Environmental Impact Assessment Report
Volume 3, Appendix 25.3: Construction Stage Noise and Vibration Assessment

MarramWind Offshore Wind Farm

December 2025

MarramWind

Document code:	MAR-GEN-ENV-REP-WSP-000139
Contractor document number:	852346-WEIS-IA-I6-RP-O7-979412
Version:	Final for Submission
Date:	08/12/2025
Prepared by:	WSP UK Limited
Checked by:	WSP UK Limited
Approved by:	MarramWind Limited

Contents

1. Introduction

1.1.1.1 This Appendix of the Environmental Impact Assessment (EIA) Report presents the methodology and results of the construction stage noise and vibration assessment for the onshore infrastructure of the proposed MarramWind Offshore Wind Farm (hereafter referred to as "the Project").

1.1.1.2 There is potential for noise and vibration effects during the construction and decommissioning stages of the onshore infrastructure of the Project. This Appendix presents detailed lists of construction plant and equipment that could potentially be used in the construction and decommissioning stages of the landfall(s) (covering the landfall(s) elements above Mean Lower Water Springs), onshore export cable corridor and the onshore substations.

1.1.1.3 This Appendix should be read in conjunction with the project description provided in **Volume 1, Chapter 4: Project Description** and the relevant parts of the following Chapter and Appendices:

- **Volume 1, Chapter 25: Onshore Noise and Vibration**;
- **Appendix 25.1: Noise and Vibration Relevant Legislation, Policy and Technical Guidance**; and
- **Appendix 25.2: Baseline Noise Surveys**.

1.1.1.4 The Appendix is supported by the following figure:

- **Volume 2, Figure 25.2: Construction Stage Assessment Noise Sensitive Receptors**.

2. Construction Stage Noise and Vibration Assessment Methodology

2.1 Overview

2.1.1.1 The prediction and assessment of construction and decommissioning stage noise has been undertaken based on the guidance contained within British Standard (BS) 5228-1 (see **Appendix 25.1**). A series of construction noise level predictions have been undertaken, with the results of these predictions compared against derived assessment criteria (see **Section 2.2.1**). The margin of compliance / exceedance of the assessment criteria has been used to determine whether a significant effect would arise.

2.1.1.2 The assessment of construction vibration has been undertaken based on the guidance contained within BS 5228-2 (see **Appendix 25.1**). Drawing upon the historical ground-borne vibration measurement data, and vibration prediction methods contained within this Standard, a series of typical set-back distances have been determined, at which different degrees of human exposure to ground-borne vibration arise. Set-back distances have been determined for a sample of vibration generating plant. The distances of vibration sensitive receptors from such plant have then been compared against the derived set-back distances to determine whether a significant effect would arise.

2.2 Assessment criteria

2.2.1 Construction noise

2.2.1.1 Construction noise thresholds have been determined for each receptor in accordance with the BS 5228-1 'ABC method', as shown in Table 4.1 in **Appendix 25.1**, and drawing on the results of the baseline noise surveys presented in **Appendix 25.2**.

2.2.1.2 The baseline noise levels at the noise sensitive receptors (NSRs) are consistent with the lowest ambient noise category from BS 5228-1, Category A for the daytime, evening and weekend periods. Following the ABC assessment method from BS 5228-1, the Category A construction noise threshold criteria which apply are as follows:

- 65 decibels (dB) $L_{Aeq,T}$ during the daytime (i.e. Weekdays 07:00-19:00 and Saturdays 07:00-13:00); and
- 55dB $L_{Aeq,T}$ during the evening (i.e. Weekdays 19:00-23:00, Saturdays 13:00-23:00, Sundays 07:00-23:00).

2.2.1.3 In the absence of measurement data, the most stringent criteria, i.e. Category A, has been applied for the night-time period. Following the ABC assessment method, the construction noise threshold criteria which apply to the night-time works are as follows:

- Category A - 45dB $L_{Aeq,T}$;
- Category B: 50dB $L_{Aeq,T}$; and
- Category C: 55dB $L_{Aeq,T}$.

2.2.1.4 If noise levels exceed these threshold values a potential significant effect is indicated, but the significance could be tempered, for example if the exceedance is for a short duration.

2.2.1.5 When using the ABC method, there is a 5dB step between the absolute noise level associated with each category (for example, between Categories A and B, or Categories B and C). To determine the impact magnitude associated with construction noise, this 5dB step has been applied to the adopted criteria. The resulting impact magnitude scale is detailed in **Table 2.1**. These thresholds reflect increasing levels of potential disturbance, with higher exceedances to the threshold values for Category A indicating greater likelihood of significant effects.

