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Noise Impact Assessment

Whites Farm BESS

02/08/2022

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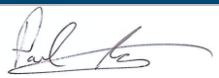
Approved By	Paul Neary	

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1. EXECUTIVE SUMMARY

1.1 This Noise Impact Assessment has been undertaken for a Proposed Development consisting of the installation and operation of a proposed BESS and ancillary infrastructure on lands east of Whites Farm, east of Barleylands Road and west of Harding's Elms Road, Essex.

1.2 The objectives of the assessment were to identify and describe any likely significant noise effects on key receptors during the operational phase of the Proposed Development.

1.3 In order to assess the potential noise impacts of the Proposed Development, the current baseline characteristics of the Application Site and the surrounding area have been identified as well as the predicted impacts of the Proposed Development and the cumulative impacts with the solar farm to the south.

1.4 A total of 36 noise sensitive receptors were included in the assessment within a Study Area of 500m of the noise generating area of the Application Site. All of the identified receptors are residential dwellings.

1.5 An unattended noise was undertaken within a field to the east of the Application Site between the 7th and 8th of July 2022. This location was chosen as it far enough away from the farm operations to the west so that they did not interfere with the baseline measurements.

1.6 The method set out in Figure 4 of BS4142 which uses a histogram to determine the most commonly occurring background noise ($L_{A90,t}$) value within the data set was assessed, however the average background noise level was found to be lower and therefore that was adopted as a worst case scenario.

1.7 A simulation of noise associated with the Proposed Development was produced using SoundPlan modelling software to predict noise levels for the purpose of undertaking an ISO9613-2 assessment. Source noise levels were modelled based on a candidate noise source.

1.8 An assessment of the acoustic impact of the Proposed Development was undertaken in accordance with BS4142. The results showed only **Low** and **Negligible impacts** at all receptors within the Study Area.

1.9 In addition to this, the levels at each receptor are below the Night Noise Guideline value of 40dB set out in the WHO Night-time Guidelines. This is the level recommended for the primary prevention of subclinical adverse health effects related to night noise in the population.

2. INTRODUCTION

BACKGROUND

2.1 Neo Environmental Ltd has been appointed by Anglo Renewables Ltd (the "Applicant") to undertake a Noise Impact Assessment (NIA) for a proposed Battery Energy Storage System (BESS) and associated infrastructure (the "Proposed Development") on lands east of Whites Farm, east of Barleylands Road and west of Harding's Elms Road, Essex (the "Application Site").

2.2 Please refer to **Figure 1: Appendix A** for the layout of the Proposed Development.

DEVELOPMENT DESCRIPTION

2.3 The Proposed Development consists of a battery storage facility, substation, control buildings, storage buildings new compound, fencing, access road, and associated infrastructure.

SCOPE OF THE ASSESSMENT

2.4 The objectives of this assessment are to identify and describe any likely significant noise effects on key receptors during the operational phase of the Proposed Development.

2.5 In order to assess the potential noise impacts of the Proposed Development, this report identifies the current baseline characteristics of the Application Site and the surrounding area, as well as the predicted impacts. This allows for the identification of potential noise impacts and recommendation of mitigation measures where appropriate.

2.6 This report is supported by the following Appendices:

- **Appendix A: Figures**
  - Figure 1: Development Layout
  - Figure 2: Noise Assessment Map
- **Appendix B: Time Series Charts**
- **Appendix C: Histograms**
- **Appendix D: Photographs of Noise Monitoring Equipment**

STATEMENT OF AUTHORITY

2.7 This Noise Impact Assessment has been produced by Michael McGhee and David Thomson of Neo Environmental. Having completed a civil engineering degree in 2012, Michael became a technician member of the Institute of Acoustics in 2013 and has since worked on over 100 noise impact assessments, ranging from solar and wind farms to large scale residential developments across the UK and Ireland.

2.8 David has a BSc (Hons) in physics, a MSc in sensor design and a MSc in nanoscience and nanotechnology. He is currently undertaking his Diploma in Acoustics and Nosie Control.

3. LEGISLATION

3.1 This assessment has been collated and considered based on the following legislative, planning policy and guidance context:

- The Environmental Protection Act 1990[1]
- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142)[2]
- ISO9613-2 Method for Rating Industrial noise affecting mixed residential and industrial areas[3];
- World Health Organisation (WHO) Guidelines for Community Noise[4]; and
- WHO Night-time Guidelines.[5]

The Environmental Protection Act 1990

3.2 The EPA 1990 specifies mandatory powers available to Local Authorities in respect of any noise that either constitutes or is likely to cause a statutory nuisance, which is also defined in the Act. A duty is imposed on Local Authorities to carry out inspections to identify statutory nuisances, and to serve abatement notices against these. Procedures are also specified with regards to complaints from persons affected by a statutory nuisance.

