MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Outline construction noise and vibration management plan

September 2024
Rev: F01

MOR001-FLO-CON-ENV-PLN-0045
MRCNS-J3303-RPS-10061

PINS Reference: EN020028
APFP Regulations: 5(2)(j)
Document reference: J1.3

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
F01	For issue	AS	September 2024	IM	September 2024

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Term	Meaning
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW).
Noise	An unwanted or unexpected sound.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning

Acronyms

Acronym	Meaning
BS	British Standard
CoCP	Code of Construction Practice
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
LOAEL	Lowest Observed Adverse Effect Level

Acronym	Meaning
MLWS	Mean Low Water Springs
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level
LAeq,T	Baseline sound levels

Units

Unit	Description
dB	Decibels
dB(A)	A-weighted decibels
mms^{-1}	Millimetres per second

1 Outline construction noise and vibration management plan

1.1 Background

1.1.1 Introduction

1.1.1.1 This document forms the Outline Construction Noise and Vibration Management Plan prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets').

1.1.2 Implementation

1.1.2.1 This Outline Construction Noise and Vibration Management Plan forms an appendix to the Outline Code of Construction Practice (CoCP) (document reference J1). Following the granting of consent for the Transmission Assets, detailed Construction Noise and Vibration Management Plans will be prepared as a part of the detailed Code of Construction Practice(s) on behalf of Morgan OWL and/or Morecambe OWL, prior to commencement of the relevant stage of works and will follow the principles established in this Outline Construction Noise and Vibration Management Plan. The detailed Construction Noise and Vibration Management Plan will require approval by the relevant planning authority following consultation with relevant stakeholders. The Applicants and all appointed contractors will be responsible for the implementation of the detailed Construction Noise and Vibration Management Plans.

1.1.2.2 The Applicants have committed to implementation of detailed Construction Noise and Vibration Management Plans via the following commitment, CoT79 (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3), and is secured by inclusion of Requirement 8 of the draft Development Consent Order (DCO) (document reference C1) Schedules 2A & 2B. Below sets out the requirement wording for Project A (Project B's requirement mirror those of Project A for this requirement and are, therefore, not repeated):

8.—(1) No stage of the Project A onshore works or Project A intertidal works may commence until for that stage a code of construction practice has been submitted to and approved by the relevant planning authority following consultation as appropriate with Lancashire County Council, Natural England, the Environment Agency and, in relation to the Project A intertidal works or, if applicable to the Project A offshore works, the MMO.

(2) Each code of construction practice must accord with the outline code of construction practice and include, as appropriate to the relevant stage…

> *(c) construction noise and vibration management plan (in accordance with the outline construction noise and vibration management plan);*

(3) The code of construction practice approved in relation to the relevant stage of the Project A onshore works must be followed in relation to that stage of the Project A onshore works.

1.1.2.3 The Transmission Assets may adopt a staged approach to the approval of DCO requirements. This will enable requirements to be approved in part or in whole, prior to the commencement of the relevant stage of works in accordance with whether a staged approach is to be taken to the delivery of each of the offshore wind farms.

1.1.2.4 For onshore and intertidal works (landward of Mean Low Water Springs), this approach will be governed by the inclusion of Requirement 3 within the draft DCO, which requires notification to be submitted to the relevant planning authority/authorities detailing whether Project A or Project B relevant works will be constructed in a single stage; or in two or more stages to be approved prior to the commencement of the authorised development.

1.1.3 Regulatory framework and guidance

1.1.3.1 The regulatory framework and guidance that underpins this Outline Construction Noise and Vibration Management Plan is set out below.

- British Standard 5228:2009+A1:2014 (BS 5228) - 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' - Part 1: Noise and Part 2: Vibration'.
- Design Manual for Roads and Bridges (DMRB) – LA 111 – Noise and Vibration.
- Environmental Protection Act 1990.
- Sections 60, 61, and 72 of the Control of Pollution Act 1974.
- Noise and Statutory Nuisance Act 1993.

1.1.3.2 The guidance within BS 5228:2009+A1:2014 and DMRB have been used to derive the reasonable limits of construction induced vibration for the purposes of assessing the impacts associated with construction induced vibration. Appropriate mitigation measures would be introduced to control the effects where vibration levels are predicted to exceed 'just perceptible' levels.

