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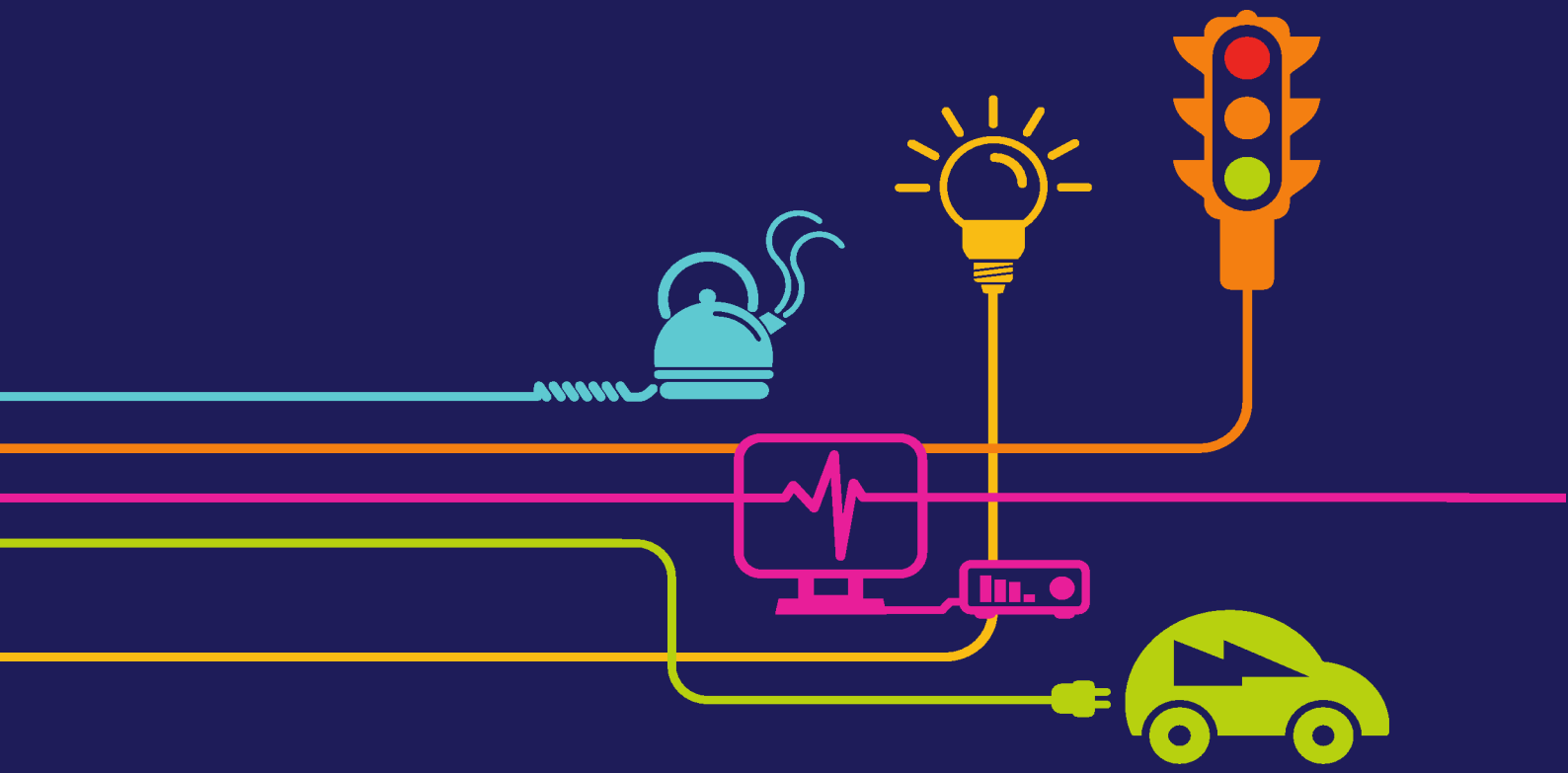
DOCUMENT 5.15.2.4

Construction Noise and Vibration Model Inputs

Chapter 15 – Appendix 4

National Grid (North Wales Connection Project)

Regulation 5(2)(a) including (l) and (m) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



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North Wales Connection Project

Volume 5

Document 5.15.2.4 Appendix 15.4 Construction Noise and Vibration Model Inputs

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1 Construction Noise and Vibration Assessment Model Input Data

1.1 INTRODUCTION

1.1.1 This Appendix contains details of calculation methodologies and model input data for the numerical assessments included in Chapter 15, Construction Noise and Vibration **(Document 5.15)**. Information related to qualitative assessments is not included in this Appendix.

1.1.2 The construction noise and vibration assessment has been undertaken in accordance with BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' and BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'.

1.1.3 The assessment has been based on the construction programme for the Proposed Development which is provided in Chapter 4 Construction, Operation, Maintenance and Decommissioning of the Proposed Development (**Document 5.4**).

1.1.4 Typical plant for each construction activity, including the tunnelling sites, have been used to form the basis for the assessment of each element of the Proposed Development and are provided in the sections below.

1.2 OVERHEAD LINE AND SUBSTATIONS

Noise

1.2.1 Calculations of noise from works to construct the overhead line have been carried out following the methodology in Annex F Section F.2.2.2 of BS 5228-1:2009+A1:2014. The combined sound levels for the plant from each activity have been calculated at 10 m using a spreadsheet following standard corrections for the number of plant and percentage on-time. The calculations have been made at receptors, based upon the distance between the worksite (fusing assumptions as indicated for each assessment). Corrections have not been made for screening or reflection.

