HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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1 Construction noise model inputs and assessment

1.1 Plant Octave Band Sound Pressure Levels

1.1.1 The octave band sound pressure levels associated with each plant item assumed for the construction noise assessment are presented in table 1-1.

1.1.2 The sound power level, L_{WA}, has been derived from the sound pressure level at a distance of 10m from the source using point source hemispherical geometric spreading (20 log r + 8dB).

Table 1- 1 Plant list octave band levels

Equipment	Reference	Linear Octave Band Sound Pressure Levels, dB by 1/1 Centre Band Frequency, Hz								A-weighted sound pressure level, $L_{Aeq,T}$ dB at 10m	L_{WA}
		63	125	250	500	1000	2000	4000	8000		
Breaker mounted on excavator; 121kW; (15t) 1 650kg breaker	BS 5228:2009+A1:2014 Table C.1.9	88	88	86	89	83	83	80	76	90	118
Tracked excavator	BS 5228:2009+A1:2014 Table C.8.10	67	70	67	65	63	62	60	55	69	97
Articulated dump truck (tipping fill)	BS 5228:2009+A1:2014 Table C.1.11	94	76	77	75	76	73	68	63	80	108
Dump Truck	BS 5228:2009+A1:2014 Table C.6.26	88	84	75	73	75	72	68	60	79	107
Tipper lorry	BS 5228:2009+A1:2014 Table C.8.20	88	82	74	74	74	73	70	67	79	107
Dozer	BS 5228:2009+A1:2014 Table C.8.9	76	78	71	70	71	65	60	55	74	102
Articulated dump truck	BS 5228:2009+A1:2014 Table C.5.17	85	88	77	75	77	74	69	63	81	109
Tracked mobile crane	BS 5228:2009+A1:2014 Table C.3.29	81	77	69	67	62	60	61	51	70	98
Cement mixer truck (discharging)	BS 5228:2009+A1:2014 Table C.4.19	77	71	65	65	66	66	60	51	71	99
Vibratory roller	BS 5228:2009+A1:2014 Table C.5.20	90	82	73	72	70	65	59	54	75	103
Lorry with lifting boom	BS 5228:2009+A1:2014 Table C.4.53	81	78	76	74	72	69	64	56	77	105
Concrete pump	BS 5228:2009+A1:2014 Table C.3.26	82	82	72	71	69	68	62	54	75	103
Site fork lift	BS 5228:2009+A1:2014 Table C.4.54	79	73	66	65	78	66	54	47	79	107
Large rotary bored piling rig	BS 5228:2009+A1:2014 Table C.3.14	84	92	81	80	78	76	68	61	83	111
Road planer	BS 5228:2009+A1:2014 Table C.5.7	81	87	79	77	77	74	70	67	82	110
Wheeled backhoe loader	BS 5228:2009+A1:2014 Table C.2.8	74	66	64	64	63	60	59	50	68	96
Vibratory plate (petrol)	BS 5228:2009+A1:2014 Table C.2.41	70	74	71	78	74	75	63	58	80	108
Petrol hand-held circular saw	BS 5228:2009+A1:2014 Table C.4.70	72	89	81	80	80	82	86	85	91	119

1.2 Plant list and activity sound power levels used in noise assessment

1.2.1 The assumed plant list and calculated activity sound power levels used in assessment of monthly Off-Site Power Station Facilities construction scenarios are provided in table 1-2.

1.2.2 The plant sound power levels have been corrected for the quantity and % on-time of each plant item. The activity sound power levels have been calculated from the summation of the individual corrected plant sound power levels.

