Outer Dowsing Offshore Wind

Outline Noise and Vibration Management Plan

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OUTER DOWSING OFFSHORE WIND

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Abbreviations

Acronym	Expanded name
CoCP	Code of Construction Practice
DCO	Development Consent Order
ECC	Export Cable Corridor
GT R4 Ltd	The Applicant making the application for a DCO. The Applicant is GTR4 Limited (a joint venture between Corio Generation and TotalEnergies), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company) and TotalEnergies.
LCC	Lincolnshire County Council
MLWS	Mean Low Water Springs
NVMP	Noise and Vibration Management Plan
NSR	Noise Sensitive Receptor
NVMP	Noise and Vibration Management Plan
OnSS	Onshore Substation
PEIR	Preliminary Environmental Impact Report
PPV	Peak Particle Velocity

Terminology

Term	Definition
Baseline	The status of the environment at the time of assessment without the development in place.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
Haul Road	The track within the onshore ECC which the construction traffic would use to facilitate construction.
Mitigation	Mitigation measures, or commitments, are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which the export cable running from the landfall to the onshore substation will be situated.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.

Term	Definition
Onshore substation (OnSS)	The Project's onshore substation, containing electrical equipment to enable connection to the National Grid
Preliminary Environmental Information Report (PEIR)	The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.

Units

Term	Definition
Decibel (dB)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies
L_{Aeq}	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, that would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{10} & L_{90}	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may

Term	Definition
	have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
PPV	Peak Particle Velocity - Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far from the equilibrium position that something moves), velocity (how fast something moves), or acceleration (the rate of change of velocity). Standards for the assessment of building damage are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV) in mms^{-1}.
hr	Hour
km	Kilometre
m	Metre
mms^{-1}	Millimetres per second
mph	Miles Per Hour
km/h	Kilometres Per Hour
ms^{-1}	Metres per second

1 Introduction

1.1 Purpose of this Outline Noise and Vibration Management Plan

1.1.1 This Outline Noise and Vibration Management Plan (NVMP) (document reference 8.1.1) is provided, a supplementary document to the Preliminary Environmental Impact Report (PEIR), for Outer Dowsing Offshore Wind (the Project). This document will form part of the Outline Onshore Code of Construction Practice (CoCP) to be submitted at DCO Application.

1.1.2 GT R4 Limited ("the Applicant") is proposing to develop the Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall, and connection to the electricity transmission network (see Volume 1, Chapter 3: Project Description for full details).

1.1.3 This is an outline document that, by reference to the assessments reported in the PEIR, sets out the key elements that will be secured in the detailed NVMP which the Applicant will be required to submit to Lincolnshire County Council (LCC) for approval.

1.1.4 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. This should be read in conjunction with the CoCP to be produced for DCO Application, its supporting appendices, and the assessment of the Project construction noise (Volume 1, Chapter 26: Noise and Vibration).

Scope of this Outline Noise and Vibration Management Plan

1.1.5 This Outline NVMP relates to the onshore elements of the Project only (i.e., landward of Mean Low Water Springs (MLWS)). This document does not relate to offshore works seaward of MLWS that are principally marine activities.

Objectives

1.1.6 Construction activity by its very nature can generate adverse noise and vibration impacts on noise sensitive receptors (NSRs) 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.

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

1.1.8 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.

1.2 Statutory and Policy Context

1.2.1 The relevant legislation and planning policy for offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to noise and vibrations are outlined in Table 1.

Table 1: Legislation and policy context

Legislation/policy	Key provisions
BS 5228 *'Code of Practice for Noise and Vibration Control on Construction and Open Sites'* - Part 1: Noise and Part 2: Vibration	Provides guidance on how to manage and mitigate noise emanating from construction and open sites, as well as methods for calculation and assessment.
Environmental Protection Act 1990 (EPA)	Part III of the EPA provides powers for Local authorities to issue abatement notices where a statutory nuisance exists.
Control of Pollution Act 1974 (CoPA)	Sections 60 and 61 of Part III of the CoPA provide powers to Local authorities for controlling noise from construction activities.

1.2.2 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 Development Consent Order (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.

1.2.3 For the purposes of assessing impacts associated with construction induced vibration, the guidance within BS 5228 has been used to derive reasonable limits. Where vibration levels are predicted to exceed 'just perceptible' levels, appropriate mitigation measures may need to be introduced to control the effects.

