

Project name	Brynwell Solar Park		
Design note title	Noise Impact Appraisal - Revision 1		
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## 1. INTRODUCTION

Hydrock have been appointed by Savills to provide a noise assessment for the battery storage facility at the proposed Brynwell Solar Farm.

This impact appraisal evaluates the likely impacts associated with the proposed battery storage at nearby sensitive receptors, based on currently available information.

The site is located in Brynwell, east of Cardiff, with the existing solar farm to the north, and the A4232 and residences beyond. To the east and south is open farmland, with a farm including residence at the south east corner of the site. To the west is open farmland with a farm including a residence beyond.

## 2. NATIONAL GUIDANCE

The following national guidance has been considered during this assessment:

### 2.1 BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings

BS 8233 provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building. The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in the table below:

Table 1 BS8233 Recommended Internal Noise Levels

Activity	Location	Period	
		Daytime (07:00 to 23:00 hrs)	Night-time (23:00 to 07:00 hrs)
Resting	Living room	L <sub>Aeq,16hrs</sub> 35 dB	-
Dining	Dining room/area	L <sub>Aeq,16hrs</sub> 40 dB	-
Sleeping (daytime resting)	Bedroom	L <sub>Aeq,16hrs</sub> 35 dB	L <sub>Aeq,8hrs</sub> 30 dB

Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L<sub>AFmax</sub> for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a

specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: Guidelines for Community Noise below.

With respect to external amenity space such as gardens and patios it is stated that it is desirable that the 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. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

## 2.2 BS 4142:2014 - Methods for rating and assessing commercial and industrial sound

BS 4142 describes methods for rating and assessing sound from industrial and manufacturing processes, fixed installations which comprise mechanical and electrical plant and equipment, the loading and unloading of goods and materials at industrial and/or commercial premises and mobile plant and vehicles that are an intrinsic part of the overall sound emanating from premises or processes.

The methods 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.

If appropriate, the specific sound level of the source ( $L_{Aeq,T}$ ) is corrected, by the application of one or more corrections for acoustic features to give a 'rating' level ( $L_{Ar,Tr}$ ). The Standard effectively compares and rates the difference between the rating level of the sound and the prevailing background sound level ( $L_{A90,T}$ ). Comparing the rating level with the background sound level, BS 4142 states:

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

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

*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. 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."*

### 3. NOISE IMPACT APPRAISAL

#### 3.1 Overview

The battery storage facility is located on the eastern site boundary, and is highlighted on the attached site plan.

This appraisal uses data from previous solar farm measurements, and background noise levels estimated from available data and previous experience on similar sites.

#### 3.2 Existing Sensitive Receptors

The nearest Existing Sensitive Receptors (ESRs) is the farmhouse to the south east of the site. The approximate distances from the proposed battery storage locations, are described in **Table 2** below. ESRs are also shown on the attached site plan.

Table 2 Existing Sensitive Receptors

Receptor	Description	Bearing from Battery Storage Area	Distance from Battery Storage Area
ESR1	Brynwell Farmhouse	South-east	140m

#### 3.3 Battery Storage Facility Noise Levels

The proposed battery storage facility comprises three battery storage units and six associated inverters. Specific noise levels have been taken from a noise assessment of a similar solar park, which gives the following levels for the battery storage units and inverters.

Table 3 Battery Storage Facility Noise Levels

Equipment	Sound Pressure Level, dBA at 1m
Battery	82.5
Inverter	70.0

These levels have been used to represent the specific noise level for each piece of equipment of the facility for the purposes of this assessment.

### 3.4 Existing Background Noise Levels

No site noise survey has been undertaken at this stage. However, based experience with similar sites, and data from the Wales Noise and Air Quality maps, the background noise levels are considered likely to be within the following ranges:

- Daytime: 30 dB(A) – 35 dB(A) L<sub>90</sub>
- Night-time 20 dB(A) – 25dB(A) L<sub>90</sub>

To ensure the appraisal is robust, the low end of the ranges have been used in the assessment.

### 3.5 Noise Impact Appraisal

The assessment represents a rudimentary, but worst-case prediction of potential noise levels associated with the battery storage facility, at ESR1. Distance attenuation has been calculated using on a conservative approximation of separation distances between the proposed storage facility and residential receptor, based on a review of the proposed site layout. Screening attenuation has been predicted based on existing buildings visible, and screening by the equipment itself. Predictions do not account for ground absorption.