Table 2.1 Construction noise thresholds and impact magnitude criteria

Receptor construction noise level, dB $L_{Aeq,T}$	**Impact magnitude**
Day (Weekdays 07:00-19:00 and Saturdays 07:00-13:00)	
≥70 A-weighted decibel (dB(A))	High
≥65 to <70dB(A)	Medium
≥60 to <65dB(A)	Low
<60dB(A)	**Negligible**
Evening (Weekdays 19:00-23:00, Saturdays 13:00-23:00, Sundays 07:00-23:00)	
≥60dB(A)	High
≥55 to <60dB(A)	Medium
≥50 to <55dB(A)	Low
<50dB(A)	**Negligible**
Night Category A (Weekdays, Saturdays, Sundays 23:00-07:00)	
≥50dB(A)	High
≥45 to <50dB(A)	Medium
≥40 to <45dB(A)	Low
< 40dB(A)	**Negligible**
Night Category B (Weekdays, Saturdays, Sundays 23:00-07:00)	
≥55dB(A)	High
≥50 to <55dB(A)	Medium
≥45 to <50dB(A)	Low
< 45dB(A)	**Negligible**

Receptor construction noise level, dB $L_{Aeq,T}$	**Impact magnitude**
Night Category C (Weekdays, Saturdays, Sundays 23:00-07:00)	
≥65dB(A)	High
≥55 to <60dB(A)	Medium
≥50 to <55dB(A)	Low
< 50dB(A)	**Negligible**

2.2.2 Construction vibration

2.2.2.1 Construction vibration has been assessed in accordance with the guidance contained in BS 5228-2. The construction vibration threshold criteria for humans which apply are set out in **Table 2.2**.

Table 2.2 Construction vibration impact magnitude criteria

Impact magnitude	**Vibration level (Peak Particle Velocity (PPV), millimetres per second (mm/s))**
Medium – High	Greater than or equal to 1.0
Low	Greater than or equal to 0.3 and less than 1.0
Negligible	Less than 0.3

3. Construction Stage Noise Assessment

3.1 Overview

3.1.1.1 Construction for onshore infrastructure elements of the Project will generate noise based upon the plant needed to undertake the work. The activities that form the basis of construction and decommissioning noise assessments of the onshore infrastructure elements of the Project are split into the following activities:

- construction of landfall(s) temporary construction compound (TCC);
- landfall(s) construction stage activities;
- construction of TCCs supporting onshore works;
- general construction stage activities within TCCs;
- mobilisation and installation activities associated with the onshore export cable corridor, including trenching, ducting, joint bay construction and cable pulling;
- construction of trenchless crossings for the onshore export cable corridor;
- construction of temporary access tracks, temporary construction haul roads and permanent access roads to the onshore substations; and
- construction stage activities related to the onshore substations including:
  - site clearance;
  - earthworks and site preparation;
  - civils – piling;
  - civils – trenching and foundations;
  - civils – backfilling and roadway construction;
  - civils – ducts and pits; and
  - structure installation and construction of ecology mitigation, landscaping and drainage works.

3.1.1.2 The EIA Report considers the decommissioning stage. At this stage it is anticipated that the onshore export cables will be left in-situ with ends cuts, sealed and buried to minimise environmental effects associated with removal. The underground structures of the joint bays / transition joint bays, fibre optic cable junction boxes and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use. The majority of the activities associated with the decommissioning stage of the onshore substations will be similar to the activities associated with the onshore substations' construction stage. Therefore, it is likely that the decommissioning activities will generally be similar to or results in less noise and vibration effects than the construction activities. As such, the effect of decommissioning will be represented by considering the construction stage activities and requiring no more mitigation than the construction stage, and with no higher residual effect. Therefore, the decommissioning stage activities are not assessed further in this Appendix.

3.2 Assessment locations

3.2.1.1 The locations of the nearest NSRs considered in the construction stage noise assessment are described in **Table 3.1** and identified in **Volume 2, Figure 25.2**. **Table 3.1** also presents the night-time construction noise thresholds determined for each receptor in accordance with the BS 5228-1 'ABC method'.

Table 3.1 Construction stage noise assessment locations

NSR ID reference	NSR location	Ordnance survey coordinates	Night-time ABC category
NSR1	South Scotston.	NK 10675 51920	Category A.
NSR2	Lunderton Cottages.	NK 10695 49598	Category C.
NSR3	Mains of Inverugie.	NK 10989 48577	Category A.
NSR4	Kinloch Manor.	NK 10392 51050	Category B.
NSR5	Inverquinzie Cottages.	NK 10417 50919	Category B.
NSR6	Steading Cottage.	NK 10485 48722	Category A.
NSR7	Cairnhill House.	NK 09458 49091	Category A.
NSR8	Easterton of Barnyards.	NK 09262 48437	Category A.
NSR9	Tortorston Drive / Tortorston Drive.	NK 08752 46511	Category A.
NSR10	East Thunderton.	NK 07483 46228	Category C.
NSR11	Parkhill	NK 06818 45490	Category A.
NSR12	Kinloch House.	NK 09783 50636	Category A.
NSR13	Portofino	NK 09929 49949	Category A.
NSR14	Tortorston Road (seven properties between Tortorston Mission Hall	NK 08849 46959	Category C.

NSR ID reference	NSR location	Ordnance survey coordinates	Night-time ABC category
	and Westwyn).		
NSR15	Downiehills Farm (Tortorston Road).	NK 08534 46846	Category C.
NSR16	Craigevar Denholme.	NK 08131 45576	Category A.
NSR17	West Thunderton.	NK 07343 46083	Category A.
NSR18	Lunderton, (west of A90).	NK 10447 49337	Category A.
NSR19	Cattlemans Cottage.	NK 09951 49076	Category A.
NSR20	Meadowbank Inverugie.	NK 09220 47326	Category A.
NSR21	Tortorston Mission Hall.	NK 08855 47078	Category A.
NSR22	Tortoston Road (Oakdene Villa).	NK 08843 46952	Category A.
NSR23	Tortorston Road (Westwyn).	NK 08843 46892	Category A.
NSR24	Old Quarry House, Faichfield.	NK 06693 46295	Category A.
NSR25	Hawthorn Cottage, Forehill.	NK 08855 46349	Category C.
NSR26	Howemuir	NK 08533 45732	Category A.
NSR27	Craigievar, Denholme.	NK 08131 45576	Category A.
NSR28	Parkhill Farm, Richmondhill.	NK 06290 46968	Category A.
NSR29	Smiddyhill Farm.	NK 08751 47400	Category A.

