FENWICK SOLAR FARM

Fenwick Solar Farm

EN010152

Environmental Statement

Volume III Appendix 11-4: Construction and Operation and Maintenance Noise Modelling

Document Reference: EN010152/APP/6.3

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2024
Revision Number: 00

BOOM POWER

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Revision History

Revision Number	Date	Details
00	October 2024	DCO application

Prepared for:
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1. Noise Modelling

1.1.1 In order to determine potential operation and maintenance noise emissions from the development, noise prediction models have been prepared using the CadnaA® v2023 MR1 software package (Ref. 1). The following assumptions were applied in noise models:

a. 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);

b. The maximum order of reflections was 1;

c. Air temperature was assumed to be 9 degrees Celsius and humidity 78%, which is typical annual average weather conditions in Doncaster;

d. Building massing in the surrounding area outside of the Order limits has been sourced from Ordnance Survey Open Map data and modelled with a standard height of 8 m;

e. Land topography has been sourced from Department for Environment Food and Rural Affairs (Defra);

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

g. Receiver points have been modelled as 4 m above local ground level (representative of first floor windows).

1.2 Construction Noise

1.2.1 CadnaA® noise mapping software (Ref. 1) 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 (Ref. 2). Sound power levels for each of the following construction activities have been calculated:

a. Noise Generating Activity (NGA) 1 – Construction of the Battery Energy Storage System (BESS) Area, Field Stations, and Solar PV Panels;

b. NGA2 – Cable installation (general works); and

c. NGA3 – Cable installation (horizontal directional drilling (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.

1.2.3 Sound power levels from BS 5228 (Ref. 2) were used to calculate the overall sound power level for NGA2 and NGA3. The distance the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) would be reached in meters from each activity was calculated based on using information in Table 1.

Table 1: Construction Plant

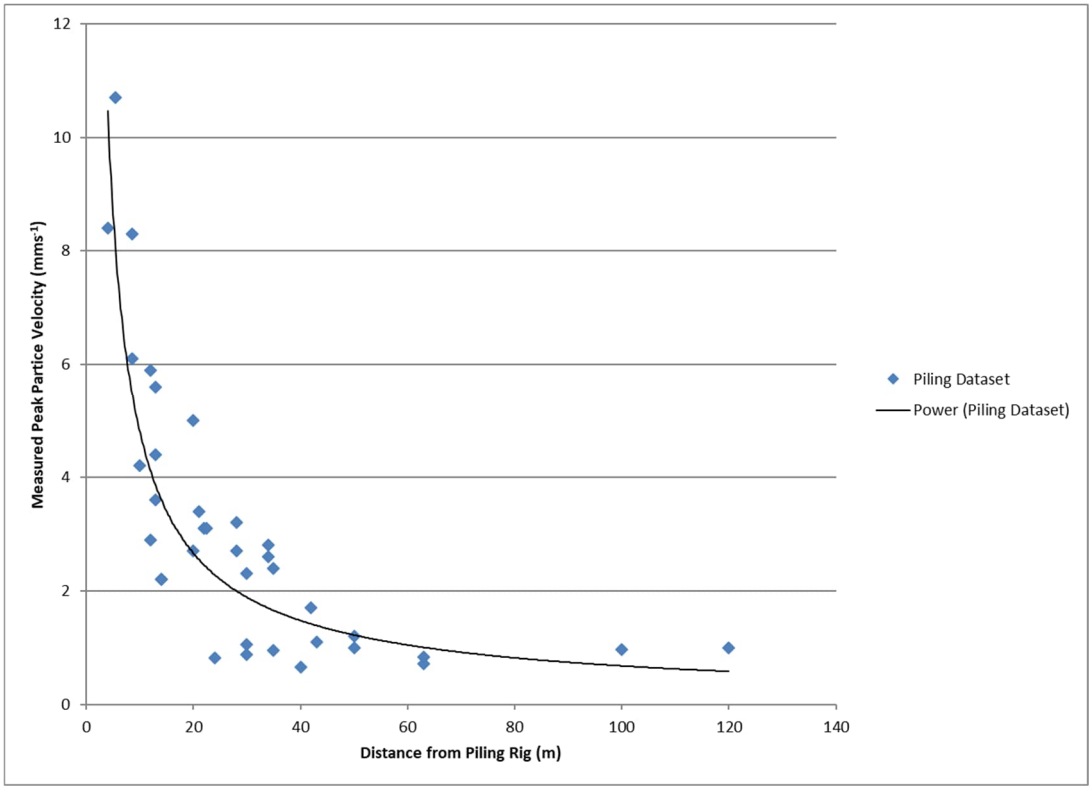
Work Package	Plant/Equipment	BS 5228 Reference	Sound Power Lw (dBA)	Quantity
Solar PV Mounting Structure Construction	Articulated dump truck	C.5, Item 16	104	1
	Wheeled mobile telescopic crane	C.4, Item 38	106	1
	Diesel generator	C.4, Item 85	94	1
	Continuous flight auger piling	C.3, Item 17	104	1
	Cement mixer truck (discharging)	C.4, Item 18	103	1
	Dumper	C.4, Item 9	105	1
Construction of BESS Area and Field Stations	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

