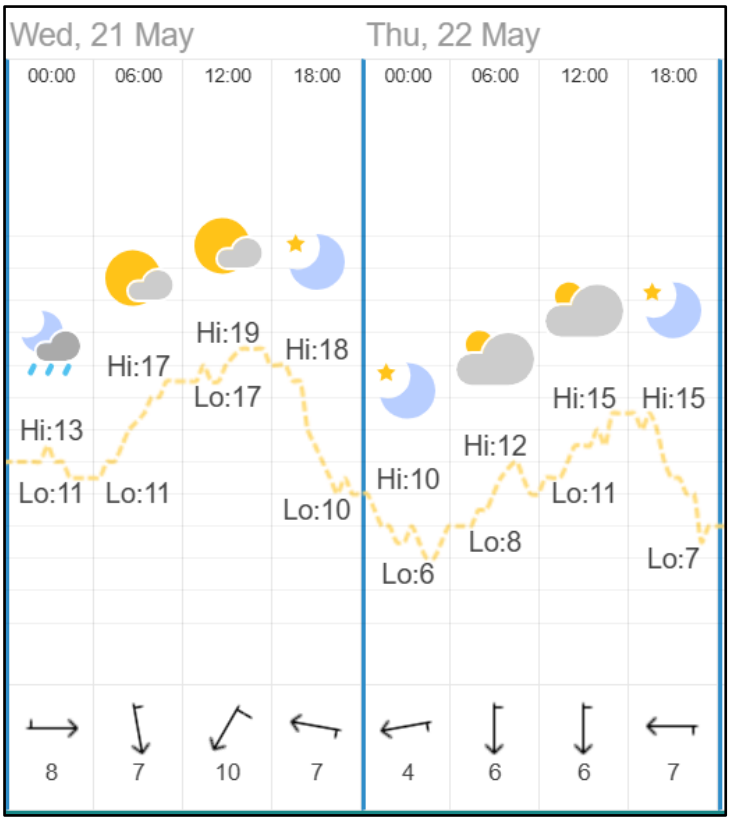
3.3.1 The noise monitoring equipment used during the surveys is shown in Table 3-3 and was set to record the $L_{Aeq,T}$, L_{A90}, L_{A10} and L_{Afmax} parameters.

3.3.2 The following set-up parameters were used on the sound level meter during all the noise measurements undertaken:

Time Weighting: Fast

Frequency Weighting: "A"

Figure 3-1: Weather Conditions – May Survey



3.3.3 The sound level meters were field calibrated, using the acoustic calibrator, prior to and upon completion of the overall survey. No drifts in calibration were noted.

Table 3-2: Noise Monitoring Equipment

Location	Equip. Make & Model	Class	Serial No.	Calibration Date Prior to Survey
ML01	Rion NL52 Sound Level Meter	1	520990	19/08/2024
	Rion NC75 Acoustic Calibrator	-	34724233	19/08/2024
ML02	Rion NL52 Sound Level Meter	1	721020	01/11/2024
	Rion NC75 Acoustic Calibrator	-	35024423	01/11/2024
ML03	Rion NL53 Sound Level Meter	1	351948	06/05/2025
	Rion NC75 Acoustic Calibrator	-	34356635	06/05/2025
ML04	Rion NL53 Sound Level Meter	1	351949	06/05/2025
	Rion NC75 Acoustic Calibrator	-	34456696	06/05/2025

3.3.4 The external calibration documentation for the equipment used is available upon request.

3.4 Survey Details and Results

3.4.1 The results of the baseline surveys are summarised in Table 3-4 below and can be found in full in Appendix A.

Table 3-3: Summary of Baseline Survey Results, dB

Location	Period	Duration hh:mm	Average dB $L_{Aeq,T}$	dB L_{AFmax}	dB L_{A90}	dB L_{A10}
ML01	Day	03:00	43.0	80.1	32.3	44.8
	Night	03:00	52.2	75.0	33.8	53.3
ML02	Day	09:45	45.5	79.8	33.7	44.5
	Night	03:00	49.1	73.6	33.4	49.4
ML03	Day	09:30	50.8	74.4	41.7	49.6
	Night	03:00	54.4	84.7	41.4	52.7
ML04	Day	08:30	42.6	70.9	34.2	44.6
	Night	03:00	44.1	67.5	35.1	45.7

3.5 Existing Context

3.5.1 The general noise climate comprised background and local road traffic noise, more evident during the morning rushing hour. Other noise sources included birdsong, overhead aircraft and local activities.

4 Assessment of Impacts

4.1 Introduction

4.1.1 Specific sound levels generated by the development proposals have been predicted to the site facing façade or site facing outdoor amenity space of the nearest noise-sensitive receptors identified using the calculation methodology outlined in ISO9613.

