Noise and Vibration Appendix 10.2 Noise Modelling

1.1 Construction Noise

1.1.1 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:

- Enabling works.
- Substructure (including piling) construction.
- Building construction.

1.1.2 Noise source data for construction plant are presented in Table 1.1. Plant equipment that has been used for the assessment are typical of construction works and have been selected based on previous experience of data centre projects. The actual construction methodologies and equipment will not be decided until a principal contractor has been appointed.

Table 1.1 Construction Plant Noise Data

Activity	Plant	No.	% on-time	Overall Sound Power Level [LwA dB]	Reference
Mobilisation and enabling works	Tracked excavator	2	60	102	Average of BS 5228 C.2.14 C.2.15 C.2.16 C.2.17 C.2.18 C.2.19 C.2.20 C.2.21 C.2.22 C.2.23 C.2.24 C.2.25
	Wheeled backhoe loader	1	60	90	Average of BS 5228 C.2.8 C.2.9
	Delivery Lorry	2	60	109	Average of BS 5228 C.2.34 C.6.19 C.6.20 C.6.21 C.6.22 C.6.23 C.8.20 C.11.4 C.11.5 C.11.6 C.11.7 C.11.8 C.11.9 C.11.10 C.11.11 C.11.12 C.11.13 C.11.14 C.11.15 C.11.16 C.11.17 C.11.18 C.11.19 C.11.20
	Telescoping handler	1	60	101	Average of BS 5228 C.2.35 C.4.54 C.4.55
	Vibratory compactor	1	60	105	Average of BS 5228 C.2.39 C.2.40 C.2.42 C.5.20 C.5.21 C.5.22 C.5.23 C.5.24 C.5.25 C.5.26 C.5.27 C.5.28
	Hand-held hydraulic breaker	1	60	114	Average of BS 5228 C.5.1 C.5.2 C.5.3 C.5.4 C.1.1 C.1.2 C.1.6 C.1.7 C.1.8
	Diesel generator	1	60	91	Average of BS 5228 C.4.76 C.4.77 C.4.78 C.4.79 C.4.80 C.4.81 C.4.82 C.4.83 C.4.84 C.4.86 C.4.87 C.6.39 C.8.24
Substructure and Foundations	Auger piling rig	1	60	109	Average of BS 5228 C.3.14 C.3.15 C.3.16
	Tracked excavator	2	60	102	Average of BS 5228 C.2.14 C.2.15 C.2.16 C.2.17 C.2.18 C.2.19 C.2.20 C.2.21 C.2.22 C.2.23 C.2.24 C.2.25
	Articulated dump truck	2	60	108	Average of BS 5228 C.1.11 C.2.30 C.2.31 C.2.32 C.2.33 C.4.1 C.4.2
	Concrete mixer truck pumping	2	60	105	Average of BS 5228 C.4.24 C.4.25 C.4.26 C.4.27 C.4.28 C.4.29 C.4.30 C.4.31 C.4.32

	Mobile crane	1	60	98	Average of BS 5228 C.4.38 C.4.39 C.4.40 C.4.41 C.4.42 C.4.43 C.4.44 C.4.45 C.4.46 C.4.47
	Tamper	2	60	91	BS 5228: Tab C.4 #35
	Generator for welding	1	60	95	Average of BS 5228 C.3.31 C.3.32 C.3.33 C.3.34 C.3.35
	Telescoping handler	1	60	101	Average of BS 5228 C.2.35 C.4.54 C.4.55
	Gas cutter	2	60	99	Average of BS 5228 C.1.18 C.3.34 C.3.35
	Concrete poker	2	60	101	Average of BS 5228 C.4.33 C.4.34 C.4.36
	Roller compactor	1	60	105	Average of BS 5228 C.2.39 C.2.40 C.2.42 C.5.20 C.5.21 C.5.22 C.5.23 C.5.24 C.5.25 C.5.26 C.5.27 C.5.28
	Delivery Lorry	2	60	109	Average of BS 5228 C.2.34 C.6.19 C.6.20 C.6.21 C.6.22 C.6.23 C.8.20 C.11.4 C.11.5 C.11.6 C.11.7 C.11.8 C.11.9 C.11.10 C.11.11 C.11.12 C.11.13 C.11.14 C.11.15 C.11.16 C.11.17 C.11.18 C.11.19 C.11.20
	Diesel generator	1	60	91	Average of BS 5228 C.4.76 C.4.77 C.4.78 C.4.79 C.4.80 C.4.81 C.4.82 C.4.83 C.4.84 C.4.86 C.4.87 C.6.39 C.8.24
Superstructure envelope	Mobile telescopic crane	1	60	98	Average of BS 5228 C.4.38 C.4.39 C.4.40 C.4.41 C.4.42 C.4.43 C.4.44 C.4.45 C.4.46 C.4.47
	Telescoping handler	2	60	101	Average of BS 5228 C.2.35 C.4.54 C.4.55
	Delivery Lorry	2	60	109	Average of BS 5228 C.2.34 C.6.19 C.6.20 C.6.21 C.6.22 C.6.23 C.8.20 C.11.4 C.11.5 C.11.6 C.11.7 C.11.8 C.11.9 C.11.10 C.11.11 C.11.12 C.11.13 C.11.14 C.11.15 C.11.16 C.11.17 C.11.18 C.11.19 C.11.20
	Concrete mixer truck pumping	1	60	105	Average of BS 5228 C.4.24 C.4.25 C.4.26 C.4.27 C.4.28 C.4.29 C.4.30 C.4.31 C.4.32
	Generator for welding	2	60	95	Average of BS 5228 C.3.31 C.3.32 C.3.33 C.3.34 C.3.35
	Gas cutter	1	60	99	Average of BS 5228 C.1.18 C.3.34 C.3.35
	Diesel generator	1	60	90.769230 77	Average of BS 5228 C.4.76 C.4.77 C.4.78 C.4.79 C.4.80 C.4.81 C.4.82 C.4.83 C.4.84 C.4.86 C.4.87 C.6.39 C.8.24
	MEWP	2	60	97.5	Average of BS 5228 C.4.57 C.4.58 C.4.59 C.4.60

1.1.3 The combined sound power level for each construction activity is presented in Table 1.2. Sound power data has been applied based on the assumption that plant would be located within a 100m x 100m area.