1.2.2 For distances of up to 25 m, the following correction K_h (hard ground) in decibels for distance R has been applied to determine the sound level at the receptor:

$$K_h = 20\log_{10}\frac{R}{10}$$

(Source: BS 5228-1:2009+A1:2014 eqn F.1)

1.2.3 For distances of greater than 25 m, the following correction K_s (soft ground) in decibels for distance R has been applied to determine the sound level at the receptor:

$$K_s = \left(25\log_{10}\frac{R}{10}\right) - 2$$

(Source: BS 5228-1:2009+A1:2014 eqn F.2)

Construction Compounds

1.2.4 A summary of the typical plant likely to be used at Penmynydd Road, Pentir and Pentir Substation construction compounds are provided in Table 15.4.1. In the majority of cases the data source is from BS 5228-1:2009+A1:2014. The sound pressure level at 10 m used in the assessment, the number of plant and percentage on-time have also been provided.

Table 15.4.1: Plant used for the Assessment of Noise Effects from Penmynydd Road, Pentir and Pentir Substation Construction Compounds					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
Installation of Construction Compounds, Preparation and Ground Clearance	Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100
	JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	2	100
	360 excavator	BS 5228-1 Table C.2 #5/6 Tracked Excavator (72 kW, 16 t)	76	1	100
	Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	3	100
	Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	100
	Stone waggons	BS 5228-1 Table C.4 #4/5 Dumper (75 kW, 9 t)	76	1	100
	Bomags 360	BS 5228-1 Table C.2 #37/38 Roller (145 kW, 18 t)	79	2	100
General Activities in Construction Compounds	Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100
	Dumper trucks	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	1	50

Table 15.4.1: Plant used for the Assessment of Noise Effects from Penmynydd Road, Pentir and Pentir Substation Construction Compounds					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
	(empty)				
	Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50
	Road Sweeper	BS 5228-1 Table C.4 #90 Road Sweeper (70 kW)	76	1	50
	Lorry Wash	Measured by RPS	64	1	50

Substation Works

1.2.5 A summary of the typical plant used for the assessment of noise from substation works are provided in Table 15.4.2. In the majority of cases, the data source is from BS 5228-1:2009+A1:2014. The sound pressure level at 10 m used in the assessment, the number of plant and percentage on-time have also been provided.

Table 15.4.2: Plant used for the Assessment of Noise Effects from Substation Works					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
Levelling and Creation of Substation Platform for Construction	360 excavator	BS 5228-1 Table C.2 #5 Tracked Excavator (72 kW, 16 t)	76	2	100
	360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	2	100
	Bulldozer	BS 5228-1 Table C.2 #10 Dozer (239 kW, 41 t)	80	2	100
	Dumper trucks	BS 5228-1 Table C.4 #4 Dumper (75 kW, 9 t)	76	3	100
	Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	3	100
	Smooth roller compacting plant	BS 5228-1 Table C.5 #19 Road roller (95 kW, 22 t)	80	1	65
Construction of Equipment Foundations	360 excavator	BS 5228-1 Table C.2 #5 Tracked Excavator (72 kW, 16 t)	76	2	100
	360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	2	100
	Dumper trucks	BS 5228-1 Table C.4 #4 Dumper (75 kW, 9 t)	76	2	65
	Dumper	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	65

Table 15.4.2: Plant used for the Assessment of Noise Effects from Substation Works					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
	trucks (idling)				
	Ready mix delivery (discharging)	BS 5228-1 Table C.4 #18 Cement Mixer Truck	75	2	100
	Ready mix delivery (idling)	BS 5228-1 Table C.4 #19 Cement Mixer Truck	71	2	100
	Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	100
	Hydrovac	BS 5228-1 Table C.11 #4 Lorry (350 kW, 44 t)	83	1	100
Removal and Installation of Security Fence	Readymix (discharging)	BS 5228-1 Table C.4 #18 Cement Mixer Truck	75	3	65
	Readymix (idling)	BS 5228-1 Table C.4 #19 Cement Mixer Truck	71	3	65
	Dumper trucks	BS 5228-1 Table C.4 #4 Dumper (75 kW, 9 t)	76	1	100
	Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	1	100
	Jackhammers	BS 5228-1 Table C.5 #4 Road breaker (hand-held	95	2	50

Table 15.4.2: Plant used for the Assessment of Noise Effects from Substation Works					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
		pneumatic)			
	Compressor	BS 5228-1 Table C.5 #5 Compressor for hand held pneumatic breaker (1 t)	65	1	50
	Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	1	100
	360 excavator	BS 5228-1 Table C.2 #5 Tracked Excavator (72 kW, 16 t)	76	1	100
	360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	100

Installation and Dismantling of Pylons and Conductors

1.2.6 A summary of the typical plant used for the assessment of noise from installation and dismantling of pylons and conductors are provided in Table 15.4.3. In the majority of cases, the data source is from BS 5228-1:2009+A1:2014. The sound pressure level at 10 m used in the assessment, the number of plant and percentage on-time have also been provided.

