4.22.1

Rampion 2 WIND FARM

Volume 4, Appendix 22.1

Noise and vibration

GoBe wood.

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1. Introduction

1.1.1 This appendix supports **Chapter 22: Noise and vibration (onshore), Volume 2** and relates to the onshore elements of the proposed Rampion 2 offshore windfarm. This appendix presents detailed modelling methodologies and results.

1.1.2 The full assessment of potential effects has been detailed in **Chapter 22, Volume 2** which includes relevant policy and legislation, baseline conditions, the Maximum Design Scenario (MDS), the noise assessment and cumulative effects.

1.1.3 This appendix should also be read in conjunction with:

- **Chapter 4: The Proposed Development, Volume 2** which provides information relating to the Proposed Development upon which the noise modelling assumptions have been based; and,
- **Chapter 5: Approach to the EIA, Volume 2** which sets out the overall environmental impact assessment (EIA) approach which has been used to determine potential significant effects for noise and vibration.

1.1.4 This appendix provides the assumptions and data used within the noise predictions and a fuller set of results which have been summarised in **Chapter 22, Volume 2**. The appendix is split out as follows:

- **Section 2: Scope**;
- **Section 3: Noise predictions methodology**;
- **Section 4: Assumptions and limitations**;
- **Section 5: Glossary and abbreviations**; and
- **Section 6: References list**.

2. Scope

2.1.1 The following noise and vibration sources as part of the onshore elements of the Proposed Development have been assessed in the Preliminary Environmental Information Report (PEIR):

- temporary effects from the construction and operation of the temporary construction compounds;
- temporary effects from the trenchless crossing works;
- temporary effects from onshore substation construction;
- temporary effects from onshore cable installation (trenched);
- temporary effects from construction and use of temporary and permanent accesses;
- temporary effects from construction road traffic (no additional information is within this appendix); and
- decommissioning.

2.1.2 As outlined in **Chapter 22, Volume 2**, operation and maintenance noise effects associated with the onshore substation have not been assessed at the PEIR stage as the design of the onshore substation is yet to be fully defined. The operation and maintenance noise effects will be assessed in the Environmental Statement (ES).

3. Noise predictions methodology

3.1.1 The methodology used to calculate noise predictions have been based on the level of detail obtained during this stage however, all predictions have followed the approach outlined in the British Standard (BS) 5228-1:2009+A1:2014 (British Standards Institution, 2014a) for noise and the BS 5228-2:2009+A1:2014 (British Standards Institution, 2014b).

3.1.2 There have been two separate approaches for predicting construction noise and this has been based on the level of information currently available at PEIR stage. Where the location of the construction site/s and therefore, the locations of the receptors are known a full BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a) calculation approach has been undertaken. This includes consideration into the distance between the source and receiver and a 3 decibel (dB) façade correction to account for reflections from the receptors. Attenuation has considered one of two approaches, dependent on which is approach provides greater attenuation. Either screening with hard ground conditions or no screening and soft ground conditions which is based on the following:

> "*It is not usually advisable to combine the effects of screening and soft ground attenuation. Take either the attenuation from screening and hard ground propagation, or the attenuation of soft ground, whichever is the greater*" (BS 5228-1:2009+A1:2014, British Standards Institution, 2014a)

3.1.3 Where screening has been included, this has been 10dB on the assumption that full line sight between the noise source and the receiver is broken. This is usually achieved with a purpose designed barrier or topographical features in the surrounding terrain.

3.1.4 In instances where locations of construction sites are not known, a simple distance attenuation calculation has been used, compared against the noise levels of the corresponding criteria, as set out in **Chapter 22, Volume 2**. This approach provides an understanding of distances where potential significant effects may occur between a construction site and noise sensitive receptors.

4. Assumptions and limitations

4.1 Overview

4.1.1 This section should be read in conjunction with **Table 22-10** of **Chapter 22, Volume 2** which outlines the MDS. This section sets out the detailed noise assumptions used within the predictions.

