

**TYDD SOLAR FARM & BESS
GOREFIELD**

NOISE IMPACT ASSESSMENT

PACE Titan Energy Ltd

**TYDD SOLAR FARM & BESS
GOREFIELD
NOISE IMPACT ASSESSMENT**

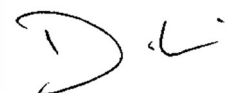
Report prepared by:
Hepworth Acoustics Ltd
The Wheelhouse
Bond's Mill Estate
Stonehouse
Gloucestershire
GL10 3RF

On behalf of:
PACE Titan Energy Ltd

Report prepared by:
Graham Bowland BSc MIOA – Technical Director



Report checked by:
Donald Quinn BSc FIOA – Managing Director



CONTENTS

1.0	INTRODUCTION	1
2.0	NOISE CRITERIA	3
3.0	BASELINE NOISE SURVEY	6
4.0	PREDICTED NOISE EMISSIONS	8
5.0	NOISE ASSESSMENT	10
6.0	SUMMARY AND CONCLUSION	14
FIGURE 1: SITE PLAN		15
FIGURE 2: PROPOSED SITE LAYOUT		16
APPENDIX I: NOISE UNITS & INDICES		17
APPENDIX II: NOISE SURVEY RESULTS		19

1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by PACE Titan Energy Ltd to carry out a noise impact assessment in connection with a planning application for the proposed Tydd solar farm and battery energy storage system (BESS) at Land East of Guanockgate Road, Gorefield, Lincolnshire PE13 4PL.
- 1.2 The site and surroundings are currently open farmland. The site and wider surroundings are very flat, given the fenland location.
- 1.3 There are existing residential properties at varying distances from a number of points around the site perimeter, all starting at well over 300m from the nearest plant items at respective locations.
- 1.4 The site location plan is shown Figure 1. The proposed site layout is shown in Figure 2.
- 1.5 Current proposals are for solar modules across most of the site area. A total of 16 Solar Inverter units will be distributed across the site, among the solar modules.
- 1.6 In addition, in a generally central area of the site a BESS compound will be formed by way of acoustic screening at the perimeter, within which will be arranged a total of 35 Battery Container units plus a total of 7 Battery Inverter units.
- 1.7 Finally, in an area more towards the southeast of the site, a 33kV Substation is proposed.
- 1.8 The proposed solar plant will have the potential to operate during sunlight hours only.
- 1.9 Also, we understand that the quoted noise levels for the solar equipment are based on full operation of the equipment, during peak periods, which will be in the middle of the daytime on warm/hot summer days. When the equipment is running at a lower capacity, due to a lower intensity of sunlight, e.g. during cooler months, or during the earlier and later part of daylight hours at any time of year, when the angle of incidence of sun rays will be lower, a lower level of noise output is expected. However, at this stage no detailed information is available to provide a clear profile of reduced noise levels in this regard and hence the full duty noise levels have been used to ensure a robust assessment.

- 1.10 The BESS plant will have the potential to operate at any time, although the functioning window is typically a small number of hours per day. Nevertheless, to provide a robust assessment, potential operation at any time day or night has been considered herein. Similar to above, lower noise levels from the BESS equipment are expected at lower operational duties however, full duty noise levels have been used to ensure a robust assessment.
- 1.11 The various noise units and indices referred to in this report are described in Appendix II. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 NOISE CRITERIA

NPPF

- 2.1 The National Planning Policy Framework (NPPF), December 2023, states at paragraph 180 that *“Planning policies and decisions should contribute to and enhance the natural and local environment by: ... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution ...”*.
- 2.2 Paragraph 185 states that *“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life ...”*.
- 2.3 However, there is as yet no specific guidance on numerical acoustic assessment/design criteria for developments such as this provided in the NPPF, accompanying Technical Guidance National Planning Practice Guidance ‘Noise’, nor the NPSE.

BS 4142

- 2.4 British Standard 4142: 2014 +A1:2019, *Methods for rating and assessing industrial and commercial sound* provides methods for rating and assessing sound of an industrial nature from industrial or commercial premises.
- 2.5 This requires the sound from a specific source (in L_{Aeq}) to be compared with the existing background sound level (L_{A90}) outside residential locations. The standard also puts weight on the importance on the context in which the sound will occur.
- 2.6 The noise ‘rating’ level is derived based on the ‘specific’ L_{Aeq} sound level attributable to the operation with an ‘acoustic feature’ penalty added for any sound sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.
- 2.7 BS 4142 stipulates that impacts should be assessed over a reference time interval of 1-hour during the daytime (0700-2300hrs) and 15-minutes during the night-time (2300-0700hrs).

