

Project name	Bypass Farm Solar Site		
Design note title	Noise Impact Appraisal		
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Date	26 August 2020	Approved	✓

1. INTRODUCTION

Hydrock have been appointed by By-Pass Solar Farm Ltd to provide a noise impact appraisal to address comments made by Environmental Health Services department of South Kesteven District Council (SKDC), in response to proposals for development of land south of the A1 Bypass in to a Solar Farm.

Comments provided by SKDC indicate that the proposed substation associated with the development is considered to have the potential for adverse impact at nearby existing residential dwellings, when the proposed development becomes operational.

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

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 _{Aeq,16hrs} 35 dB	-
Dining	Dining room/area	L _{Aeq,16hrs} 40 dB	-
Sleeping (daytime resting)	Bedroom	L _{Aeq,16hrs} 35 dB	L _{Aeq,8hrs} 30 dB

Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} 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 main solar farm site is located to the south of Foston Village, Lincolnshire, on land south of the A1 By-Pass, across the circa 210-acre site. However, the substation is proposed to be located approximately 2km to the north of the main site, to the east of Westborough village. The proposed substation location is highlighted on **Figure 1**.

3.2 Existing Sensitive Receptors

The nearest Existing Sensitive Receptors (ESRs) comprise residential properties between 300m to 400m from the proposed substation location, as described in **Table 2** below. ESRs are also shown on **Figure 1**.

Table 2 Existing Sensitive Receptors

Receptor	Description	Bearing from Substation	Distance from Substation
ESR1	Residential Properties off Long Lane	South-west	300m
ESR2	Residential Properties to the north of Ease Lane	West	400m

3.3 Substation Noise Levels

The proposed substation comprises a number of inverters and transformers housed within a single skin brick structure, with an associated through-wall air handling vent to maintain suitable operating temperatures within.

While the inverters and transformers housed within the substation will emit noise, the atmospheric noise emissions from the substation originate from the through-wall air handling vent, which is considered comprise the primary noise source, with respect to the external noise environment.

The free field noise level of the through-wall air handling vent is assumed to be 65 dB(A) $L_{Aeq, T}$ Sound Pressure Level at 1m, based on noise data from similar solar schemes. This level has been used to represent the specific noise level of the substation for the purposes of this assessment.

3.4 Existing Background Noise Levels

The nearest ESRs to the proposed substation are located approximately 2km from the A1, to the south and west. The A1 is a major road in the area, which facilitate traffic at 70mph and at relatively high volumes. Therefore, it is considered that the noise environment in the vicinity of the ESRs is likely to be dominated by distant road traffic noise associated with the A1, together with the remainder of the local road network.

No site noise survey has been undertaken at this stage. However, based experience with similar sites, the background noise levels are considered likely to be within the following ranges:

- Daytime: 30 dB(A) – 40 dB(A) L_{90}
- Night-time 25 dB(A) – 35dB(A) L_{90}

3.5 Noise Impact Appraisal

The assessment represents a rudimentary, but worst-case prediction of potential noise levels associated with the substation, at ESRs. Distance attenuation has been calculated using on a conservative approximation of separation distances between the proposed substation and ESRs, based on a review of Ordnance Survey and satellite mapping data. Predictions do not account for screening attenuation or ground absorption.

Predicted noise levels at ESRs are presented in **Table 3** below.

Table 3 Predicted Noise Levels at Existing Sensitive Receptors

Receptor	Source Noise Level, dB L _{Aeq,T}	Distance Attenuation, dB	Predicted Level, dB L _{Aeq,T}
ESR1	65	50	15
ESR2		52	13

Table 3 shows that the noise level from the substation at the nearest receptor, ESR1, is predicted to be 15dB L_{Aeq,T}. This indicates substation noise is predicted to be significantly less than likely existing background noise level, in the vicinity of ESRs, by 15dB and 10dB during the daytime and night time periods, respectively.

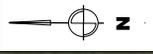
Noise from the substation has the potential to be readily distinctive above the residual acoustic environment however, therefore in accordance with BS4142, an acoustic feature correction of 3dB should be applied.

With the inclusion of an acoustic feature correction, substation noise levels are still likely to be at least 12dB and 7dB below the background levels at ESRs, during the daytime and night time periods, respectively. Therefore, the assessment indicates that potential impacts are likely to be low, in accordance with BS4142.

Furthermore, predicted substation noise levels 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 substation.

Westborough



Existing Sensitive Receptor Locations

Approximate Substation Location



2

1



Project Title

By-Pass Farm Solar Site

Drawing Title

Existing Sensitive Receptor Locations

Job Number: C-14731

Date: 26.08.2020

Scale: NTS

By: EG

Checked: LS

Status: A1

Description

Date By

Rev

Issue

Figure 1

Issue

02

4. CONCLUSIONS & SUMMARY

Hydrock have been appointed by By-Pass Solar Farm Ltd to provide a noise impact appraisal to address comments made by Environmental Health Services department of South Kesteven District Council (SKDC), in response to proposals for development of the site in to a Solar Farm.

Comments from SKDC specifically raise concerns regarding the potential noise impact associated with the proposed substation, therefore this report provides an appraisal of potential operational impacts associated with the substation.

The impact appraisal indicates that predicted noise levels associated with the substation are significantly lower than likely existing background noise levels in the vicinity of Existing Sensitive Receptors (ESRs). Therefore, impacts are considered to be low in accordance with BS4142, depending on context.

Furthermore, predicted substation noise levels are significantly less than the health-based guideline external and internal noise levels recommended by BS8233, which indicates that the potential for adverse impacts are low

Therefore, it is considered that no specific mitigation measures are required.
