MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Outline construction noise and vibration management plan

8 August 2025
Rev: F02

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

PINS Reference: EN020028
APFP Regulations: 5(2)(j)

Document reference: J1.3/F02

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
F01	For issue	AS	September 2024	IM	September 2024
F02	Submission at D4	JW	August 2025	IM	August 2025

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Glossary

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 owned by Copenhagen Infrastructure Partners' (CIP) fifth flagship fund, Copenhagen Infrastructure V (CI V).
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 JERA Nex bp (JNbp) 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
BAOL	Blackpool Airport Operations Limited
BS	British Standard
CoCP	Code of Construction Practice
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges

Acronym	Meaning
LOAEL	Lowest Observed Adverse Effect Level
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').

1.1.1.2 This Outline Construction Noise and Vibration Management Plan has been updated for Deadline 4 to include the following:

- Update to Requirement 8 wording in line with the draft Development Consent Order (document reference C1) to include Blackpool Airport Operations Limited (BAOL) as a consultee along with the relevant management plans upon which BAOL will be consulted by the relevant planning authority.
- Clarification of the roles and responsibilities for implementing this outline management plan
- Clarification that the measures within this outline management plan will be implemented during the onshore site preparation works
- Further detail on examples of noise control measures
- Clarification on noise monitoring
- Clarification on construction working hours.

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 (REP3-018)). 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 (REP3-013)), 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 –

(a) Lancashire County Council;

(b) Natural England;

(c) the Environment Agency;

(d) in relation to the Project A intertidal works or, if applicable to the Project A offshore works, the MMO.

(e) in relation to the Project A Blackpool Airport works, BAOL to the extent specified in the outline code of construction practice.

(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 and Project A intertidal works.

1.1.2.3 Requirement 8(1)(e) identifies BAOL as a named consultee prior to the approval by the relevant planning authority of detailed codes of construction practice. BOAL will be consulted in relation to a stage of construction that includes either the Project A Blackpool Airport Works or the Project B Blackpool Airport Works. With regards to the management plans to be appended (as appropriate to the relevant stage) to the detailed codes of construction practice, BAOL will be consulted on the Construction Noise and Vibration Management Plan (in accordance with the outline Construction Noise and Vibration Management Plan) by the relevant planning authority.

1.1.2.4 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.

1.1.2.5 For onshore and intertidal works (landward of Mean Low Water Springs (MLWS)), 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 Purpose and scope of this Outline Construction Noise and Vibration Management Plan

1.1.3.1 The purpose of this Outline Construction Noise and Vibration Management Plan is to set out the key management and monitoring procedures that will be adopted during the onshore site preparation works and construction of the Transmission Assets.

1.1.3.2 Onshore site preparation works are defined in article 2 of the draft DCO (document reference C1). This Outline Construction Noise and Vibration Management Plan applies to the onshore site preparation works and construction activities for the Transmission Assets located landward of MLWS.

1.1.3.3 Onshore site preparation works will be undertaken prior to the commencement of construction. These works will be undertaken in accordance with the following sections of the Outline Construction Noise and Vibration Management Plan, as certified through the DCO:

- Section 1.4: Management measures
- Section 1.6: Construction working hours
- Section 1.7: Monitoring.

1.1.3.4 The measures within this outline management plan are in accordance with best practice and are appropriate to manage the impacts associated with onshore site preparation works.

1.2 Roles and responsibilities

1.2.1 Overview

1.2.1.1 The key roles and associated responsibilities with regard to this Outline Construction Noise and Vibration Management Plan are set out below. The Construction (Design and Management) Regulations 2015 also identify the legal duties, responsibilities and obligations of all the major roles within the construction team.

1.2.1.2 The responsibilities of each role will be refined in the detailed Construction Noise and Vibration Management Plans.

