Awel y Môr Offshore Wind Farm

Outline Code of Construction Practice

Appendix 2, Outline Noise and Vibration Management Plan

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Abbreviations and acronyms

TERM	DEFINITION
CEMP	Construction Environmental Management Plan
CMS	Construction Method Statement
CoCP	Code of Construction Practice
DCO	Development Consent Order
ECC	Export Cable Corridor
ECoW	Ecological Clerk of Works
ES	Environmental Statement
HDD	Horizontal directional drilling
NVMP	Noise and Vibration Management Plan
NRW	Natural Resources Wales
OWF	Offshore Wind Farm
WTGs	Wind turbine generators

1 Introduction

1.1 Purpose of this Outline NVMP

1 This Outline Noise and Vibration Management Plan (NVMP) is provided as Appendix 2 to the Outline Onshore Code of Construction Practice (CoCP) (Volume 8, Document 8.3 (application ref: 8.3)) as part of the Environmental Statement (ES).

2 This is an outline document that, by reference to the assessments reported in the ES, sets out the key elements that will be secured in the detailed NVMP which Awel y Môr Offshore Wind Farm Limited (The Applicant) will be required to submit to Denbighshire County Council (DCC) for approval under a requirement of the Development Consent Order (DCO).

3 This Outline NVMP sets out the noise and environment management techniques which may (subject to the final design of the proposed project) be implemented by the Applicant and its contractors during the construction of the onshore works and should be read in conjunction with the Outline CoCP, its supporting appendices, and the assessment of AyM construction noise which is provided in Chapter 3, Volume 10: Airborne Noise and Vibration (application ref: 6.3.10).

1.2 Scope of this Outline NVMP

4 For the avoidance of doubt, this Outline NVMP relates to the onshore elements of the Awel y Môr offshore windfarm (AyM) only (i.e. landward of Mean High Water Springs). This document does not relate to offshore works seaward of Mean High Water Springs that are principally marine activities.

2 Objectives and Policy

2.1 Objectives

5 Construction activity by its very nature can generate adverse noise and vibration impacts on noise sensitive receptors in close proximity to the development site. In particular, noise and vibration associated with construction plant and drilling equipment are potential sources for adverse noise and vibration effects.

6 The landfall, other trenchless work (such as horizontal directional drilling (HDD)), sites, the onshore substation (OnSS), and the onshore export cable corridor (ECC) are located in rural areas. Baseline noise levels at the noise sensitive receptors potentially affected by the project have been measured as low, except where the receptors are in close proximity to existing highway infrastructure.

7 The principal contractor's objective will be to control and limit noise and vibration levels, so far as is reasonably practicable and to minimise disturbance to sensitive receptors.

2.2 Policy

8 Key control measures will be derived from the following legislation/standards:

- BS5228 - 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' - Part 1: Noise and Part 2: Vibration'
- Environmental Protection Act 1990;
- Control of Pollution Act 1974; and
- Noise and Statutory Nuisance Act 1993.

9 The main objectives with regard to managing construction noise are to:

- Comply with relevant legislation and standards relating to construction noise and the requirements of the DCO; and
- To control and limit noise and vibration levels, so far as is reasonably practicable and to minimise disturbance to residents and sensitive receptors.

10 For the purposes of assessing impacts associated with construction induced vibration, the guidance within BS5228 has been used to derive reasonable limits. Where vibration levels are predicted to exceed 'just perceptible' levels, appropriate mitigation measures would need to be introduced to control the effects.

3 Management Measures

3.1 Selection of Measures

11 This section sets out the selection of general and specific noise and vibration mitigation measures which will be deployed by the Applicant, in respect of the onshore works associated with AyM.

12 The extent to which any or all of the measures are contained within the final NVMP approved by DCC for any specific stage or stages of such works will be subject to further consultation between the Applicant and DCC. Consultation will be undertaken on the preliminary design at this stage, with final measures defined against the detailed design which will be available post-consent.

13 During the detailed design, mitigation measures will be specified (and agreed with DCC through approval of the final NVMP. These measures will relate to the specifics of the detailed design, and so cannot be accurately included in the outline NVMP at this stage. However, examples of what these mitigation measures may be, and an indication of how much mitigation they may provide, are given in Table 1 below.

Table 1: Potential detailed design mitigation measures relating to noise and vibration

MITIGATION MEASURE	INDICATIVE NOISE LEVEL REDUCTION	JUSTIFICATION FOR INDICATIVE NOISE LEVEL REDUCTION
Localised acoustic screening providing partial line of sight between noise source and receiver	Up to 5 dB(A)	Section F.2.2.2 of BS5228:2009+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*
Localised acoustic screening preventing any line of sight between noise source and receiver	Up to 10 dB(A)	

MITIGATION MEASURE	INDICATIVE NOISE LEVEL REDUCTION	JUSTIFICATION FOR INDICATIVE NOISE LEVEL REDUCTION
		the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver'
Fitting more efficient exhaust sound reduction equipment to earth moving plant	5 to 10 dB(A)	Table B.1 of BS5228:2009+A1:2014
Enclose breakers and rock drills in portable or fixed acoustic enclosures with suitable ventilation	Up to 20 dB(A)	Table B.1 of BS5228:2009+A1:2014
Use rotary drills and boring plant inside acoustic shed with adequate ventilation	Up to 15 dB(A)	Table B.1 of BS5228:2009+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 3dB reduction.
Re-positioning plant as far away from NSRs as reasonably practicable	Up to 6 dB(A)	Doubling the distance between a noise source and a receiver can provide up to a 6dB reduction.
Not using particularly noisy items of plant pieces at night as far as reasonably practicable	Up to 3 dB(A)	Halving the amount of plant being utilised simultaneously, thus halving the sound

MITIGATION MEASURE	INDICATIVE NOISE LEVEL REDUCTION	JUSTIFICATION FOR INDICATIVE NOISE LEVEL REDUCTION
		energy being generated, could provide a 3dB 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	Dependant on item of plant.

