Tillbridge Solar

Tillbridge Solar Project

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Environmental Statement
Appendix 13-4: Noise Modelling
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tillbridgesolar.com

@: info@tillbridgesolar.com T: 0800 046 9643

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1. Introduction

1.1.1 In order to determine potential operational noise emissions from the Scheme, noise prediction models have been prepared using the SoundPLAN® version 8.2 software package. The following assumptions were applied in noise models:

a. The ground acoustic absorption has been modelled based on recommended absorption coefficients from OS Mapping land use categories, and have been assumed to be largely soft (G=0.8) in all areas not defined in this way;

b. The maximum order of reflections was 3;

c. Air temperature was assumed to be 10 degrees and humidity 70%;

d. No buildings have been included in the model;

e. Land topography has been sourced from publicly available Defra LIDAR data;

f. No boundary fences/walls have been included in the noise model; and

g. Receiver points have been modelled as free-field 1.5m above local ground level (representative of ground floor windows) for daytime noise and 4m above ground (representative of first floor windows) for night-time noise.

2. Decommissioning and Construction Noise

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

a. Scenario 1 – Construction of the main substation;

b. Scenario 2 – Installation of BESS, inverters and transformers;

c. Scenario 3 – Construction of ground-mounted solar PV panels;

d. Scenario 4 – Cable installation; and

e. Scenario 5 – Continuous activities associated with trenchless cable installation at Cottam Power Station railway line, the River Trent and the East Midlands Railway.

2.1.2 Noise source data for decommissioning and construction plant are presented in **Table 1**. Decommissioning and construction noise predictions were carried out to represent a worst-case scenario where all plant is operational on-site. Consequently, decommissioning and 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 BESS, 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	C.4, Item 38	106	1

Work Package	Plant / Equipment	BS 5228 Reference	Sound Power Lw (dBA)	Quantity
	telescopic crane			
	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 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

Work Package	Plant / Equipment	BS 5228 Reference	Sound Power Lw (dBA)	Quantity
	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
Trenchless cable installation	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 31	110	1

3. Decommissioning and Construction Traffic Noise

3.1.1 Road traffic flow data used to assess decommissioning and construction traffic noise impacts are presented in **Table 2**. Cumulative development decommissioning and construction traffic data are presented in **Table 3**.

Table 2: Construction Traffic Noise

Road	2026 Baseline		2026 Baseline + Construction Traffic		85th Percentile Speed (mph)
	AAWT	HGV%	AAWT	HGV%	
A631, West of School Lane	7478	11%	8217	11%	60
A631, East of Minor Access South	6461	11%	7142	13%	59
A631, West of Minor Access South	6514	11%	7600	15%	56
A631, West of B1398	6409	11%	7770	16%	53
B1398, North of A631	3393	10%	3527	10%	63
A631, East of B1398	6571	11%	7869	18%	49
B1398, South of A631	3069	7%	3640	12%	61
A631, Hanover Hill, West of Spital Lane	5317	13%	6615	21%	53
A15, North of Spital Lane	12688	23%	13358	25%	50
A631, East of A15	5665	12%	5826	11%	53
A15, South of A631	14012	19%	14534	20%	53
Kexby Road, East of	192	10%	192	10%	44

Road	2026 Baseline		2026 Baseline + Construction Traffic		85th Percentile Speed (mph)
	AAWT	HGV%	AAWT	HGV%	
Northlands Road					
Common Lane, South of A631	89	15%	89	15%	37
School Lane, South of A631	43	9%	151	50%	48
Common Lane, West of A631	105	19%	105	19%	51
Cow Lane, East of Common Lane	91	10%	266	52%	50
Glentworth Road, East of High Street	84	6%	84	6%	47
Fillingham Lane, East of Farm Track	172	11%	658	64%	45
High Street, West of B1241	2631	9%	3117	20%	34
Gainsborough Road, North of High Street	2866	7%	2866	7%	47
Marton Road, South of High Street	387	7%	387	7%	30
B1241, South of Cot Garth Lane	2564	7%	3050	19%	61
B1241, North of Fleets Road	3457	6%	4171	18%	33
Tillbridge Road, West of Thorpe Lane	5088	7%	5820	16%	61