1.1.3.3 The Applicants and any Contractor (and subcontractors) will ensure compliance with relevant legislation, requirements, standards, and best practice relating to construction noise. The main objective regarding managing construction noise is to minimise noise and vibration impacts on nearby residents and other sensitive receptors to acceptable levels in accordance with British Standard (BS) 5228:2009+A1:2014 or other relevant guidance agreed in consultation with the relevant planning authority. Any measurement of construction phase noise and vibration will be undertaken in accordance with BS 5228:2009+A1:2014 (or the most recent iteration).

1.2 Management measures

1.2.1 General noise and vibration management

1.2.1.1 Noise control measures will be consistent with the recommendations of the current version of BS 5228 - Part 1: Noise and Part 2: Vibration. Statutory requirements and legislation will be fully complied with during the construction works. Construction contractors would carry out the works in a manner which minimises the noise and vibration wherever feasible giving consideration to the following measures.

- Core working hours will be included in the outline CoCP (document reference J1).
- Where practicable, preference will be given to the use of plant fitted with measures which may reduce potential noise emissions, for example those with effective silencers, noise insulation, those with acoustic enclosures, or reduced sound models.
- Impose and signpost a maximum-speed-limit of 15 miles per hour (mph) on surfaced and 10 mph on un-surfaced haul roads and work areas.
- Activities will be designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors, where practicable.
- Construction plant will be regularly serviced, maintained, and operated in accordance with manufacturer's instructions.
- Plant that is intermittently used should be shut down in the intervening periods between work or throttled down to a minimum.
- Use of local noise screening or site hoardings will be used to reduce noise, where necessary and practicable.
- The appointment of a site contact to whom complaints/queries about construction activity can be directed - any complaints should be investigated, and action taken where appropriate.
- In certain circumstances, specific works may have to be undertaken outside the core working hours to maintain time critical activities. Where applicable, these activities will be notified to the relevant planning authority at least 48-hours' notice in advance of the works.
- Emergency works may also be undertaken outside of the core working hours.
- In the event of any emergency, notification of the emergency will be given to the relevant planning authority and highways authority as soon as reasonably practicable.
- Where noise complaints are received, construction noise and vibration monitoring may be undertaken at the relevant receptors to ensure the threshold values are not exceeded and notify the principal contractor if exceedances occur. Further information on communication is provided in

the Communications Plan, an outline of which is provided in the Outline Communications Plan (document reference J1.1).

- Where practicable, any idling vehicles, plant and equipment will be switched off while stationary or not in use.
- Construction traffic control measures will be implemented such as agreed routes and the number of vehicle movements at any given time. A construction traffic management plan (CTMP) (document reference J5) which provides measures related to traffic management.
- All plant and equipment would be expected to be shut down when it is not in use with the exception of generators, pumps and electric plant.
- Site personnel will be informed about the need to minimise noise as well as about the health hazards of exposure to excessive noise. Their training should include advice relating to the proper use and maintenance of tools and equipment, the positioning of machinery on site to reduce noise emissions to neighbouring residents, as well as ensuring, where possible, that unnecessary noise is avoided when carrying out manual operations and operating plant and equipment.
- No audible music or radios will be played on the construction sites.
- Construction contractors will adhere to the codes of practice for construction working set out in BS 5228:2009+A1:2014 insofar as these are reasonably practicable and applicable to the construction works.

1.2.2 Erection of physical barriers

1.2.2.1 The erection of temporary noise barriers to minimise the effects of construction noise to the nearest receptors may be required at necessary locations.

1.2.2.2 Appropriate barrier locations will be identified by the Applicants in consultation with the relevant authority considering the methods of construction to be used. Particular consideration will be given to the following methods.

- Where required, temporary noise barriers may used prior to the site preparation of the temporary construction compounds or onshore export cable corridor.
- Where required, temporary noise barriers may be installed around works areas or equipment to provide screening for sources located at low heights. However it should be noted that it is likely to be impractical to provide noise barriers that are high enough to screen the drilling rigs associated with trenchless techniques).
- Consideration will be given to the potential effect of noise reflection from acoustic barriers impacting upon other receptors, and absorptive barriers may be adopted where necessary.