Table 15.4.3: Plant used for the Assessment of Noise Effects from Installation and Dismantling of Pylons and Conductors					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
Installation of Pylon foundations – tube pile	Piling rig	BS 5228-1 Table C.3 #2 Hydraulic Hammer Rig (186 kW, 4 t)	87	1	80
	Concrete delivery Lorries	BS 5228-1 Table C.11 #14 Lorry (254 kW, 32 t)	79	1	25
	Vibration compaction plant	BS 5228-1 Table C.5 #29 Vibratory compactor (asphalt) (3 kW, 60 kg)	82	1	50
	Compressor	BS 5228-1 Table C.5 #5 Compressor for hand held pneumatic breaker (1 t)	65	1	10
	JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	1	75
	Dumper trucks	BS 5228-1 Table C.2 #32/33 Articulated Dump Truck (187 kW, 23 t)	81	1	50
Pylon Dismantling	JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	1	50
	360 excavator	BS 5228-1 Table C.2 #5/6 Tracked Excavator (72 kW, 16 t)	76	1	50

Table 15.4.3: Plant used for the Assessment of Noise Effects from Installation and Dismantling of Pylons and Conductors					
Activity Description	Plant Description	Data Source	Sound Pressure Level at 10 m L_{Aeq} dB	No	% on-time
	Dumper trucks	BS 5228-1 Table C.2 #32/33 Articulated Dump Truck (187 kW, 23 t)	81	1	50
	Cranes	BS 5228-1 Table C.3 #28 Tracked mobile crane (184 kW, 110 t)	67	1	50

Vibration

Installation and Dismantling of Pylons and Conductors

1.2.7 Calculations of vibration from the installation and dismantling of pylons and conductors have been carried out using the empirical data in Table E.1, Annex E of BS 5228-2:2009+A1:2014. The following equation has been applied to determine the resultant PPV in mm/s, v_{res}, from vibratory piling based on the distance x of the receptor from the worksite:

$$v_{res} = \frac{k_v}{x^{\delta}}$$

(Source: BS 5228-2:2009+A1:2014 Table E.1)

1.2.8 A scaling factor k_v of 60 and delta 1.2 have been applied.

1.3 TUNNELLING WORKS

Noise

Noise from Works in Tunnel Construction Compounds

1.3.1 Works in the construction compounds at Braint and Tŷ Fodol have been modelled using SoundPLAN v7.4 implementing the methodology in ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'. The ISO provides calculation procedures for the following physical effects:

- Geometric divergence (A_{div}) - reduction in sound level due to distance - (not frequency dependent)
- Atmospheric absorption (A_{atm}) - absorption of sound by the air (frequency dependent)
- Ground effect (A_{gr}) - absorption of sound by the ground (frequency dependent)
- Reflection from surfaces (not frequency dependent, rarely employed for wind farms)
- Screening by obstacles (A_{bar}) - shielding by a feature or the ground, this causes a reduction in the noise level (frequency dependent)
- Miscellaneous effects (A_{misc}) - such as propagation through trees

1.3.2 These effects are combined with the sound power level of each sound source (L_W) in the following equation to derive the sound pressure level (L_P) at the receptors:

$$L_P = L_W – A_{div} – A_{atm} – A_{gr} – A_{bar} - A_{misc}$$

(Source ISO 9613-2:1996 eqn 4)

1.3.3 The ground terrain around the construction compounds has been determined from OS data. The height of the construction compounds for various stages has been determined and this has been taken into account. The following assumptions have been used in the assessment:

- Air Pressure = 1013.3 mbar;
- Relative Humidity = 70%;
- Temperature = 10°C;
- Ground attenuation of mixed ground (G=0.5);
- Receptors modelled at a height of 4 m above local ground level

1.3.4 The following equation has been used to calculate ground attenuation as opposed to the standard equation 12 from ISO 9613-2:1996:

$$A_{bar} = D_z – Max(A_{gr},0)$$

Source SoundPLAN v 7.4

1.3.5 The ISO 9613-2:1996 method predicts noise levels likely to occur under conditions favourable to noise propagation, i.e. downwind or under a moderate ground-based temperature inversion that may occur at night.

1.3.6 A summary of the typical plant used for the assessment of noise from works in the construction compounds are provided in Table 15.4.4 for Braint Construction Compound and 15.4.5 for Tŷ Fodol Construction Compound. In the majority of cases, the data source is from BS 5228-1:2009+A1:2014; however, reductions have been applied to some plant, as indicated, where mitigation would need to be in place to reduce the noise from that source to an acceptable level. Further details regarding mitigation are provided in section 9 of Chapter 15 Construction Noise and Vibration **(Document 5.15)**. Where mitigation has been applied, the sound power levels provided are with mitigation unless otherwise stated.

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
Enabling Works for the Construction Compound - Daytime	250 kW Generator	Cummins noise compliant generator C250 D5 - see generators tab	96	No additional (low noise generator selected)	96	1	100
	Excavators	CAT 340F L (2017): https://www.cat.com/en_GB/products/new/equipment/excavators/large-excavators/1000032029.html	106	n/a	106	2	80
	Spoil wagons	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	2	40
	Spoil wagons (tipping fill)	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	2	40
	50 kW Generator	Cummins noise compliant generator C55 D5 - see generators tab	94	No additional (low noise generator selected)	94	1	100
	Dozer	BS 5228-1:2009+A1:2014 Table C7 #8	103	n/a	103	2	80

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Loading shovel (loading dump trucks)	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	2	80
	Dumper	BS 5228-1:2009+A1:2014 Table C4 #1	109	n/a	109	2	80
	Vibro-roller	BS 5228-1:2009+A1:2014 Table C5 #25	103	n/a	103	2	80
	Stone Wagon	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	2	40
	Concrete delivery	BS 5228-1:2009+A1:2014 Table C4 #22	104	n/a	104	2	40
Enabling Works for the Construction Compound and Surface	250 kW Generator	Cummins noise compliant generator C250 D5	96	No additional (low noise generator selected)	96	1	100
	Excavators	CAT 340F L (2017): https://www.cat.com/en_GB/products/new/equipment/excav	106	n/a	106	2	80

