Fferm Solar Larnog

Environmental Statement

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1. Noise Assessment Data

1.1. Introduction

1.1.1. This appendix sets out the assessment data used in the assessment of likely significant noise and vibration effects due to the construction, decommissioning and operation of the Proposed Development.

1.1.2. The assessment data are based on review of the project information, manufacturers data[1] and professional experience of similar schemes. As such, the assessment data are representative of a likely worst case and actual noise and vibration emissions will vary.

1.1.3. Whilst assumptions on the likely noise emissions have been made to favour a reasonable worst case, there are control measures that can be used to ensure significant effects are avoided. Potential impacts during construction will be controlled via CEMP and potential impacts during operation can be controlled via planning condition requiring a revised noise assessment based on the final plant selection. forming part of an Operational Noise Management Plan (ONMP), to be submitted and approved

1.2. Construction Phase

Input Data

1.2.1. Based on review of **Chapter 5: Project Description**, the main construction activities with the potential to result in significant noise and vibration emissions were identified and construction plant lists produced for the main construction activities which are considered to have the potential to give rise to significant effects. All construction activities are assumed to occur during normal construction working hours only (Monday to Friday 0700 to 1900 hrs, Saturday 0700 to 1300 hrs).

1.2.2. The main Construction Activities (CAs) are listed in **Table 1**, below.

Table 1 – Construction Activities

Construction Activity (CA) Ref.	Construction Activity
CA1.1	Main Site Compound
CA1.2	Western Satellite Compound
CA1.3	Eastern Satellite Compound
CA2	Foundation Construction – Substation and BESS
CA3	Delivery and Installation of Equipment – Substation and BESS
CA4	Foundation Construction – Transformers/Inverters/PV Panels

[1] Sungrow Power Supply Co. Ltd. (2022). *Noise Test Report SG320HX, SH350HX.*

Construction Activity (CA) Ref.	Construction Activity
CA5	Erection of PV Panels – Pile-driven Supports
CA6	Trenching
CA7	Trenchless crossings

1.2.3. Assumed plant requirements for the main CAs listed above in **Table 1** are set out in **Table 2** to **Table 8**, below.

Table 2 – CA1: Construction of construction compounds

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C5.35 Tracked excavator	1	80	103	102
C2.27 Wheeled loader	1	80	108	107
C8.21 Skip wagon	1	50	106	103
C4.76 Diesel generator	1	100	89	89
C2.33 Articulated dump truck	1	50	109	105
C2.34 Lorry	1	50	108	105
C2.37 Roller (rolling fill)	1	50	108	105
Total Sound power corrected for no. & on time, dBA L_W				**113**

Table 3 – CA2: Construction of Substation and BESS Units Foundation

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C5.35 Tracked excavator	1	80	103	102
C2.30 Dump truck (tipping fill)	1	50	107	104
C4.24 Concrete pump + cement mixer truck (discharging)	1	50	96	93
C4.37 Concrete placing boom	1	50	92	89
C4.76 Diesel generator	1	100	89	89
C2.38 Roller	1	50	102	99
C2.34 Lorry	1	80	108	107
C4.19 Cement mixer truck (idling)	1	50	99	96
Total Sound power corrected for no. & on time, dBA L_W				**110**

Table 4 – CA3: Delivery and Installation of Substation and BESS Units Equipment

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C4.43 Wheeled mobile crane	1	80	98	97
C3.7 Power pack	1	80	98	97
C4.69 Core drill (electric)	1	25	113	112

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C6.21 Road lorry (full)	2	80	109	111
C2.26 Wheeled loader	1	80	107	106
C2.34 Lorry	1	80	108	107
C4.76 Diesel generator	1	100	89	89
Total Sound power corrected for no. & on time, dBA L_W				**114**

Table 5 – CA4: Construction of Foundations for Intermediate Transformers & PV Panels (where required)

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C5.35 Tracked excavator	1	80	103	102
C2.30 Dump truck (tipping fill)	1	50	107	104
C4.24 Concrete pump + cement mixer truck (discharging)	1	50	96	93
C4.37 Concrete placing boom	1	50	92	89
C4.76 Diesel generator	1	100	89	89
C2.38 Roller	1	50	102	99
C2.34 Lorry	1	80	108	107
C4.19 Cement mixer truck (idling)	1	50	99	96
Total Sound power corrected for no. & on time, dBA L_W				**110**

