

Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment
Report

Volume 5: Appendices
Appendix 15.3 Noise Modelling Inputs

ILI (Borders PSH) Ltd

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Quality information

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1. Model Input Data

1.1 Construction Noise Modelling

Free field construction noise levels have been predicted at residential receptor locations for the construction activities outlined in this appendix.

1.1.1 Construction Noise Model Setup

Construction noise from the proposed Development was modelled in CadnaA (version 2023) acoustic modelling software. This software implements the sound propagation calculation methodology set out in BS 5228-1 'Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise' (BSI, 2014a).

Temporary and permanent compounds have been modelled as area sources, such that the total sound power level associated with a compound related activity is spread uniformly over the area and positioned at height of 2 m above ground.

The construction of the Temporary B840 Realignment, Access Tracks and upgrade of Access Tracks has been modelled for each receptor as a point source located 2 m above ground at the closest approach along the track for the duration of the B840 realignment or access track works, In practice the construction activity associated with preparing these routes will move over time and therefore this modelling approach is a worst case scenario. A point source has assumption has also been used to model bridges and culvert construction, it is assumed construction at the locations occurs simultaneously at all bridge/culverts as a worst-case scenario.

The movement of HGVs on access tracks within the Site has been modelled using line sources configured as moving point-sources at a speed of 20 km/h and average of 3.25 vehicles per hour (equating to 59 vehicles per 18 hr day). These values are based on the quantity of vehicles using Link 6 (see *Section Construction Traffic Noise Chapter 15: Noise and Vibration (Volume 2: Main Report)* spread over the 18hr day.

Ground absorption has been set universally as soft ground, with the exception of Loch Awe and Loch Fyne which are assumed to be acoustically hard (reflective). Ground topology has been assumed to be flat for the purpose of the noise modelling, this is a worst-case assumption as it means the natural screening that would be provided by the land at some receptors might not be included. In general though, the worst affected sensitive receptors do have line of sight and are unlikely to benefit from natural screening.

1.2 Construction Plant and Equipment Definitions

A full list of plant associated with construction activities and associated sound power data from BS 5228-1 and percentage (%) on time is presented in *Table 1*.

The data is conservative representation only for the purposes of undertaking a worst case assessment of impacts at receptors. Actual equipment items, quantities on-times may vary slightly, but would not change the outcome of the assessment.

Table 1. List of Construction Activities and Construction Plant

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant Lw	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
Phase 1: Enabling Works						
P1-A1-T1	Road Sweeper	104	1	10	104.0	BS 5228: Tab C.4 #90
	Grader	114	2	8	116.0	BS 5228: Tab C.6 #31

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
Existing Access Improvements	Excavator	96	4	8	101.1	BS 5228: Tab C.1 #12
	Roller	101	2	4	100.0	BS 5228: Tab C.5 #19
	Tipper	107	4	8	112.1	BS 5228: Tab C.8 #20
Phase 2: General Mobilisation						
P2-A1-T1 Construction of new Access Tracks	Harvester	114	3	8	117.8	BS 5228: Tab C.5 #14
	Chainsaw	114	5	8	120.0	BS5228 Table D.2, no. 14
	Forestry wagon	106	5	8	112.0	BS 5228: Tab C.9 #22
	Excavator	96	5	8	102.0	BS 5228: Tab C.1 #12
	Dozer	106	3	8	109.8	BS 5228: Tab C.6 #28
	Roller	101	4	4	103.0	BS 5228: Tab C.5 #19
	Grader	114	3	8	117.8	BS 5228: Tab C.6 #31
P2-A1-T2 Compound setup (temporary and permanent)	Generator	88	12	10	98.8	BS 5228: Tab C.4 #84
	Excavator	96	3	8	99.8	BS 5228: Tab C.1 #12
	Grader	114	3	8	117.8	BS 5228: Tab C.6 #31
P2-A1-T3 Temporary Jetty Construction	Jack-up Barge (piling rig)	110	1	10	110	BS 5228: Tab C.3 #16
	Mobile Crane	103	1	10	98.0	BS 5228: Tab C.4 #52
	Crane with Diesel Piling Hammer	132	1	6	129.8	BS5228 Table D.4, no. 10
Phase 2: Upper Reservoir						
P2-A2-T1 Constructions of access including bridges and culverts	Excavator	96	4	8	101.1	BS 5228: Tab C.1 #12
	Dump Trailer	114	10	8	123.0	
	Mobile Crane	98	1	8	97.0	BS 5228: Tab C.4 #52
	Grader	114	4	8	119.1	BS 5228: Tab C.6 #31
P2-A2-T2 Site clearance	Harvester	114	1	8	113.0	BS 5228: Tab C.5 #14
	Chainsaw	114	1	8	111.8	BS5228 Table D.2, no. 14
	Forestry wagon	106	1	6	103.8	BS 5228: Tab C.9 #22
	Excavator	96	1	8	95.0	BS 5228: Tab C.1 #12