1.3 Management Measures

Selection of Measures

1.3.1 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 the Project.

1.3.2 The extent to which any or all of the measures are contained within the final NVMP approved by LCC for any specific stage or stages of such works will be subject to further consultation between the Applicant and LCC. 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.

1.3.3 During the detailed design, mitigation measures will be specified (and agreed with LCC 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 2 below.

Table 2: 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 5dB(A)	Section F.2.2.2 of BS 5228-1:2009+A1:2014 states: *'if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5dB 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 preventing any line of sight between noise source and receiver	Up to 10dB(A)	
Fitting more efficient exhaust sound reduction equipment to earth moving plant	5 to 10dB(A)	Table B.1 of BS 5228-1:2009+A1:2014
Enclose breakers and rock drills in portable or fixed acoustic enclosures with suitable ventilation	Up to 20dB(A)	Table B.1 of BS 5228-1:2009+A1:2014
Use rotary drills and boring plant inside acoustic shed with adequate ventilation	Up to 15dB(A)	Table B.1 of BS 5228-1:2009+A1:2014
Reduction of simultaneous use of plant	Up to 3dB(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 Noise Sensitive Receptors (NSR) as reasonably practicable	Up to 6dB(A)	Doubling the distance between a noise source and a receiver can provide up to a 6 dB reduction.
Not using particularly noisy items of plant pieces at night as far as reasonably practicable	Up to 3dB(A)	Halving the amount of plant being utilised simultaneously, thus halving the sound 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.

General Noise and Vibration Management

1.3.4 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;
- Where feasible, HGV deliveries of consumables shall be scheduled to avoid contributing at peak noise periods;
- Access routes, particularly for HGV and construction plant, shall be routed where possible to minimise proximity to NSRs;
- Construction of scopes such as the Onshore Substation shall favour designs that eliminate noisy construction methods."
- Plant maintenance operations will be undertaken as far away from NSRs as is practicable;
- The works will be phased, where practicable, to maximise the benefit from perimeter structures;
- There will be a preference for compressors brought on to site to be silenced or sound reduced models fitted with acoustic enclosures;
- The speed of vehicle movements being limited to below 15miles per hour on unbound haul roads and/or trackway;
- Operations will be designed to be undertaken with any directional noise emissions pointing away from NSRs 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;
- 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; and
- With the exception of generators, pumps and electric plant, all plant and equipment would be expected to be shut down when not in use.

1.3.5 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.

Erection of Acoustic Screening

1.3.6 To minimise the effects of construction noise at the nearest receptors, acoustic screening may be required at appropriate locations. Acoustic screening may take the form of either bunding or temporary noise barriers as required. Where acoustic screening is used, it would be located to ensure that an enhanced level of noise attenuation is provided to the most sensitive receptors.

1.3.7 Locations would be defined by the Applicant, in consultation with LCC, taking into account the methods of construction to be used. A Construction Method Statement will be drafted for inclusion as part of the DCO Application, which will include methods such as:

- Where required temporary noise barriers will be constructed prior to the site preparation of the temporary construction compound or onshore ECC 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 trenchless drilling rig); and
- Consideration will be given to the potential effect of noise reflection from acoustic barriers impacting upon other receptors.

Vibration from Percussive Piling (if required)

1.3.8 BS 5228:2009+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.

1.3.9 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 0.14mms^{-1} and 0.30mms^{-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 3.

Table 3: 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.

1.3.10 At this stage in the Project development process, the exact location of infrastructure and the precise technologies and construction methods that will be employed are not yet defined. 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.

1.3.11 It is anticipated that the PPV levels from piling operations would be below $1.0mms^{-1}$ at the nearest vibration sensitive receptors to the 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 LCC in advance of any percussive piling taking place.

Construction Working Hours

1.3.12 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 LCC.

Notifications

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

1.3.14 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.

Monitoring

1.3.15 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.

1.4 Pre-Commencement

1.4.1 The aspects of this outline NVMP that will be adhered to in carrying out 'pre-commencement' activities (where relevant to those activities), are as follows:

- Selection of Measures (as set out in section 1.3);

- General Noise and Vibration Management (as set out in section 1.3); and
- Monitoring (as set out in section 1.3).