Gate Burton
ENERGY PARK

Gate Burton Energy Park Environmental Statement

Volume 3, Appendix 11-D: Noise Modelling
Document Reference: EN010131/APP/3.3
January 2023

APFP Regulation 5(2)(a)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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1. Noise Modelling

1.1.1 In order to determine potential operational noise emissions from the development, noise prediction models have been prepared using the CadnaA® v2022 software package. The following assumptions were applied in noise models:

- The ground acoustic absorption has been set to 0.8 (i.e. assumed soft ground conditions which is considered appropriate for predominantly open grass field and farmland);
- The maximum order of reflections was 1;
- Air temperature was assumed to be 10 degrees and humidity 70%;
- Building massing in the surrounding area outside of the DCO Site boundary has been sourced from Ordnance Survey Open Map data and modelled with a standard height of 7m.
- Land topography has been sourced from Ordnance Survey Open Map data;
- No boundary fences/walls have been included in the noise model; and
- Receiver points have been modelled as 1.5m above local ground level (representative of ground floor windows) for daytime noise and 4m above ground (representative of 1st floor windows) for night-time noise.

1.2 Construction Noise

1.2.1 CadnaA noise mapping software was used to predict construction noise levels at the selected receptors. The construction noise model followed the procedures for prediction of demolition and construction noise set out in BS 5228-1. Sound power levels for each of the following construction activities have been calculated:

- Noise Generating Activity 1 – Construction of the BESS and on-site Substation;
- Noise Generating Activity 2 – Construction of inverters and transformers;
- Noise Generating Activity 3– Construction of Ground mounted solar PV panel arrays; and
- Noise Generating Activity 4 – Cable installation (general works); and
- Noise Generating Activity 5 – Cable installation (HDD activities).

1.2.2 Noise source data for construction plant are presented in Table 1. Construction noise predictions were carried out to represent a worst-case scenario where all plant is operational on-site. Consequently, construction noise predictions may overestimate construction noise levels so can be considered as worst case.

Table 1 Construction Plant

Work Package	Plant / Equipment	BS 5228 Reference	Sound Power Lw (dBA)	Quantity
Construction of inverters and transformers	Tracked excavator	C.2, Item 14	107	1
	Wheeled loader	C.2, Item 27	108	1
	Wheeled mobile telescopic crane	C.4, Item 38	112	1
	Dump truck (tipping fill)	C.2, Item 30	107	2
	Telescopic handler	C.2, Item 35	99	1
	Cement mixer truck (discharging)	C.4, Item 18	103	1
PV Module Construction	Articulated dump truck	C.5, Item 16	104	1
	Wheeled mobile telescopic crane	C.4, Item 38	106	1
	Diesel generator	C.4, Item 85	94	1
	Continuous flight auger piling	C.3, Item 17	104	1
	Cement mixer truck (discharging)	C.4, Item 18	103	1
	Dumper	C.4, Item 9	105	1
Construction of BESS and main substation	Tracked excavator	C.2, Item 14	107	2
	Lorry	C.2, Item 34	108	4
	Telescopic handler	C.2, Item 35	99	2
	Continuous flight auger piling	C.3, Item 17	104	1
	Wheeled mobile crane	C.3, Item 30	98	4
	Hand-held welder (welding piles)	C.3, Item 31	101	4
	Generator for welding	C.3, Item 32	101	4
	Gas cutter (cutting top of pile)	C.3, Item 34	96	4
	Mobile telescopic crane	C.4, Item 41	99	2
	Lifting platform	C.4, Item 57	95	4
	Site lift for workers	C.4, Item 62	94	4
	Diesel generator	C.4, Item 85	94	2
Cable Installation	Tracked excavator	C.4, Item 63	105	1
	Wheeled backhoe loader	C.4, Item 66	97	1
	Dumper	C.4, Item 9	105	2
	Telescopic handler	C.4, Item 55	98	1
	Vibratory roller	C.5, Item 27	95	1
Horizontal Directional Drill	Directional drill (generator)	C.2, Item 44	105	1
	Water pump	C.2, Item 45	93	1
	Tracked excavator	C.2, Item 14	107	1
	Drilling rig	C.3, Item 15	110	1