1.2.3 Activity source heights were modelled at 2m with Activity 5 (CFA piling) at a height of 3m.

Table 1- 2 Plant list and activity sound power levels

Activity ID	Activity name	Plant and machinery	BS 5228-1:2009+A1 2014 Ref	% On-time	No. Plant	dB L_{WA}	Corrected dB L_{WA}	Activity L_{WA}, dB
1	Demolition of existing buildings	Breaker mounted on excavator; 121kW; (15t) 1 650kg breaker	BS 5228-1:2009+A1:2014 table C1.9	50	1	118	115	116.5
		Tracked excavator; 102kW; 22t	BS 5228-1:2009+A1:2014 table C8.10	80	1	97	96	
		Articulated dump truck (tipping fill); 187kW; 23t	BS 5228-1:2009+A1:2014 table C1.11	80	1	108	107	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 table C6.26	80	1	107	106	
		Tipper lorry	BS 5228-1:2009+A1:2014 table C8.20	80	1	107	106	
2	Site clearance and topsoil strip	Tracked excavator; 102kW; 22t	BS 5228-1:2009+A1:2014 table C8.10	80	1	97	96	111.7
		Dozer; 142kW; 20t	BS 5228-1:2009+A1:2014 table C8.9	80	1	102	101	
		Articulated dump truck (tipping fill); 187kW; 23t	BS 5228-1:2009+A1:2014 table C1.11	80	1	108	107	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 table C6.26	80	1	107	106	
		Tipper lorry	BS 5228-1:2009+A1:2014 table C8.20	80	1	107	106	
3	The movement, by crane, of the site cabins	Tracked mobile crane; 132kW; 55t	BS 5228-1:2009+A1:2014 table C3.29	80	1	98	97	106.5
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 table C6.26	80	1	107	106	
4	Laying grasscrete paving surfaces at emergency car park	Cement mixer truck (discharging)	BS 5228-1:2009+A1:2014 table C4.19	80	1	99	98	112.9
		Vibratory roller; 98kW; 8.9t	BS 5228-1:2009+A1:2014 table C5.20	80	1	103	102	
		Lorry with lifting boom	BS 5228-1:2009+A1:2014 table C4.53	80	1	105	104	
		Concrete pump; 59kW; 2.8t/180mm diameter/59bar	BS 5228-1:2009+A1:2014 table C3.26	80	1	103	102	
		Site fork lift	BS 5228-1:2009+A1:2014 table C4.54	80	1	107	106	
		Articulated dump truck (tipping fill); 187kW; 23t	BS 5228-1:2009+A1:2014 table C1.11	80	1	108	107	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 table C6.26	80	1	107	106	

Activity ID	Activity name	Plant and machinery	BS 5228-1:2009+A1 2014 Ref	% On-time	No. Plant	dB L_{wA}	Corrected dB L_{wA}	Activity L_{wA}, dB
5	Continuous Flight Auger (CFA) piling at the Off-Site Power Station Facilities	Large rotary bored piling rig; 110t/20m deep/1.2m diameter	BS 5228-1:2009+A1:2014 Table C3.14	80	1	111	110	112.8
		Tracked mobile crane; 132kW; 55t	BS 5228-1:2009+A1:2014 Table C3.29	80	1	98	97	
		Tracked excavator (inserting cylindrical metal cage); 20t	BS 5228-1:2009+A1:2014 Table C8.10	80	1	97	96	
		Concrete pump; 59kW; 2.8t/180mm diameter/59bar	BS 5228-1:2009+A1:2014 Table C3.26	80	1	103	102	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 Table C5.17	80	1	109	108	
6	Erect super-structure for Off-Site Power Station Facilities	Tracked mobile crane; 240kW; 105t	BS 5228-1:2009+A1:2014 Table C3.29	80	1	98	97	109.3
		Site fork lift	BS 5228-1:2009+A1:2014 Table C4.54	80	1	107	106	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 Table C6.26	80	1	107	106	
7	Final Off-Site Power Station Facilities site road surface construction	Road planer; 185kW; 17t	BS 5228-1:2009+A1:2014 Table C5.7	80	1	110	109	113.7
		Cement mixer truck (discharging)	BS 5228-1:2009+A1:2014 Table C4.19	80	1	99	98	
		Vibratory roller; 98kW; 8.9t	BS 5228-1:2009+A1:2014 Table C5.20	80	1	103	102	
		Articulated dump truck (tipping fill); 187kW; 23t	BS 5228-1:2009+A1:2014 Table C1.11	80	1	108	107	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 Table C6.26	80	1	107	106	
		Tipper lorry	BS 5228-1:2009+A1:2014 Table C8.20	80	1	107	106	
8	Laying paths and soft landscaping	Wheeled backhoe loader; 62kW; 8t	BS 5228-1:2009+A1:2014 Table C2.8	80	1	96	95	114.2
		Vibratory plate (petrol); 3kW; 62kg	BS 5228-1:2009+A1:2014 Table C2.41	80	1	108	107	
		Hand-held circular saw (cutting paving slabs); 1.5kW; 7.6 kg/235mm diameter	BS 5228-1:2009+A1:2014 Table C4.70	20	1	119	112	
		Articulated dump truck (tipping fill); 187kW; 23t	BS 5228-1:2009+A1:2014 Table C1.11	80	1	108	107	
		Articulated dump truck; 187kW; 23t	BS 5228-1:2009+A1:2014 Table C6.26	80	1	107	106	