Work Package	Plant/Equipment	BS 5228 Reference	Sound Power Lw (dBA)	Quantity
Horizontal Directional Drilling	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 Construction Vibration

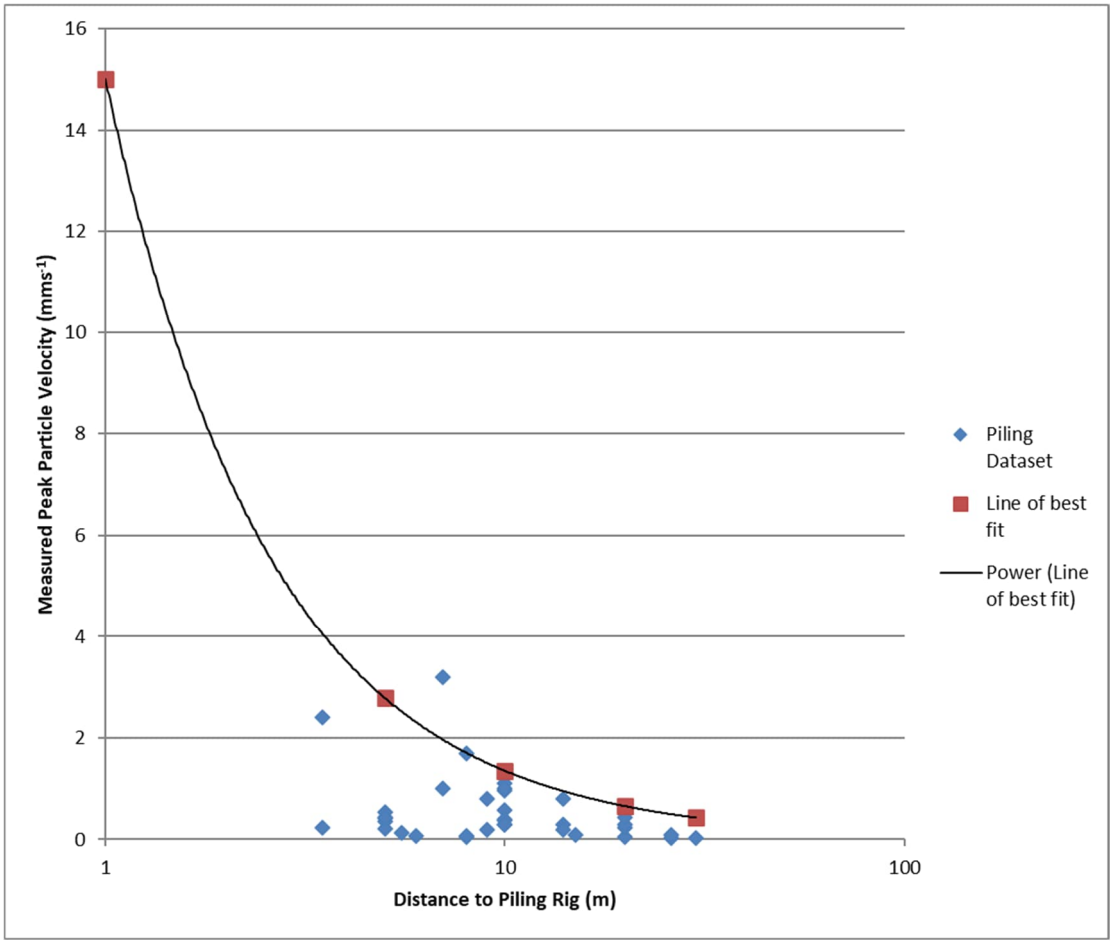
1.3.1 Data from driven piling activities was referenced from Table D.2 of BS 5228-2 (Ref. 2) to determine the likely level of vibration that may be experienced during piling works. Regression analysis was undertaken to determine a formula for calculating the PPV from driven piling activities. This analysis is presented in Plate 1.

Plate 1: Driven Piling Data Regression Analysis



1.3.2 Data from bored piling activities was referenced from Table D.6 of BS 5228-2 (Ref. 2) to determine the likely level of vibration that may be experienced during piling works. Regression analysis was undertaken to determine a formula for calculating the PPV from bored piling activities. This analysis is presented in Plate 2.

Plate 2: Bored Piling Data Regression Analysis



1.4 Construction Traffic Data

1.4.1 Construction traffic data used in the calculation of construction traffic noise effects are presented in Table 2.

Table 2: Construction Traffic Assessment Data

Name	2026 Baseline		2026 Baseline + Construction Traffic		85th %ile Speed (kph)
	AAWT	% HGVs	AAWT	% HGVs	
1 M62 West of Junction 34	65,906	23.0%	66,068	23.0%	112
2 M62 Between J34 and J35	57,751	26.3%	57,755	26.3%	112
3 M62 East of J35	46,914	21.0%	46,934	21.0%	112
4 M18 Between M62 Junction 35 and M18 Junction 6	52,258	27.1%	52,279	27.1%	112
5 M180	44,067	31.9%	44,080	31.9%	112