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
Drilling and Grouting - Daytime		ators/large-excavators/1000032029.html					
	Spoil wagons	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	2	40
	Spoil wagons (tipping fill)	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	2	40
	50 kW Generator	Cummins noise compliant generator C55 D5	94	No additional (low noise generator selected)	94	1	100
	Dozer	BS 5228-1:2009+A1:2014 Table C7 #8	103	n/a	103	2	80
	Loading shovel (loading dump trucks)	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	2	80
	Drilling rig (advanced grouting)	BS 5228-1:2009+A1:2014 Table C.6 #35 tracked hydraulic drilling rig	114	n/a	114	1	80

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	80
	Grout pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	n/a	105	1	80
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	n/a	103	1	80
	Dumper	BS 5228-1:2009+A1:2014 Table C4 #1	109	n/a	109	2	80
Shaft Sinking – Daytime and Weekend	Gantry crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	60
	Mobile crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	30

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	1	40
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	20
	Grout pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	20
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	n/a	103	1	40
	Loading shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	50
	Muck wagon (on access track)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Muck wagon (loading)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Ventilation plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Concrete mixer	BS 5228-1:2009+A1:2014 Table C4 #22	104	n/a	104	1	40
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	n/a	106	1	20
	Dumper	BS 5228-1:2009+A1:2014 Table C4 #1	109	n/a	109	1	60
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	50

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
Shaft Sinking – Night-time	Gantry crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	40
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	1	40
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	20
	Grout pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	20
	Ventilation plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Concrete mixer	BS 5228-1:2009+A1:2014 Table C4 #22	104	n/a	104	1	40

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	n/a	106	1	20
Tunnel Construction - TBM method – Daytime and Weekend	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Slurry Screening Plant	Silvertown Tunnel Slurry Tunnel Boring Machine (TBM) and Treatment Plant: Environmental Appraisal. Table 3.3 External Plant used during STP Operation. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010021/TR010021-001209-TfL%208.66%20Slurry%20Tunnel%20Boring%20Machine%20(TBM)%20and%20Treatment%20Plant%20Environmental%20Appraisal.pdf	n/a	Equipment located in enclosure. Sound Power Level is provided. Details of enclosure provided in Table 15.4.5.	107	1	100

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	30
	Mobile Crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	30
	Access Track (1&2) - Muck Wagon	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Muck Wagon (Stationary)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Loading Shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	80
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Access Track (1&2) - HGV	BS 5228-1:2009+A1:2014 Table C11 #20	111	n/a	111	1	60
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	40
	Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	50
Tunnel Construction - TBM method – Night-time	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Slurry Screening Plant	Silvertown Tunnel Slurry Tunnel Boring Machine (TBM) and Treatment Plant: Environmental Appraisal. Table 3.3 External Plant used during STP Operation. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010021/TR010021-001209-TfL%208.66%20Slurry%20Tunnel%20Boring%20Machine	n/a	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	107	1	100

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
		%20(TBM)%20and%20Treatment%20Plant%20Environmental%20Appraisal.pdf					
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	25
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	40
	Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.p	105	Pump would be put in an enclosure resulting in a noise reduction of 5	100	1	40

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
		df		dB or greater.			
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50
Tunnel Construction – D&B method – Daytime and Weekend	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	3	100
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	40
	Mobile Crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	60

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Access Track (1&2) - Muck Wagon	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	30
	Muck Wagon (Stationary)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Loading shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	80
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	80
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Access Track (1&2) - HGV	BS 5228-1:2009+A1:2014 Table C11 #20	111	n/a	111	1	100

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Construction Compound Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	60
	Construction Compound Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	40
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	60

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Concrete batching plant	BS 5228-1:2009+A1:2014 Table D6 #10	106	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	106 (internal)	1	60
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	n/a	106	1	40
	Rock Crusher	BS 5228-1:2009+A1:2014 Table C9 #15	124	n/a	124	1	10
Tunnel Construction – D&B method – Night-time	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	3	40
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	50

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Construction Compound Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	40
	Construction Compound Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50

Table 15.4.4: Plant used for the Assessment of Noise Effects from Works in Braint Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Concrete batching plant	BS 5228-1:2009+A1:2014 Table D6 #10	106	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	106 (internal)	1	40
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	n/a	106	1	10

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
Enabling Works Construction Compound - Daytime	250 kW Generator	Cummins noise compliant generator C250 D5 - see generators tab	96	No additional (low noise generator selected)	96	1	100
	Excavators	CAT 340F L (2017): https://www.cat.com/en_GB/products/new/equipment/excavators/large-excavators/1000032029.html	106	n/a	106	2	80
	Spoil wagons	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	2	40
	Spoil wagons (tipping fill)	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	2	40
	50 kW Generator	Cummins noise compliant generator C55 D5 - see generators tab	94	No additional (low noise generator selected)	94	1	100

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	- Dozer	BS 5228-1:2009+A1:2014 Table C7 #8	103	n/a	103	2	80
	Loading shovel (loading dump trucks)	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	2	80
	Dumper	BS 5228-1:2009+A1:2014 Table C4 #1	109	n/a	109	2	80
	Vibro-roller	BS 5228-1:2009+A1:2014 Table C5 #25	103	n/a	103	2	80
	Stone Wagon	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	2	40
	Concrete delivery	BS 5228-1:2009+A1:2014 Table C4 #22	104	n/a	104	2	40
Shaft Sinking – Daytime	Gantry crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	60

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
and Weekend	Mobile crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	30
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	1	40
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	20
	Grout pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	20
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	n/a	103	1	40
	Loading shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	50