4.1.2 The sound power levels from onsite activities for each phase and type of construction plant have been based on the data available in the BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a).

4.2 Temporary construction compounds for noise assessment

Table 4-1 Plant list for temporary construction compound calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Construction of the temporary construction compound (site clearance)			
Tracked excavators	2	107	80%
Dozer	1	107	80%
wheeled loader	1	95	80%
40t Articulated Dump Truck (ADT)	1	106	80%
Water Pump	1	93	100%
Construction of the temporary construction compound (construction of internal and haul roads)			
Tracked excavators	2	110	80%
Dozer	1	104	80%
Asphalt paver (+tipper lorry)	1	100	50%
Vibratory Roller	1	100	50%

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
40t ADT	2	109	80%
Road Planer	1	107	50%
Operational (Temporary construction compound)			
Generators	2	93	50%
Operational (fabrication area)			
Forklift	1	106	80%
Mobile Crane	2	99	50%
Handheld saw	1	110	50%
Generators	2	103	50%
Handheld Drill	1	102	50%
Concrete Batching (Mixer)	1	103	20%
Operational (haul roads)			
40 tonne ADT	2	109	80%

4.3 Landfall works and major crossings for noise and vibration assessment

Table 4-2 Plant list for landfall works and major crossing noise calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Daytime			
Excavator	2	98	10
Dump truck	1	104	10
Mobile crane	1	88	10

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
HDD Drill rig	1	107	90
Water pump	1	93	100
Generator	1	94	100
Night-time			
HDD Drill rig	1	107	100
Water pump	1	93	100
Generator	1	94	100

Table 4-3 Plant list for landfall works and major crossing vibration calculations

Source	Number of sources	BS 5228-2:2009+A1:2014 Empirical equation	Peak Particle Velocity (PPV) mm/s at 10m
HDD Drill rig	1	Tunnelling (groundborne vibration)	10

4.4 Onshore substation construction for noise assessment

Table 4-4 Plant list for onshore substation construction calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Site preparation (topsoil stripping)			
Dumper	2	107	50%
Bulldozer	2	110	83%
Wheeled loader backhoe loader - Clearing Site	2	95	40%

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Wheeled loader (backhoe) loading lorries	2	107	40%
Excavator	2	109	83%
Dump truck (tipping fill)	2	93	2%
Dozer	2	10	50%
Groundwork (pre-earthworks drainage)			
Dumper	2	107	50%
Bulldozer	2	108	83%
Wheeled loader (backhoe) loading lorries	2	108	40%
Excavator - trenching	2	105	83%
Wheeled backhoe loader - trenching	2	97	40%
Dump truck (tipping fill)	2	107	5%
Dozer	2	107	50%
Lorries	1	111	10%
Dewatering	1	93	10%
Large concrete mixer (mixing concrete)	1	104	73%
Truck mounted concrete truck with Boom arm (pumping concrete)	1	108	10%
Groundwork (excavation and installation of below ground cables, ducts and pipes			

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Dumper	2	107	50%
Bulldozer	2	108	83%
Wheeled loader (backhoe) loading lorries	2	108	40%
Excavator - trenching	2	105	83%
Wheeled backhoe loader - trenching	2	97	40%
Dump truck (tipping fill)	2	107	5%
Dozer	2	107	10%
Lorries	1	111	10%
Dewatering	1	93	10%
Vibratory compactor	1	110	50%
Civils (piling)			
Directional drill (Generator)	1	105	50%
Mobile crane	1	98	50%
Press-in Piling	1	105	83%
Drop hammer pile rig power pack	1	97	83%
Civils (trench excavation and laying concrete foundations)			
Excavator - trenching	2	105	83%
Large concrete mixer (mixing concrete)	1	104	73%