4.1.2 The resulting predicted specific sound levels have then been assessed in accordance with the guidance contained in BS4142 with reference made to sleeping conditions in bedrooms at night in accordance with the guidance contained in BS4142 and BS8233.

4.2 Sources Being Assessed

4.2.1 The noise source data used in the assessment is shown in Table 4-1. The figures are shown in either sound power levels or sound pressure levels at a given distance and are taken from the equipment manufacturers' datasheets or from the Enzygo data library

Table 4-1: Noise Source Information

Sound Source	Linear Sound Level [dB] per Frequency Band, Hz								Overall Sound Level Modelled
	63	125	250	500	1k	2k	4k	8k	
Inverters Stations	-	-	-	-	-	-	-	-	65dB(A) @ 10m
Substation Transformer	67	63	82	76	66	55	41	38	76.6dB L_{WA}
Aux Transformers	60	59	61	68	57	48	41	43	65.8dB L_{WA}

4.3 Noise Modelling Protocols

4.3.1 The model was constructed using the proprietary noise modelling software package CadnaA® utilising Google Earth geo-referenced 1:1 scaled aerial photography, openstreetmap.org mapping data, DEFRA online ground height data and noise sources and source data supplied by the client/equipment manufacturer.

4.3.2 It is assumed that the ground between the site and the receptors would be at least 90% soft ground. Wind and temperature gradient assisted sound propagation has been assumed to all receptors.

4.4 Predicted Sound Levels

4.4.1 For the purposes of this assessment the predicted sound levels assume that all equipment would be operating simultaneously.

4.4.2 Predicted specific sound levels during the day have been made to a height of 1.5m to represent outdoor amenity spaces. Predicted specific sound levels at night have been made

to a height of 1.5m and 4.0m to represent ground floor bedroom windows (in bungalows) and first-floor bedroom windows in respectively.

4.4.3 The results are shown in Table 4-2.

Table 4-2: Predicted Specific Sound Levels at the Receptors

Receptor Location	Period (hrs)	Receptor Height (m)	Predicted Specific Sound Level, dB $L_{Aeq,T}$
Home Farm – North	07:00 – 22:00	1.5	25.2
	05:00 – 07:00	1.5	29.8
Manor House	07:00 – 22:00	1.5	20.4
	05:00 – 07:00	4.0	25.2
New House Farm	07:00 – 22:00	1.5	31.6
	05:00 – 07:00	4.0	34.8
Oaklands Farm	07:00 – 22:00	1.5	20.9
	05:00 – 07:00	4.0	25.7
The Hollys	07:00 – 22:00	1.5	25.1
	05:00 – 07:00	4.0	29.9
The Plain	07:00 – 22:00	1.5	18.8
	05:00 – 07:00	4.0	19.1
Throstle Nest Way	07:00 – 22:00	1.5	19.0
	05:00 – 07:00	4.0	23.8
Top Wild Park Farm	07:00 – 22:00	1.5	30.7
	05:00 – 07:00	4.0	34.0
Wild Park Lane	07:00 – 22:00	1.5	22.4
	05:00 – 07:00	4.0	27.2

4.5 Subjective Impressions at the Receptors

4.5.1 As the development proposals are in the planning stage, there are currently no specific noise sources at site, the ambient sound level and residual sound level are considered equal and are taken as the measured $L_{Aeq,T}$. There have been no corrections applied to the measured sound levels. The specific sound level will be predicted using the proprietary noise modelling software CadnaA.

4.6 Sound Rating Levels

Existing Context

4.6.1 The identified nearest noise-sensitive receptors are in a rural area with a minor country road and the A52 being the main noise-generating sources. Farming activities are also likely to be

a source of noise when being undertaken; however, none were audible at the time of set up or retrieval of the monitoring equipment.

Derived Sound Rating Levels

4.6.2 It is considered that due to the relatively low predicted noise levels, any tonal feature generated by the proposed development would not be audible at the receptor and therefore no acoustic feature corrections for tonality have been included within the predictions.

4.6.3 Under normal operating conditions the facility would not generate any impulsive noise or 'other' sound characteristics. Therefore, no corrections for these characteristics have been made for these acoustic features.

4.7 Assessment of the Impacts

4.7.1 BS4142 states:

"*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.*"

4.7.2 A comparative assessment has been undertaken to determine the potential impact of the predicted sound rating levels at the nearest residential receptors upon the measured background noise levels.

4.7.3 Table 4-3 summarises the results of the assessment. Measured background levels have been rounded to the nearest whole decibel.