2.8 An initial estimate of the impact of the operation is determined by subtracting the background level from the 'rating' level. BS 4142 states that:

- 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 on the context
- Where the 'rating' level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.9 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:

- The absolute level of noise, including *"where background noise levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background. This is especially true at night"*
- The character and level of the residual noise
- The sensitivity of the receptor

2.10 Regarding background sound levels, BS 4142 requires that *"values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*. It is also stated that *"diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes"*.

BS 8233

2.11 British Standard 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* provides guidelines on design criteria for acceptable noise levels within residential accommodation for the daytime (0700-2300hrs) and night-time (2300-0700hrs) periods, as summarised in Table 1.

Table 1 : BS 8233 Recommended Acoustic Design Criteria

Activity	Location	Internal Noise Levels	
		Daytime 0700-2300hrs	Night-time 2300-0700hrs
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

- 2.12 BS 8233 clarifies that the above guidance relates only to noise without specific character (e.g. noise that does not have a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) and that where such characteristics are present, lower noise limits might be appropriate.
- 2.13 Regarding outdoor living areas, BS 8233 states that *“it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB L_{Aeq} , which would be acceptable in noisier environments.*

3.0 BASELINE NOISE SURVEY

- 3.1 Continuous baseline ambient/background noise monitoring was undertaken in sequential 15-minute samples at two locations, identified in Figure 1 as Monitoring Locations 1 and 2, over the period commencing at 1600hrs on Wednesday 15 November 2023 and ending at 1300hrs on Thursday 16 November 2023.
- 3.2 The noise monitoring was undertaken at Monitoring Location 1 using a Norsonic 140 Class 1 integrating sound level meter (serial no. 1406529) and at Monitoring Location 2 using a Nti Audio XL2-TA 'Class 1' sound analyser (serial no. A2A-23512-E1). Calibration checks were carried out to all equipment using a Brüel & Kjær Type 4231 acoustical calibrator (serial no. 2389221) before and after the survey, and no variation in calibration level was observed.
- 3.3 The measurement microphones were fitted with windshields and mounted at 1.5m above local ground in free-field conditions.
- 3.4 The weather during the monitoring was dry with light winds of speeds typically below 4m/s, of mixed but predominantly westerly direction.
- 3.5 The measured noise levels were due to distant ambient noise. There was some daytime noise from farming activity in the wider local area, as well as noise from occasional aircraft, and animal noises. Early in the monitoring period there was some residual noise from RAF jets flying at a distance from the site. These had been directly overflying a little earlier, generating very high noise levels at the site, but prior to noise measurements commencing.
- 3.6 The measured noise level data has been analysed, and summarised for each location into relevant time periods as follows:
- 3.7 For the assessment including solar equipment, the daytime period has been based on the hours 0700-2100hrs, whereas this night-time period has been based on the hours 0500-0700hrs respectively, noting that the solar equipment will not be operational over the approximate period 2100-0500hrs, which will be in darkness (or very low sun) even in midsummer.
- 3.8 Addition assessments have been undertaken based on the BESS equipment operating in isolation, for the late evening period of 2100-2300hrs and for the full night-time period. Drawing on the provisions of BS 4142, baseline noise levels for the night-time have been based on the period 2300-0100hrs.

3.9 The baseline noise levels are summarised in Table 2.

Table 2 : Summary of Baseline Noise Monitoring Results

Index		Day (0700-2100hrs)		Late Evening (2100-2300hrs)		Early Night-time (2300-0100hrs)		Late Night-time (0500-0700hrs)	
		Location 1	Location 2	Location 1	Location 2	Location 1	Location 2	Location 1	Location 2
$L_{Aeq,T}$ 'residual'	Range	29-51	26-52	27-33	29-35	21-27	20-28	24-32	26-33
	Log. Average	41	41	31	32	24	24	28	30
$L_{A90,T}$ 'background'	Range	23-37	23-34	23-28	25-30	20-23	19-25	21-27	21-28
	Mean	30	29	26	27	21	21	23	24
	Mode	31	32	28	26	20	20	21	22

3.10 It is noted that the residual L_{Aeq} noise levels and background L_{A90} noise levels are fairly consistent between the two locations. Indeed, the nature of the local environment is such that it may be taken that noise levels will be generally consistent across the wider area, when not influenced by transitory local noise events.