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Truck mounted concrete truck with Boom arm (pumping concrete)	1	108	10%
Lorries	2	111	10%
Dewatering	1	93	10%
Civils (backfilling)			
Heavy Goods Vehicle (HGV)	1	101	10%
ADT	2	104	80%
Excavator	2	109	83%
Wheeled backhoe loader - trenching	2	96	40%
Roller	2	100	10%
Grader	2	117	100%
Civils (pits, chambers, troughs, trays and ducting)			
Dumper	2	107	50%
Bulldozer	2	110	83%
Wheeled loader (backhoe) loading lorries	2	107	40%
Excavator - Trenching	2	107	83%
Wheeled backhoe loader - trenching	2	96	40%
Dump truck (tipping fill)	2	97	5%
Dump truck (empty) - moving	2	108	10%

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Lorries	1	101	10%
Dewatering	1	83	10%
Mobile crane	1	91	20%
Vibratory compactor	1	107	50%
Finishing (topsoil replacement and landscape implementation)			
Dumper	2	107	50%
Bulldozer	2	110	83%
Wheeled loader backhoe loader - Clearing Site	2	95	40%
Wheeled loader (backhoe) loading lorries	2	107	40%
Excavator	2	109	83%
Dump truck (tipping fill)	2	93	2%
Dozer	2	107	50%

4.5 Onshore cable installation for noise assessment

Table 4-5 Plant list for onshore cable installation calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections*)	Percentage time in use (hourly)
Topsoil stripping			
Dumper	3	111	83%
Bulldozer	1	107	83%
Excavator	1	106	83%

Source	Number of sources	Sound Power Level dB(A) (including corrections*)	Percentage time in use (hourly)
Benching / levelling, grading of working area			
Grader	2	117	100%
Duct delivery and stringing			
HGV	1	101	10%
Trench excavation			
Trenching machines/mechanical excavators	2	107	83%
Compressor	1	96	20%
Dewatering	1	83	10%
Lower and lay			
Excavators / sideboom tractors	2	102	100%
Backfilling			
HGV delivering CBS	1	101	10%
ADT	2	104	80%
Roller	2	100	10%
Grader	2	117	100%

4.6 Construction of temporary and permanent access routes for noise assessment

Table 4-6 Plant list for onshore cable installation calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Excavator	2	71.0	20
Dump Truck	2	73.0	20

Source	Number of sources	Sound Power Level dB(A) (including corrections)	Percentage time in use (hourly)
Aggregate Wagon	3	78.8	20

4.7 Decommissioning for noise assessment

Table 4-7 Plant list for decommissioning calculations

Source	Number of sources	Sound Power Level dB(A) (including corrections*)	Percentage time in use (hourly)
Excavator with mounted breaker	1	118	100

4.8 Limitations

4.8.1 The design of the onshore elements of the Proposed Development are at an early stage and therefore some of the locations as part of the assessment are yet to be fully determined. In these instances, calculations have been undertaken looking at standoff distances based the criteria outlined in **Chapter 22, Volume 2**.

4.8.2 As the predictions have been based on the guidance outlined in the BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a) other factors such as meteorological conditions (particularly wind speed and direction) and atmospheric absorption have not been considered in the predictions although they can influence the noise levels received.

5. Glossary of terms and abbreviations

Table 5-1 Glossary of terms and abbreviations

Term (acronym)	Definition
ADT	Articulated Dump Truck
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Proposed Development together with any known or foreseeable future changes that will take place before completion of the Proposed Development.
BS	British Standard
Cumulative effects	Additional changes caused by a Proposed Development in conjunction with other similar developments or as a combined effect of a set of developments.
dB	Decibel
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
HGV	Heavy Goods Vehicle
Horizontal Directional Drill (HDD)	An engineering technique avoiding open trenches.
MDS	Maximum Design Scenario
PPV	Peak Particle Velocity
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.

Term (acronym)	Definition
Proposed Development	The development that is subject to the application for development consent, as described in **Chapter 4 The Proposed Development**.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
The Proposed Development / Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to 1200 MW, located in the English Channel in off the south coast of England.

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*. London: BSI.

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*. London: BSI.