Table 4-3: BS4142 Assessment

Location	Period	Location	Rating Level dB $L_{Aeq,T}$	Background Noise Level dB L_{A90}	Difference dB
Home Farm – North	Day	Amenity	25	42	-17
	Night	Ext. 1 Floor Bedroom	30	41	-11
Manor House	Day	Amenity	20	42	-22
	Night	Ext. 1 Floor Bedroom	25	41	-16
New House Farm	Day	Amenity	32	32	0
	Night	Ext. 1 Floor Bedroom	35	34	+1
Oaklands Farm	Day	Amenity	21	42	-21
	Night	Ext. 1 Floor Bedroom	26	41	-15
The Hollys	Day	Amenity	25	32	-7
	Night	Ext. 1 Floor Bedroom	30	34	-4
The Plain	Day	Amenity	19	34	-15
	Night	Ext. 1 Floor Bedroom	19	35	-16
Throstle Nest Way	Day	Amenity	19	34	-15

Location	Period	Location	Rating Level dB $L_{Aeq,T}$	Background Noise Level dB L_{A90}	Difference dB
	Night	Ext. 1 Floor Bedroom	24	35	-11
Top Wild Park Farm	Day	Amenity	31	34	-3
	Night	Ext. 1 Floor Bedroom	34	33	+1
Wild Park Lane	Day	Amenity	22	34	-12
	Night	Ext. 1 Floor Bedroom	27	33	-6

4.7.4 Table 4-3 shows that the predicted rating levels during the day are below the measured background noise levels at all locations assessed indicating that the specific sound level generated by the proposed Solar Farm development would have a low impact.

4.7.5 Table 4-3 also shows that the predicted rating levels during the night are below the measured background noise levels at all receptors except New House Farm and Top Wild Park Farm, indicating that the specific sound level generated by the proposed Solar Farm development would have a low impact at all receptors except Top Wild Park Farm.

4.7.6 At New House Farm and Top Wild Park Farm the predicted night-time rating levels are above the measured background noise level by just 1dB indicating a low to adverse impact, depending on the context.

4.8 Context

4.8.1 BS4142 states that where the initial estimate of impact needs to be modified due to the context, all pertinent factors should be taken into consideration.

The Absolute Level of Sound

4.8.2 The specific sound levels generated by the development proposals are predicted to be below the existing prevailing average ambient $L_{Aeq,1hr}$ noise levels at the receptors assessed during both the day and night.

4.8.3 Therefore, it is unlikely that noise levels from the proposed solar farm development would be noticeable against the prevailing noise climate.

Sensitivity of the Receptors

4.8.4 The nearest receptors identified are residential in nature and as such are sensitive to noise impact during both the day and overnight.

Summary of Context

4.8.5 During the day, the predicted rating levels are below the existing background noise levels and considerably below the existing ambient noise levels and therefore would be masked by other environmental sounds in the area.

4.8.6 During the night, it is unlikely that residents would be using outdoor amenity spaces therefore an assessment of internal noise levels using the guidance contained in BS8233, as suggested by BS4142, has been made, specifically those relating to sleeping conditions in bedrooms.

4.9 BS8233 Assessment

4.9.1 At night residents are likely to be inside dwellings, potentially with windows open, with higher residual sound levels providing masking sound from the proposed development.

4.9.2 BS8233 states that a window partially open for ventilation would give a sound reduction of approximately 15dB. An assessment has been made against the guideline values for internal ambient noise levels for sleeping in bedrooms at night, i.e. 30dB $L_{Aeq,8hr}$.

4.9.3 Table 4-4 details the results of the assessment based on the worst-case predicted noise level outside the bedroom windows of the nearest properties to the site.

Table 4-4: BS8233 Assessment of Internal Noise Levels at Night

Location	Predicted External Noise Level, dB $L_{Aeq,T}$	Predicted Internal Noise Level, dB $L_{Aeq,T}$	Guidance Levels dB $L_{Aeq,8hr}$	Difference, dB
Home Farm	29	14	30	-16
Manor House	25	10		-20
New House Farm	35	20		-10
Oaklands Farm	26	11		-19
The Hollys	30	15		-15
The Plain	19	4		-26
Throstle Nest Way	24	9		-21
Top Wild Park Farm	34	19		-11
Wild Park Lane	27	12		-18

4.9.4 Table 4-4 shows that predicted internal noise levels, with the windows left partially open for ventilation, would achieve the guidance values for sleeping in bedrooms at night at all receptors assessed.

4.9.5 Based on the findings of the assessments above, it is considered that mitigation measures to reduce the potential impacts are unnecessary.

5 Conclusion

5.1.1 Enzygo Limited has been commissioned by BSR Energy Limited to undertake a noise impact assessment to support a planning application for their proposed Solar PV Scheme on land at Brailsford, Derbyshire.