1.2.2 Applicants

1.2.2.1 The Applicants will be responsible for the following:

- Ensuring that the Outline Construction Noise and Vibration Management Plan is implemented effectively
- Giving necessary direction to contractors (for example, setting contractual obligations)
- Preparing the detailed Construction Noise and Vibration Management Plans and undertaking reviews and refining the Construction Noise and

Vibration Management Plans (where necessary) in conjunction with the Principal Contractors.

1.2.3 Principal Contractors

1.2.3.1 Section 72 of the Control of Pollution Act (CoPA) highlights that contractors are required to adopt best practicable means to minimise noise disturbance. Principal Contractors will be appointed by the Morgan OWF and Morecambe OWF and have the overall responsibility for:

- Delivering the outline and detailed Construction Noise and Vibration Management Plans on behalf of the Applicants
- Ensuring all procedures in the outline and detailed Construction Noise and Vibration Management Plans are followed
- Ensuring all contractors are suitably qualified and experienced in implementing the measures within the outline and detailed Construction Noise and Vibration Management Plans
- Ensuring that all legal and contractual requirements relating to the outline and detailed Construction Noise and Vibration Management Plans are met by ensuring adequate plans/procedures, licences and certificates are in place, and that they can be achieved
- Establish procedures for the regular review and recording of the quality of the works as part of its Quality Management System
- Maintain records relevant to the outline and detailed Construction Noise and Vibration Management Plans.

1.2.4 Contractors/Subcontractors

1.2.4.1 Contractors and subcontractors will be required to understand their responsibilities and implement the measures within the outline and detailed Construction Noise and Vibration Management Plans.

1.3 Regulatory framework and guidance

1.3.1.1 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.

1.3.1.2 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.

1.3.1.3 The Applicants and any Contractor(s) (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).

1.4 Management measures

1.4.1 Selection of measures

1.4.1.1 This section sets out the general and specific construction noise and vibration mitigation measures that will be implemented by the Applicants.

1.4.1.2 This Outline Construction Noise and Vibration Management Plan includes general measures to mitigate noise and vibration impacts from onshore site preparation works and construction activities. The Plan also includes examples of noise control measures that can be applied to specific construction activities. These measures will be defined as the detailed design progresses and will be agreed with the relevant authority via the detailed Construction Noise and Vibration Management Plan. Examples of these mitigation measures and an indication of the noise reduction they may provide, are given in Table 1.1 below.

Table 1.1: Example noise control mitigation measures

Mitigation Measure	Indicative Noise Level Reduction	Justification for indicative noise level reduction
Localised acoustic screening, including earth bunds, partially reducing the line of sight between noise source and receiver	Up to 5 dB(A)	Section F.2.2.2 of BS 5228:2009+A1:2014 states: *'if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver'.*
Localised acoustic screening, including earth bunds, preventing any line of sight between noise source and receiver	Up to 10 dB(A)	
Fitting more efficient exhaust sound reduction equipment to earth moving plant	5 to 10 dB(A)	Table B.1 of BS 5228:2009+A1:2014

Mitigation Measure	Indicative Noise Level Reduction	Justification for indicative noise level reduction
Enclose breakers and rock drills in portable or fixed acoustic enclosures with suitable ventilation	Up to 20 dB(A)	Table B.1 of BS 5228:2009+A1:2014
Use rotary drills and boring plant inside acoustic shed with adequate ventilation	Up to 15 dB(A)	Table B.1 of BS 5228:2009+A1:2014
Reduction of simultaneous use of plant	Up to 3 dB(A)	Halving the amount of plant being utilised simultaneously thus halving the sound energy being generated could provide a 3 dB reduction.
Re-positioning plant as far away from noise sensitive receptors as reasonably practicable	Up to 6 dB(A)	Doubling the distance between a noise source and a receiver can provide up to a 6 dB reduction.
Limiting the number of plant operating at night to essential equipment as far as reasonably practicable	Up to 3 dB(A)	Reducing the quantity of plant operating simultaneously at night-time will reduce the overall construction noise level at the receptor. As an example, halving the amount of plant being utilised simultaneously, thus halving the sound energy being generated, could provide a 3 dB reduction.
Limiting or eliminating certain works during more sensitive periods	Varies	Would depend on what works/plant was limited or eliminated.
Use of electric or hybrid construction plant	Varies	Dependent on item of plant.