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Muck wagon (on access track)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Muck wagon (loading)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Ventilation plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Concrete mixer	BS 5228-1:2009+A1:2014 Table C4 #22	99	Mixer would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	99	1	40
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	101	1	20
	Dumper	BS 5228-1:2009+A1:2014 Table C4 #1	109	n/a	109	1	60

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	50
Shaft Sinking – Night-time	Gantry crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	40
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	1	40
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	20
	Grout pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	20

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Ventilation plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Concrete mixer	BS 5228-1:2009+A1:2014 Table C4 #22	104	Mixer would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	99	1	40
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	101	1	20
Tunnel Construction - TBM method – Daytime and Weekend	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Slurry Screening Plant	Silvertown Tunnel Slurry Tunnel Boring Machine (TBM) and Treatment Plant: Environmental Appraisal. Table 3.3 External Plant used during STP Operation.	n/a	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	107	1	100

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
		https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010021/TR010021-001209-TfL%208.66%20Slurry%20Tunnel%20Boring%20Machine%20(TBM)%20and%20Treatment%20Plant%20Environmental%20Appraisal.pdf					
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	30
	Mobile Crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	30
	Access Track (1&2) - Muck Wagon	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Muck Wagon (Stationary)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Loading shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	80
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Access Track (1&2) - HGV	BS 5228-1:2009+A1:2014 Table C11 #20	111	n/a	111	1	60
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	40
	Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	50
Tunnel Construction - TBM method – Night-time	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Slurry Screening Plant	Silvertown Tunnel Slurry Tunnel Boring Machine (TBM) and Treatment Plant: Environmental Appraisal. Table 3.3 External Plant used during STP Operation. https://infrastructure.planninginspectorate.gov.uk/wp-	n/a	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	107	1	100

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
		content/ipc/uploads/projects/TR010021/TR010021-001209-TfL%208.66%20Slurry%20Tunnel%20Boring%20Machine%20(TBM)%20and%20Treatment%20Plant%20Environmental%20Appraisal.pdf					
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	25
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWL	90	n/a	90	1	40

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
		e.pdf					
	Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	103	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50
Tunnel Construction – D&B method – Daytime and Weekend	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	3	100
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	40

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Mobile Crane	BS 5228-1:2009+A1:2014 Table C4 #46	95	n/a	95	1	60
	Access Track (1&2) - Muck Wagon	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	30
	Muck Wagon (Stationary)	BS 5228-1:2009+A1:2014 Table C2 #33	109	n/a	109	1	80
	Loading shovel	BS 5228-1:2009+A1:2014 Table C9 #8	114	n/a	114	1	80
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	80
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Access Track (1&2) - HGV	BS 5228-1:2009+A1:2014 Table C11 #20	111	n/a	111	1	100

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Construction Compound Grout Mixer	Supplied by project design team: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	60
	Construction Compound Grout Pump	Supplied by project design team: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	98	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	40
	Telehandler	BS 5228-1:2009+A1:2014 Table C2 #35	99	n/a	99	1	50

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound

Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Forklift Truck	RPS Noise Database - 'Forklift diesel average work'	100	n/a	100	1	60
	Concrete batching plant	BS 5228-1:2009+A1:2014 Table D6 #10	106	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	106 (internal)	1	60
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	101	1	40
	Rock Crusher	BS 5228-1:2009+A1:2014 Table C9 #15	124	n/a	124	1	10
Tunnel Construction – D&B method – Night-time	Ventilation Plant	GIA SewdVent Mining & Tunnelling Fan data with silencers	84	No additional (silenced fan used)	84	3	100
	Muck skips	BS 5228-1:2009+A1:2014 Table C2 #32	102	n/a	102	3	40

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Gantry Crane	BS 5228-1:2009+A1:2014 Table C4 #61	96	n/a	96	1	50
	Conveyor (Drive Unit)	BS 5228-1:2009+A1:2014 Table C10 #20	105	Would be enclosed to reduce level by a minimum of 5 dB below standard level.	100	1	100
	Conveyor (Feed Hopper)	BS 5228-1:2009+A1:2014 Table C10 #22	97	n/a	97	1	100
	Construction Compound Grout Mixer	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	90	n/a	90	1	40
	Construction Compound Grout Pump	http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf	105	Pump would be put in an enclosure resulting in a noise reduction of 5 dB or greater.	100	1	40

Table 15.4.5: Plant used for the Assessment of Noise Effects from Works in Tŷ Fodol Construction Compound							
Activity Description	Plant Description	Data Source	Sound Power Level L_{WA} dB (unmitigated)	Mitigation	Mitigated Sound Power Level L_{WA} dB	No	% on-time
	Compressor	BS 5228-1:2009+A1:2014 Table C3 #19	98	Compressor would be put in an enclosure resulting in a noise reduction of 5 dB below standard level.	98	1	50
	Concrete batching plant	BS 5228-1:2009+A1:2014 Table D6 #10	106	Equipment located in enclosure. Internal Sound Power Level is provided here. Details of enclosure provided in Table 15.4.6.	106 (internal)	1	40
	Concrete pump	BS 5228-1:2009+A1:2014 Table C3 #25	106	n/a	106	1	10

1.3.7 Table 15.4.6 contains details of the façade sound insulation of the enclosure for the slurry screening plant. This is identical for the plant at the Braint and Tŷ Fodol Construction Compounds.