BS4142:2014+A1:2019

3.3 This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;

1 UK Government The Environmental Protection Act, 1990, Available at https://www.legislation.gov.uk/ukpga/1990/43/contents

2 BSI BS 4142+A1:2019 (2019) Methods for rating and assessing industrial and commercial sound.

3 International Standards Organisation (1996) Acoustics – Attenuation of sound during propagation outdoors, Dec 1996

4 World Health Organization (WHO), Guidelines for Community Noise, 1999

5 World Health Organization (WHO), Night Noise Guidelines for Europe, 2009

- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- 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 Application Site.

3.4 The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

ISO9613 Part 2

3.5 This International Organisation for Standardisation (ISO) standard specifies an engineering method for calculating the attenuation of outdoor sound during propagation to predict the levels of environmental noise at a distance from a variety of sources.

WHO Guidelines for Community Noise

3.6 The WHO Guidelines for Community Noise sets out specific guideline values for community noise in specific environments. The values relevant to this assessment are:

- An L_{Aeq} of 30dB within bedrooms during night time hours (8 hour period);
- An L_{Aeq} of 35dB within living rooms during day time hours (16 hour period);
- An L_{Aeq} of 50-55dB in gardens during day time hours (16 hour period); and
- An L_{Aeq} of 45 dB outside bedrooms with an open window during night time hours (8-hour period).

WHO Night Time Guidelines

3.7 The WHO Night Time Guidelines recommend updated levels lower than those found in the community noise guidelines. In respect of sleep disturbance, the guidelines recommend:

- 40 dB $L_{night,\ outside}$ Night Noise Guideline (NNG); and
- 55 dB $L_{night,\ outside}$ Interim Target (IT).

3.8 It further states:

"For the primary prevention of subclinical adverse health effects related to night noise in the population, it is recommended that the population should not be exposed to night noise levels greater than 40 dB of $L_{night,outside}$ during the part of the night when most people are in bed. The

LOAEL of night noise, 40 dB $L_{night,outside}$, can be considered a health-based limit value of the night noise guidelines (NNG) necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.

An interim target (IT) of 55 dB $L_{night,outside}$ is recommended in the situations where the achievement of NNG is not feasible in the short run for various reasons. It should be emphasized that IT is not a health-based limit value by itself. Vulnerable groups cannot be protected at this level. Therefore, IT should be considered only as a feasibility-based intermediate target which can be temporarily considered by policy-makers for exceptional local situations."

4. METHODOLOGY

BASELINE CONDITIONS

4.1 A desk-based assessment has been conducted to identify Noise Sensitive Receptors (NSRs) where it is considered that there is potential for increased noise effects due to the Proposed Development.

4.2 Residences closest to the Proposed Development were identified as the key NSRs for the purposes of this assessment. The Study Area included all receptors within 500m of the Application Site (**Figure 2: Appendix A**).

4.3 The establishment of baseline conditions was then undertaken using the methodology found in BS4142. A sound level meter (SLM) was set-up to record the required acoustic information at the NSRs identified in the desk-based assessment.

4.4 This equipment is housed in weather-proof enclosures and is powered by battery. The SLM was set up to collect a number of noise metrics within a sampling period of 15 minutes. Only the $L_{A90,15min}$ is reported, as this defines the background levels which are required in the assessment.

4.5 The microphone was placed between 1.2m and 1.5m above the ground level in free-field conditions at all measurement locations, i.e. at least 3.5m from the nearest vertical, reflective surface.

4.6 The microphone was calibrated using a class 1 calibrator. Noise levels are monitored continuously, and summary statistics stored every 15 minutes in the internal memory of each meter.

4.7 Prior to establishing the baseline conditions the acoustic data was filtered as follows for each background noise measurement location:

- Periods of heavy rain, which can adversely affect the noise data, have been excluded from the analysis;
- Periods when the wind speed is above 5m/s; and
- Periods of measured background noise data thought to be affected by extraneous noise sources, i.e. non-typical, are removed from the acoustic data set. Whilst some 'extraneous' data may actually be real, in practice it tends to bias any trend lines upwards, so its removal is adopted as a conservative measure.