1.3 Octave band sound power levels used in noise assessment

1.3.1 Octave band sound pressure levels for each plant item have been normalised such that the summation of levels across all bands gives an A-weighted broadband sound pressure level at 10m that is equal to those presented in table 1-1. The normalised values for each plant item have then been grouped and used to derive octave band activity sound power levels in the same way as the broadband sound power levels.

1.3.2 The resulting octave band sound power levels associated with each activity assumed in the Off-Site Power Station Facilities construction noise assessment are presented in table 1-3.

Table 1- 3 Assumed Off-Site Power Station Facilities activities during indicative programme

Activity ID	Activity name	Linear octave band sound power levels, dB by 1/1 centre band frequency (Hz)								dB (A)
		63	125	250	500	1000	2000	4000	8000	
1	A: Demolition of existing buildings	123.0	116.1	112.3	114.3	110.2	109.3	106.1	101.9	116.5
2	B: Site clearance and topsoil strip	122.6	113.9	107.7	106.3	107.2	104.6	100.6	96.0	111.7
3	C: The movement, by crane, of the site cabins	115.7	111.7	102.9	100.9	102.1	99.1	95.7	87.4	106.5
4	D: Laying grasscrete paving surfaces at emergency car park	123.5	115.5	109.1	107.4	109.5	104.8	99.7	93.0	112.9
5	E: CFA piling at the Off-Site Power Station Facilities	116.1	120.5	109.7	108.4	107.6	105.3	99.3	92.7	112.8
6	F: Erect super-structure for Off-Site Power Station Facilities	116.2	112.0	103.4	101.5	107.1	100.2	95.9	87.6	109.3
7	G: Final Off-Site Power Station Facilities site road surface construction	123.8	117.6	110.2	108.6	109.0	106.4	102.3	98.2	113.7
8	H: Laying paths and soft landscaping	121.9	113.8	107.8	108.3	107.7	107.0	106.9	105.4	114.2

1.4 Assumed Off-Site Power Station Facilities activities during indicative programme

1.4.1 The programmed works activities associated with the Off-site Power Station Facilities are presented in table 1-4.

Table 1- 4 Assumed Off-Site Power Station Facilities construction activities during indicative programme

Activity ID	Activity name	Assumed works location by month																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	A: Demolition of the existing buildings	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	B: Site clearance and topsoil strip	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	C: The movement, by crane, of the site cabins	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	D: Laying grasscrete paving surfaces at emergency car park	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
5	E: CFA piling at the Off-Site Power Station Facilities	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-	-	-	-	-	-
6	F: Erect super-structure for Off-Site Power Station Facilities	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-	-
7	G: Final Off-Site Power Station Facilities site road surface construction	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-	-
8	H: Laying paths and soft landscaping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X

2 Construction noise model outputs and assessment

2.1 Assessment of effects at residential receptors

2.1.1 The summary of magnitudes of change and assessment of significance for each month of the programme at residential properties (high sensitivity) due to the Off-Site Power Station Facilities construction works are presented in table 2-1. The predicted noise levels at the worst affected receptor in each receptor group over the duration of the Off-Site Power Station Facilities works programmed are presented in table 2-2.

Table 2- 1 Summary of effects and assessment of significance at residential properties

Magnitude of change	Noise level from plant and machinery, $L_{Aeq,T}$	Significance of effect at residential receptor	Approximate number of residential properties affected during day (07:00–19:00)																			
			month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9	month 10	month 11	month 12	month 13	month 14	month 15	month 16	month 17	month 18	month 19	month 20	month 21
Large	>= 75.0 dB(A)	Major significance	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium	70.0 - 75.0 dB(A)	Major significance	0	0	4	0	0	2	2	2	3	1	1	1	3	3	1	1	4	4	2	2	2
Small	65.0 - 70.0 dB(A)	Moderate significance	4	4	1	3	3	3	1	0	2	4	4	4	5	5	4	4	1	1	2	2	2
Negligible	< 65.0 dB(A) or less than 3dB(A) increase in ambient level	Minor (not significant)	118	118	117	120	120	118	120	121	118	118	118	118	115	115	118	118	118	118	119	119	119