4.0 PREDICTED NOISE EMISSIONS

4.1 Calculations have been undertaken in order to determine potential worst-case noise levels attributable to the proposed development at the nearest existing residential locations to the north and east.

4.2 It is understood that, at this stage, precise plant selections are yet to be confirmed. However, based on previous experience of similar developments with the same operational strategy, the following attributable sound power data has been adopted for assessment purposes:

- Solar Inverter: - 92dB L_{WA}
- Battery Containers: - 85dB L_{WA}
- Battery Inverters: - 92dB L_{WA}
- Substation: - 89dB L_{WA}

4.3 The assessment locations considered are identified in Figure 1 as Assessment Locations A – E.

4.4 In terms of natural attenuation of noise on the paths of propagation between sources and receivers, a highly cautious approach has been adopted.

4.5 Firstly, as well as significant reductions over the separation distances that apply, natural attenuation will occur due to a number of factors.

4.6 For the Solar inverters, to account for uncertainties relating to the effects of the presence of the solar panels on soft ground absorption, and also the open space below the panels on the potential screening effects, a nominal reduction for acoustic screening / soft ground of 5dB(A) has been taken in most cases. In certain cases, i.e. for the two proposed Solar Inverters to be position to the western edge of the site when considered at Assessment Location 1 and 2, zero screening correction is applied, however a nominal 2dB(A) correction has been applied to account for soft ground absorption.

4.7 For the BESS compound, assuming a perimeter acoustic barrier of height equivalent to the plant contained within the compound, and construction according to the specification set out herein (paragraphs 5.17 - 5-18), a 10dB(A) screening correction has been taken for all Assessment Locations.

- 4.8 For the substation, a nominal 5dB(A) screening correction has been taken for all Assessment Locations.
- 4.9 Distance corrections have also been applied to each individual item of plant to each of the nearest existing residential locations. Noting the corrections already outlined above, to ensure a cautious assessment this has been done based on a calculation of propagation over hard ground.
- 4.10 In reality, lower noise levels may be expected and as such the calculations may be taken to represent worst-case situations. This is especially true during off-peak periods for solar generation.
- 4.11 The predicted worst-case noise levels are summarised in Table 3.

Table 3 : Predicted Worst-case Noise Levels at Nearest Dwellings

Receiver Location	Predicted Noise Level dB $L_{Aeq,T}$		
	Solar Equipment	BESS Equipment	Combined Solar + BESS
A	35	26	35
B	34	24	34
C	33	28	34
D	31	28	32
E	31	27	32

5.0 NOISE ASSESSMENT

- 5.1 Based on the results of the baseline noise survey and the predicted worst-case noise levels from the development, a set of 'initial estimate' assessments of the potential noise impact of the development, as per BS 4142 guidelines, has been undertaken.
- 5.2 As a further step to ensure a highly robust assessment, the initial assessments include a +2dB 'acoustic feature' penalty to account for a potentially 'just perceptible' tonal component, and a further +3dB 'acoustic feature' penalty to account for the potential intermittent characteristic of inverters, as per BS 4142. In reality, it is by no means clear that either of the above acoustic features will be noticeably present at nearby residences, but have been included in the initial estimates to ensure a highly cautious approach.
- 5.3 Representative background sound levels have been determined based on the noise monitoring set out herein and applied equally to all Assessment Locations.
- 5.4 Firstly, initial estimate assessments are presented for the solar and BESS equipment operating together over the active period for the solar equipment of 0500-2100hrs. This is summarised in Table 4.