1.2.2.3 Physical barriers may also take the form of spoil bunds built from topsoil moved during the construction phase. Where possible, spoil bunds will be

erected along the boundary of the site adjacent to the most exposed noise-sensitive receptors.

1.2.2.4 In particular, the Applicants will erect a topsoil bund along the western boundary of the Morecambe Temporary Construction Compound to minimise noise impacts during the construction phase at Quaker Wood Stables.

1.3 Construction vibration

1.3.1.1 BS 5228:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' provides recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels.

1.3.1.2 The threshold of perception for vibration, is typically in the peak particle velocity (PPV) range of between 0.14 mms^{-1} and 0.30 mms^{-1}. Vibration levels above these values can cause disturbance. BS 5228-2:2009+A1:2014 provides guidance on the effects of vibration shown in **Table 1.1**.

Table 1.1: Vibration levels and associated risk of complaint.

Peak Particle Velocity (PPV), mms^{-1}	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30	Vibration might be just perceptible in residential environments.
1.00	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10.00	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

1.3.1.3 It is anticipated that the PPVs from construction operations would be below 1.0 mms^{-1} at the nearest vibration sensitive receptors and that any piling works are expected to take place during the daytime period.

1.3.1.4 The detailed Construction Noise and Vibration Management Plan(s) will include further measures, where necessary, informed by detailed design, in advance any vibration-generating construction works taking place.

1.4 Construction working hours

1.4.1.1 The Principal Contractor(s) will undertake construction activities associated with the Transmission Assets in accordance with the controls on working hours (CoT18) as stated in the Outline CoCP (Document Reference J1) which will be secured as a requirement of the DCO.

1.4.1.2 Impact criteria for construction noise during different construction periods have been determined in accordance with DMRB LA111 and Annex E of BS 5228-1:2009+A1:2014.

1.4.1.3 Table 3.12 of DMRB LA111 provides the following guidance (as summarised in **Table 1.2** below) for determining the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) for construction noise and for determining the magnitude of impacts (see **Table 1.3** below).

Table 1.2: Construction time period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL
Weekdays (07:00-19:00 hours) Saturdays (07:00-19:00 hours)	Baseline sound levels, $L_{Aeq,T}$	Lowest threshold values as presented in Table E.1 BS 5228-1:2009+A1:2014(1).
Evenings (19:00-23:00 hours) Sundays (07:00-23:00 hours)		
Night (23:00-07:00 hours)		

(1) This assumption may result in an overestimation of the effects due to construction noise at a limited number of locations and thus forms the basis of a robust assessment.

Table 1.3: Construction noise impact magnitude criteria

Magnitude of impact	Construction noise level
High	$L_{Aeq,T} \geq$ SOAEL + 5 dB
Medium	SOAEL $\leq L_{Aeq,T} <$ SOAEL +5 dB
Low	LOAEL $\leq L_{Aeq,T} <$ SOAEL
Negligible	$L_{Aeq,T} <$ LOAEL

1.4.1.4 Construction noise will be controlled to levels below the SOAEL by adopting the measures outlined in **section 1.2.1** and will be minimised to below the LOAEL, where reasonably practicable.

1.5 Monitoring

1.5.1.1 The mitigation measures will be monitored by the Principal Contractor throughout the construction phase, and regular audits of the construction work areas will be undertaken.

1.5.1.2 Where necessary, appropriate remedial actions will be identified if nonconformity with any of the mitigation measures is identified and recorded.

1.6 References

British Standards Institution (2014a) *'British Standard 5228-1:2009+A1:2014 (2014) Code of practice for noise and vibration control on construction and open sites - Part 1: Noise'*

British Standards Institution (2014b) *'British Standard 5228-2:2009+A1:2014 (2014) Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration'*

Control of Pollution Act 1974, Chapter 40, Part III

Environmental Protection Act (1990), Chapter 43, Part III

Highways England, Transport Scotland, Llwyodraeth Cymru, Department for Infrastructure (2020), *'Design Manual for Roads and Bridges – LA111: Noise and vibration'*

Noise and Statutory Nuisance Act 1993