Road	2026 Baseline		2026 Baseline + Construction Traffic		85th Percentile Speed (mph)
	AAWT	HGV%	AAWT	HGV%	
Saxilby Road, South of Queensway	3718	7%	3718	7%	37
Stow Park Road, East of Adams Way	4107	7%	4937	17%	61
High Street, South of Willingham Road	8263	8%	8645	9%	43
High Street, South of Wapping Lane	5737	9%	6311	15%	51
Kexby Lane, East of Upton Road	737	6%	912	19%	56
Cottam Road, East of Westbrecks Lane	1080	10%	1794	36%	63
Headstead Bank, South of Broad Lane	175	15%	538	58%	36

Table 3: Cumulative Construction Traffic Noise

Road	2026 Baseline		2026 Baseline + Cumulative Construction Traffic		85th Percentile Speed (mph)
	AAWT	HGV%	AAWT	HGV%	
B1398, South of A631	3069	7%	4062	14	61
A631, Hanover Hill, West of Spital Lane	5317	13%	7332	22	53
A15, North of Spital Lane	12688	23%	15689	26	50

Road	2026 Baseline		2026 Baseline + Cumulative Construction Traffic		85th Percentile Speed (mph)
	AAWT	HGV%	AAWT	HGV%	
School Lane, South of A631	43	9%	224	71	48
Cow Lane, East of Common Lane	91	10%	411	44	50
Fillingham Lane, East of Farm Track	172	11%	803	56	45
B1241, South of Cot Garth Lane	2564	7%	3215	19	61
Stow Park Road, East of Adams Way	4107	7%	5877	19	61
High Street, South of Wapping Lane	5737	9%	7205	16	51
Cottam Road, East of Westbrecks Lane	1080	10%	2169	34	63
Headstead Bank, South of Broad Lane	175	15%	888	45	36

4. Operational Noise

Modelling Methodology

4.1.1 Operational noise was modelled in SoundPLAN 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) (Ref 2) and Part 2: General Method of Calculation (1996) (Ref 3). The following assumptions and parameters have been used to prepare the noise model:

a. Sound source heights for inverters and transformers have been based on measurements of Power Electronics central inverters at a similar existing facility;

b. No specific layout has been assumed for the substations, with the sound sources spread evenly across the proposed substation footprint;

c. 140 Solar Stations have been identified, with six BESS modules and one inverter per Station;

d. A tracker system will be used on the solar PV modules to maximise their efficiency by keeping them oriented towards the sun. Manufacturers data from NEXTracker indicate that tracker motors have a sound pressure level of approximately 40 dB. As this level of noise is unlikely to be perceptible outside the Order Limits and would be unlikely to cause disturbance, noise emissions from tracker motors have not been considered in the operational noise assessment; and

e. Modelling assumes the site is continuously operational during daytime and night-time as a worst-case assumption, based on the possibility for some sound sources to operate in the early mornings and late evenings, particularly in the summer.

Sound Level Data – Inverters and Transformers

4.1.2 The proposed inverters are represented by indicative sound source data based on measurements of Power Electronics central inverters at a similar existing facility, giving a total sound power of approximately 88dB.

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

4.1.4 Inverters have been modelled as vertical area sources with a source height of 3m.

Sound Level Data – BESS Battery Storage Units

4.1.5 Battery storage module sound power levels have been based on AECOM library sound power data for battery storage module cooling systems, giving a sound power of 71dB(A). Battery storage cooling fans have been modelled as point sources with a source height of 2m.

Sound Level Data – Substation Plant

4.1.6 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 95dB(A) has been applied for transformers within substation areas. Substation transformers have been modelled as horizontal area sources with a source height of 3.5m.

4.1.7 Sound level data of shunt reactors at the Scheme are based on similar rated shunt reactor for National Grid substation developments from AECOM library data. An assumed sound power level of 82dB(A) has been applied for shunt reactors within substation areas. Shunt reactors have been modelled as horizontal area sources with a source height of 4m.

5. References

Ref 1 British Standards Institute (2014) BS 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites.– Part 1: Noise. London: BSI.

Ref 2 International Organisation for Standardisation (ISO) (1993) ISO 9613 Attenuation of Sound during Propagation Outdoors – Part 1: Calculation of the absorption of sound by the atmosphere: ISO

Ref 3 International Organisation for Standardisation (ISO) (1996) ISO 9613 Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation. Switzerland: ISO