Name	2026 Baseline		2026 Baseline + Construction Traffic		85th %ile Speed (kph)
	AAWT	% HGVs	AAWT	% HGVs	
6 M18 Between M18 Junction 4 and Junction 5	60,818	19.4%	60,819	19.4%	112
7 A19 Selby Road - South of Station Road A19	10,244	13.0%	10,441	13.0%	57
8 A19 Selby Road - North of Station Road A19	15,162	12.4%	15,401	12.4%	48
9 Moss Road - Askern Village	5,660	8.8%	6,065	8.8%	43
10 Moss Road - Eastern of Askern	3,660	10.6%	4,065	10.6%	66
11 Fenwick Common Lane (Access Point 1)	383	8.9%	578	8.9%	70
12 Trumfleet Lane - South of Moss	1,271	14.6%	1,326	14.6%	60
13 Marsh Road	1,281	6.4%	1,336	6.4%	60
14 Thorpe Bank	1,767	10.6%	1,822	10.6%	60
15 Fordstead Lane West	5,415	11.0%	5,415	11.0%	60
16 Fordstead Lane East	4,822	8.7%	4,872	8.7%	60
17 Moss Road - East of Moss	2,121	10.7%	2,162	10.7%	61
18 Kirkhouse Green Road	1,853	12.8%	1,893	12.8%	72
19 West Lane - West of Sykehouse	631	8.7%	631	8.7%	49
20 Sykehouse Road - East of Sykhouse	504	13.7%	504	13.7%	60
21 A614	5,369	14.4%	5,369	14.4%	79
22 Sour Lane	1,932	4.3%	1,972	4.3%	61
23 Fishlake Nab	2,046	8.8%	2,087	8.8%	73

1.5 Operation and Maintenance Noise

Modelling Methodology

1.5.1 The noise model includes Field Stations and BESS Area.

1.5.2 Operation and maintenance noise was modelled in CadnaA® (Ref. 1) 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. 3) and Part 2: General Method of Calculation (1996) (Ref. 4). The following assumptions and parameters have been used to prepare the noise model:

a. Sound source heights have been based on information specification sheets provided by the Applicant;

b. The layout of the BESS Area and On-Site Substation is as provided by the Applicant;

c. Each Field Station will contain up to four central inverters except the following:

   i. the southern Field Station within Field NW11 and Field Station within Field NW8 will have one Field Station Unit;

   ii. the Field Stations within Fields SW2 and SW5 will have two Field Station Units; and

   iii. the Field Station within Field NW7 will have three Field Station Units.

d. In a lack of specific sound data for the BESS Area and Field Stations, sound data has been used based on previous solar farm DCO assessments; and

e. Modelling assumes the Scheme is continuously operational during daytime and night-time.

Sound Level Data – Central Inverters

1.5.3 The central inverters that have been modelled are based on data from a previously assessed solar farm project DCOs with a measured sound pressure level of 70 dB(A) 1.0 m.

1.5.4 Central inverters have been modelled as vertical area sources with a source height of 3.5 m.

Sound Level Data – BESS Containers

1.5.5 Noise predictions of the BESS Containers are based on data from a previously assessed solar farm DCOs with a measured sound pressure level of 64 dB(A) at a measurement distance of 1.0 m, which has been used to model noise emissions.

1.5.6 BESS Containers have been modelled as vertical area sources with a source height of 2.5 m.

Sound Level Data – On-Site Substation Transformers

1.5.7 Sound level data of On-Site Substation transformers at the Scheme are based on similar rated transformers for solar farm DCOs from AECOM library data. An assumed sound power level of 95 dB(A) has been applied for transformers within the On-Site Substation. On-Site Substation transformers have been modelled as vertical and horizontal area sources with a source height of 7.5 m.

Sound Level Data – Backup Generator

1.5.8 A backup diesel generator will be installed at the On-Site Substation to operate protection systems is required in the event of electrical failure.

1.5.9 The generator (Powerlink GMS450CS 385kW/481 kVA 3-Phase) has a reported sound pressure level of 74.7 dB(A) when measured at 7 m.

1.5.10 It is assumed that, for the purpose of this assessment, the generator will only operate up to a maximum of 8 hours in any one year.

1.5.11 Calculations indicate that the additional noise from the backup generator will not have a substantial effect on the outcome of this assessment.

2. References

Ref. 1 CadnaA®, registered trademark of Datakustik GmbH (Munich, Germany). [Accessed 19 August 2024].

Ref. 2 British Standards Institute (2014). BS 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. London: BSI. Available at: https://knowledge.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise/standard. [Accessed 19 August 2024].

Ref. 3 International Organisation for Standardisation (ISO) (1996). ISO 9613 Attenuation of Sound during Propagation Outdoors – Part 1: Calculation of the absorption of sound by the atmosphere. Switzerland: ISO. Available at: https://www.iso.org/standard/17426.html. [Accessed 19 August 2024].

Ref. 4 ISO (1996). ISO 9613 Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation. Switzerland: ISO. Available at: https://www.iso.org/standard/20649.html. [Accessed 19 August 2024].

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