3.3 Construction working hours

3.3.1.1 As set in **Volume 1, Chapter 4: Project Description**, and secured in **Volume 4: Outline Construction Environmental Management Plan**, core working hours for onshore construction works for the Project are as follows:

- 08:00-18:00 hours Monday to Friday; and
- 08:00-13:00 hours on Saturday.

3.3.1.2 Prior to and following the core working hours Monday to Friday, a 'shoulder hour' for mobilisation and shut down will be applied (07:00-08:00 and 18:00-19:00) for which restrictions are described further in **Volume 4: Outline Construction Environmental Management Plan**. No activity outside of these hours, including Sundays, public holidays or bank holidays will take place apart from under the following circumstances:

- where continuous periods (up to 24-hours, seven days per week) of construction work are required for horizontal directional drilling (HDD) (or similar trenchless technique);
- for other works requiring extended working hours such as concrete pouring which will require the relevant Planning Authority to be notified at least 72 hours in advance;
- for the delivery of abnormal loads to the connection works, which may cause congestion on the local road network, where the relevant highway authority has been notified prior to such works 72 hours in advance;
- where works are being carried out on the foreshore; or
- as otherwise agreed in writing with the relevant Planning Authority.

3.4 Key construction activities and activity sound power levels of associated plant

3.4.1.1 **Table 3.2** to **Table 3.16** presents the breakdown of the indicative construction plant needed to undertake the works for each activity. Sound power levels provided for construction plant and equipment (unless otherwise specified) are reproduced from BS 5228-1.

3.4.1.2 The sound power levels for each activity have been used to determine the likely construction noise levels at sensitive receptors. The plant lists are based upon current understanding of the Project and similar construction projects. A detailed list of the equipment that will be used will not be available until the Principal Construction Contractor is appointed and the design and programme are developed. In the data tables, "number of sources" represents the estimated number of items of named plant items that may be working concurrently.

3.4.1.3 In the data tables, "percentage time in use" is the estimated proportion of a nominal ten-hour day (or eight-hour night) where the plant is operational and undertaking the described activities (for example, 50 per cent for an excavator would be five hours moving material around, and five hours at rest, on a typical ten-hour day).

Table 3.2 Construction of landfall(s) TCC

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Excavator	Annex C Table 2 Row 2.	2	105	100
Dozer	Annex C Table 2 Row 13.	1	106	25
Telescopic handler	Annex C Table 2 Row 35.	1	99	25
Articulated Dump Truck (ADT)	Annex C Table 2 Row 30.	1	107	25
Water pump	Annex C Table 2 Row 45.	2	93	50
Generator	Annex C Table 4 Row 76.	1	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	100
Total Sound Power Level dBA ref 10^{-12} W			110	

Table 3.3 Landfall(s) construction stage activity

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Excavator	Annex C Table 2 Row 2.	2	105	100
ADT	Annex C Table 2 Row 30.	1	107	25
HDD (or similar trenchless technique)	Annex C Table 4 Row 96.	2	105	100
Water Pumps (including clay pumps)	Annex C Table 2 Row 45.	4	93	100

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			112	

Table 3.4 Construction of TCC supporting onshore works

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Excavator	Annex C Table 2 Row 2.	2	105	100
Dozer	Annex C Table 2 Row 13.	1	106	25
Telescopic handler	Annex C Table 2 Row 35.	1	99	25
ADT	Annex C Table 2 Row 30.	1	107	25
Generator	Annex C Table 4 Row 76.	1	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	100
Total Sound Power Level dBA ref 10^{-12} W			110	

Table 3.5 General construction stage activities within TCCs

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Excavator	Annex C Table 2 Row 2.	2	105	100
Telescopic handler	Annex C Table 2 Row 35.	1	99	25
Welder	Annex C Table 3 Row 31.	2	101	20
Generator	Annex C Table 4 Row 76.	1	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	100
Total Sound Power Level dBA ref 10^{-12} W			109	

Table 3.6 Mobilisation and installation activities associated with the onshore export cable corridor, including trenching, ducting, joint bay construction and cable pulling

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Excavator	Annex C Table 2 Row 2.	2	105	100
Telescopic handler	Annex C Table 2 Row 35.	1	99	25
Generator	Annex C Table 4 Row 76.	1	89	100
Tower lights	Annex C Table 4 Row 86.	2	93	20
Large concrete mixer	Annex C Table 4 Row 22.	1	108	25

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Truck-mounted concrete pump and boom arm	Annex C Table 4 Row 28.	1	103	25
Total Sound Power Level dBA ref 10^{-12} W			109	

Table 3.7 Trenchless crossing

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 4 Row 64.	1	103	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Dumper	Annex C Table 4 Row 3.	1	104 (L_{WAmax})*	25
HDD (or similar trenchless technique) System (above ground static plant)	Annex C Table 4 Row 96.	2	105	100
Water pumps (including clay pumps)	Annex C Table 2 Row 45.	4	93	75
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			110	

* Sound power calculated assuming mobile plant at 8 kilometres per hour (km/h) and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10 metres (m).