Table 15.4.6: Sound Insulation of Slurry Screening Plant Enclosure and Concrete Batching Plant Enclosure in Braint and Tŷ Fodol Construction Compounds

Rw (dB)	Transmission Loss (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
25	19	18	20	24	20	29	39	47

1.4 TRAFFIC ON ACCESS TRACKS

1.4.1 Traffic data assessed for each access track are based upon annual average flow for the peak year in the construction programme. These data have been used to predict the traffic noise level at receptors within the study area using a computer generated model in SoundPLAN v7.4 implementing the prediction methodology in ISO 9613-2:1996. Traffic on the access track has been modelled at as a line source 1 m above ground level and receptors at 1.5 m above ground level, with a ground factor of G=1. Other modelling assumptions are identical to those provided for the Braint and Tŷ Fodol construction compounds as described in 'section 1.3 tunnelling works'.

1.4.2 Traffic has been split into Light Goods Vehicle (LGVs) and Heavy Goods Vehicles (HGVs). The assessment has used a standard 20 tonne articulated dump truck with a sound power level of 109 dB L_W (Ref: Appendix C2 #33 from BS 5228-1:2009+A1:2014) to represent HGVs. LGVs comprise of various vehicle sizes ranging from a car to a van. It has been assumed that LGVs would be significantly quieter, so these have been modelled using the same source spectrum as HGVs but with a sound reduction of 10 dB.

1.4.3 The sound power level per metre has been calculated based on the vehicle speed. A speed restriction of 10 mph has been placed on the access tracks. Vehicles have been modelled as travelling at 8 km/h i.e. half this speed. This is a conservative estimate, as vehicles travelling up to the full speed limit would be 3 dB/m L_W quieter than those at the modelled speed.

1.4.4 . The quantity of vehicles modelled is provided in Table 15.4.7 below.

Table 15.4.6: Modelled Traffic Flows on Access Tracks				
Access Track Section (Identified by Bellmouth Locations)	TBM Method (Options A and B, Scenarios 1 and 2)		Drill and Blast Method (Options A and B, Scenario 3)	
	LGV / day (12 hr)	HGV / day (12 hr)	LGV / day (12 hr)	HGV / day (12 hr)
A4 - A2 - A1	6	12	6	12
A3	2	2	6	12
A5 - B2	18	44	18	44
B5 - B4	8	20	8	20
B7 - B8	10	20	10	20
B9 - C3	12	32	12	32
C4 - C8	14	38	14	38
C9	2	2	2	2
C10 - D2	2	6	2	6
D3 - D2	6	18	6	18
D4 - E2	2	6	2	6
E1 - E5 / E5A	6	18	6	18
E6	4	6	4	6
E7 - BRAINT SEC	77	53	84	75
F1C - BRAINT SEC	77	53	84	75
F1/F2 - BRAINT SEC	77	53	84	75
TY FODOL SEC - F14/F3	113	102	108	91

1.5 TRAFFIC ON CONSTRUCTION TRAFFIC ROUTES

1.5.1 Road traffic on the construction traffic routes has been modelled using a computer generated model in SoundPLAN v7.4 implementing the methodology in the 'Calculation of Road Traffic Noise' (Ref 15.12). The ground terrain has been determined from OS data. No buildings have been included in the model.

1.5.2 The predicted $L_{A10,18hr}$ noise level at each receptor has been converted into an $L_{Aeq,16hr}$ using the following standard correction:

$L_{Aeq,16hr}$ (dB) = $L_{A10,18hr}$ (dB) – 2

1.5.3 Model input data are provided in Tables 15.4.7 to Table 15.4.10 below.

Table 15.4.7: Traffic Data for 2020 Construction Opening Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
1	A5025	A5025 between A5 at Valley Crossroads and Wylfa.	2835	8%	88
2	A5	A5 between A55 J3 and Valley Crossroads.	7634	7%	68
3	UR 4	UR 4 between B5111 and B2	1062	6%	85
4	B5111	B5111 Between B5110 and Llanerchymedd	3487	5%	88
4.1	B5111	B5111 Between Llanerchymedd access B8	3826	6%	59
5	B5110	B5110 between B5111 and access C8	2865	6%	68
6	B5420 / B5109 / Ffordd Cae Sel	B5420 / B5109 / Ffordd Cae Sel between LLR and B5111	10381	4%	48
7	B5420	Between Llangefni Link Road and Access D4	2318	4%	86
7.1	B5420	Between Access D4 and Four Crosses Roundabout.	2318	4%	86
8	A5114	Between A55 J6 Llangefni Link Road.	15598	6%	76
8.1	Industrial Estate Road	Between A5114 via existing carrigeway to Llangefni Link Road	7245	5%	48
8.2	Llangefni Link Road (LLR)	LLR between A5114 and the B5420.	7339	5%	48

Table 15.4.7: Traffic Data for 2020 Construction Opening Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
9	A5025	A5025 between A55 J8 and Four Crosses Roundabout	12087	5%	77
11	UR 21	Unnamed Road between Star and access E5.	793	5%	44
11.1	UR 21	UR between Star Crossroads and Unnamed Road Star	793	5%	44
12	A5152	Between A55 J7 and A5.	5437	10%	48
13	A5	A5 between A5152 and A55 J7a.	4803	6%	94
14	NCR8	NCR8 / Llanddaniel Road between A5 and access E7	1188	8%	77
15	Pont Rhonwy Link (PRL)	PRL between A5 and access F1	482	5%	54
16	A4080	A4080 between A5 at Tollgate and F2.	4404	4%	72
17	A5	A5 Between A55 J8a and A4080	9941	5%	61
18	A487	Between B4547 and A55 J9.	19688	7%	79
18.1	A4087	Between A55 J10 and A487	12345	3%	97
19	B4547	B4547 between A4244 and A487.	6266	4%	90
20	A4244	A4244 between A5 and B4547	8180	8%	86
21	A55	Britannia Bridge between A55 J9 and A55 J8a	34685	6%	113
22	B5109	B5109 between LLR and access D2	1852	5%	81
23	A5025 / Ffordd y Felin	A5025 / Ffordd y Felin between Wylfa Access and Brynddu Road	1164	4%	51
24	B5110	B5110 between access C8 and UR 19	2865	6%	68
25	Brynddu	Brynddu Road Between Fordd y	551	5%	66