Table 4 : Initial BS 4142 Assessments – Solar and BESS – 0500-2100hrs

		Assessment Location				
		1	2	3	4	5
Specific Level, $L_{Aeq,T}$ dB		35	34	34	32	32
Acoustic Feature Corrections, dB	Tonality	+2	+2	+2	+2	+2
	Intermittency	+3	+3	+3	+3	+3
Rating Level, $L_{Ar,Tr}$ dB		40	39	39	37	37
Daytime Assessment (0700-2100hrs)	Background Level, $L_{A90,T}$ dB	31	31	31	31	31
	Difference: Rating minus Background	+9	+8	+8	+6	+6
Late Night-time Assessment (0500-0700hrs)	Background Level, $L_{A90,T}$ dB	23	23	23	23	23
	Difference: Rating minus Background	+17	+16	+16	+14	+14

- 5.5 The initial assessment set out in Table 4 indicates that, based on worst-case assumptions, the proposed development will, at some locations at least, give rise to an 'adverse' impact during the daytime period, **depending on the context**, but not amounting to a significant adverse impact. For the late night-time (i.e. dawn period during midsummer), the initial assessment indicates a potential 'significant adverse' impact, again **depending on the context**. However, it is noted that in fact lower noise levels are expected during that time period, away from peak periods for solar generation.
- 5.6 Secondly, initial estimate assessments are presented for just the BESS equipment operating in isolation, outside the active period for the solar equipment. This is summarised in Table 5.

Table 5 : Initial BS 4142 Assessments – BESS only – 2100-0500hrs

		Assessment Location				
		1	2	3	4	5
Specific Level, $L_{Aeq,T}$ dB		26	24	28	28	27
Acoustic Feature Corrections, dB	Tonality	+2	+2	+2	+2	+2
	Intermittency	+3	+3	+3	+3	+3
Rating Level, $L_{Ar,Tr}$ dB		31	29	33	33	32
Late Evening Assessment (2100-2300hrs)	Background Level, $L_{A90,T}$ dB	27	27	27	27	27
	Difference: Rating minus Background	+4	+2	+6	+6	+5
Night-time Assessment (2300-0100hrs)	Background Level, $L_{A90,T}$ dB	21	21	21	21	21
	Difference: Rating minus Background	+10	+8	+12	+12	+11

- 5.7 The initial assessment set out in Table 5 indicates that, based on worst-case assumptions, the proposed development will give rise to an 'adverse' impact during the late evening period, **depending on the context**, but not amounting to a significant adverse impact. For the night-time, the initial assessment indicates a potential 'significant adverse' impact, again **depending on the context**. However, it is noted that in fact lower noise levels are expected during that time period, away from peak periods for solar generation.
- 5.8 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account.

- 5.9 In this case, the most critical contextual element to consider is the absolute level of noise. In particular BS 4142 states that *“where background noise levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background. This is especially true at night”*.
- 5.10 The worst-case predicted noise levels attributable to the proposed development do not exceed 35dB L_{Aeq} , for the daytime period, and are therefore 15dB better than the ‘desirable’ level for external noise in outdoor living areas, as per BS 8233.
- 5.11 In terms of internal noise at the residences, it is generally accepted that a noise reduction of up to 15dB (outside to inside) is achievable via a partially open window. On this basis, internal noise levels at residences, attributable to the proposed development, would not exceed 20dB $L_{Aeq,T}$, even with windows open. This level is 15dB better than the recommended internal daytime noise level limit, as per BS 8233.
- 5.12 During the night-time, based on the worst-case predicted noise attributable to the whole proposed development, would be 10dB better than the recommended internal night-time noise level limit, even with windows open, as per BS 8233. In reality, however, lower noise levels are anticipated for this off-peak period for solar generation.
- 5.13 During periods of no solar generation (i.e. hours of darkness), noise levels attributable to just the proposed BESS development do not exceed 28dB L_{Aeq} . Therefore during these period, internal noise at the residences would not exceed would not exceed 13dB $L_{Aeq,T}$, even with windows open. This level is 17dB better than the recommended internal night-time noise level limit, as per BS 8233.
- 5.14 Noting that the only anticipated feature at this location may be a tonal component to the transformer noise, British Standard 7445: 1991 Description and measurement of environmental noise; Part 2: Acquisition of data pertinent to land use states that *“if tonal components are essential characteristics of the sound within a specified time interval, an adjustment may be applied for that time interval, to the measured equivalent continuous noise level [i.e. $L_{Aeq,T}$] ... If tonal components are clearly audible and their presence can be detected by one-third octave analysis, the adjustment may be 5 to 6dB”*.
- 5.15 The predicted internal noise levels at residences are therefore well within suitable absolute noise level limits, even with windows open, adequately accounting for any potential characteristics.