Table 3.8 Construction of all temporary and permanent access routes associated with onshore substations

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	2	103	100
Dozer	Annex C Table 2 Row 13.	1	108	100
Road lorry	Annex C Table 2 Row 34.	2	107*	20
ADT	Annex C Table 2 Row 30.	1	108	100
Road roller	Annex C Table 5 Row 19.	2	108*	50
Total Sound Power Level dBA ref 10^{-12} W			112*	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m.				

Table 3.9 Onshore substations - site clearance works

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	2	105	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Dumper	Annex C Table 2 Row 30.	2	107	50
Dozer	Annex C Table 2 Row 13.	2	106	75

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			113	

Table 3.10 Onshore substations – site preparation and earthworks

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	2	105	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Dumper	Annex C Table 2 Row 30.	2	107	75
Dozer	Annex C Table 2 Row 13.	2	106	75
Telescopic handler	Annex C Table 2 Row 35.	2	99	50
Water pump	Annex C Table 2 Row 45.	1	93	10
Road lorry	Annex C Table 2 Row 34.	2	108*	10
Large concrete mixer	Annex C Table 4 Row 22.	1	108	50
Truck-mounted concrete	Annex C Table 4 Row 28.	1	103	50

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
pump and boom arm				
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			114	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m.				

Table 3.11 Onshore substations – civils: piling

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	1	105	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Mobile crane	Annex C Table 2 Row 30.	2	107	10
Impact piling rig	Annex C Table 3 Row 3.	1	116	50
Road lorry	Annex C Table 2 Row 34.	2	108*	10
Large concrete mixer	Annex C Table 4 Row 22.	1	108	20
Truck-mounted concrete pump and	Annex C Table 4 Row 28.	1	103	20

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
boom arm				
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			114	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m.				

Table 3.12 Onshore substations and connection works – civils: trenching and foundations

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 4 Row 64.	2	103	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Large concrete mixer	Annex C Table 4 Row 22.	2	108	80
Truck-mounted concrete pump and boom arm	Annex C Table 4 Row 28.	2	103	50
Powerfloat	Annex D Table 6 Row 44.	1	100	50
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Total Sound Power Level dBA ref 10^{-12} W			112	

Table 3.13 Onshore substations and connection works – civils: backfilling and roadway construction

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 4 Row 64.	2	103	100
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	100
Large concrete mixer	Annex C Table 4 Row 22.	2	108	80
Truck-mounted concrete pump and boom arm	Annex C Table 4 Row 28.	2	103	50
Road roller	Annex C Table 5 Row 19.	2	108*	50
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			110	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m				

Table 3.14 Onshore substations and connection works – ducts and pits

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	2	103	50
Wheeled backhoe	Annex C Table 4 Row 66.	1	97	75
Dozer	Annex C Table 2 Row 13.	2	108	10
Road lorry	Annex C Table 2 Row 34.	2	107*	50
ADT	Annex C Table 2 Row 30.	2	108	50
Vibratory compactor	Annex C Table 5 Row 20.	1	103	50
Water pump	Annex C Table 2 Row 45.	2	89	10
Generator	Annex C Table 4 Row 76.	2	89	100
Tower lights	Annex C Table 4 Row 86.	4	93	50
Total Sound Power Level dBA ref 10^{-12} W			110*	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m.				

Table 3.15 Onshore substations and connection works – structure installation and construction of ecology mitigation, landscaping and drainage works

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Tracked excavator	Annex C Table 2 Row 2.	2	103	75

Item of plant	BS 5228-1 reference	Number of sources	Sound Power Level dB(A) per plant item	Percentage time in use (%)
Wheeled backhoe	Annex C Table 4 Row 66.	2	97	75
Dozer	Annex C Table 2 Row 13.	2	108	100
Road lorry	Annex C Table 2 Row 34.	2	107*	50
ADT	Annex C Table 2 Row 30.	2	108	50
Wheeled mobile telescopic crane (400 tonne (t))	Annex C Table 4 Row 38.	1	106	20
Mobile telescopic crane (50t)	Annex C Table 4 Row 46.	2	95	20
Generator	Annex C Table 4 Row 76.	3	89	100
Total Sound Power Level dBA ref 10^{-12} W			113*	
* Sound power calculated assuming mobile plant at 8km/h and 180 degree field of view. L_{WAmax} derived from L_{Amax} plant passby at 10m.				

3.4.1.4 The sound power levels for each construction activity are summarised in **Table 3.16**. Sound powers have been rounded to the nearest integer.

Table 3.16 Summary of activity total sound power levels

Activity	Activity sound power level, dB(A)
Construction of landfall(s) TCC	110
Landfall(s) construction stage activity	112
Construction of TCC supporting onshore works	110
General construction stage activities within TCCs	109
Mobilisation and installation activities associated with the onshore export cable corridor, including trenching, ducting, joint bay construction and cable pulling	109
Trenchless crossing including night-time operation	110
Construction of temporary and permanent access routes associated with the onshore substation	112
Onshore substations – site clearance works	113
Onshore substations – site preparation and earthworks	114
Onshore substations and connection works civils: piling	114
Onshore substations and connection works civils: trenching and foundations	111
Onshore substations and connection works civils: backfilling and roadway construction	110
Onshore substations and connection works civils: ducts and pits	110
Onshore substations structure installation and construction of ecology mitigation, landscaping and drainage works	113

4. Construction Stage Noise Assessment

4.1 Sound pressure levels at representative receptors

4.1.1.1 BS 5228-1, Annex F, propagation calculations (assuming 100 per cent soft ground) have been carried out to determine the construction sound pressure levels at the nearest NSRs.