POTENTIAL EFFECTS

4.8 As the Proposed Development is not yet constructed, it is not possible to complete an onsite survey to measure the actual source noise levels on the Application Site. Therefore, the predicted impacts were calculated using source noise data from the manufacturer of the noise emitting equipment. The data is similar to the type anticipated to be used for the Proposed Development and therefore provided a valid method for calculating sound levels.

4.9 SoundPlan[6] noise modelling software was utilised to determine the noise impact from the Proposed Development. The software allows the user to create a three-dimensional replication of the topographic and structural detail of the assessment area. The user can characterise the ground type, and include further structural detail such as berms, walls and reflective surfaces. The user also assigns relevant Sound Power Levels (LWA) to individual items of plant taking account of percentage on time, etc. This software is industry standard.

4.10 ISO9613-2[7] is an international standard which specifies an engineering method for calculating the attenuation of sound during propagation outdoors, in order to predict the levels of environmental noise at a distance from a variety of sources.

4.11 The ISO9613-2 algorithms take the octave band sound power output of the source as their acoustic input data and calculates on an octave band basis attenuation due to geometric spreading, atmospheric absorption and ground effects. This is the model which was utilised within the software model.

4.12 Where appropriate, a rating penalty was established to correct the specific sound level if a tone, impulse or other characteristic was expected to occur.

4.13 The SoundPlan software model simulates the digital ground model ("DGM"), single point receivers and noise contour lines, to generate noise contour maps for each model simulation. Noise contour maps accurately illustrate noise propagation for the Study Area and can be viewed in Figure 2: Appendix A.

IMPACT ASSESSMENT

4.14 Once the specific sound levels due to the proposed new sound source were predicted, the rating sound level was calculated, and it is this which was compared to the existing background sound level to determine the level of impact. The rating level was obtained by

[6] SoundPLAN International LLC, *Soundplan Noise software, debuting in 1986*. Further information found at http://www.soundplan.eu/english/soundplan-acoustics/

[7] International Standards Organisation (1996) *Acoustics – Attenuation of sound during propagation outdoors*

adding any penalties due to character that may be applicable to the predicted specific sound level.

4.15 Table 4-1 below details how the difference between the rating sound level and background sound level was used to conclude the level of impact under BS 4142, although it should be noted that any assessment is context specific.

Table 4-1: Magnitude of Impact Criteria

MAGNITUDE OF IMPACT	DEFINITION
High	Rating level is more than 5dB above the background level
Low	Rating level is less than 5dB above the background level
Negligible	Rating level is 10dB or more below the background level

5. BASELINE CONDITIONS

NOISE SENSITIVE RECEPTORS IN THE STUDY AREA

5.1 The co-ordinates of the NSRs can be found in **Table 5-1** and these were identified from available mapping sources including Google Earth.

Table 5-1: Noise Sensitive Receptors in Study Area

Name	Easting	Northing
Receptor 1	569508	191648
Receptor 2	569512	191640
Receptor 3	569751	191445
Receptor 4	569633	191388
Receptor 5	569729	191352
Receptor 6	569806	190896
Receptor 7	569833	190907
Receptor 8	569836	190895
Receptor 9	569840	190886
Receptor 10	569846	190879
Receptor 11	569878	190869
Receptor 12	569872	190901
Receptor 13	569866	190920
Receptor 14	569972	190926
Receptor 15	569978	190952
Receptor 16	570026	191058
Receptor 17	570056	191062
Receptor 18	570137	191054
Receptor 19	570130	191103

Receptor 20	570174	191114
Receptor 21	570195	191059
Receptor 22	570222	191041
Receptor 23	570220	191068
Receptor 24	570258	191133
Receptor 25	570283	191136
Receptor 26	570295	191139
Receptor 27	570263	191174
Receptor 28	570339	191193
Receptor 29	570378	191162
Receptor 30	570404	191165
Receptor 31	570534	191227
Receptor 32	570540	191247
Receptor 33	570555	191307
Receptor 34	570525	191374
Receptor 35	570525	191415
Receptor 36	570539	191438

BASELINE MONITORING

5.2 An unattended noise was undertaken within a field to the east of the Application Site (see **Figure 2: Appendix A**) between the 7th and 8th of July 2022. This location was chosen as it is far enough away from the farm operations to the west so that they did not interfere with the baseline measurements. The receptors at Whites Farm to the west of the Application Site are at a similar elevation to Harding's Elms Road and will have line of sight blocked by intervening buildings. Where the measurement location was set up, Harding's Elms Road is at a similar elevation with the vegetation breaking line of sight to Harding's Elms Road. It was thought that this location could be used as a good proxy location for these reasons.