5.1.2 The noise assessment has been undertaken to assess the potential impacts, in accordance with the relevant standards and guidance, at the nearest noise-sensitive properties to the site and to provide outline mitigation advice if considered necessary.

5.2 Noise Assessment

5.2.1 Sound levels generated by the proposed development have been predicted using CadnaA® and assessments have been made in accordance with the guidance contained in BS4142:2014+A1:2019.

5.2.2 The BS4142 assessment also shows that the daytime predicted sound rating levels are below the measured background noise levels. This would indicate that the rating sound level would have a **low impact** depending on the context and fall into the NOEL effect level when assessed in accordance with the Planning Policy Guidance for noise.

5.2.3 At night the BS8233 assessment, made in accordance with the guidance outlined in BS4142, has shown that, with the windows left partially open for ventilation, internal noise levels would achieve the guidance value of 30dB $L_{Aeq,8hr}$ for sleeping in bedrooms and therefore fall into the NOEL effect level when assessed in accordance with the Planning Policy Guidance for noise.

5.2.4 Given the above, it has been demonstrated that, there are no reasons on noise grounds why planning consent for the proposed development cannot be granted.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level; it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this when undertaking the measurement of noise, the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regards to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. Attempting produce a figure that relates this variable nature of noise to human subjective response, various statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
$L_{A10,T}$	The 10th statistical percentile of a measurement period, i.e., the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
$L_{A90,T}$	The 90th statistical percentile of a measurement period, i.e., the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all noise sources incident at one location, both in the near- and far-field (*The ambient sound comprises the residual sound and the specific sound when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation: $$L_{Aeq,T} = 10lg_{10}\left\{\left(\frac{1}{T}\right)\int_{t1}^{t2}\left[p_A\frac{(t)^2}{{p_0}^2}\right]dt\right\}$$

Term	Definition
	Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t.
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of several non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound, over time, T.
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed.

Statement of Uncertainty

This report is based upon a range of measurements, a system of calculations and noise predictions. As such, this report attempts to quantify fluctuations in air pressure and is subject to the effects of meteorology, physical and perceived anomalies, tolerances within the measuring and monitoring equipment and accuracy margins within the noise modelling software. In the interests of repeatability, this report must be considered as being affected by common factors involved in the measurement and calculation of noise propagation.

All measurement values, outcomes and assumptions are subject to a margin of uncertainty. This has been quantified and assessed as follows:

- Rounding errors – systemic tolerance of ±1dB;
- Meteorology – allowance of ±1.9dB; and
- CadnaA® noise propagation modelling software – operational accuracy of ±2.1dB

The most influential uncertainty factors for the assessment of noise are deemed to be equipment tolerances, meteorology and software accuracy. A root-sum-square statistical average has been used to provide an overall margin of uncertainty of ±3dB.

APPENDICES

Table A1: Location ML01, New House Farm Daytime

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 10:00	38.5	53.1	31.2	42.1
22/05/2025 10:15	39.7	58.3	34.3	41.7
22/05/2025 10:30	41.9	66.0	32.9	43.5
22/05/2025 10:45	45.2	64.9	33.3	46.5
22/05/2025 11:00	43.9	62.4	32.3	47.4
22/05/2025 11:15	45.1	64.8	33.6	48.7
22/05/2025 11:30	40.9	61.4	30.0	44.6
22/05/2025 11:45	42.9	55.0	31.7	48.2
22/05/2025 12:00	45.1	80.1	32.7	44.8
22/05/2025 12:15	45.6	57.0	33.7	49.7
22/05/2025 12:30	39.8	63.2	31.7	41.4
22/05/2025 12:45	39.3	62.6	30.1	38.9
Overall (Daytime)	**43.0**	**80.1**	**32.3**	**44.8**

Table A2: Location ML01, New House Farm Night-time

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 04:00	44.7	59.7	31.4	49.4
22/05/2025 04:15	53.8	67.8	37.3	59.2
22/05/2025 04:30	56.8	67.2	42.2	61.6
22/05/2025 04:45	56.4	67.5	35.5	61.4
22/05/2025 05:00	54.7	70.6	34.4	59.6
22/05/2025 05:15	52.0	68.9	32.7	51.0
22/05/2025 05:30	46.7	62.3	31.8	51.1
22/05/2025 05:45	51.5	75.0	33.6	57.0
22/05/2025 06:00	50.4	67.2	33.0	54.8
22/05/2025 06:15	42.4	62.0	31.4	45.5
22/05/2025 06:30	44.0	61.3	31.4	47.6
22/05/2025 06:45	39.8	66.6	31.0	41.2
Overall (Night-time)	**52.2**	**75.0**	**33.8**	**53.3**