Table 15.4.7: Traffic Data for 2020 Construction Opening Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
	Road	Felin and access B2			
26	B5112	B5112 between A55 J5 and B5111	1328	6%	75
27	UR 1	UR 1 between Brynddu Road and UR 4	91	0%	48
28	UR 8	UR8 between B5111 and access B11	520	0%	48
29	UR 9	UR9 between B5111 UR 10	643	10%	62
30	Fodolydd Lane West	Fodolydd Lane between B4547 and access F3	39	0%	62
31	UR 10	UR10 between B5111 and UR 9	770	8%	77
32	UR 16	UR 16 between B5420 and access E1	477	7%	68
33	UR 19	UR 19 between B5110 and access C6	85	0%	50
34	Fodolydd Lane East	Fodolydd Lane between B4547 and access F4 (enabling works only)	41	0%	49
35	UR 3	UR 3 between Brynddu Road and access A9	99	0%	59
36	North of J7	UR 3 between Brynddu Road and access A10	137	8%	62

Table 15.4.8: Traffic Data for 2023 Peak Construction Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
1	A5025	A5025 between A5 at Valley Crossroads and Wylfa.	93	6%	88

Table 15.4.8: Traffic Data for 2023 Peak Construction Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
2	A5	A5 between A55 J3 and Valley Crossroads.	294	8%	68
3	UR 4	UR 4 between B5111 and B2	34	3%	85
4	B5111	B5111 Between B5110 and Llanerchymedd	159	4%	88
4.1	B5111	B5111 Between Llanerchymedd access B8	155	6%	59
5	B5110	B5110 between B5111 and access C8	66	7%	68
6	B5420 / B5109 / Ffordd Cae Sel	B5420 / B5109 / Ffordd Cae Sel between LLR and B5111	481	4%	48
7	B5420	Between Llangefni Link Road and Access D4	54	3%	86
7.1	B5420	Between Access D4 and Four Crosses Roundabout.	54	3%	86
8	A5114	Between A55 J6 Llangefni Link Road.	663	10%	76
8.1	Industrial Estate Road	Between A5114 via existing carrigeway to Llangefni Link Road	336	4%	48
8.2	Llangefni Link Road (LLR)	LLR between A5114 and the B5420.	340	5%	48
9	A5025	A5025 between A55 J8 and Four Crosses Roundabout	462	6%	77
11	UR 21	Unnamed Road between Star and access E5.	16	2%	44
11.1	UR 21	UR between Star Crossroads and	16	2%	44

Table 15.4.8: Traffic Data for 2023 Peak Construction Year Without the Proposed Development					
Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
		Unnamed Road Star			
12	A5152	Between A55 J7 and A5.	252	16%	48
13	A5	A5 between A5152 and A55 J7a.	128	12%	94
14	NCR8	NCR8 / Llanddaniel Road between A5 and access E7	31	4%	77
15	Pont Rhonwy Link (PRL)	PRL between A5 and access F1	10	4%	54
16	A4080	A4080 between A5 at Tollgate and F2.	134	4%	72
17	A5	A5 Between A55 J8a and A4080	287	9%	61
18	A487	Between B4547 and A55 J9.	708	12%	79
18.1	A4087	Between A55 J10 and A487	575	3%	97
19	B4547	B4547 between A4244 and A487.	201	5%	90
20	A4244	A4244 between A5 and B4547	362	11%	86
21	A55	Britannia Bridge between A55 J9 and A55 J8a	1616	5%	113
22	B5109	B5109 between LLR and access D2	41	4%	81
23	A5025 / Ffordd y Felin	A5025 / Ffordd y Felin between Wylfa Access and Brynddu Road	22	6%	51
24	B5110	B5110 between access C8 and UR 19	66	7%	68
25	Brynddu Road	Brynddu Road Between Fordd y Felin and access B2	12	1%	66
26	B5112	B5112 between A55 J5 and B5111	48	2%	75
27	UR 1	UR 1 between Brynddu Road and UR 4	3	0%	48
28	UR 8	UR8 between B5111 and access	25	0%	48

Table 15.4.8: Traffic Data for 2023 Peak Construction Year Without the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT		
			AAWT	% HGV	Speed km/h
		B11			
29	UR 9	UR9 between B5111 UR 10	22	6%	62
30	Fodolydd Lane West	Fodolydd Lane between B4547 and access F3	14	0%	62
31	UR 10	UR10 between B5111 and UR 9	31	6%	77
32	UR 16	UR 16 between B5420 and access E1	13	6%	68
33	UR 19	UR 19 between B5110 and access C6	4	0%	50
34	Fodolydd Lane East	Fodolydd Lane between B4547 and access F4 (enabling works only)	8	0%	49
35	UR 3	UR 3 between Brynddu Road and access A9	2	0%	59
36	North of J7	UR 3 between Brynddu Road and access A10	5	0%	62

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
1	A5025	A5025 between A5 at Valley Crossroads and Wylfa.	2977	9%	88	2977	9%	88

