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 Power Levels

1.1.1 The octave band sound pressure levels associated with each plant item assumed in the Logistics Centre 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 and activity sound power 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		
Tracked excavator; 102kW; 22 t	BS 5228-1:2009+A1:2014 Table C.8:10	67	70	67	65	63	62	60	55	69	97
Dozer; 142kW; 20 t	BS 5228-1:2009+A1:2014 Table C.8:9	76	78	71	70	71	65	60	55	74	102
Articulated dump truck (tipping fill); 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.1:11	94	76	77	75	76	73	68	63	80	108
Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	85	88	77	75	77	74	69	63	81	109
Tracked mobile crane; 132kW; 55 t	BS 5228-1:2009+A1:2014 Table C.3:29	81	77	69	67	62	60	61	51	70	98
Vibratory roller; 98kW; 8.9 t	BS 5228-1:2009+A1:2014 Table C.5:20	90	82	73	72	70	65	59	54	75	103
Lorry with Lifting Boom	BS 5228-1:2009+A1:2014 Table C.4:53	81	78	76	74	72	69	64	56	77	105
Site fork lift	BS 5228-1:2009+A1:2014 Table C.4:54	79	73	66	65	78	66	54	47	79	107
Tipper Lorry	BS 5228-1:2009+A1:2014 Table C.8:20	88	82	74	74	74	73	70	67	79	107
Wheel Wash	BS 5228-1:2009+A1:2014 Table C.3:13	75	75	62	58	55	54	48	40	63	91
Large rotary bored piling rig; 110 t / 20 m deep / 1.2 m diameter	BS 5228-1:2009+A1:2014 Table C.3:14	83	91	80	79	77	75	67	60	83	111
Tracked mobile crane; 240kW; 105 t	BS 5228-1:2009+A1:2014 Table C.3:28	81	77	66	62	59	57	51	46	67	95
Tracked excavator (inserting cylindrical metal cage); 20 t	BS 5228-1:2009+A1:2014 Table C.8:10	67	70	67	65	63	62	60	55	69	97
Concrete pump; 59kW; 2.8 t / 180 mm diameter / 59 bar	BS 5228-1:2009+A1:2014 Table C.3:26	82	82	72	71	69	68	62	54	75	103
Road planer; 185kW; 17 t	BS 5228-1:2009+A1:2014 Table C.5:7	81	87	79	77	77	74	70	67	82	110
Wheeled backhoe loader; 62kW; 8 t	BS 5228-1:2009+A1:2014 Table C.2:8	74	66	64	64	63	60	59	50	68	96
Vibratory plate (petrol); 3kW; 62 kg	BS 5228-1:2009+A1:2014 Table C.2:41	70	74	71	78	74	75	63	58	80	108
Hand-held circular saw (cutting paving slabs); 1.5kW; 7.6 kg / 235 mm diameter	BS 5228-1:2009+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 Logistics Centre 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.