- 5.16 Based on the foregoing, considering both the initial assessment of impact and the relevant contextual factors, in line with BS 4142 and other relevant guidelines, no unacceptable noise impact, and consequently no harm to residential amenity, is anticipated as a result of proposed development.
- 5.17 Nonetheless, drawing together the initial and contextual assessments, it is considered that to ensure development proposals mitigate and reduce to a minimum any potential adverse impacts resulting from noise, and avoid noise giving rise to significant adverse impacts on health and the quality of life, (i.e. to align with the requirements of the NPPF) additional mitigation should be applied to the proposed BESS to reduce noise emissions towards the north.
- 5.18 Firstly, therefore, considering the proposed acoustic barrier to the BESS compound, as already stated it is recommended that this is of a height at least equivalent to the plant contained within the compound. The acoustic barrier should be of an equivalent height as the BESS equipment and of overall mass not less than 10kg/m^2 and nominal thickness not less than 20mm. It should be imperforate with no holes or gaps and should be sealed at the base.
- 5.19 Furthermore, to control potential reflective build-up of noise, it is recommended that the acoustic barrier should be lined to the inner facing side with acoustically absorbent panels, e.g. formed of $\sim 100\text{mm}$ mineral fibre of density $10\text{--}60\text{kg/m}^3$, retained behind perforated sheet steel. Proprietary solutions for acoustically absorbent panels are available from numerous companies, including www.gallowaygroup.co.uk, www.allawayacoustics.co.uk and www.iacacoustics.global.
- 5.20 Also, in order to reduce potential noise to a minimum it is also recommended that small areas of localised acoustic barriers are applied close to each of the two Solar Inverters that are proposed to the west boundary of the site. These should be oriented such as to preclude line-of-sight from any existing residences to the west of the site to those Solar Inverters. As above, these areas of acoustic barrier should be of an equivalent height as the plant, and of overall mass not less than 10kg/m^2 and nominal thickness not less than 20mm. It should be imperforate with no holes or gaps and should be sealed at the base. For these localised barriers, acoustically absorbent inner-faces are not required. A proprietary acoustic barrier is recommended.
- 5.21 With the recommended noise mitigation in place, the noise impact from the proposed development will be low, in line with relevant guidelines. Acceptable noise limits for the site may be readily enshrined and enforced by way of a suitable worded planning condition.

6.0 SUMMARY AND CONCLUSION

- 6.1 The potential noise impact associated with the proposed Tydd solar farm and battery energy storage system (BESS) at Land East of Guanockgate Road, Gorefield, Lincolnshire PE13 4PL.
- 6.2 A noise survey has been undertaken at locations representative of the nearest residential properties to the proposed development to determine prevailing background and residual noise levels.
- 6.3 A noise assessment has been undertaken in accordance with the guidelines set out in relevant British Standard guidelines.
- 6.4 The likely noise impact at the nearest residential location to the development has been assessed in accordance with the guidelines set out in relevant British Standard guidelines.
- 6.5 Recommendations have been made to ensure no more than a low noise impact from the development in line with relevant guidelines. Acceptable noise limits for the site may be readily enshrined and enforced by way of a suitable worded planning condition.