1.3 Operational Noise

Modelling Methodology

1.3.1 Operational noise was modelled in CandnaA, which employs the noise prediction routines commonly used in the UK (e.g. ISO 9613 Acoustics –

Attenuation of Sound during Propagation Outdoors – Part 1: Calculation of the absorption of sound by the atmosphere (1993) and Part 2: General Method of Calculation (1996). The following assumptions and parameters have been used to prepare the noise model:

- Sound source heights for inverters and transformers have been based on information in **ES Volume 1, Chapter 2: The Scheme [EN010131/APP/3.1]**;
- The central inverter option was modelled, which is considered to be the worst-case option in terms of noise;
- The layout of the BESS and substation assumes that the substation is located in the west of the site and the BESS in the east;
- Four transformers make up the substation;
- 162 units have been assumed for the BESS; and
- Modelling assumes the site is continuously operational during daytime and night-time.

Sound Level Data – Solar Station Inverters and Transformers

1.3.2 The proposed inverters that have been modelled are SUNGROW central inverters (model SG3600UD). Manufacturer noise data for these inverters quotes provides a sound power level of 95.9 dB(A) for the unit. These are considered to represent a worst-case and it is likely that actual plant selected for the final design will produce lower levels of noise.

1.3.3 Inverters have been modelled as vertical area sources with a source height of 3.5 m.

1.3.4 Transformers associated with the inverters will have noise emissions approximately 10 dB(A) below that of the inverters. Noise from solar station transformers will not be audible above noise from the inverters and have not been included in the modelling.

Sound Level Data – BESS Battery Storage Units

1.3.5 Noise predictions of the proposed battery storage units are based on measured noise data provided by SUNGROW. Noise measurements around a battery storage unit provides a worst-case sound pressure level of 64 dB(A) at a measurement distance of 1 m, which has been used to model noise emissions. Battery storage units have been modelled as vertical area sources with a source height of 2.5 m.

Sound Level Data – Substation Transformers

1.3.6 Sound level data of substation transformers at the Scheme are based on similar rated transformers for solar plant developments from AECOM library data. An assumed sound power level of 95 dB(A) has been applied for transformers within the BESS substation areas. Substation transformers have been modelled as vertical and horizontal area sources with a source height of 7 m.

1.4 String Inverter Sensitivity Testing

1.4.1 Noise modelling of an option with 1,430 small scale string inverters has been undertaken as a sensitivity test to confirm that the central inverter option represents a reasonable worst-case. The 1,430 string inverters were placed at arbitrary locations around the boundary of each PV area. The units were applied with sound data equivalent to a sound pressure level of 68 dB at 1 m. The results of sensitivity testing of the string inverter option are illustrated in **ES Volume 2: Figure 11-3 [EN010131/APP/3.2]**. A comparison of predicted noise level from the string inverter option compared with the central inverter option results are presented in Table 2.

Table 2 String Inverter Sensitivity Test

Receptor	Predicted rating level $L_{Ar,Tr}$ dB		Difference dB
	Central Inverter Option	String Inverter Option	
R1	34	29	-5
R2	38	31	-7
R	39	31	-8
R4	38	30	-8
R5	33	26	-7
R6	41	35	-6
R7	39	33	-6
R8	37	33	-4
R9	36	32	-4
R10	39	34	-5
R11	40	36	-4
R12	39	34	-5
R13	38	32	-7
R14	33	29	-4
R15	44	35	-6
R16	40	34	-6
R17	41	34	-7
R18	44	38	-6
R19	39	32	-7
R20	34	30	-4
R21	40	34	-6
R22	29	25	-4