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
2	A5	A5 between A55 J3 and Valley Crossroads.	7870	7%	68	7870	7%	68
3	UR 4	UR 4 between B5111 and B2	1101	7%	85	1101	7%	85
4	B5111	B5111 Between B5110 and Llanerchymedd	3626	6%	88	3626	6%	88
4.1	B5111	B5111 Between Llanerchymedd access B8	3971	7%	59	3971	7%	59
5	B5110	B5110 between B5111 and access C8	2963	7%	68	2963	7%	68
6	B5420 / B5109 / Ffordd Cae Sel	B5420 / B5109 / Ffordd Cae Sel between LLR and B5111	10707	5%	48	10707	5%	48
7	B5420	Between Llangefni Link Road and Access D4	2401	5%	86	2401	5%	86
7.1	B5420	Between Access D4 and Four Crosses Roundabout.	2401	5%	86	2401	5%	86
8	A5114	Between A55 J6 Llangefni Link Road.	16050	6%	76	16050	6%	76
8.1	Industrial	Between A5114	7534	6%	48	7534	6%	48

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development								
Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
	Estate Road	via existing carrigeway to Llangefni Link Road						
8.2	Llangefni Link Road (LLR)	LLR between A5114 and the B5420.	7482	5%	48	7482	5%	48
9	A5025	A5025 between A55 J8 and Four Crosses Roundabout	12362	6%	77	12362	6%	77
11	UR 21	Unnamed Road between Star and access E5.	824	6%	44	824	6%	44
11.1	UR 21	UR between Star Crossroads and Unnamed Road Star	824	6%	44	824	6%	44
12	A5152	Between A55 J7 and A5.	5678	11%	48	5705	11%	48
13	A5	A5 between A5152 and A55 J7a.	5032	7%	94	5059	7%	94
14	NCR8	NCR8 / Llanddaniel Road between A5 and access E7	1341	11%	77	1371	13%	77
15	Pont Rhonwy	PRL between A5 and access F1	621	12%	54	651	15%	54

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
	Link (PRL)							
16	A4080	A4080 between A5 at Tollgate and F2.	4619	5%	72	4649	5%	72
17	A5	A5 Between A55 J8a and A4080	10265	6%	61	10295	6%	61
18	A487	Between B4547 and A55 J9.	20402	7%	79	20386	7%	79
18.1	A4087	Between A55 J10 and A487	12765	4%	97	12757	4%	97
19	B4547	B4547 between A4244 and A487.	6640	5%	90	6624	5%	90
20	A4244	A4244 between A5 and B4547	8603	9%	86	8587	8%	86
21	A55	Britannia Bridge between A55 J9 and A55 J8a	35853	6%	113	35858	6%	113
22	B5109	B5109 between LLR and access D2	1899	4%	81	1899	4%	81
23	A5025 / Ffordd y Felin	A5025 / Ffordd y Felin between Wylfa Access and Brynddu Road	1198	4%	51	1198	4%	51
24	B5110	B5110 between access C8 and UR 19	2942	6%	68	2942	6%	68
25	Brynddu	Brynddu Road	574	5%	66	574	5%	66

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
	Road	Between Fordd y Felin and access B2						
26	B5112	B5112 between A55 J5 and B5111	1390	5%	75	1390	5%	75
27	UR 1	UR 1 between Brynddu Road and UR 4	104	0%	48	104	0%	48
28	UR 8	UR8 between B5111 and access B11	567	0%	48	567	0%	48
29	UR 9	UR9 between B5111 UR 10	691	9%	62	691	9%	62
30	Fodolydd Lane West	Fodolydd Lane between B4547 and access F3	115	0%	62	115	0%	62
31	UR 10	UR10 between B5111 and UR 9	821	7%	77	821	7%	77
32	UR 16	UR 16 between B5420 and access E1	493	7%	68	493	7%	68
33	UR 19	UR 19 between B5110 and access C6	97	0%	50	97	0%	50
34	Fodolydd Lane East	Fodolydd Lane between B4547 and access F4 (enabling works only)	42	1%	49	42	1%	49

Table 15.4.9: Traffic Data for 2023 Peak Construction Year With the Proposed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV		AAWT	% HGV	Speed km/h
35	UR 3	UR 3 between Brynddu Road and access A9	112	0%	59	112	0%	59
36	North of J7	UR 3 between Brynddu Road and access A10	154	14%	62	154	14%	62

Table 15.4.10: Traffic Data for 2023 Peak Construction Year With the Proposed Development and other Committed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV	Speed km/h	AAWT	HGV	Speed km/h
1	A5025	A5025 between A5 at Valley Crossroads and Wylfa.	4955	10%	88	4955	10%	88
4.1	B5111	B5111 Between Llanerchymedd access B8	3980	7%	59	3980	7%	59
5	B5110	B5110 between B5111 and access C8	2967	7%	68	2967	7%	68
7	B5420	Between Llangefni Link	2483	5%	86	2483	5%	86

Table 15.4.10: Traffic Data for 2023 Peak Construction Year With the Proposed Development and other Committed Development

Link Ref	Highway Link	Description	18 Hour AAWT					
			TBM Method (Options A and B, Scenarios 1 and 2)			Drill and Blast Method (Options A and B, Scenario 3)		
			AAWT	% HGV	Speed km/h	AAWT	HGV	Speed km/h
		Road and Access D4						
8	A5114	Between A55 J6 Llangefni Link Road.	16213	6%	76	16213	6%	76
18	A487	Between B4547 and A55 J9.	21423	8%	79	21407	8%	79
21	A55	Britannia Bridge between A55 J9 and A55 J8a	37717	7%	113	37722	7%	113
23	A5025 / Ffordd y Felin	A5025 / Ffordd y Felin between Wylfa Access and Brynddu Road	1272	4%	51	1272	4%	51
26	B5112	B5112 between A55 J5 and B5111	1445	5%	75	1445	5%	75