4.1.1.2 Calculations have been undertaken based on all plant items positioned at a single location and located at the closest point of the Onshore Red Line Boundary to be the nearest NSR The average scenario considers that all plant for each construction activity will be located at the approximate centre of the potential works. As the location of the works is dependent on the final design, the NSRs assume all prospective construction areas are viable.

4.1.1.3 **Table 4.1** sets out the predicted construction noise levels for each activity during core working hours. The predicted construction noise levels have been compared against the daytime threshold criteria of 65dB $L_{Aeq, T}$. The predicted construction noise levels which exceed this criteria are shown in **bold**.

4.1.1.4 **Table 2.1** sets out the predicted construction noise levels for the activities which may take place outside of the core working hours. The predicted construction noise levels for potential evening and weekend activities have been compared against the threshold criteria of 55dB $L_{Aeq, T}$, whilst the predicted construction noise levels for potential night-time activities have been compared against relevant threshold based on the assumed ABC Category as set out in **Table 3.4**. The predicted construction noise levels which exceed this criteria are shown in **bold**.

Table 4.1 Summary of predicted construction noise levels – core working hours

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of landfall TCC - Scotstown	110	NSR1	135	56	200	52
Construction of landfall TCC – Lunderton North	110	NSR2	190	52	290	48
Construction of landfall TCC – Lunderton South	110	NSR3	360	46	435	44
Landfall construction stage activity – Scotstown	112	NSR1	135	58	200	53
Landfall construction stage activity – Lunderton North	112	NSR2	190	54	290	49
Landfall construction stage activity – Lunderton South	112	NSR3	360	47	435	45
Construction of TCC supporting onshore works	110	NSR4	245	49	300	47
Construction of TCC supporting Onshore Works	110	NSR5	230	50	300	47
Construction of TCC supporting Onshore Works	110	NSR2	220	50	285	47

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of TCC supporting onshore works	110	NSR6	55	65	145	55
Construction of TCC supporting onshore works	110	NSR7	90	60	180	52
Construction of TCC supporting onshore works	110	NSR8	50	**66**	200	51
Construction of TCC supporting onshore works	110	NSR9	80	61	150	54
Construction of TCC supporting onshore works	110	NSR10	220	50	255	49
Construction of TCC supporting onshore works	110	NSR11	220	51	350	46
General construction stage activities within TCCs	109	NSR12	245	49	300	47
General construction stage activities within TCCs	109	NSR5	230	50	300	47
General construction stage activities within TCCs	109	NSR6	220	50	285	47
General construction stage activities within TCCs	109	NSR2	55	65	145	54

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
General construction stage activities within TCCs	109	NSR7	90	59	180	52
General construction stage activities within TCCs	109	NSR8	50	**66**	200	51
General construction stage activities within TCCs	109	NSR9	80	61	150	54
General construction stage activities within TCCs	109	NSR10	220	50	255	48
General construction stage activities within TCCs	109	NSR11	220	50	350	45
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR2	45	**67**	150	54
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR7	50	**66**	140	55
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR8	50	**66**	95	59

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR9	55	65	110	57
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR19	50	**66**	100	58
Mobilisation and installation activities associated with the onshore export cable corridor	109	NSR29	50	**66**	95	59
Trenchless crossing	110	NSR1	55	65	130	56
Trenchless crossing	110	NSR2	50	**67**	130	56
Trenchless crossing	110	NSR4	140	55	185	52
Trenchless crossing	110	NSR6	60	65	140	55
Trenchless crossing	110	NSR7	60	65	180	53
Trenchless crossing	110	NSR8	160	54	280	48
Trenchless crossing	110	NSR10	150	55	275	48

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Trenchless crossing	110	NSR12	270	48	335	46
Trenchless crossing	110	NSR13	200	51	285	48
Trenchless crossing	110	NAR14	50	**67**	155	54
Trenchless crossing	110	NSR15	300	47	390	44
Trenchless crossing	110	NSR16	300	47	480	42
Trenchless crossing	110	NSR17	260	49	335	46
Trenchless crossing	110	NSR18	65	64	165	54
Trenchless crossing	110	NSR21	70	63	175	53
Trenchless crossing	110	NSR22	60	65	145	55
Trenchless crossing	110	NSR23	65	64	120	57
Trenchless crossing	110	NSR27	280	48	470	42
Trenchless crossing	110	NSR28	65	64	215	51
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR1	100	61	100	61

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR2	225	53	225	53
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR4	280	50	280	50
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR5	300	50	300	50
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR6	65	**66**	65	**66**
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR7	70	65	70	65
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR8	40	**71**	40	71

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR9	210	53	210	53
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR18	50	69	160	56
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR19	40	**71**	40	**71**
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR20	90	62	90	62
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR21	140	58	140	58
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR22	20	**78**	35	**72**

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR23	50	**69**	50	**69**
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR24	235	52	235	52
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR28	170	56	170	56
Construction of temporary and permanent access routes associated with the onshore substations	112	NSR11	160	56	160	56
Onshore substations – site clearance	113	NSR25	290	50	645	41
Onshore substations – site clearance	113	NSR26	210	54	410	46
Onshore substations – site clearance	113	NSR27	130	59	500	44
Onshore substations – site preparation and earthworks	114	NSR25	290	51	645	43