Table A3: Location ML02, Top Wild Park Farm Daytime

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 11:30	52.4	74.2	35.8	57.1
21/05/2025 11:45	51.3	68.2	33.5	56.3
21/05/2025 12:00	42.8	64.2	33.0	42.0
21/05/2025 12:15	42.9	66.5	35.2	42.8
21/05/2025 12:30	47.3	75.4	37.6	45.9
21/05/2025 12:45	42.6	57.7	37.6	45.5
21/05/2025 13:00	43.2	65.0	36.2	44.6
21/05/2025 13:15	47.9	73.9	35.2	46.6

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 13:30	49.5	79.8	34.2	45.1
21/05/2025 13:45	42.3	59.9	33.6	45.0
21/05/2025 14:00	38.2	48.3	34.1	40.8
21/05/2025 14:15	37.4	49.8	33.6	40.0
21/05/2025 14:30	41.3	58.9	34.7	44.1
21/05/2025 14:45	40.3	57.6	34.9	43.2
21/05/2025 15:00	38.9	54.3	32.3	42.9
21/05/2025 15:15	38.6	55.2	33.0	40.8
21/05/2025 15:30	44.7	67.0	34.1	45.0
21/05/2025 15:45	41.6	57.1	34.2	44.5
21/05/2025 16:00	38.7	50.1	33.4	41.6
21/05/2025 16:15	45.3	71.4	37.6	46.7
21/05/2025 16:30	44.1	70.6	34.7	43.3
21/05/2025 16:45	50.8	76.8	35.7	47.8
21/05/2025 17:00	49.3	77.0	34.9	44.2
21/05/2025 17:15	43.3	69.2	35.1	43.5
21/05/2025 17:30	41.5	66.8	34.9	43.0
21/05/2025 17:45	42.7	62.2	35.7	44.5
21/05/2025 18:00	39.4	49.5	34.2	42.5
21/05/2025 18:15	39.2	50.4	34.4	41.9
21/05/2025 18:30	37.5	49.6	31.8	40.8
21/05/2025 18:45	45.2	63.7	34.5	48.2
21/05/2025 19:00	38.8	59.3	33.1	40.9
21/05/2025 19:15	52.0	79.3	33.7	53.5
21/05/2025 19:30	46.9	63.5	30.7	51.0
21/05/2025 19:45	39.9	57.3	29.2	43.6
21/05/2025 20:00	47.3	74.7	33.4	45.1
21/05/2025 20:15	37.1	52.4	30.6	41.0
21/05/2025 20:30	35.4	50.8	28.4	38.4
21/05/2025 20:45	34.1	49.3	28.1	37.2
21/05/2025 21:00	41.1	58.7	27.2	42.9
Overall (Daytime)	**45.5**	**79.8**	**33.7**	**44.5**

Table A4: Location ML02, Top Wild Park Farm Night-time

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 04:00	48.4	66.7	32.3	52.1
22/05/2025 04:15	55.7	73.6	36.3	59.7
22/05/2025 04:30	49.6	64.5	33.5	55.4
22/05/2025 04:45	49.6	64.9	33.8	55.0
22/05/2025 05:00	51.8	67.4	32.9	57.3

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 05:15	49.6	65.8	34.1	53.3
22/05/2025 05:30	46.9	62.0	33.6	52.3
22/05/2025 05:45	39.0	57.9	32.4	39.1
22/05/2025 06:00	42.4	63.2	32.2	45.1
22/05/2025 06:15	37.4	54.4	33.4	39.9
22/05/2025 06:30	39.5	58.3	33.4	41.6
22/05/2025 06:45	41.6	71.2	32.3	41.8
Overall (Night-time)	**49.1**	**73.6**	**33.4**	**49.4**

Table A5: Location ML03, Bullocks Lane Daytime

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 12:00	44.3	53.3	40.7	46.3
21/05/2025 12:15	46.0	52.8	42.1	48.4
21/05/2025 12:30	47.4	56.0	43.7	49.6
21/05/2025 12:45	46.9	56.9	43.5	49.2
21/05/2025 13:00	48.5	61.4	41.9	53.1
21/05/2025 13:15	57.6	68.2	54.6	59.7
21/05/2025 13:30	63.0	72.0	57.5	65.7
21/05/2025 13:45	48.7	59.8	41.1	54.1
21/05/2025 14:00	44.2	53.5	40.5	46.8
21/05/2025 14:15	45.6	60.7	41.9	48.1
21/05/2025 14:30	44.6	59.9	40.8	47.2
21/05/2025 14:45	56.1	72.1	43.9	60.1
21/05/2025 15:00	48.0	60.2	42.2	52.1
21/05/2025 15:15	44.4	58.7	41.0	46.4
21/05/2025 15:30	45.4	53.9	42.4	47.6
21/05/2025 15:45	45.3	57.3	41.4	48.3
21/05/2025 16:00	50.4	63.1	42.9	54.5
21/05/2025 16:15	48.1	70.2	42.5	48.5
21/05/2025 16:30	45.6	69.2	41.8	47.5
21/05/2025 16:45	45.2	58.8	41.6	47.3
21/05/2025 17:00	45.4	62.0	42.5	47.0
21/05/2025 17:15	45.0	55.8	42.2	46.9
21/05/2025 17:30	44.8	58.6	41.3	46.5
21/05/2025 17:45	46.2	74.4	42.2	47.4
21/05/2025 18:00	44.5	54.9	41.3	46.7
21/05/2025 18:15	45.5	65.3	40.3	46.7
21/05/2025 18:30	43.7	52.1	40.0	46.0
21/05/2025 18:45	46.0	63.2	39.7	47.1
21/05/2025 19:00	43.4	51.2	40.2	45.6