Noise from the inverters has the potential to be readily distinctive above the residual acoustic environment, therefore in accordance with BS4142, an acoustic feature correction of 3dB has been applied to these sources only.

Predicted specific sound levels are assessed in accordance with BS 4142:2014 and shown below.

Table 4 Predicted Noise Levels at Existing Sensitive Receptors

BS 4142:2014 reference	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Specific sound level, dB(A)	44	44
Barrier Attenuation*, dB	25	25
Rating level, dB(A)	19	19
Background sound level, dB(A)	30	20
Exceedance, dB	-11	-1
Impact	Low	Low

\*Barrier attenuation is due to self-screening and existing buildings.

The full calculations for both of the proposed layout options can be seen in the attached Appendix B.

Table 4 shows that the noise rating level from the storage facility at the nearest receptor is predicted to be 19dB L<sub>Ar, Tr</sub>. This indicates substation noise is predicted to be lower than likely existing background noise levels, by 11dB and 1dB during the daytime and night time periods, respectively. This indicates a low impact at ESR1, in accordance with BS4142.

Furthermore, predicted noise levels from the storage facility are significantly less than the health-based guideline external and internal noise levels recommended by BS8233, as summarised in **Table 1**. This highlights that the potential for adverse impacts are low.

Therefore, it is considered that no specific noise mitigation is likely to be required, with respect to noise from the proposed battery storage facility.