Table 1- 2 Logistics Centre plant list and activity sound power levels

Group ID	Group Name	Assumption	BS 5228-1:2009+A1 2014 Ref	% On	No. Plant	Corrected dB L_{WA}	Activity L_{wA}, dB
1	Site clearance and topsoil strip	Tracked excavator; 102kW; 22 t	BS 5228-1:2009+A1:2014 Table C.8:10	80	2	99	111
		Dozer; 142kW; 20 t	BS 5228-1:2009+A1:2014 Table C.8:9	80	1	101	
		Articulated dump truck (tipping fill); 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.1:11	40	2	107	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	40	2	108	
2	Movement, by crane, of the site cabins	Tracked mobile crane; 132kW; 55 t	BS 5228-1:2009+A1:2014 Table C.3:29	80	2	100	109
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	80	1	108	
3	Laying of hardcore and road surface for HGV parking area	Vibratory roller; 98kW; 8.9 t	BS 5228-1:2009+A1:2014 Table C.5:20	80	1	102	113
		Lorry with Lifting Boom	BS 5228-1:2009+A1:2014 Table C.4:53	80	1	104	
		Site fork lift	BS 5228-1:2009+A1:2014 Table C.4:54	80	1	106	
		Articulated dump truck (tipping fill); 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.1:11	40	1	104	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	40	1	105	
		Tipper Lorry	BS 5228-1:2009+A1:2014 Table C.8:20	80	1	106	
		Wheel Wash	BS 5228-1:2009+A1:2014 Table C.3:13	80	1	90	
4	Continuous Flight Auger (CFA) piling at the Welfare and Security Building	Large rotary bored piling rig ; 110 t / 20 m deep / 1.2 m diameter	BS 5228-1:2009+A1:2014 Table C.3:14	80	1	110	113
		Tracked mobile crane; 240kW; 105 t	BS 5228-1:2009+A1:2014 Table C.3:28	80	1	94	
		Tracked excavator (inserting cylindrical metal cage) ; 20 t	BS 5228-1:2009+A1:2014 Table C.8:10	80	1	96	
		Concrete pump; 59kW; 2.8 t / 180 mm diameter / 59 bar	BS 5228-1:2009+A1:2014 Table C.3:26	80	1	102	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	80	1	108	
		Wheel Wash	BS 5228-1:2009+A1:2014 Table C.3:13	80	1	90	
5	Welfare and Security building, Security Gatehouse and Scanning equipment construction	Tracked mobile crane; 240kW; 105 t	BS 5228-1:2009+A1:2014 Table C.3:28	80	2	97	110
		Site fork lift	BS 5228-1:2009+A1:2014 Table C.4:54	80	1	106	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	80	1	108	
6	Final access/egress road construction	Road planer; 185kW; 17 t	BS 5228-1:2009+A1:2014 Table C.5:7	80	1	109	113
		Vibratory roller; 98kW; 8.9 t	BS 5228-1:2009+A1:2014 Table C.5:20	80	1	102	
		Articulated dump truck (tipping fill); 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.1:11	40	1	104	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	40	1	105	
		Tipper Lorry	BS 5228-1:2009+A1:2014 Table C.8:20	80	1	106	
		Wheel Wash	BS 5228-1:2009+A1:2014 Table C.3:13	80	1	90	
7	Laying paths and soft landscaping	Wheeled backhoe loader; 62kW; 8 t	BS 5228-1:2009+A1:2014 Table C.2:8	80	1	95	119
		Vibratory plate (petrol); 3kW; 62 kg	BS 5228-1:2009+A1:2014 Table C.2:41	80	1	107	
		Hand-held circular saw (cutting paving slabs); 1.5kW; 7.6 kg / 235 mm diameter	BS 5228-1:2009+A1:2014 Table C.4:70	80	1	118	
		Articulated dump truck; 187kW; 23 t	BS 5228-1:2009+A1:2014 Table C.5:17	80	1	108	

Table Notes [1] Presented plant quantities and % on-times as provided by project design engineers

1.3 Activity 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 activity sound power levels associated with each activity assumed in the Logistics Centre construction noise assessment are presented in table 1-3.

Table 1- 3 Assumed Logistics Centre activity sound power level

Group ID	Group 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	Site clearance and topsoil strip	121	116	108	106	107	104	99	94	111
2	Movement, by crane, of the site cabins	115	115	105	103	104	101	97	90	109
3	Laying of hardcore and road surface for HGV parking area	122	116	108	107	109	104	100	96	113
4	Continuous Flight Auger (CFA) piling at the Welfare and Security Building	116	121	110	108	108	105	99	93	113
5	Welfare and Security building, Security Gatehouse and Scanning equipment construction	115	116	105	103	108	102	96	90	110
6	Final access/egress road construction	122	118	110	108	108	105	101	98	113
7	Laying paths and soft landscaping	113	119	110	110	110	111	114	112	119

1.4 Assumed Logistics Centre activities during indicative programme

1.4.1 The programmed works activities associated with the Logistics Centre are presented in table 1-4. Activities associated with the construction of the Logistics Centre are located within the Logistics Centre application area as shown on figure H6-1 (Application Reference Number: 6.8.29).

Table 1- 4 Assumed Logistics Centre construction activities during indicative programme

Activity ID	Activity name	Start	Finish	dB L_{WA}	Assumed works location by month				
					1	2	3	4	5
1	Site clearance (trees) and topsoil strip	1	2	111.3	Site area	Site area	-	-	-
2	Movement, by crane, of the site cabins	2	2	108.7	-	Site access	-	-	-
3	Laying of hardcore and road surface for HGV parking area	3	6	112.5	-	-	Site area	Site area	Site area
4	CFA piling at the Welfare and security Building	4	8	112.7	-	-	-	Welfare and security buildings	Welfare and security buildings
5	Welfare and security building, Security Gatehouse and Scanning equipment construction	6	9	110.4	-	-	-	-	-
6	Final access/egress road construction	9	12	112.9	-	-	-	-	-
7	Laying paths and soft landscaping	12	14	118.8	-	-	-	-	-