5.3 A Class 1 Sound Level Meter (SLM) (Svantek 977) was used to measure noise at this receptor. The sound level meter was calibrated at the start and end of the noise surveys with no recorded drift greater than 0.5dB at 1kHz. Calibration records can be provided on request.

5.4 The monitoring location is within a rural environment. Road traffic noise from Harding's Elms Road, occasional impact noise from Whites Farm, beeping from farm equipment and noise from overhead aircraft are the dominant noise sources. Noise from farm animals, insects, wind and rustling of grass and trees were also evident.

Weather

- **Weather start:** 20°C, slight breeze (≤5m/s), dry, 95% cloud
- **Weather finish:** 20°C, slight breeze (≤5m/s), dry, 30% cloud.

ANALYSIS OF BASELINE DATA

5.5 The time series chart (**Appendix B**) showed relatively stable noise levels for the quiet day time and night time periods with no major outlier data points. No data was removed due to rainfall or high windspeeds as the weather was relatively settled for the monitoring period and this can be seen from the weather at the start and end of the survey period.

5.6 The method set out in Figure 4 of BS4142 was adopted for this assessment which uses a histogram to determine the most commonly occurring background noise ($L_{A90,t}$) value within the data set. The histograms for both day time and night time periods can be found in **Appendix C.** In this case, the average noise level was lower than the histograms most common noise level and therefore it will be used in this assessment as a worst case.

5.7 **Tables 5-2** show the background noise levels at both quiet day time and night time periods, respectively.

Table 5-2: Quiet Day Time and Night Time Noise Levels

Period	MOST COMMON NOISE LEVEL $L_{A90,\ 15MIN}$ (DB)	AVARAGE NOISE LEVEL, $L_{A90,15MIN}$ (DB)
Day Time	44.0	43.9
Night Time	37.0	35.6

5.8 An assessment and comparison against the WHO night time levels will also be undertaken.

6. POTENTIAL EFFECTS

6.1 The main sources of sound within the Proposed Development are the cooling fans for the Power Conversion System (PCS) units, which will also include the HVAC system for the batteries, as well as Substation Transformer.

6.2 The 24 battery storage units are expected to be continuously charging and discharging. If there are any rest periods for the battery storage units these are likely to be infrequent and the HVAC will still be functioning. This will likely be similar with the fans on the PCS units.

6.3 Source noise levels are estimated based on research of similar projects and represent the equipment operating at maximum capacity. Predictions based on this data therefore represent a worst-case scenario and the sound levels would be expected to be less when the Proposed Development isn't operating at maximum capacity.

6.4 **Table 6-1** shows A-weighted sound power levels of the noise sources which have been included in the noise model.

Table 6-1: Summary of 1/1 Octave Band Centres

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
PCS Unit	39.8	59.9	64.4	72.8	68	78.5	50	44.1	**80.0**
HVAC System	46.8	64.4	73.4	72.8	71	72.2	69.5	65.9	**79.3**
Grid Transformer	50.8	65.9	72.4	77.8	75	71.2	66	56.9	**81.1**

6.5 Should the chosen noise source increase noise levels from that specified in this report then this would be agreed with the Council prior to the construction stage.

RESULTS

6.6 Predicted specific sound levels at nearby properties are detailed in **Table 6-2** and an illustrative sound footprint for the Proposed Development is provided in **Figure 2 of Appendix A.**

6.7 The sound emitted by the PCS and HVAC units, as well as the site transformer, can depend on the capacity and usage of the ESF. It can therefore be intermittent. Under the intermittency

method described in BS4142, a correction of 3dB would typically be applied as consistent with 'If the intermittency is readily distinctive against the residual acoustic environment'. Although it could be argued that the Proposed Development noise won't be distinctive at all NSR's, the correction has been supplied to all as a worst-case scenario.