Table 6 – CA5: Construction of PV Panel & String Inverter Mounting Structures (piled supports)

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C3.17 Mini piling rig	1	80	104	103
C8.20 Tipper lorry	1	80	107	107
Total Sound power corrected for no. & on time, dBA L_W				**108**

Table 7 – CA6: Trenching for cabling

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C5.35 Tracked excavator	1	80	103	102
C2.30 Dump truck (tipping fill)	1	80	107	106
Total Sound power corrected for no. & on time, dBA L_W				**107**

Table 8 – CA7: Trenchless crossing for cabling (if required)

Plant	No.	on time (%)	Sound Power, dBA L_W	Sound power corrected for no. & on time, dBA L_W
C2.44 Directional drill (generator)	1	100	106	106
C3.15 Tracked drilling rig with hydraulic drifter	1	100	111	111
C2.30 Dump truck (tipping fill)	1	100	107	107
Total Sound power corrected for no. & on time, dBA L_W				**113**

Predicted Construction Phase Noise Levels

Methodology

1.2.4. Based on the input data presented above, predictions of noise levels from the works with no additional mitigation have been undertaken using attenuation with distance calculations in accordance with the method provided in BS 5228-1 Annex F 2.2, with 50% hard ground assumed. The predictions do not, therefore, account for any complex propagation effects such as reflections or atmospheric absorption. No screening has been assumed. As such, the predictions are considered to be worst case. The predicted noise levels are free field equivalent sound levels.

1.2.5. It should be noted that the plant items will move around the Site, operate at different times or for different durations and at different locations on any one day. As such, the predicted levels only ever provide an indication of the likely noise levels during construction.

Prediction Results

1.2.6. Predicted construction noise levels, when construction activities are at the closest point to each receptor, are provided in **Table 9**, below.

Table 9 – Predicted Worst Case Construction Noise Levels per Construction Activity

Construction Activity (CA)	Predicted Worst Case Construction Noise Levels, dB $L_{Aeq,T}$									
	R01	R02	R03	R04	R05	R06	R07	R08	R09	R10
CA1.1	47	45	44	55	52	48	43	52	46	61
CA1.2	55	51	47	49	48	48	44	45	51	48
CA1.3	51	47	45	52	51	50	44	47	48	51
CA2	52	48	44	46	46	46	42	43	48	45
CA3	56	52	48	50	50	50	45	47	52	49
CA4	61	61	63	61	65	65	56	49	72	51
CA5	60	60	61	60	64	65	54	48	70	49
CA6	62	53	55	58	60	64	48	46	63	47

Construction Activity (CA)	Predicted Worst Case Construction Noise Levels, dB $L_{Aeq,T}$									
	R01	R02	R03	R04	R05	R06	R07	R08	R09	R10
CA7	64	52	47	50	49	50	45	46	51	50

1.3. Operation Phase

Input Data

1.3.1. Based on manufacturer's data[1], professional experience of similar schemes, review of the data which informed the capacity study and liaison with the design team to discuss assumptions on variations of operational noise emissions at different times of day, the model input data for the operational noise assessment are presented overleaf in **Table 10**. Where assumptions have been made, these have favoured a worst-case scenario.

1.3.2. Whilst there is some uncertainty over the precise operating duty of plant associated with the PV panels in the evening (i.e. string inverters and intermediate transformer stations), the assumed 50% operating duty in the evening is considered to be a worst-case assumption that could account for component cooling requirements on days with hotter ambient air temperatures. The assumption is considered conservative based on the indicative average percentage total energy yield that would occur during evening hours. Based on the data which informed the capacity study, the maximum average yield in any evening hour (1900 to 2300 hrs) would be 8%, as indicated in **Figure 1**, below. Note that the figure below is based on data which accounts for potential cloud cover and is indicative only.