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 19:15	44.2	60.3	40.9	45.6
21/05/2025 19:30	42.9	54.6	38.8	45.2
21/05/2025 19:45	45.5	67.6	37.6	48.6
21/05/2025 20:00	46.6	63.6	40.0	49.3
21/05/2025 20:15	45.1	61.5	38.1	47.8
21/05/2025 20:30	48.6	67.4	36.3	48.0
21/05/2025 20:45	48.2	67.1	36.6	50.0
21/05/2025 21:00	49.3	67.9	36.6	52.2
21/05/2025 21:15	51.8	67.3	42.3	56.0
Overall (Daytime)	**50.8**	**74.4**	**41.7**	**49.6**

Table A6: Location ML03, Bullocks Lane Night-time

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 04:00	52.8	77.5	41.1	54.6
22/05/2025 04:15	63.8	84.7	43.8	57.6
22/05/2025 04:30	49.8	61.8	41.8	53.7
22/05/2025 04:45	48.9	61.1	40.7	52.6
22/05/2025 05:00	48.7	60.8	41.1	52.4
22/05/2025 05:15	48.9	60.4	42.2	52.4
22/05/2025 05:30	47.1	59.6	39.7	50.4
22/05/2025 05:45	47.8	60.3	40.8	51.4
22/05/2025 06:00	46.9	59.8	39.7	50.3
22/05/2025 06:15	48.9	61.0	42.5	52.8
22/05/2025 06:30	48.2	59.7	41.2	51.7
22/05/2025 06:45	48.6	61.0	41.7	52.0
22/05/2025 04:00	52.8	77.5	41.1	54.6
Overall (Night-time)	**54.4**	**84.7**	**41.4**	**52.7**

Table A7: Location ML04, Throstle Nest Way Daytime

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 12:30	42.4	54.7	37.5	45.1
21/05/2025 12:45	42.8	57.5	37.3	45.8
21/05/2025 13:00	39.5	51.6	35.2	42.5
21/05/2025 13:15	43.4	62.9	36.2	46.8
21/05/2025 13:30	42.0	62.8	34.4	44.1
21/05/2025 13:45	41.3	61.0	34.2	43.8
21/05/2025 14:00	39.1	56.3	34.5	41.8
21/05/2025 14:15	39.5	55.2	33.2	42.6
21/05/2025 14:30	38.6	60.0	33.7	41.2
21/05/2025 14:45	39.2	54.0	34.5	41.6
21/05/2025 15:00	40.8	56.3	34.3	44.2

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
21/05/2025 15:15	39.9	53.9	33.6	43.4
21/05/2025 15:30	40.0	55.9	34.2	42.8
21/05/2025 15:45	40.0	53.6	33.7	44.1
21/05/2025 16:00	38.6	52.8	33.5	41.2
21/05/2025 16:15	44.6	61.7	34.2	48.2
21/05/2025 16:30	41.6	59.4	34.4	44.8
21/05/2025 16:45	42.2	60.4	34.1	44.9
21/05/2025 17:00	44.2	63.2	34.7	46.1
21/05/2025 17:15	41.6	61.2	34.8	43.7
21/05/2025 17:30	46.6	63.2	34.7	51.2
21/05/2025 17:45	48.2	64.6	35.8	52.8
21/05/2025 18:00	41.4	61.5	33.8	42.7
21/05/2025 18:15	48.1	70.9	34.0	52.0
21/05/2025 18:30	39.6	58.4	33.7	42.7
21/05/2025 18:45	46.2	65.7	34.2	46.9
21/05/2025 19:00	41.1	68.7	33.4	42.6
21/05/2025 19:15	39.2	53.6	33.1	42.8
21/05/2025 19:30	37.8	58.3	32.4	39.9
21/05/2025 19:45	41.8	57.9	32.9	45.4
21/05/2025 20:00	42.7	58.7	34.0	46.1
21/05/2025 20:15	40.9	53.8	33.0	44.5
21/05/2025 20:30	39.3	53.7	31.1	43.1
21/05/2025 20:45	40.9	57.6	32.9	44.4
Overall (Daytime)	**42.6**	**70.9**	**34.2**	**44.6**