6.8 Note that a 3dB façade correction is included within the SoundPlan model at each of the receptor locations.

Table 6-2: Predicted Noise Impacts at the NSRs

Receptor	Specific Sound Level ($L_{Ar,Tr}$) dB (Predicted)	Rating Penalty (dB)	Rating Level (dB)
Receptor 1	21.1	3	24.1
Receptor 2	21.8	3	24.8
Receptor 3	31.2	3	34.2
Receptor 4	26.8	3	29.8
Receptor 5	29.7	3	32.7
Receptor 6	19.0	3	22.0
Receptor 7	19.4	3	22.4
Receptor 8	19.1	3	22.1
Receptor 9	19.0	3	22.0
Receptor 10	18.9	3	21.9
Receptor 11	18.8	3	21.8
Receptor 12	19.4	3	22.4
Receptor 13	19.8	3	22.8
Receptor 14	20.2	3	23.2
Receptor 15	20.9	3	23.9
Receptor 16	24.2	3	27.2
Receptor 17	24.6	3	27.6
Receptor 18	23.9	3	26.9
Receptor 19	26.6	3	29.6
Receptor 20	25.2	3	28.2

Receptor 21	22.8	3	25.8
Receptor 22	21.9	3	24.9
Receptor 23	22.6	3	25.6
Receptor 24	23.6	3	26.6
Receptor 25	23.2	3	26.2
Receptor 26	23.1	3	26.1
Receptor 27	25.0	3	28.0
Receptor 28	23.8	3	26.8
Receptor 29	22.0	3	25.0
Receptor 30	21.5	3	24.5
Receptor 31	20.2	3	23.2
Receptor 32	20.2	3	23.2
Receptor 33	19.7	3	22.7
Receptor 34	20.4	3	23.4
Receptor 35	20.4	3	23.4
Receptor 36	20.1	3	23.1

7. IMPACT ASSESSMENT

7.1 Table 7-1 and 7-2 compares the predicted rating level with the adopted background noise levels for both the day time and night time periods.

Table 7-1: Noise Impacts against the Quiet Day Time Background Noise Level

Receptor	Rating Level (dB)	Baseline Noise Level (LA90) dB	Exceedance (dB)	Receptor
Receptor 1	24.1	43.9	-19.8	Negligible
Receptor 2	24.8	43.9	-19.1	Negligible
Receptor 3	34.2	43.9	-9.7	Low
Receptor 4	29.8	43.9	-14.1	Negligible
Receptor 5	32.7	43.9	-11.2	Negligible
Receptor 6	22.0	43.9	-21.9	Negligible
Receptor 7	22.4	43.9	-21.5	Negligible
Receptor 8	22.1	43.9	-21.8	Negligible
Receptor 9	22.0	43.9	-21.9	Negligible
Receptor 10	21.9	43.9	-22.0	Negligible
Receptor 11	21.8	43.9	-22.1	Negligible
Receptor 12	22.4	43.9	-21.5	Negligible
Receptor 13	22.8	43.9	-21.1	Negligible
Receptor 14	23.2	43.9	-20.7	Negligible
Receptor 15	23.9	43.9	-20.0	Negligible
Receptor 16	27.2	43.9	-16.7	Negligible
Receptor 17	27.6	43.9	-16.3	Negligible
Receptor 18	26.9	43.9	-17.0	Negligible
Receptor 19	29.6	43.9	-14.3	Negligible
Receptor 20	28.2	43.9	-15.7	Negligible
Receptor 21	25.8	43.9	-18.1	Negligible

Receptor 22	24.9	43.9	-19.0	Negligible
Receptor 23	25.6	43.9	-18.3	Negligible
Receptor 24	26.6	43.9	-17.3	Negligible
Receptor 25	26.2	43.9	-17.7	Negligible
Receptor 26	26.1	43.9	-17.8	Negligible
Receptor 27	28.0	43.9	-15.9	Negligible
Receptor 28	26.8	43.9	-17.1	Negligible
Receptor 29	25.0	43.9	-18.9	Negligible
Receptor 30	24.5	43.9	-19.4	Negligible
Receptor 31	23.2	43.9	-20.7	Negligible
Receptor 32	23.2	43.9	-20.7	Negligible
Receptor 33	22.7	43.9	-21.2	Negligible
Receptor 34	23.4	43.9	-20.5	Negligible
Receptor 35	23.4	43.9	-20.5	Negligible
Receptor 36	23.1	43.9	-20.8	Negligible