Activity ID	Activity Name	Start	Finish	dB L_{WA}	Assumed works location by month				
					6	7	8	9	10
1	Site clearance (trees) and topsoil strip	1	2	111.3	-	-	-	-	-
2	Movement, by crane, of the site cabins	2	2	108.7	-	-	-	-	-
3	Laying of hardcore and road surface for HGV parking area	3	6	112.5	Site area	-	-	-	-
4	CFA piling at the Welfare and security building	4	8	112.7	Welfare and security buildings	Welfare and security buildings	Welfare and security buildings	-	-
5	Welfare and security building, Security Gatehouse and Scanning equipment construction	6	9	110.4	Welfare and security buildings	Welfare and security buildings	Welfare and security buildings	Welfare and security buildings	-
6	Final access/egress road construction	9	12	112.9	-	-	-	Site access	Site access
7	Laying paths and soft landscaping	12	14	118.8	-	-	-	-	-

Activity ID	Activity Name	Start	Finish	dB L_{WA}	Assumed works location by month				
					11	12	13	14	15
1	Site clearance (trees) and topsoil strip	1	2	111.3	-	-	-	-	-
2	Movement, by crane, of the site cabins	2	2	108.7	-	-	-	-	-
3	Laying of hardcore and road surface for HGV parking area	3	6	112.5	-	-	-	-	-
4	CFA piling at the Welfare and security building	4	8	112.7	-	-	-	-	-
5	Welfare and security building, Security gatehouse and scanning equipment construction	6	9	110.4	-	-	-	-	-
6	Final access/egress road construction	9	12	112.9	Site access	Site access	-	-	-
7	Laying paths and soft landscaping	12	14	118.8	-	Site perimeter	Site perimeter	Site perimeter	-

2 Construction noise level outputs and assessment

2.1 Noise levels at residential receptor groups

2.1.1 The summary of noise levels for each month of the programme at the worst affected receptor in each group of residential properties (high sensitivity) due to the Logistics Centre construction works are presented in table 2-1.

2.1.2 The assessment periods for construction are 07:00 – 19:00 Monday to Friday and 07:00 – 13:00 Saturdays.

Table 2- 1 Summary of noise levels at residential groups

Receptor Group	Calculated Monthly Noise Level, dB $L_{Aeq,T}$														
	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
Properties at Penrhyn Geiriol	46	49	47	51	51	52	50	50	52	51	51	55	53	53	53
Properties at Tyddyn-Uchaf	45	49	46	50	50	51	50	50	52	51	51	55	52	52	52
Properties at Kingsland Road	46	47	47	51	51	52	50	50	50	48	48	54	53	53	53

2.2 Assessment of effects at residential receptors

2.2.1 The summary of magnitudes of change and assessment of significance for each month of the programme at residential properties (high sensitivity) due to the Logistics Centre construction works are presented in table 2-2. Please refer to figure H6-1 (Application Reference Number: 6.8.29) for a map showing the residential properties.

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

Magnitude of change	Noise level from plant and machinery, dB $L_{Aeq,T}$	Significance of effect at residential receptor	Total number of effects at residential properties by programme month													
			Month1	Month2	Month3	Month4	Month5	Month6	Month7	Month8	Month9	Month10	Month11	Month12	Month13	Month14	Month15
Large	≥ 75.0	Major significance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium	70.0 - 74.9	Major significance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small	65.0 - 69.9	Moderate significance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Negligible	< 65.0*	Minor (not significant)	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
*or less than a 3dB increase in the pre-existing ambient noise level																	

2.3 Assessment of effects at non-residential receptors

2.3.1 The summary of non-residential receptors within 600m of the Logistics Centre construction works area and the highest, or range, of predicted noise level over the duration of the Logistics Centre works programmed are presented in table 2-3. For further background on assessment methodology and derivation of the criteria, please refer to section 9.5 of appendix B6-2 (Noise and vibration modelling and assessment methodology report) (Application Reference Number: 6.2.21).

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
Penrhos industrial estate	Commercial	Low	56.9	Negligible	Negligible
Penrhos industrial estate	Industrial	Negligible	60.3	Negligible	Negligible
Industrial in-between a55 and London road	Industrial	Negligible	58.0	Negligible	Negligible
Electricity sub-station 251m from road	Industrial	Negligible	67.2	Minor	Negligible
Pumping station Trearddur Bay Holyhead	Industrial	Negligible	70.8	Moderate	Negligible

3 Operation noise model inputs

3.1 Octave band sound power levels used in noise assessment

3.1.1 The octave band sound power levels associated with each activity assumed in the Logistics Centre noise assessment are presented in table 3-1.

