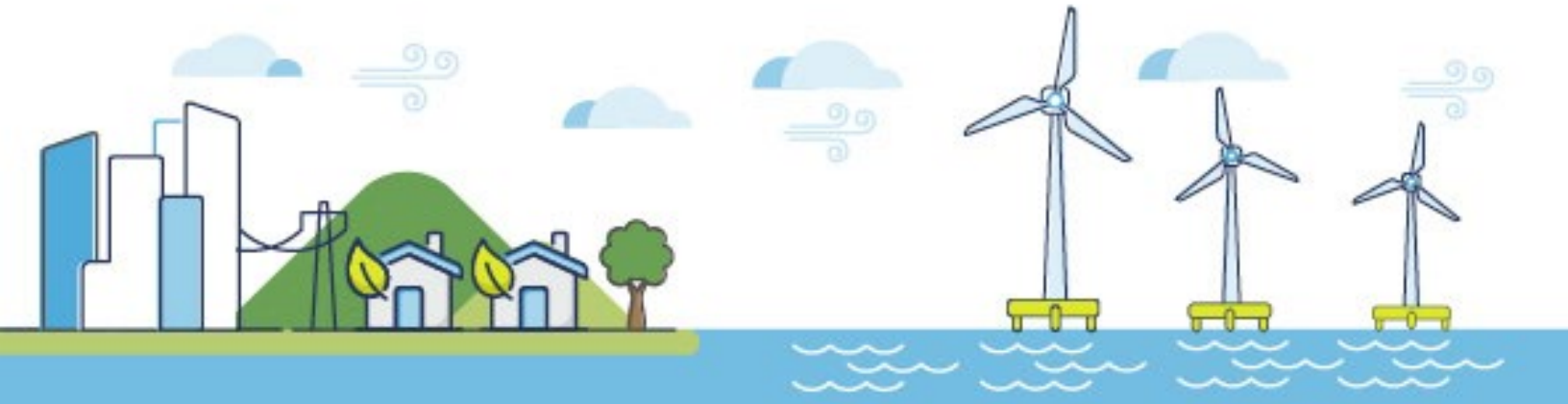
WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Chapter 21: Noise and Vibration



Document Code:	FLO-WHI-REP-0002-21	
Contractor Document Number:	PC2978-RHD-ZZ-XX-RP-Z-0161	
Version Number:	0	
Date:	*Issue Date 10/03/2023*	
Prepared by:	DD	*Electronic Signature*
Checked by:	TB	*Electronic Signature*
Owned by:	CB	*Electronic Signature*
Approved by Client :	AP	*Electronic Signature*

Version Number	Reason for Issue / Major Changes	Date of Change
0	For issue	10/03/2023

Table of Contents

Table of Tables

Glossary of Acronyms

Acronym	Definition
AfL	Agreement for Lease
AAWT	Annual Average Weekday Traffic
BEIS	Department for Business, Energy and Industrial Strategy
BPM	Best Practicable Means
BS	British standard
CCW	Countryside Council for Wales
CEMP	Construction Environmental Management Plan
CRTN	Calculation of Road Traffic Noise
dB	Decibel
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicles
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
ISO	International Standards Organisation
km	Kilometre
Km2	Square kilometre
L_p **L_{pA} (or L_A)** **L_{AF}, L_{AS}**	The instantaneous sound pressure level (L_p) The A-weighted instantaneous sound pressure level (L_{pA} or L_A) This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant). The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max} **L_{Amax}** **L_{AFmax}** **L_{min} , L_{Fmin}**	The maximum instantaneous sound pressure level (L_{max}), The A-weighted maximum instantaneous sound pressure level (L_{Amax}) The A-weighted maximum instantaneous sound pressure level with a FAST time constant (L_{AFmax}). This is the highest instantaneous sound pressure level reached during a measurement period. The opposite of the L_{max} is the minimum instantaneous sound pressure