Figure 1: Site Plan

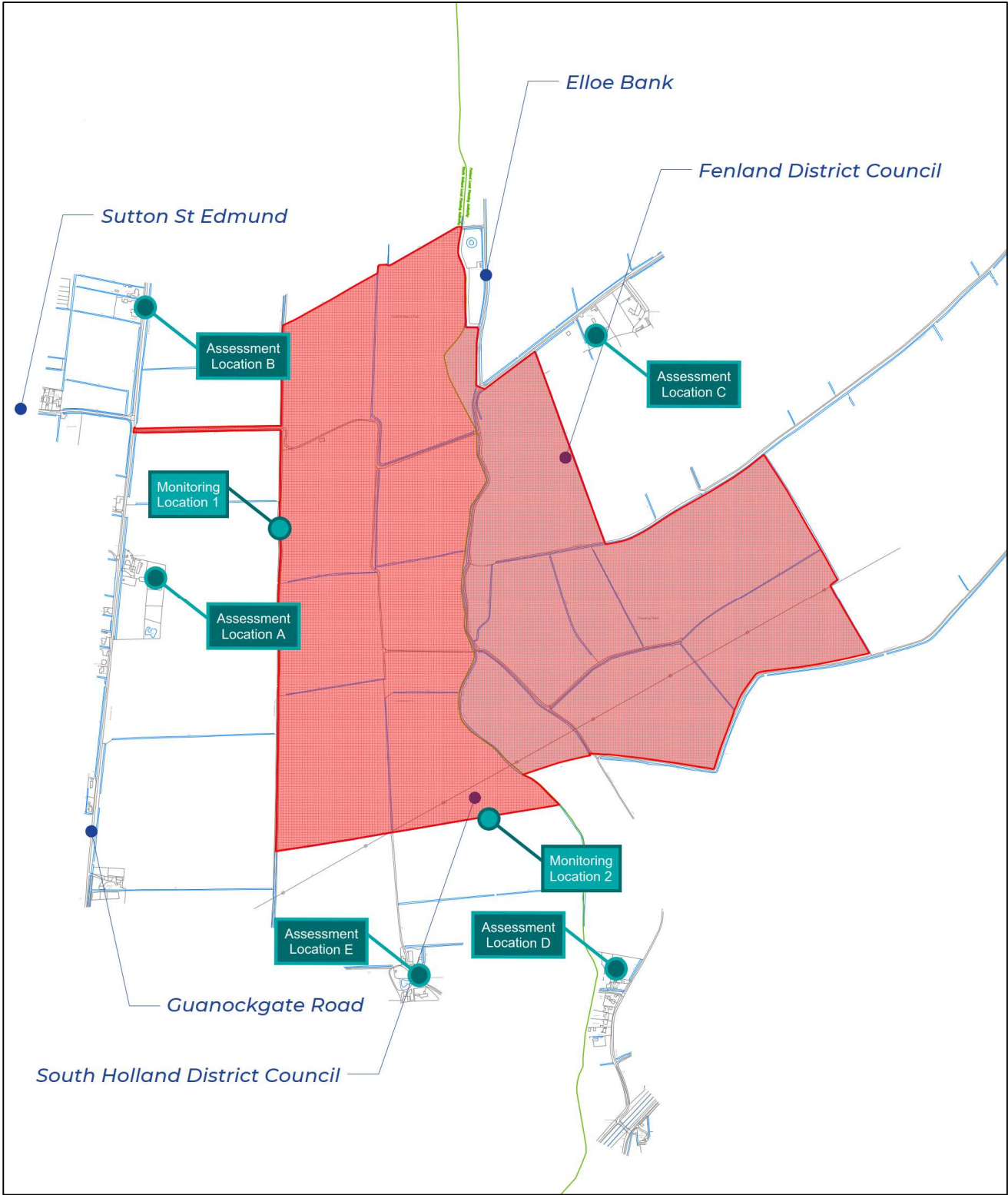