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Onshore substations – site preparation and earthworks	114	NSR26	210	55	410	47
Onshore substations – site preparation and earthworks	114	NSR27	130	60	500	45
Onshore substations and connection works - civils: piling	114	NSR25	290	53	645	44
Onshore substations and connection works - civils: piling	114	NSR26	210	56	411	49
Onshore substations and connection works - civils: piling	114	NSR27	130	61	500	47
Onshore substations and connection works - civils: trenching and foundations	111	NSR25	290	47	645	39
Onshore substations and connection works - civils: trenching and foundations	111	NSR26	210	51	411	44
Onshore substations and connection works - civils: trenching and foundations	111	NSR27	130	56	500	41

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Onshore substations and connection works - civils: backfilling and roadway construction	110	NSR25	290	49	645	39
Onshore substations and connection works - civils: backfilling and roadway construction	110	NSR26	210	53	411	44
Onshore substations and connection works - civils: backfilling and roadway construction	110	NSR27	130	58	500	42
Onshore substations and connection works - civils: ducts and pits	110	NSR25	290	48	645	40
Onshore substations and connection works - civils: ducts and pits	110	NSR26	210	52	410	45
Onshore substations and connection works - civils: ducts and pits	110	NSR27	130	57	500	43
Onshore substations structure installation and construction of ecological	113	NSR25	290	50	645	42

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
mitigation, landscaping and drainage works						
Onshore substations structure installation and construction of ecological mitigation, landscaping and drainage works	113	NSR26	210	54	411	47
Onshore substations structure installation and ecological mitigation, landscaping and drainage works	113	NSR27	130	59	500	44

Table 4.2 Summary of predicted construction noise levels – outside of core hours, i.e. evening, weekend and night-time working hours

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Construction of landfall TCC – Scotstown	110	NSR1	135	**56**	200	**52**
Construction of landfall TCC – Lunderton North	110	NSR2	190	52	290	48
Landfall construction stage activity – Scotstown	112	NSR2	135	**58**	200	53
Landfall construction stage activity – Lunderton North	112	NSR3	190	**54**	290	**49**
Landfall construction stage activity – Lunderton South	112	NSR1	360	**47**	435	45
Trenchless crossing	110	NSR1	55	**65**	130	**56**
Trenchless crossing	110	NSR2	50	**67**	130	**56**
Trenchless crossing	110	NSR4	140	**55**	185	**52**
Trenchless crossing	110	NSR6	60	**65**	140	**55**
Trenchless crossing	110	NSR7	60	**65**	180	**53**
Trenchless crossing	110	NSR8	160	**54**	280	**48**

Activity	Activity sound power level, dB(A)	Nearest NSR	Shortest distance between NSR and activity, m	Resultant Maximum Design Scenario Sound Pressure Level, dB $L_{Aeq,T}$	Average distance between NSR and Activity, m	Resultant Average Scenario Sound Pressure Level, dB $L_{Aeq,T}$
Trenchless crossing	110	NSR10	150	55	275	48
Trenchless crossing	110	NSR12	270	48	335	46
Trenchless crossing	110	NSR13	200	**51**	285	**48**
Trenchless crossing	110	NSR14	50	**67**	155	54
Trenchless crossing	110	NSR15	300	47	390	44
Trenchless crossing	110	NSR16	300	**47**	480	42
Trenchless crossing	110	NSR17	260	**49**	335	**46**
Trenchless crossing	110	NSR18	65	64	165	54
Trenchless crossing	110	NSR21	70	**63**	175	**53**
Trenchless crossing	110	NSR22	60	**65**	145	**55**
Trenchless crossing	110	NSR23	65	**64**	120	**57**
Trenchless crossing	110	NSR27	280	**48**	470	42
Trenchless crossing	110	NSR28	65	**64**	215	**51**

4.1.1.5 During core working hours, **Table 4.1** indicates that when works are at their closest distance to the NSRs the daytime threshold criteria of 65dB $L_{Aeq,T}$ may be exceeded for the following activities:

- construction of TCCs supporting onshore works;
- general construction stage activities within TCCs;
- construction of trenchless crossings; and
- construction of temporary and permanent access routes associated with the onshore substations.

4.1.1.6 Outside of core working hours, **Table 4.2** indicates that when works are at their closest distance to NSRs the evening and weekend threshold criteria of 55dB $L_{Aeq,T}$, and the adopted night-time threshold criteria may be exceeded for the following activities:

- construction of landfall(s) TCC (considered to be weekend and evening activity only – not night-time);
- landfall(s) construction stage activity with TCCs (considered to be weekend and evening activity only – not night-time); and
- construction of trenchless crossings.

4.2 Consideration of mitigation measures

4.2.1.1 The majority of activities where the predicted levels in **Table 4.1** and **Table 4.2** exceed the threshold of significance are likely to be for a duration of longer than one month, and therefore there is a need to provide mitigation measures to avoid significant effects. **Table 4.3** details the reductions needed to meet the threshold of significance for the average and maximum design scenario activity sound levels.

4.2.1.2 The construction programme will seek to minimise the duration of high noise generating construction activities, as far as practicably possible. Construction methodologies will be set once the Contractor is appointed, therefore, the advice on mitigation presented below is subject to a revised assessment during detailed design.