Table 7-2: Noise Impacts against the Night Time Background Noise Level

Receptor	Rating Level (dB)	Baseline Noise Level (LA90) dB	Exceedance (dB)	Receptor
Receptor 1	24.1	35.6	-11.5	Negligible
Receptor 2	24.8	35.6	-10.8	Negligible
Receptor 3	34.2	35.6	-1.4	Low
Receptor 4	29.8	35.6	-5.8	Low
Receptor 5	32.7	35.6	-2.9	Low
Receptor 6	22.0	35.6	-13.6	Negligible
Receptor 7	22.4	35.6	-13.2	Negligible
Receptor 8	22.1	35.6	-13.5	Negligible
Receptor 9	22.0	35.6	-13.6	Negligible

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Receptor 11	21.8	35.6	-13.8	Negligible
Receptor 12	22.4	35.6	-13.2	Negligible
Receptor 13	22.8	35.6	-12.8	Negligible
Receptor 14	23.2	35.6	-12.4	Negligible
Receptor 15	23.9	35.6	-11.7	Negligible
Receptor 16	27.2	35.6	-8.4	Low
Receptor 17	27.6	35.6	-8.0	Low
Receptor 18	26.9	35.6	-8.7	Low
Receptor 19	29.6	35.6	-6.0	Low
Receptor 20	28.2	35.6	-7.4	Low
Receptor 21	25.8	35.6	-9.8	Low
Receptor 22	24.9	35.6	-10.7	Negligible
Receptor 23	25.6	35.6	-10.0	Negligible
Receptor 24	26.6	35.6	-9.0	Low
Receptor 25	26.2	35.6	-9.4	Low
Receptor 26	26.1	35.6	-9.5	Low
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Receptor 28	26.8	35.6	-8.8	Low
Receptor 29	25.0	35.6	-10.6	Negligible
Receptor 30	24.5	35.6	-11.1	Negligible
Receptor 31	23.2	35.6	-12.4	Negligible
Receptor 32	23.2	35.6	-12.4	Negligible
Receptor 33	22.7	35.6	-12.9	Negligible
Receptor 34	23.4	35.6	-12.2	Negligible
Receptor 35	23.4	35.6	-12.2	Negligible
Receptor 36	23.1	35.6	-12.5	Negligible

7.2 The Proposed Development, including cumulative, is predicted to have only **Low** or **Negligible impacts** at all receptors within the study area.

7.3 In addition to this, the levels at each receptor are found to be below the Night Noise Guideline value of 40dB set out in the World Health Organisation (WHO) Night-time Guidelines. This is the level recommended for the primary prevention of subclinical adverse health effects related to night noise in the population.

8. SUMMARY

8.1 This Noise Impact Assessment has been undertaken for a Proposed Development consisting of the installation and operation of a proposed BESS and ancillary infrastructure on lands east of Whites Farm, east of Barleylands Road and west of Harding's Elms Road, Essex.

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8.3 In order to assess the potential noise impacts of the Proposed Development, the current baseline characteristics of the Application Site and the surrounding area have been identified as well as the predicted impacts of the Proposed Development and the cumulative impacts with the solar farm to the south.

8.4 A total of 36 noise sensitive receptors were included in the assessment within a Study Area of 500m of the noise generating area of the Application Site. All of the identified receptors are residential dwellings.

8.5 An unattended noise was undertaken within a field to the east of the Application Site between the 7th and 8th of July 2022. This location was chosen as it far enough away from the farm operations to the west so that they did not interfere with the baseline measurements.

8.6 The method set out in Figure 4 of BS4142 which uses a histogram to determine the most commonly occurring background noise ($L_{A90,t}$) value within the data set was assessed, however the average background noise level was found to be lower and therefore that was adopted as a worst case scenario.

8.7 A simulation of noise associated with the Proposed Development was produced using SoundPlan modelling software to predict noise levels for the purpose of undertaking an ISO9613-2 assessment. Source noise levels were modelled based on a candidate noise source.

8.8 An assessment of the acoustic impact of the Proposed Development was undertaken in accordance with BS4142. The results showed only **Low** and **Negligible impacts** at all receptors within the Study Area.

8.9 In addition to this, the levels at each receptor are below the Night Noise Guideline value of 40dB set out in the WHO Night-time Guidelines. This is the level recommended for the primary prevention of subclinical adverse health effects related to night noise in the population.

9. APPENDICES

APPENDIX A: FIGURES

- Figure 1: Development Layout
- Figure 2: Noise Assessment Map

APPENDIX B: TIME SERIES CHARTS

APPENDIX C: HISTOGRAMS

APPENDIX D: PHOTOGRAPHS OF NOISE MONITORING EQUIPMENT