3.2 General Noise and Vibration Management

14 Construction works will be undertaken in accordance with the best practicable means (as defined in Section 72 of the Control of Pollution Act 1974) to minimise noise and vibration effects. Noise control measures will be consistent with the recommendations of the current version of BS 5228 - Part 1: Noise and Part 2: Vibration. Construction contractors would carry out the works in a manner which seeks to minimise noise and vibration wherever feasible, taking account of statutory requirements and legislation. These measures may include:

- There will be a preference for the use of plant fitted with effective silencers and noise insulation. Where possible, works will limit the use of particularly noisy plant at certain times, i.e. do not use particularly noisy plant early in the morning.
- The number of plant items in use at any one time will be limited, where practicable.
- Plant maintenance operations will be undertaken as far away from noise-sensitive receptors as is practicable.
- The works will be phased, where practicable, to maximise the benefit from perimeter structures.
- Any compressors brought on to site will be silenced or sound reduced models fitted with acoustic enclosures.

- The speed of vehicle movements will be limited to below 15 miles per hour.
- Operations will be designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors where practicable.
- The use of pink noise reversing alarms that produce a "static" sound as opposed to a beep will be used where reasonably practicable to reduce the noise generated by reversing bleepers on site vehicles.
- Construction plant will be regularly serviced and 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.
- The use of local noise screening or site hoardings to reduce noise where necessary.
- 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.
- Local residents will be kept informed of construction activities, including working hours through measures set out in the Construction Communications Plan (an outline version of this document is provided in Appendix 12 of the CoCP (application ref; 8.13.12)).
- All reasonable steps will be taken to limit the number of vehicles waiting to deliver materials to the proposed development.
- Construction which would be closest to nearby residential receptors will be undertaken as efficiently and quickly as reasonably possible.
- With the exception of generators, pumps and electric plant, all plant and equipment would be expected to be shut down when not in use.

15 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, and the avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment. Construction contractors will adhere to the codes of practice for construction working set out in BS 5228 'Code of Practice for noise and vibration control on construction and open sites' insofar as these are reasonably practicable and applicable to the construction works.

3.3 Erection of Physical Barriers

16 To minimise the effects of construction noise at the nearest receptors, temporary noise barriers may be required at appropriate locations. The barriers would be located to ensure that an enhanced level of noise attenuation is provided to the most sensitive receptors.

17 The barrier locations would be defined by the Applicant in consultation with DCC taking into account the methods of construction to be used (those methods being detailed within the Outline Construction Method Statement; which forms Appendix 1 to the Outline Onshore CoCP (application ref: 8.3.1)). In particular:

- Where required temporary noise barriers will be constructed prior to the site preparation of the temporary construction compound or cable route and will remain in place until the site preparation phase is completed.
- Temporary noise barriers, where required, will be installed around works areas or equipment in order to provide screening for sources located at low heights (note however that it is likely to be impractical to provide noise barriers that are high enough to screen the entire horizontal directional drill (HDD) drilling rig (or other drilling rigs associated with trenchless techniques).

18 Consideration will be given to the potential effect of noise reflection from acoustic barriers impacting upon other receptors.

3.4 Vibration from percussive piling (if required)

19 BS5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration* gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/ operations generate significant vibration levels.

20 The majority of people are known to be very sensitive to vibration, the threshold of perception being 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. BS5228-2:2009+A1:2014 provides guidance on the effects of vibration shown in Table 2.

Table 2: Risk of complaints from vibration levels

VIBRATION LEVEL, 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.

21 At this stage in the AyM development process, decisions on exact locations of infrastructure and the precise technologies and construction methods that will be employed have not been made. This includes the requirement for percussive piling during construction as well as the type of piler and ram weight (if required). These will be determined during detailed design that will take place between a decision on the application for development consent and the start of construction.

22 It is anticipated that the PPV levels from piling operations would be below 1.0 mm/s at the nearest vibration sensitive receptors to the cofferdam and OnSS, and that percussive piling works would only take place during the daytime period. The Final NVMP will include predictions for PPV arising from percussive piling operations that will be informed by detailed design, for approval by DCC in advance of any percussive piling taking place.

3.5 Construction Working Hours

23 The principal contractor shall only undertake construction activities associated with the project in accordance with the controls on working hours as stated in the Final CoCP unless agreed in advance with DCC.

3.6 Notifications

24 Some discrete aspects of construction activity may give rise to greater noise levels at nearby properties.

25 Local residents considered to be significantly affected by noise from HDD (or other trenchless techniques) works will be kept informed of the likely period during which the work will take place, the times and durations of planned works and the measures that are being taken to avoid unnecessary noise through measures set out in the Construction Communications Plan (an outline version of this document is provided in Appendix 12 of the CoCP (application ref; 8.13.12)).

26 On completion of the trenchless works at a particular location, local residents will be informed that the works are complete and noise impacts due to trenchless works will cease.

3.7 Monitoring

27 The mitigation measures will be monitored by the Applicant throughout the construction phase. If nonconformity with any of the mitigation measures is identified, it will be recorded during a site audit and appropriate remedial actions will be implemented.

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