Figure 1 – Average hourly % energy yield per month (indicative)

Hour	Average % yield											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0 - 1	0	0	0	0	0	0	0	0	0	0	0	0
1 - 2	0	0	0	0	0	0	0	0	0	0	0	0
2 - 3	0	0	0	0	0	0	0	0	0	0	0	0
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0
4 - 5	0	0	0	0	0	0	0	0	0	0	0	0
5 - 6	0	0	0	0	0	1	0	0	0	0	0	0
6 - 7	0	0	0	1	4	5	4	1	0	0	0	0
7 - 8	0	0	0	6	13	16	14	8	3	0	0	0
8 - 9	0	0	7	19	25	29	28	21	14	4	0	0
9 - 10	1	5	17	32	38	42	42	33	25	12	4	0
10 - 11	6	13	26	41	50	53	49	42	34	21	11	6
11 - 12	11	22	34	51	57	60	58	47	40	27	16	10
12 - 13	14	26	40	55	55	54	54	48	40	30	18	13
13 - 14	14	25	44	55	59	57	54	51	41	30	19	13
14 - 15	16	28	39	53	54	53	53	47	39	28	16	11
15 - 16	11	21	32	46	48	47	46	41	34	21	11	6
16 - 17	5	13	24	36	41	41	38	35	26	12	4	1
17 - 18	0	4	12	25	30	31	28	23	17	4	0	0
18 - 19	0	0	3	11	17	19	17	13	5	0	0	0
19 - 20	0	0	0	2	5	8	8	4	0	0	0	0
20 - 21	0	0	0	0	1	2	2	0	0	0	0	0
21 - 22	0	0	0	0	0	0	0	0	0	0	0	0
22 - 23	0	0	0	0	0	0	0	0	0	0	0	0
23 - 0	0	0	0	0	0	0	0	0	0	0	0	0

Table 10 – Operational Noise Assessment: Model Input Data

Plant	Period, Operating Duty (assumed)	No. of Units	Modelled as	Height above local ground level, m	Sound power levels per octave band, dB								Overall Sound Power Level, dBA L_W
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
String Inverters	Daytime, 100%	90*	Line sources	1.5	82	80	81	78	74	73	80	72	84
	Evening, 50%				73	72	73	69	65	64	71	63	75
	Night-time				65	63	64	61	57	56	63	55	67
Intermediate Transformer Station	Daytime, 100%	5	Point source	2.5	75	76	77	81	75	65	59	53	80
	Evening, 50% (-3 dB assumed)				72	73	74	78	72	62	56	50	77
	Night-time (-10 dB assumed)				65	66	67	71	65	55	49	43	70
BESS Units	100%	2	Point source	2.0	92	83	79	77	76	75	73	68	82
BESS SCS & Tx	100%	1	Point source	2.5	75	76	77	81	75	65	59	53	80
Transformer	100%	1	Point source	3.5	78	94	92	90	77	68	61	61	89
Earthing Auxiliary Transformer	100%	1	Point source	1.9	68	69	70	74	68	58	52	46	73
* Approximate number													

Prediction Operational Phase Noise Levels

Methodology

1.3.3. Predictions of noise levels from the operational plant with no additional mitigation were undertaken using a 3D noise model produced in CadnaA noise modelling software. The model includes topography data, noise sources and receivers modelled at 4 m above local ground level to represent first floor level of nearby dwellings. Recreation area, and PRoW receivers are modelled at 1.5 m above local ground level. Ground was modelled with an absorption factor of G=0.8 to model mostly acoustically soft ground. Operational noise levels were predicted using the prediction methodology provided in ISO 9613-2:2024.

Prediction Results

1.3.4. Predicted operational phase noise levels are presented in **Table 11**, below

Table 11 – Predicted Operational Noise Levels

Receptor	Predicted specific sound level, dB L_S		
	Daytime (0700 to 1900 hrs)	Evening (1900 to 2300 hrs)	Night (2300 to 0700 hrs)
R01	39	33	31
R02	35	30	27
R03	33	27	23
R04	35	29	26
R05	35	29	26
R06	39	32	27
R07	32	26	22
R08	29	24	22
R09	44	35	28
R10	30	25	23