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

Activity ID	Activity name	Plant ref no.	Assumption	Source reference	Linear octave band sound power levels, dB by 1/1 centre band frequency, Hz								L_{WA}	% on	No. plant	Corrected L_{WA}
					63	125	250	500	1000	2000	4000	8000				
1	Heat pump	4	Heat pump	Assumed spectrum[2]	100	95	91	91	87	83	76	80	92	100	3	97
2	HGV Queue and scan	2	HGV idle	BS 5228-1:2009+A1:2014 tableD.7-121	96	95	90	92	92	92	89	81	98	5	9	95
		1	Door slam	Measured	115	112	104	105	99	93	88	81	105	0.001	16	67
3	HGV parking (doors and idle)	2	HGV idle	BS 5228-1:2009+A1:2014 tableD.7-121	96	95	90	92	92	92	89	81	98	5	64	103
		1	Door slam	Measured	115	112	104	105	99	93	88	81	105	0.001	64	73
4	HGV movement (haul)	3	HGV movement	Average of BS 5228-1:2009 table C.11:4-20	117	108	105	105	105	103	98	93	110	100	1 (64)[1]	110

Table Notes [1]: Indicates line source model input. Value presented in brackets indicates vehicles per/hour [2] Presented L_{wA} value from supplied manufacturers data (Daikin VRV IV Condensing). Assumed spectrum derived from available spectrum data of comparable (in terms of kW output) heat recovery unit and adjusted in regards to L_{wA} value.

4 Operation noise model outputs and assessment

4.1 Daytime assessment at worst affected residential receptor in each group

4.1.1 The daytime assessment at the worst affected property in each group of residential receptors, due to operation of the Logistics Centre, is presented in table 4-1. For further background on assessment methodology, please refer to section 9.5 of appendix B6-2 (Application Reference Number: 6.2.21).

Table 4- 1 Daytime assessment at worst affected property in each group of residential receptors

Group	Properties at Trearddur	Properties at Tyddyn-Uchaf	Properties at Kingsland Road
Specific noise level, $L_{Aeq,T}$	39	39	40
Acoustic feature correction, dB[1]	3	3	3
Rating level $L_{Ar,Tr}$	42	42	43
Background level, $L_{A90,T}$	37	37	48
Excess of Rating over background, dB	5	5	-5
Consideration of context	*Contextual assessment indicates that all specific sound levels fall below any of the absolute criteria.*		

Table Notes [1]: BS 4142 3 dB penalty for intermittency applied

4.2 Night-time assessment at worst affected residential receptor in each group

4.2.1 The night-time assessment at the worst affected property in each group of residential receptors, due to operation of the Logistics Centre, is presented in table 4-2. For further background on assessment methodology, please refer to section 9.5 of appendix B6-2 (Application Reference Number: 6.2.21).

Table 4- 2 Night-time assessment at worst affected property in each group of residential receptors

Group	Properties at Trearddur	Properties at Tyddyn-Uchaf	Properties at Kingsland Road
Specific Noise Level, $L_{Aeq,T}$	39	39	40
Acoustic Feature Correction, dB[1]	3	3	3
Rating Level $L_{Ar,Tr}$	42	42	43
Background Level, $L_{A90,T}$	33	33	35
Excess of Rating over background, dB	9	9	8
Consideration of context	*Contextual assessment indicates that all specific sound levels fall below any of the absolute criteria and are below the lowest observed adverse effect level for night noise for protection of the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.*		

Table Notes [1]: BS 4142 3 dB penalty for intermittency applied

4.3 Initial assessment of effects at residential receptor groups

4.3.1 The initial summary of magnitudes of change and assessment of significance, prior to consideration of context, at residential properties (high sensitivity) due to operation of the Logistics Centre are presented in table 4-3.

Table 4- 3 Summary of effects and assessment of significance at residential receptors

Magnitude of change (effect)	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day (07:00–19:00)	Approximate number of residential properties affected during night (19:00–07:00)
Large	Major significance	0	0
Medium	Major significance	0	0
Small	Moderate significance	4	15
Negligible	Minor (not significant)	13	2

4.4 Assessment of effects at residential receptors considering context

4.4.1 Following consideration of context, the summary of magnitudes of change and assessment of significance at residential properties (high sensitivity) due to operation of Logistics Centre are presented in table 4-4.

Table 4- 4 Summary of effects and assessment of significance at residential receptors

Magnitude of change (effect)	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day (07:00–19:00)	Approximate number of residential properties affected during night (19:00–07:00)
Large	Major significance	0	0
Medium	Major significance	0	0
Small	Moderate significance	0	0
Negligible	Minor (not significant)	17	17