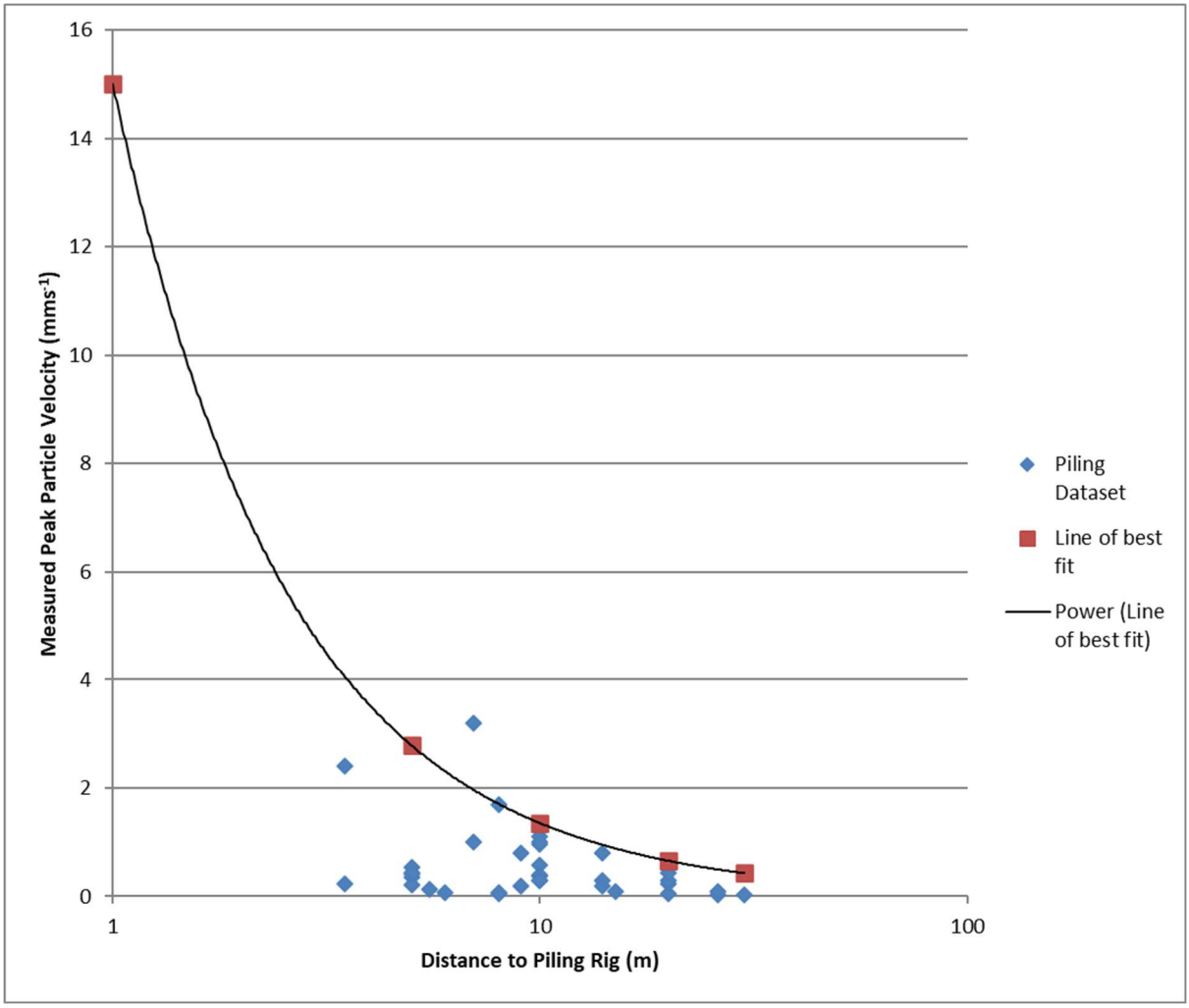
Table 1.2 Total Sound Power Data per Construction Activity

Activity Name	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total Activity L_{wA} dB
Mobilisation and enabling works	119.9	113.6	109.9	108.9	108.7	107.5	107.0	103.9	114.6
Substructure and Foundations	121.5	117.0	112.4	110.8	110.2	108.6	103.6	98.5	115.2
Superstructure envelope	119.2	112.7	108.4	107.3	107.3	104.7	100.5	95.6	111.8

1.2 Construction Vibration

1.2.1 Data from bored piling activities was referenced from Table D.6 of BS 5228-2 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 Figure 1.1.

Figure 1.1 Bored Piling Data Regression Analysis



1.3 Operational Noise

1.3.1 Operational noise data for plant that has been applied in the noise model is presented in

Table 1.3 Operational Plant Sound Power Data

Source	Number of plant	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total Activity L_{wA} dB
Chillers	64	58.0	71.0	85.5	94.5	95.5	87.0	84.5	78.5	98.5
Generator	32	74.6	89.0	113.9	118.1	119.8	119.9	119.0	114.4	126.3
Generator Exhaust	32	66.7	91.6	98.7	118.5	114.9	116.3	118.4	116.2	124.3
Substation Transformers	2	46.3	68.5	78.5	89.3	89.7	87.1	81.7	70.5	94.0