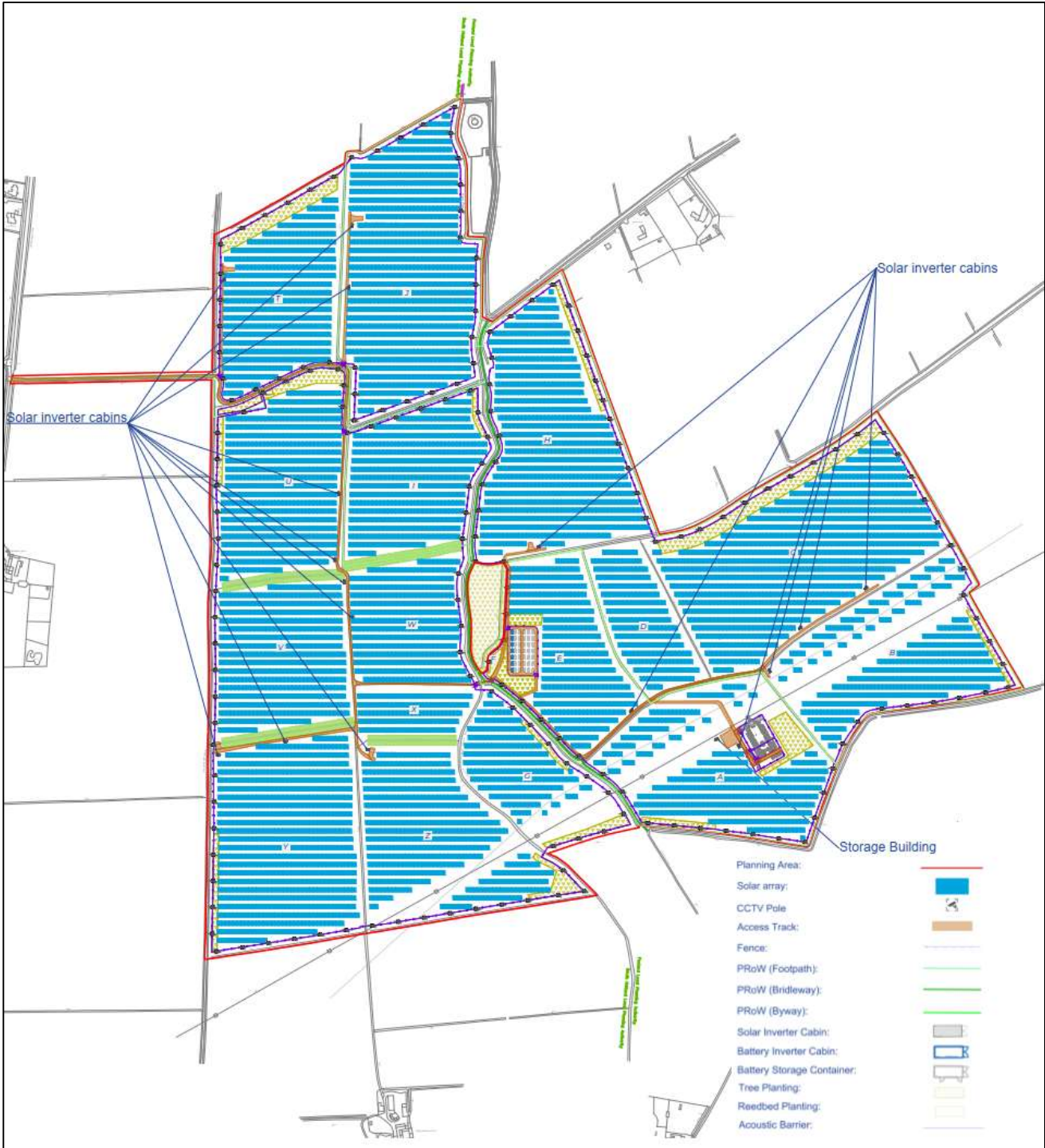