Table A8: Location ML04, Throstle Nest Way Night-time

Start Time	$L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
22/05/2025 04:00	46.9	62.2	36.4	50.2
22/05/2025 04:15	49.9	67.5	39.9	52.5
22/05/2025 04:30	47.2	63.7	37.4	50.9
22/05/2025 04:45	42.9	58.4	35.7	46.1
22/05/2025 05:00	41.7	53.7	35.7	45.2
22/05/2025 05:15	42.7	53.6	36.9	46.0
22/05/2025 05:30	40.6	54.8	34.2	44.4
22/05/2025 05:45	38.3	52.5	32.9	41.3
22/05/2025 06:00	40.9	56.5	32.9	44.4
22/05/2025 06:15	37.3	49.9	33.0	39.7
22/05/2025 06:30	39.3	53.8	32.6	42.9
22/05/2025 06:45	40.4	52.1	33.1	44.2
Overall (Night-time)	**44.1**	**67.5**	**35.1**	**45.7**

Appendix B – Noise Contour Plots

Figure B-1: Daytime L_{Aeq} Noise Contour Plot – 1.5m

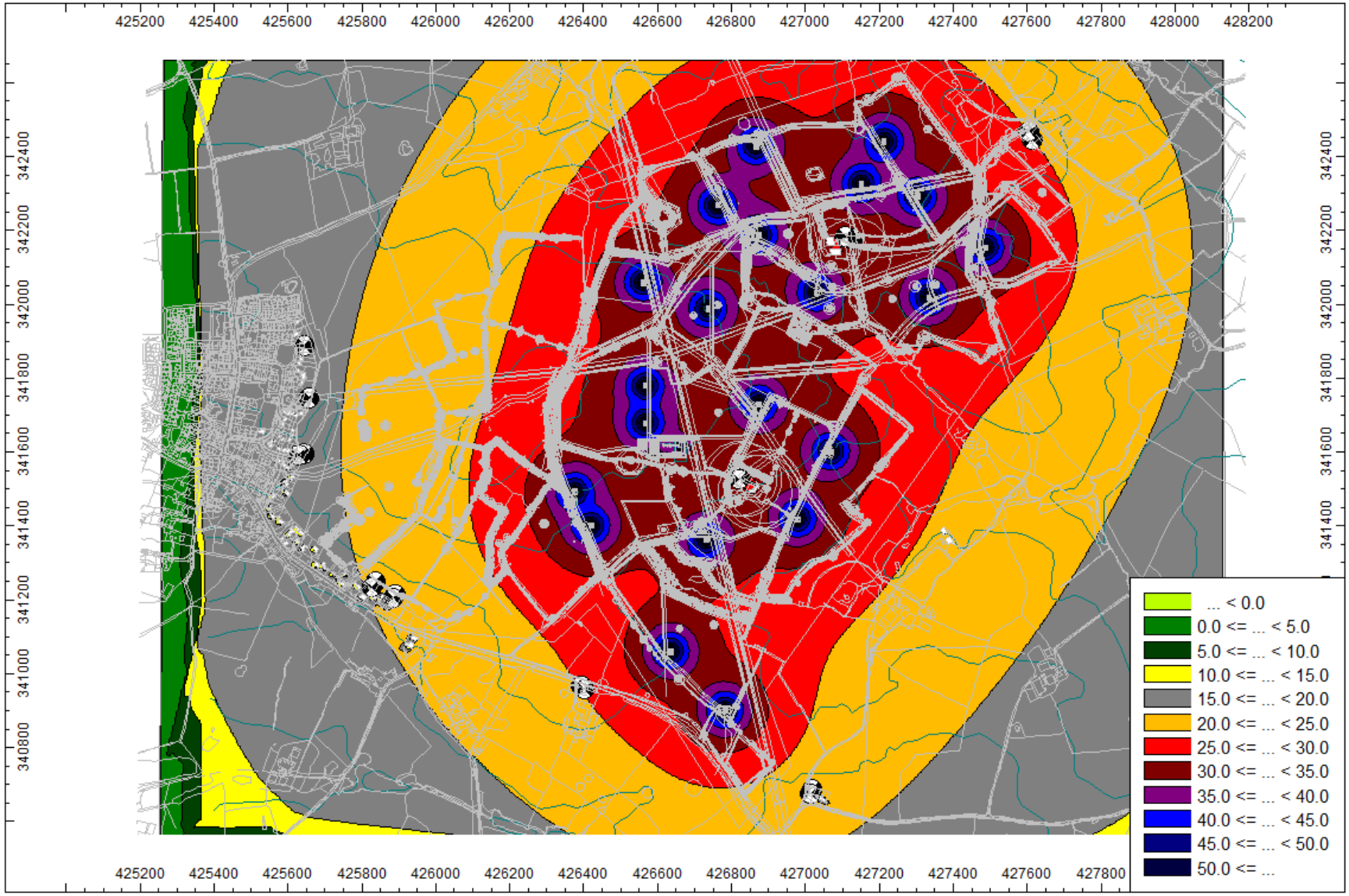
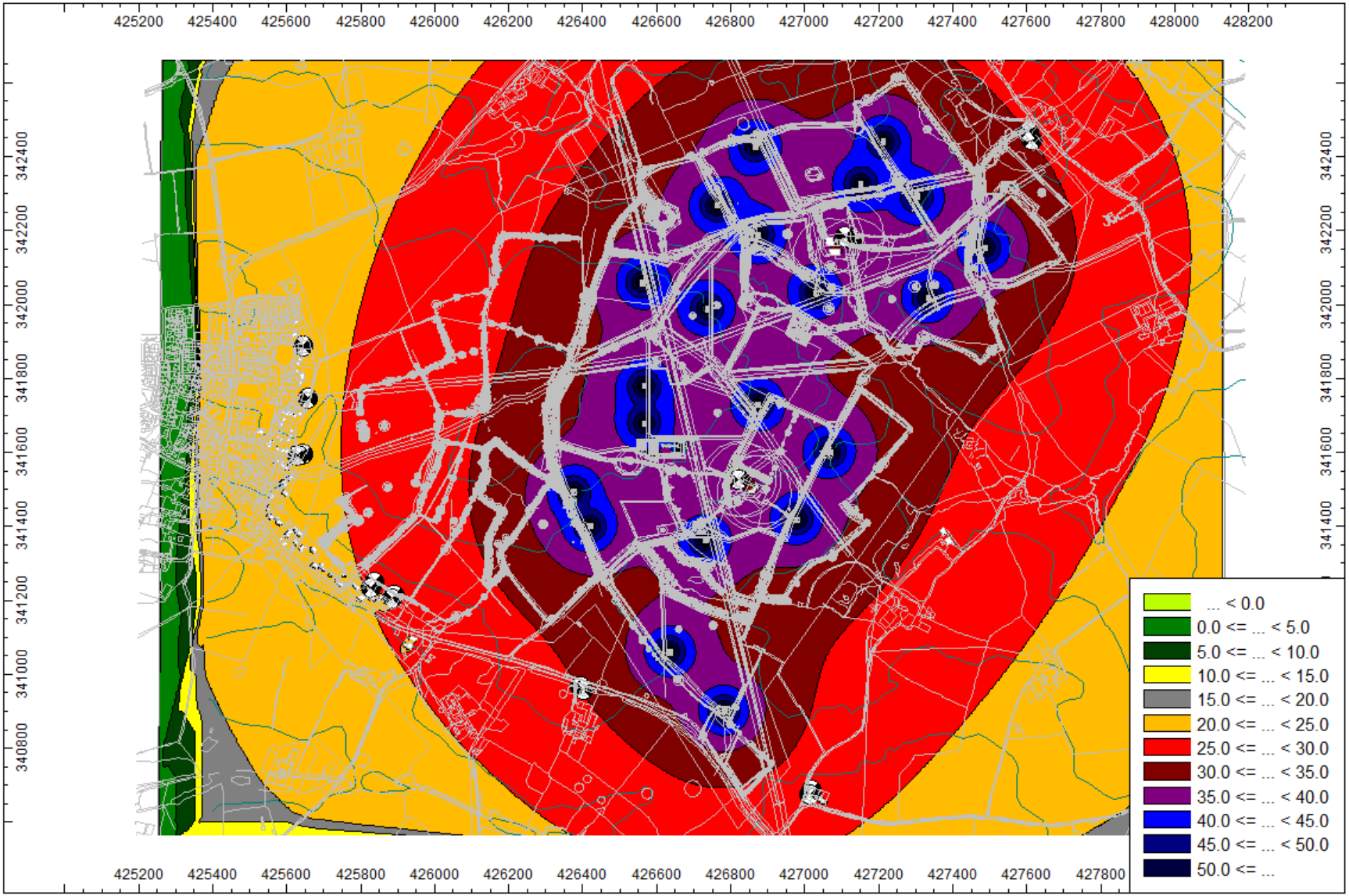


Figure B-2: Night-time L_{Aeq} Noise Contour Plot – 4.0m



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