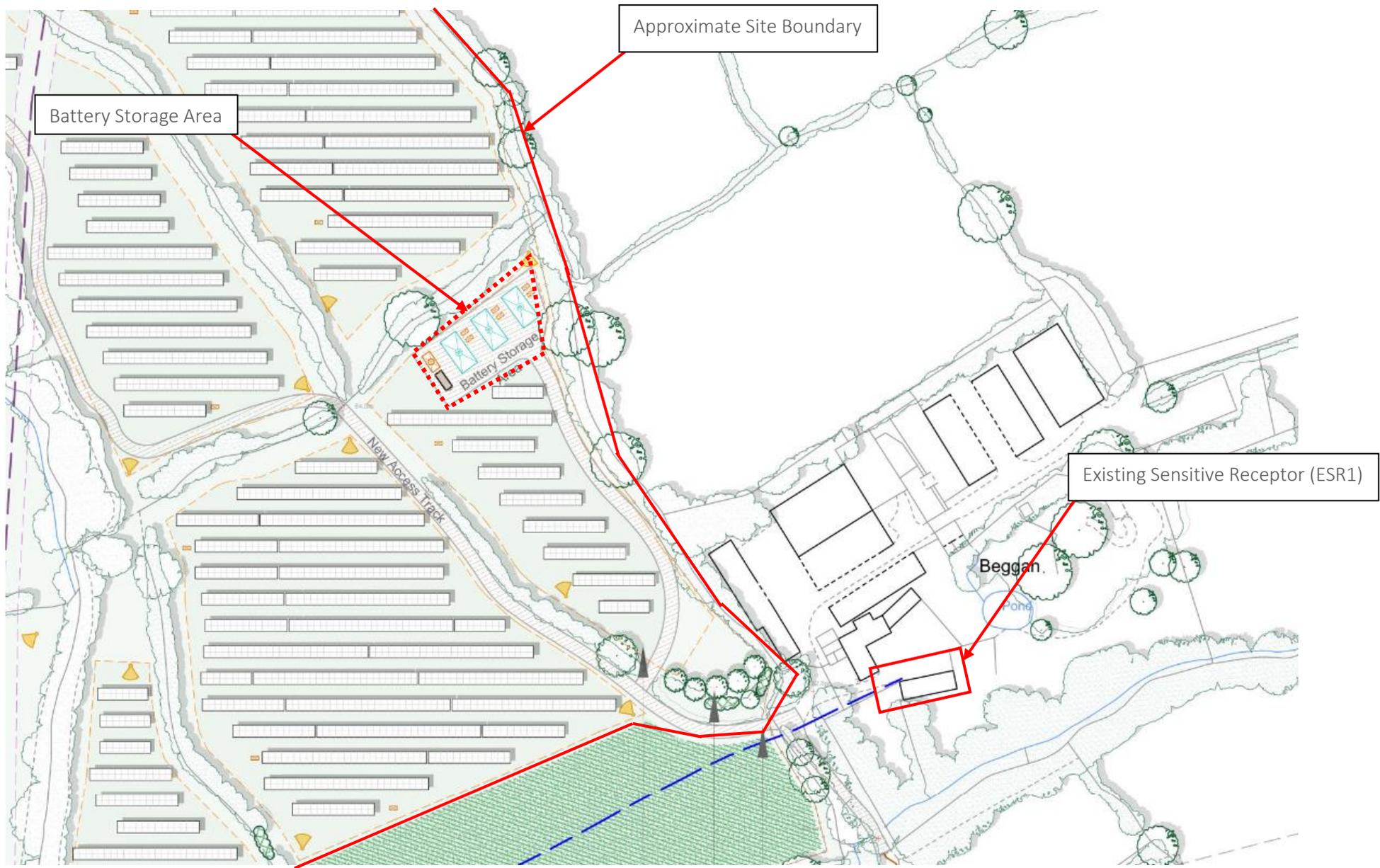
## 4. CONCLUSIONS & SUMMARY

Hydrock have been appointed by Savills to provide a noise assessment for the battery storage facility at the proposed Brynwell Solar Farm.

No site noise survey has been undertaken at this stage. However, based experience with similar sites, and data from the Wales Noise and Air Quality maps, the background noise levels for the site have been predicted. Noise levels for the proposed layout have been assessed against predicted background levels to the nearby sensitive receptor ESR1.

The appraisal indicates that noise levels from the storage facility will have a low adverse impact, in accordance with BS4142, and therefore, it is considered that no specific noise mitigation is likely to be required.

# Appendix A – Site Plan and Proposed Layout Options



## Appendix B – Plant Calculations

Directivity Factor			1		2		3		4	
1	Q=	2	Battery Storage Container 1		Battery Storage Container 2		Battery Storage Container 3		Inverter 1	
			SPL (1m)	82.5	SPL (1m)	82.5	SPL (1m)	82.5	SPL (1m)	70.0
2	Q=	2	SWL (1m)		SWL (1m)		SWL (1m)		SWL (1m)	
3	Q=	2	Distance to NSR1 (m)	150.0	Distance to NSR1 (m)	160.0	Distance to NSR1 (m)	170.0	Distance to NSR1 (m)	150.0
4	Q=	2	Tonal Correction (-val)	0.0	Tonal Correction (-val)	0.0	Tonal Correction (-val)	0.0	Tonal Correction (-val)	-3.0
5	Q=	2	Impulsive Correction (-val)	0.0						
6	Q=	2	Barrier Correction (dB)	22.0	Barrier Correction (dB)	29.0	Barrier Correction (dB)	29.0	Barrier Correction (dB)	20.0
7	Q=	2	Ground Correction (dB)	0.0						
8	Q=	2	Distance Correction (dB)	43.5	Distance Correction (dB)	44.1	Distance Correction (dB)	44.6	Distance Correction (dB)	43.5
9	Q=	2	SPL at NSR	17.0	SPL at NSR	9.4	SPL at NSR	8.9	SPL at NSR	9.5
Battery Storage Container 1			5		6		7		8	
Battery Storage Container 1		17.0	Inverter 2		Inverter 3		Inverter 4		Inverter 5	
Battery Storage Container 2		9.4	SPL (1m)	70.0						
Battery Storage Container 3		8.9	SWL (1m)		SWL (1m)		SWL (1m)		SWL (1m)	
Inverter 1		9.5	Distance to NSR1 (m)	150.0	Distance to NSR1 (m)	160.0	Distance to NSR1 (m)	160.0	Distance to NSR1 (m)	170.0
Inverter 2		9.5	Tonal Correction (-val)	-3.0						
Inverter 3		-11.1	Impulsive Correction (-val)	0.0						
Inverter 4		-11.1	Barrier Correction (dB)	20.0	Barrier Correction (dB)	40.0	Barrier Correction (dB)	40.0	Barrier Correction (dB)	40.0
Inverter 5		-11.6	Ground Correction (dB)	0.0						
Inverter 6		-11.6	Distance Correction (dB)	43.5	Distance Correction (dB)	44.1	Distance Correction (dB)	44.1	Distance Correction (dB)	44.6
Cumulative Level (dB)		19.3	SPL at NSR	9.5	SPL at NSR	-11.1	SPL at NSR	-11.1	SPL at NSR	-11.6
			9							
			Inverter 6							
			SPL (1m)	70.0						
			SWL (1m)							
			Distance to NSR1 (m)	170.0						
			Tonal Correction (-val)	-3.0						
			Impulsive Correction (-val)	0.0						
			Barrier Correction (dB)	40.0						
			Ground Correction (dB)	0.0						
			Distance Correction (dB)	44.6						
			SPL at NSR	-11.6						