Table 2- 2 Predicted noise level at each residential receptor group

Receptor group	Receptor type	Sensitivity	Highest predicted noise level from plant and machinery, dB $L_{Aeq,T}$
Residential properties within 150m of the boundary of the site	Residential	High	79.5
Residential properties approximately 300m southwest of the boundary of the site in Llanfaethlu village	Residential	High	59.6
Outlying residential properties north of the boundary of the site	Residential	High	61.2
Outlying residential properties east of the boundary of the site	Residential	High	60.8
Outlying residential properties southeast of the boundary of the site	Residential	High	60.4

2.2 Assessment of effects at non-residential receptors

2.2.1 The summary of non-residential receptors within 600m of the Off-Site Power Station Facilities construction works area and the highest predicted noise level over the duration of the Off-Site Power Station Facilities works programmed are presented in table 2-3.

Table 2- 3 Summary of effects and assessment of significance at non-residential receptors

Receptor group	Receptor type	Sensitivity	Highest predicted noise level from plant and machinery, dB $L_{Aeq,T}$	Magnitude of change	Significance of effect at non-residential receptor
Coffee House Shop, Griffith Reade House Llanfaethlu	Commercial	Low	50.8	Negligible	Negligible
Village Hall Llanfaethlu	Community	Low	51.3	Negligible	Negligible
Llanfaethlu Primary school	School	High	59.5	Negligible	Negligible
Eglwys Sant Maethlu Church	Place of worship	Medium	54.5	Negligible	Negligible
Outdoor Play Area	Recreational	Medium	41.5	Negligible	Negligible

3 Operation noise model inputs

3.1 Sound power levels used in noise assessment

3.1.1 Sound power levels associated with each activity assumed in the Off-Site Power Station Facilities noise assessment are presented in table 3-1.

Table 3- 1 Octave band sound power levels for each activity

Activity ID	Activity/source name	Source reference	Assumption	L_{WA}	% On Time	No. plant	Corrected L_{WA}	Location	Operating Time	Comments
1	Substation	NEMA Publication No.ST20 and ANSI Standard C89.2	Transformer rated at 500kvA	60dB	100%	1	60dB	North of ESL building	24 hours	
2	Generator	Manufacturers data	1 x 603kVA generator	106dB	100%	1	106dB	Adjacent to MEEG/AECC building	2 hours max per day	Tested one hour/month and two hours every three months during daytime period
3	Fuelling station	Measured	Single fuel pump	78dB	50%	1	75dB	Adjacent to MEEG/AECC building	24 hours	
4	Heating, ventilation and air conditioning (HVAC)	Manufacturers data	One fan unit on north and south façade on each building (two total per building)	63dB	100%	1	60dB	ESL and MEEG/AECC building	24 hours	
5	Toilet and kitchen extract	Manufacturers data	One kitchen and one toilet extract per building on roof	63dB	100%	1	60dB	ESL and MEEG/AECC building	24 hours	
6	External plant area	Manufacturers data	ACU/DI units	62dB	100%	2	65dB	Adjacent to MEEG/AECC building	24 hours	

3.1.2 Sound power levels for the car movement is presented in table 3-2.

Table 3- 2 Octave band sound power levels for car movement

Activity ID	Activity/source Name	Source Reference	Assumption	Linear Octave Band Sound Power Levels, dB by 1/1 Centre Band Frequency (Hz)								L_{WA}	% On	No. of cars	Corrected L_{WA}
				63	125	250	500	1000	2000	4000	8000				
7	Car movement	Measured	Assumed spectrum	102	97	92	85	83	79	77	70	90	100	9	100

3.2 Building heights

3.2.1 Building and other structure heights within the Off-Site Power Station Facilities site are presented in table 3-3.

Table 3- 3 Building heights

Structure	Building height assumption
MEEG /AECC Building	13m*
ESL building	7m*
Pumphouse	3m
Portakabins	2.6m
ISO containers	2.5m

*Building heights for the noise model inputs are based on a likely worst case and fall within the maximum parameters as stated in the DCO Parameter Tables.