Acronym	Definition
	level or L_{min} etc. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{N,T}$ **$L_{AN,T}$ $L_{AFN,T}$** **N = %age value, 0-100** **T = measurement time** **e.g. L_{A90}, L_{A10}, $L_{AF90, 5\ min}$**	The percentage exceedance sound pressure level ($L_{N,T}$), The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), The A-weighted percentage exceedance sound pressure level with a FAST time constant ($L_{AFN,T}$). This is the sound pressure level exceeded for N% of the time T. e.g. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = x dB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$ **$L_{Aeq,T}$** **T = measurement time eg.** **$L_{Aeq,5min}$**	The equivalent continuous sound pressure level over period T ($L_{eq,T}$), The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$). This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the Leq is not a simple arithmetic mean value. The Leq is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation
LOAEL	Lowest Observable Adverse Effect Level
MHWS	Mean High-Water Springs
MMO	Marine Management Organisation
MW	Megawatts
NAC	Noise Advisory Council
NE	Natural England
NNG	Noise Advisory Council
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	The National Planning Practice Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NVSR	Noise and Vibration Sensitive Receptors
OFTO	Offshore Transmission Owner (OFTO)
OWL	Offshore Wind Ltd
PDE	Project Design Envelope
PINS	Planning Inspectorate

Acronym	Definition
PPG	Planning Practice Guidance
PRoW	Public Right of Way
SOAEL	Significant Observed Adverse Effect Level
UK	United Kingdom
WHO	World Health Organisation
WTG	Wind Turbine Generator

Glossary of Terminology

Defined Term	Description
Agreement for Lease	An Agreement for Lease (AfL) is a non-binding agreement between a landlord and prospective tenant to grant and/or to accept a lease in the future. The AfL only gives the option to investigate a site for potential development. There is no obligation on the developer to execute a lease if they do not wish to.
Applicant	Offshore Wind Limited
A-weighting L_A or L_{pA}, L_{WA}, **similar – C-weighting L_C or L_{pC}, L_{WC}**	An electronic filter which is equal to the frequency sensitivity of the human ear. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all. Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would hear. When considering impacts on humans, it is therefore often necessary to apply an A-weighting to the measured sound frequency spectrum. When A-weighted, the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}. The response of the human ear varies depending on how loud the sound is. A-weighting matches the response of a sound level meter to human hearing at low levels (~ 40-90 dB). For higher levels there are other weightings, the most common of which is the C-weighting.
Cumulative effects	The effect of the Project taken together with similar effects from a number of different projects, on the same single receptor/resource. Cumulative effects are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Decibels dB	A logarithmic ratio of two values of a variable. The decibel is not a true measurement unit nor is it exclusive to acoustics. Decibels are used because they can represent very wide ranges of ratios (from trillionths and billionths to billions and trillions) with a small range of decibel values. Decibels can be used to represent measured values by using a known reference value in the ratio. When using decibels to measure something it is therefore important to specify what variable is being measured and what reference level has been used. This is done by adding a reference value statement in the form "dB re x units", where the units indicate the variable being measured and x is the reference value. Decibels are used in acoustics because the human ear responds to sound pressure in a logarithmic way and the quantities measured in acoustics vary over wide ranges. As the decibel is used in acoustics to represent a range of sound level parameters, there is a standardised notation system. This takes the form of an italic capital letter 'L' (referring to 'level') and subscript characters which give specific details of what is being represented. Because decibels are logarithmic, they must be added, subtracted, multiplied, divided and averaged using different techniques from normal numbers.