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
P2-A2-T3 River flow diversion (construction discharge) works at the main burn)	Excavator	110	1	8	95.0	BS 5228: Tab C.1 #12
	Hydraulic Breaker	113	1	8	115.0	BS 5228: Tab C.9 #12
P2-A2-T4 Stabilization works	Excavator	96	1	8	95.0	BS 5228: Tab C.1 #12
	Hydraulic Breaker	116	1	8	115.0	BS 5228: Tab C.9 #12
Phase 2: Lower Reservoir						
P2-A3-T1 Temporary B840 Realignment Works	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12
	Roller	101	1	8	100.0	BS 5228: Tab C.5 #19
	Dumper	104	2	8	106.0	BS 5228: Tab C.5 #16
	Grader	114	1	8	113.0	BS 5228: Tab C.6 #31
P2-A3-T2 Coffering inlet area	Jack-up Barge	NA	2	10	NA	Does not produce noise once installed
	Mobile Crane	98	2	10	101.0	BS 5228: Tab C.4 #52
	Vibratory Sheet Piling Rig	116	2	4	115.0	BS 5228: Tab C.3 #8
	Pump	112	4	10	118.0	BS 5228: Tab C.11 #1
	Generator	88	4	10	94.0	BS 5228: Tab C.4 #84
P2-A3-T3 Site clearance big purple area	Harvester	114	1	8	113.0	BS 5228: Tab C.5 #14
	Chainsaw	114	1	8	113.0	BS5228 Table D.2, no. 14
	Forestry wagon	106	1	6	103.8	BS 5228: Tab C.9 #22
	Excavator	96	1	8	95.0	BS 5228: Tab C.1 #12
	Dumper	104	1	8	103.0	BS 5228: Tab C.5 #16
P2-A3-T4 Trench construction for gatehouse and bifurcation	Excavator	96	4	8	101.1	BS 5228: Tab C.1 #12
	Dumper	104	8	8	112.1	BS 5228: Tab C.5 #16
	Hydraulic Breaker	116	4	4	118.0	BS 5228: Tab C.9 #12
	Drill Rig	114	4	4	116.0	BS 5228: Tab C.6 #35
Phase 2: Tunnelling works (combined)						
	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
P2-A4-T1 Form access to portal sites	Dumper	104	2	8	106.0	BS 5228: Tab C.5 #16
	Hydraulic Breaker	116	2	4	115.0	BS 5228: Tab C.9 #12
	Grader	114	2	8	116.0	BS 5228: Tab C.6 #31
P2-A4-T2 Tunnel portal construction	Generator	88	2	10	91.0	BS 5228: Tab C.4 #84
	Concrete Batching Plant	108	2	10	111.0	BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12
	Dumper	104	2	8	106.0	BS 5228: Tab C.5 #16
	Hydraulic Breaker	116	2	4	115.0	BS 5228: Tab C.6 #31
	Shotcrete Pump	106	2	8	108	BS 5228: Tab C.4 #32
	Concrete Vibrator	99	2	8	101	BS 5228: Tab C.4 #36
P2-A4-T3 Power Tunnel Portal Construction	Generator	88	1	10	88.0	BS 5228: Tab C.4 #84
	Concrete Batching Plant	108	1	10	108.0	BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Excavator	96	1	8	95.0	BS 5228: Tab C.1 #12
	Dumper	104	1	8	103.0	BS 5228: Tab C.5 #16
	Grader	114	1	8	113.0	BS 5228: Tab C.6 #31
	Hydraulic Breaker	116	1	4	112.0	BS 5228: Tab C.6 #31
	Shotcrete Pump	106	1	4	102.0	BS 5228: Tab C.4 #32
Concrete Vibrator	99	1	8	98.0	BS 5228: Tab C.4 #36	
P2-A4-T4 Tunnel excavation material transport	Single HGV Movement on Access Track	108	1	10	108.0	BS 5228: Tab C.4 #84
Phase 2: Switch room Building and HV Switchyard						
	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
P2-A5-T1 Groundworks for switch room and HV switchyard	Dumper	104	2	8	106.0	BS 5228: Tab C.5 #16
	Grader	114	1	4	110.0	BS 5228: Tab C.6 #31
	Concrete batching plant	108	1	10	108.0	BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Concrete Vibrator	99	2	8	101.0	BS 5228: Tab C.4 #36
P2-A5-T2 Superstructure construction	Concrete batching plant	108	1	10	108.0	BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Mobile Crane	98	2	7	100.0	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	2	8	101.0	BS 5228: Tab C.4 #36
Phase 3: Upper Reservoir						
P3-A1-T3 Opening and Operation of Borrow Pit	Excavator	96	6	8	102.8	BS 5228: Tab C.1 #12
	Hydraulic Breaker	116	6	10	123.8	BS 5228: Tab C.9 #12
	Dumper	104	12	8	113.8	BS 5228: Tab C.5 #16
	Drill Rig	114	6	8	121.0	BS 5228: Tab C.6 #35
	Crusher	112	4	8	117.1	BS 5228: Tab C.9 #14
	Screeners	109	4	8	114.1	BS 5228: Tab C.10 #14
P3-A1-T3 Embankment Construction Works	Excavator	96	10	8	105.0	BS 5228: Tab C.1 #12
	Grader	114	10	8	123.0	BS 5228: Tab C.6 #31
	Dump Trailers	114	10	8	123.0	BS 5228: Tab C.6 #25
P3-A1-T4 Spillway Construction	Excavator	96	4	8	101.1	BS 5228: Tab C.9 #12
	Dumper	104	6	8	110.8	BS 5228: Tab C.1 #12
	Concrete Batching Plant	108	1	10	108.0	BS 5228: Tab C.5 #16
	Mobile Crane	98	2	8	100.0	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	6	8	106.0	BS 5228: Tab C.4 #36
	Grouting Rig	109.6	1	10	109.6	Measured overall sound power level. Spectrum