4.2.1.3 For mitigation requirements of 5dB or lower, noise shall be controlled through the application of best practice measures.

4.2.1.4 For mitigation requirements between 5dB and 10dB, a combination of best practice measures and temporary acoustic screening will be needed where the worksite is temporary (for example, access construction or short trenchless crossings). For worksites where the noisy activity will be present for more than three months, acoustic screening will need to be more substantial (for example, earth bunds or site hoarding).

4.2.1.5 For predictions between 10dB and 15dB above the threshold of significance, it is recommended that acoustic screening is accompanied with compliance noise monitoring. A scheme of noise insulation should also be considered to provide further protection for NSRs, where feasible. Where the monitoring demonstrates that mitigation is inadequate, additional mitigation will be required.

4.2.1.6 For predictions of 15dB and above over the threshold of significance, best practice measures and acoustic screening will not be sufficient to avoid significant effects. These exceedances in the threshold of significance relate to the trenchless crossings and landfall works outside of core working hours. After detailed design, and before the commencement of the construction period, a Noise and Vibration Management Plan (NVMP) will be produced and agreed with the Planning Authority setting out the requirements for noise and

vibration mitigation measures. To avoid significant effects one or a combination of the following will be required:

- an appropriate separation distance between the works and NSRs;
- acoustic screening and compliance monitoring; and
- receptor specific mitigation.

4.2.1.7 Alternatively, depending on the duration of the potential exceedance in threshold of significance, temporary re-housing could be considered through consultation with the Planning Authority for residences predicted to experience levels in excess of 65dB(A) at night, where the period exceeds the duration defined in BS5228-1 Annex E.4 (i.e. for a period of ten or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months), to prevent sleep disturbance during activities in the night-time period.

Table 4.3 Mitigation requirements

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
Construction of landfall TCC - Scotstown	NSR1	52-56	0-1	Management measures (consideration of location of TCC within usable area).
Landfall construction stage activity - Scotstown	NSR1	53-58	0-3	Management measures.
Construction of TCC supporting onshore works	NSR8	51-66	0-1	Management measures (consideration of location of TCC within usable area).
General construction stage activities within TCCs	NSR8	51-66	0-1	Management measures (consideration of location of TCC within usable area).
Mobilisation and installation activities associated with the onshore	NSR2	54-67	0-2	Management measures.

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
export cable corridor				
Mobilisation and installation activities associated with the onshore export cable corridor	NSR7	55-66	0-1	Management measures.
Mobilisation and installation activities associated with the onshore export cable corridor	NSR8	55-66	0-1	Management measures.
Mobilisation and installation activities associated with the onshore export cable corridor	NSR19	58-66	0-1	Management measures.
Mobilisation and installation activities associated with the onshore export cable corridor	NSR29	59-66	0-1	Management measures.
Trenchless crossing	NSR1	56-65	14-20	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
				compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.
Trenchless crossing	NSR2	56-67	1-12	Acoustic screening, and compliance monitoring.
Trenchless crossing	NSR4	52-55	0-5	Management measures.
Trenchless crossing	NSR6	55-65	10-20	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.
Trenchless crossing	NSR7	53-65	12-20	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
				• temporary re-housing of receptors.
Trenchless crossing	NSR8	48-54	3-9	Locating above-ground plant away from receptor and acoustic screening.
Trenchless crossing	NSR12	46-48	1-3	Management measures.
Trenchless crossing	NSR13	48-51	3-6	Best practice measures and temporary acoustic screening.
Trenchless crossing	NSR14	54-67	0-12	Acoustic screening, and compliance monitoring.
Trenchless crossing	NSR16	42-47	0-2	Management measures (consideration of location of TCC within usable area).
Trenchless crossing	NSR17	46-49	1-4	Management measures.
Trenchless crossing	NSR18	54-64	9-19	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
Trenchless crossing	NSR21	53-63	8-18	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.
Trenchless crossing	NSR22	55-65	10-20	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.
Trenchless crossing	NSR23	57-64	12-19	One or a combination of the following: • an appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring;

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
				• avoid night time working; and • temporary re-housing of receptors.
Trenchless crossing	NSR27	42-48	0-3	Management measures.
Trenchless crossing	NSR28	51-64	6-19	One or a combination of the following: • An appropriate separation distance between the works and NSRs; • acoustic screening and compliance monitoring; • avoid night time working; and • temporary re-housing of receptors.
Construction of temporary and permanent access routes associated with the onshore substations	NSR18	56-69	0-4	Management measures.
Construction of temporary and permanent access routes associated with the onshore substations	NSR6	66-66	1-1	Management measures.
Construction of temporary	NSR19	71-71	6-6	Best practice measures and

Activity	Nearest NSR	Range on Sound Pressure Level for Average and Maximum Design Scenario Locations, dBA	Required mitigation / dBA	Proposed mitigation
and permanent access routes associated with the onshore substations				temporary acoustic screening.
Construction of temporary and permanent access routes associated with the onshore substations	NSR8	71-71	6-6	Best practice measures and temporary acoustic screening.
Construction of temporary and permanent access routes associated with the onshore substations	NSR22	78-78	13-13	Acoustic screening and compliance monitoring. It is considered that these works are likely to be short in duration, i.e. exceedances in the threshold of significance will be for a period of less than a month.
Construction of temporary and permanent access routes associated with the onshore substations	NSR23	69-69	4-4	Management measures.