Figure 2: Proposed Site Layout



Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{pA} This is the A-weighted sound pressure level.

L_{WA} This is the A-weighted sound power level.

Appendix II: Noise Survey Results

Date	Time		Noise Level dB					
			Location 1			Location 2		
	Start	End	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
15/11/2023	16:00	16:15	51	73	37	39	53	34
15/11/2023	16:15	16:30	48	72	36	40	52	34
15/11/2023	16:30	16:45	37	55	34	37	53	33
15/11/2023	16:45	17:00	35	45	32	33	44	31
15/11/2023	17:00	17:15	36	51	32	35	45	31
15/11/2023	17:15	17:30	37	46	33	36	49	32
15/11/2023	17:30	17:45	38	51	34	35	45	32
15/11/2023	17:45	18:00	37	55	31	34	50	30
15/11/2023	18:00	18:15	34	44	31	36	66	30
15/11/2023	18:15	18:30	35	50	32	33	45	30
15/11/2023	18:30	18:45	34	44	31	31	41	29
15/11/2023	18:45	19:00	34	58	29	31	40	27
15/11/2023	19:00	19:15	32	48	27	31	45	27
15/11/2023	19:15	19:30	35	50	30	33	45	29
15/11/2023	19:30	19:45	31	44	27	29	42	26
15/11/2023	19:45	20:00	30	43	26	28	42	25
15/11/2023	20:00	20:15	30	43	26	28	38	24
15/11/2023	20:15	20:30	31	45	26	28	42	25
15/11/2023	20:30	20:45	29	51	23	26	38	23
15/11/2023	20:45	21:00	30	48	25	29	40	25
15/11/2023	21:00	21:15	33	53	28	34	56	29
15/11/2023	21:15	21:30	32	46	28	32	44	27
15/11/2023	21:30	21:45	33	49	27	34	47	29
15/11/2023	21:45	22:00	32	42	28	35	46	30
15/11/2023	22:00	22:15	30	44	25	33	47	26
15/11/2023	22:15	22:30	28	40	25	29	45	26
15/11/2023	22:30	22:45	28	38	25	30	42	26
15/11/2023	22:45	23:00	27	42	23	29	41	25
15/11/2023	23:00	23:15	27	42	23	28	39	25
15/11/2023	23:15	23:30	26	42	22	27	40	23
15/11/2023	23:30	23:45	25	37	22	24	34	22
15/11/2023	23:45	00:00	23	40	20	22	36	20
16/11/2023	00:00	00:15	21	37	20	20	35	19
16/11/2023	00:15	00:30	27	40	21	24	37	21
16/11/2023	00:30	00:45	21	33	20	21	33	20
16/11/2023	00:45	01:00	21	37	20	21	32	20
16/11/2023	01:00	01:15	21	36	20	21	35	20
16/11/2023	01:15	01:30	21	27	20	22	32	20
16/11/2023	01:30	01:45	26	41	21	24	36	21
16/11/2023	01:45	02:00	26	36	20	24	34	20
16/11/2023	02:00	02:15	20	37	19	21	31	19
16/11/2023	02:15	02:30	21	38	19	20	30	19
16/11/2023	02:30	02:45	22	40	20	21	35	19
16/11/2023	02:45	03:00	26	44	20	26	42	19
16/11/2023	03:00	03:15	22	40	20	21	33	20
16/11/2023	03:15	03:30	25	40	20	23	37	19
16/11/2023	03:30	03:45	21	27	20	20	27	19
16/11/2023	03:45	04:00	24	40	21	24	38	20

Date	Time		Noise Level dB					
			Location 1			Location 2		
	Start	End	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
16/11/2023	04:00	04:15	28	45	21	24	40	20
16/11/2023	04:15	04:30	29	44	20	25	40	19
16/11/2023	04:30	04:45	23	35	21	26	43	21
16/11/2023	04:45	05:00	29	49	21	25	38	21
16/11/2023	05:00	05:15	25	36	21	26	36	22
16/11/2023	05:15	05:30	24	43	21	26	37	22
16/11/2023	05:30	05:45	26	42	21	27	43	21
16/11/2023	05:45	06:00	25	39	22	29	44	23
16/11/2023	06:00	06:15	27	42	23	28	43	24
16/11/2023	06:15	06:30	29	39	26	31	41	25
16/11/2023	06:30	06:45	30	47	27	33	47	28
16/11/2023	06:45	07:00	32	54	27	31	43	28
16/11/2023	07:00	07:15	31	47	29	35	49	30
16/11/2023	07:15	07:30	34	55	30	34	46	30
16/11/2023	07:30	07:45	35	50	32	36	50	33
16/11/2023	07:45	08:00	34	58	31	36	54	32
16/11/2023	08:00	08:15	34	50	31	35	47	32
16/11/2023	08:15	08:30	34	48	31	35	56	31
16/11/2023	08:30	08:45	33	46	31	35	46	31
16/11/2023	08:45	09:00	36	52	32	36	51	32
16/11/2023	09:00	09:15	35	50	32	38	50	34
16/11/2023	09:15	09:30	36	47	33	36	46	32
16/11/2023	09:30	09:45	35	51	32	36	47	32
16/11/2023	09:45	10:00	33	47	30	33	43	31
16/11/2023	10:00	10:15	50	71	30	50	69	31
16/11/2023	10:15	10:30	51	68	31	52	69	32
16/11/2023	10:30	10:45	45	64	31	46	69	31
16/11/2023	10:45	11:00	40	58	28	41	61	29
16/11/2023	11:00	11:15	32	51	27	32	52	26
16/11/2023	11:15	11:30	31	47	27	30	47	27
16/11/2023	11:30	11:45	44	65	27	48	68	27
16/11/2023	11:45	12:00	30	37	28	29	43	27
16/11/2023	12:00	12:15	34	45	30	33	46	29
16/11/2023	12:15	12:30	31	44	29	30	40	28
16/11/2023	12:30	12:45	32	46	30	31	41	29
16/11/2023	12:45	13:00	32	46	30	31	45	29