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
						from BS 5228: Tab C.3 #16
	Hydraulic Breaker	116	4	8	121.1	BS 5228: Tab C.9 #12
P3-A1-T5 Inlet / Outlet Works including gate shafts	Excavator	96	2	8	98.0	BS 5228: Tab C.9 #12
	Dumper	104	2	8	106.0	BS 5228: Tab C.1 #12
	Concrete Batching Plant	108	1	10	108.0	BS 5228: Tab C.5 #16
	Mobile Crane	98	2	8	100.0	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	4	8	104	BS 5228: Tab C.4 #36
	Grouting Rig	109.6	1	10	109.6	
	Hydraulic Breaker	116	2	8	118.0	BS 5228: Tab C.9 #12
	Phase 3: Lower Reservoir					
P3-A2-T1 Temporary works in Loch Awe	Excavator	96	5	8	102.0	BS 5228: Tab C.1 #12
	Jack-up Barge	NA	2	10	NA	Does not produce noise once installed
	Mobile Crane	98	2	10	101.0	BS 5228: Tab C.4 #52
	Pump	112	4	10	118.0	BS 5228: Tab C.11 #1
	Generator	88	4	10	94.0	BS 5228: Tab C.4 #84
P3-A2-T2 Construction of inlet and gate shafts	Excavator	96	4	8	101.1	BS 5228: Tab C.1 #12
	Dumper	104	6	8	110.8	BS 5228: Tab C.5 #16
	Concrete Batching Plant	108	2	10	111.0	Overall sound power level from BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26 BS 5228: Tab C.5 #16
	Mobile Crane	98	3	8	101.8	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	6	8	106.0	BS 5228: Tab C.4 #33
	Grouting Rig	110	1	10	110	Measured. Spectrum from BS 5228: Tab C.3 #16

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
P3-A2-T3 Construction of inlet/outlet structure	Hydraulic Breaker	116	2	8	118.0	BS 5228: Tab C.9 #12
	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12
	Dumper	104	2	8	106.0	BS 5228: Tab C.5 #16
	Concrete Batching Plant	108	1	10	108.0	Overall sound power level from BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Mobile Crane	98	2	8	100.0	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	4	8	106.0	BS 5228: Tab C.4 #36
	Grouting Rig	110	1	10	109.6	Measured. Spectrum from BS 5228: Tab C.3 #16
	Hydraulic Breaker	116	2	8	118.0	BS 5228: Tab C.9 #12
Phase 3: Switch room Building and HV Switchyard						
P3-A3-T1 Superstructure construction	Concrete Batching Plant	108	1	10	108.0	Overall sound power level from BS 5228: Tab D.6 #11. Spectrum from BS 5228: Tab C.3 #26
	Mobile Crane	98	2	7	100.0	BS 5228: Tab C.4 #52
	Concrete Vibrator	99	2	8	101.0	BS 5228: Tab C.4 #36
P3-A3-T2 AIS Switchyard (equip installation)	Mobile Crane	98	1	7	96.5	BS 5228: Tab C.4 #52
	Scissor Lift	106	3	6	108.6	BS 5228: Tab C.4 #59
Phase 4: Lower Reservoir						
P4-A1-T1 Rock excavation and armour construction	Mobile Crane	98	2	8	100.0	BS 5228: Tab C.4 #52
	Dump Trailer	114	2	8	116.0	BS 5228: Tab C.6 #25
	Jack-up Barge	NA	1	10	NA	Does not produce noise once installed
	Excavator	96	2	8	98.0	BS 5228: Tab C.1 #12

Construction Task	Plant	Sound Power Level Lw dB(A)	No. of Plant	On-time (max 10hr per day)	Overall Lw dB(A)	Reference
	Hydraulic Breaker	116	2	4	115.0	BS 5228: Tab C.9 #12

Source: Applicant project team

1.3 Operational Noise Modelling

Operational noise modelling has been undertaken using the same model as for the construction assessment with the exception that ISO 9612-2 was used as the sound propagation method. All sources (vents and substation building) were modelled as point sources due to the large distance between source and receptor (i.e. > 500 m), which means the dimensions of the sound source are less of an influence on levels at the assessment locations. The point sources were positioned at 1.5 m above the modelled ground level.