Defined Term	Description
Department for Business, Energy and Industrial Strategy (BEIS)	Government department that is responsible for business, industrial strategy, science and innovation and energy and climate change policy and consent under Section 36 of the Electricity Act.
Environmental Impact Assessment (EIA)	Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Export Cable Corridor	The area in which the export cables will be laid, either from the Offshore Substation or the inter-array cable junction box (if no offshore substation), to the NG Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
Inter-array cables	Cables which link the wind turbines to each other and the Offshore Substation Platform, or at the inter-array cables junction box (if no offshore substation). Array cables will connect the wind turbines to one and other and to the Offshore Substation (if utilised). The initial section for the inter-array cables will be freely suspended in the water column below the substructure (dynamic sections) while the on seabed sections of the cables will be buried where possible.
Jointing bay	Underground structures constructed at regular intervals along the Onshore Export Cable Corridor to join sections of cable and facilitate installation of the cables into the buried ducts
Landfall	Where the offshore export cables come ashore
Level	Values measured in decibels
Mean high water springs	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean low water springs	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Mitigation	Mitigation measures have been proposed where the assessment identifies that an aspect of the development is likely to give rise to significant environmental impacts, and discussed with the relevant authorities and stakeholders in order to avoid, prevent or reduce impacts to acceptable levels. For the purposes of the EIA, two types of mitigation are defined: • Embedded mitigation: consisting of mitigation measures that are identified and adopted as part of the evolution of the project design, and form part of the project design that is assessed in the EIA • Additional mitigation: consisting of mitigation measures that are identified during the EIA process specifically to reduce or eliminate any predicted significant impacts. Additional mitigation is therefore subsequently

Defined Term	Description
	adopted by OWL as the EIA process progresses.
National Grid Onshore Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of the electrical transformers.
National Grid Connection Point	The point at which the White Cross Offshore Windfarm connects into the distribution network at East Yelland substation and the distributed electricity network. From East Yelland substation electricity is transmitted to Alverdiscott where it enters the national transmission network.
Noise	No strict definition and is often used interchangeably with sound however it is usually taken to mean unwanted sound
Offshore Development Area	The Windfarm Site (including wind turbine generators, substructures, mooring lines, seabed anchors, inter-array cables and Offshore Substation Platform (as applicable)) and Offshore Export Cable Corridor to MHWS at the Landfall. This encompasses the part of the project that is the focus of this application and Environmental Statement and the parts of the project consented under Section 36 of the Electricity Act and the Marine and Coastal Access Act 2009
Offshore Export Cables	The cables which bring electricity from the Offshore Substation Platform or the inter-array cables junction box to the Landfall
Offshore Export Cable Corridor	The proposed offshore area in which the export cables will be laid, from Offshore Substation Platform or the inter-array cable junction box to the Landfall
Offshore Infrastructure	All of the offshore infrastructure including wind turbine generators, substructures, mooring lines, seabed anchors, Offshore Substation Platform and all cable types (export and inter-array). This encompasses the infrastructure that is the focus of this application and Environmental Statement and the parts of the project consented under Section 36 of the Electricity Act and the Marine and Coastal Access Act 2009
the Offshore Project	The Offshore Project for the offshore Section 36 and Marine Licence application includes all elements offshore of MHWS. This includes the infrastructure within the windfarm site (e.g. wind turbine generators, substructures, mooring lines, seabed anchors, inter-array cables and Offshore Substation Platform (as applicable)) and all infrastructure associated with the export cable route and landfall (up to MHWS) including the cables and associated cable protection (if required).
Offshore Substation Platform	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore
Offshore Transmission Owner	An OFTO, appointed in UK by Ofgem (Office of Gas and Electricity Markets), has ownership and responsibility for the transmission assets of an offshore windfarm.
Offshore Wind Limited	Offshore Wind Ltd (OWL) is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy Ltd