4.2.1.8 Where practical, the construction activity should be located as far from residential receptors as possible.

4.2.1.9 The implementation of noise mitigation and best practice techniques secured via **Volume 4: Outline Construction Environmental Management Plan (CEMP)**. After detailed design, and before the commencement of the construction period, a NVMP will be produced as a subordinate document to the Outline CEMP and agreed with the Planning Authority setting out the requirements for noise and vibration mitigation measures. The NVMP will

seek to avoid significant effects (daytime, evening and night-time), where reasonably practicable.

4.2.1.10 As part of the NVMP, trenchless installation activities during evening and night-time at locations will require careful consideration to include secondary mitigation including measures such as acoustic enclosures for ancillary equipment which is kept above ground for the whole duration of the activity.

4.2.1.11 With the proposed mitigation measures in place, the residual construction noise levels for each activity of the maximum design scenario would meet the relevant threshold of criteria (i.e. an impact magnitude of “negligible” and “low” magnitudes of change) and are not likely to give rise to significant effects.

5. Construction Stage Vibration Assessment

5.1.1.1 At this stage, the type and number of vibration-generating construction plant items, the programme and working methodologies to be applied are not known; these would be based on the final design, the ground conditions, and selected by the Principal Contractor, who would be appointed after planning approval.

5.1.1.2 Ground-borne vibration calculations have been performed for construction activities typically required for similar developments. The calculations are based on the empirical prediction procedures presented within BS 5228-2. **Table 5.1** presents the distances at which vibration levels are predicted to meet the criteria thresholds, based on a specified confidence limit (where applicable). The nearest NSRs to the piling works relating to the construction of the onshore substations are greater than 100m from activity and as such vibration from piling will not be considered further.

Table 5.1 Residual impact magnitude

Vibration generating activity	Confidence limit	PPV (mm/s)	Minimum distance between receptor and works (m) before PPV (mm/s) exceeded
Vibratory rollers - start and end (1)	95	0.3	80
	95	1.0	30
Vibratory rollers - steady state (1)	95	0.3	60
	95	1.0	25
Excavation	N/A	0.3	9
	N/A	1.0	3
(1) Assumes two rollers, 0.5mm amplitude, drum width of 1.3m, for example, heavy-duty ride on roller.			

5.1.1.3 The data presented in **Table 5.1** is general in nature and is not site specific. In addition, different vibration generating activities may be employed other than those listed.

5.1.1.4 The following sensitive receptors are those closest to the construction stage activities involving vibratory rollers and have the greatest potential to be subject to significant effects:

- the NSR6 Steading Cottage located approximately 65m from the works relating to the construction of temporary access routes;
- the NSR7 Cairnhill House located approximately 70m from the works relating to the construction of temporary access routes;
- the NSR8 Easterton of Barnyards located approximately 40m from the works relating to the construction of temporary access routes;

- the NSR14 of Tortorston Road (Westwyn) located approximately 50m from the works relating to the construction of temporary access routes;
- the NSR18 Lunderton, (West of A90) located approximately 50m from the works relating to the construction of temporary access routes;
- the NSR19 Cattlemans Cottage located approximately 40m from the works relating to the construction of temporary access routes;
- the NSR20 Meadowbank Inverugie located approximately 90m from the works relating to the construction of temporary access routes; and
- the NSR22 of Tortoston Road (Oakdene Villa) located approximately 20m from the works relating to the construction of temporary access routes.

5.1.1.5 The results of the assessment indicate that ground-borne vibration may be just perceptible within residential properties (defined as PPV <0.3mm/s) when vibration-generating construction activities occur within 80m of the nearest sensitive receptors, particularly during the construction of temporary and permanent access routes associated with the onshore substation. For activities occurring beyond 80m from nearest receptors, vibration levels are predicted to remain below perceptibility thresholds (i.e., <0.3mm/s). However, when vibratory rollers are operated within 30m of an sensitive receptor, vibration levels may exceed 1.0mm/s PPV, which has the potential to give rise to complaints.

6. References

British Standards Institution, (2014a). *BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.* [online] Available at: https://landingpage.bsigroup.com/LandingPage/Standard?UPI=000000000030258086 [Accessed: 22 August 2025].

British Standards Institution, (2014b). *BS 5228-2:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.* [online] Available at: https://landingpage.bsigroup.com/LandingPage/Standard?UPI=000000000030258089 [Accessed: 22 August 2025].

7. Glossary of Terms and Abbreviations

7.1 Abbreviations

Acronym	Definition
ADT	Articulated Dump Truck
BS	British Standard
CEMP	Construction Environmental Management Plan
dB	Decibel
dBA	A-weighted decibel
EIA	Environmental Impact Assessment
HDD	Horizontal directional drilling
Km	Kilometres
M	Metres
MM	Millimetres
NSR	Noise Sensitive Receptor
NVMP	Noise and Vibration Management Plan
PPV	Peak Particle Velocity
TCC	Temporary Construction Compound

7.2 Glossary of terms

Term	Definition
% on time	The amount of time that the noise from equipment / plant / activity is present in a nominal assessment period, expressed as a percentage.
Number of items	Number of items of plant (or activities, where so assessed) present in assessed work area.
dB	A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.
$L_{Aeq,T}$	The A-weighted equivalent continuous sound level. It is the notional continuous level that, over the defined time period, T, contains the same sound energy as the actual fluctuating sound that occurred over the same time period.

MarramWind