1.4.2 General noise and vibration management

1.4.2.1 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 (REP3-018)).
- 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 (REP3-020)).
- 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 (REP2-016)) 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.

1.4.3 Erection of physical barriers

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

1.4.3.2 Appropriate barrier locations will be identified by the Applicants in consultation with the relevant planning 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.

1.4.3.3 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.

1.4.3.4 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.

1.5 Construction vibration

1.5.1.1 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.

1.5.1.2 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 1.2**.

Table 1.2: 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.

1.5.1.3 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.

1.5.1.4 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.

1.6 Construction working hours

1.6.1.1 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 (REP-018)) which will be secured as a requirement of the DCO.

1.6.1.2 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 and these are summarised in **Table 1.3** and **Table 1.4** below.

Table 1.3: Construction time period – LOAEL

Time Period	LOAEL
Weekdays (07:00-19:00 hours) Saturdays (07:00-13:00 hours)	Baseline sound levels, $L_{Aeq,T}$
Saturdays (13:00-19:00 hours) Evenings (19:00-23:00 hours) Sundays (07:00-23:00 hours)	
Night (23:00-07:00 hours)	

Table 1.4: Construction time period – SOAEL

Time Period	SOAEL – Category A[1] ($L_{Aeq,T}$)	SOAEL – Category B[2] ($L_{Aeq,T}$)	SOAEL – Category C[3] ($L_{Aeq,T}$)
Time Period: Weekdays (07:00- 19:00) Saturdays (07:00-13:00)	65	70	75
Time Period: Saturdays (13:00-19:00) Evenings (19:00-23:00) Sundays (07:00-23:00)	55	60	60
Time Period: Night (23:00-07:00)	45	50	55

[1] SOAEL where baseline noise level is below this value when rounded to the nearest 5 dB
[2] SOAEL where baseline noise level is equal to this value when rounded to the nearest 5 dB
[3] SOAEL where baseline noise level is above this value when rounded to the nearest 5 dB

All SOAEL levels are described as free field levels

1.6.1.3 Construction noise will be controlled to levels below the SOAEL by adopting the measures outlined in **section 1.4.1** and will be minimised to below the LOAEL, where reasonably practicable.

1.6.1.4 Requirement 14(2)(h) of Schedules 2A and 2B of the draft DCO allows mobilisation activities to be undertaken during the hours 0600 to 0700 and 1900 to 2000 (Monday to Friday) and 1300 to 1400 (on Saturdays).

1.6.1.5 These mobilisation activities are set out in Requirement 14(6)(a) and includes the following:

- personnel briefings, inspections, tool-box talks, inductions, health and safety works, deliveries (excluding heavy good vehicle movements), movement to place of work, general preparation and site maintenance work but does not include operation of heavy machinery or operation of generators or flood lights.

1.6.1.6 Noise levels from mobilisation activities will not exceed the relevant threshold values for these periods as set out in Table E.1 BS 5228-1:2009+A1:2014, replicated in Table 1.4 above, at any noise sensitive receptor.

1.7 Monitoring

1.7.1.1 The noise and vibration mitigation measures will be monitored by the Principal Contractors throughout the construction phase, and regular audits of the construction work areas will be undertaken. .

1.7.1.2 Construction noise monitoring will be undertaken at noise sensitive receptors. The locations at which construction noise levels will be measured during the Project and their durations will be set out in the detailed Construction Noise and Vibration Management Plans that will be approved by the relevant planning authority.

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

1.7.1.4 Further details of the approach to monitoring, audit and remedial actions will be developed during the detailed design phase and included in the detailed Construction Noise and Vibration Management Plan for approval by the relevant planning authority.

1.8 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