Defined Term	Description
Project Design Envelope	A description of the range of possible elements that make up the Project design options under consideration. The Project Design Envelope, or 'Rochdale Envelope' is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact parameters are not yet known but a bounded range of parameters are known for each key project aspect.
Sound	The physical phenomenon of the transmission of energy through gaseous or liquid media via rapid fluctuations in pressure.
Sound Pressure Level L_p	The basic measure of how much sound there is at a given location. It is a measure of the size of the pressure fluctuations in the air that we perceive as sound. Sound Pressure Level is expressed in decibels with a reference level of $20x10^{-6}$ Pa (L_p in dB re 20 µPa)
the Project	The Project is a proposed floating offshore windfarm called White Cross located in the Celtic Sea with a capacity of up to 100 Megawatt (MW). It encompasses the project as a whole i.e. all onshore and offshore infrastructure and activities associated with the Project
Transition joint bay	Underground structures at the Landfall that house the joints between the offshore export cables and the onshore export cables
Weighted	Spectral values have been modified to reflect a frequency sensitivity.
White Cross Offshore Windfarm	Up to 100MW capacity offshore windfarm including associated onshore and offshore infrastructure
White Cross Onshore Substation	A new substation built specifically for the White Cross project. It is required to ensure electrical power produced by the offshore windfarm is compliant with NG electrical requirements at the grid connection point at East Yelland.
Wind Turbine Generators (WTG)	The wind turbine generators convert wind energy into electrical power. Key components include the rotor blades, nacelle (housing for electrical generator and other electrical and control equipment) and tower. The final selection of project wind turbine model will be made post-consent application
Windfarm Site	The area within which the wind turbines, Offshore Substation Platform and inter-array cables will be present
Works completion date	Date at which construction works are deemed to be complete and the windfarm is handed to the operations team. In reality, this may take place over a period of time.

21. Noise and Vibration

21.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the potential noise and vibration impacts of the White Cross Offshore Windfarm Project (the Offshore Project) on human noise and vibration sensitive receptors (NVSRs). Specifically, this chapter considers the potential impact of the Offshore Project seaward of Mean High-Water Springs (MHWS) during its construction, operation and maintenance, and decommissioning phases.

2. The ES has been finalised with due consideration of pre-application consultation to date (see **Chapter 7: Consultation**) and the ES will accompany the application to the Marine Management Organisation (MMO) on behalf of the Secretary of State for Business for The Department for Business, Energy and Industrial Strategy (BEIS) for Section 36 Consent and relevant Marine Licences under Marine and Coastal Access Act (2009).

3. This ES chapter:

    - Presents the existing environmental baseline established from desk studies, and consultation
    - Presents the potential environmental effects on noise and vibration arising from the Offshore Project, based on the information gathered and the analysis and assessments undertaken
    - Identifies any assumptions and limitations encountered in compiling the environmental information
    - Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

21.2 Policy, Legislation and Guidance

4. **Chapter 3: Policy and Legislative Context** describes the wider policy and legislative context for the Offshore Project. The principal policy and legislation used to inform the assessment of potential impacts on noise and vibration for the Offshore Project are outlined in this section.

21.2.1 National Policy Statement

5. The specific assessment requirements for noise and vibration are set out within the overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for

Renewable Energy Infrastructure (EN-3). These documents are in the process of being revised. A draft version of each NPS was published for consultation in September 2021. The specific assessment requirements for noise and vibration, as detailed in the extant and draft versions of each NPS, are summarised in **Table 21.1**. NPSs are statutory documents which set out the government's policy on specific types of Nationally Significant Infrastructure Projects (NSIPs) and are published in accordance with the Planning Act 2008. Although the Offshore Project is not an NSIP, it is recognised that due to its size of up to 100MW and its location in English waters, certain NPS are considered relevant to the Offshore Project and decision-making and are referred to in this ES.

Table 21.1 Summary of NPS EN-1 and EN-3 provisions relevant to Noise and Vibration

Summary	How and where this is considered in the ES

"Where noise impacts are likely to arise, the applicant should include:
• A description of the noise generating aspects of the development proposal leading to noise impacts including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;
• Identification of noise sensitive premises and noise sensitive areas that may be affected;
• The characteristics of the existing noise environment;
• A prediction of how the noise environment will change with the proposed development:
  • In the shorter term such as during the construction period;
  • In the longer term during the operating life of the infrastructure;
  • At particular times of the day, evening and night as appropriate;
• An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and
• Measures to be employed in mitigating noise.
The nature and extent of the noise
	As discussed in **Section 21.3.6**, noise impacts associated with the Offshore Project on offshore human NVSRs are not anticipated. Impacts on onshore human NVSRs will be assessed in the Onshore ES, which will include the information required.

Summary	How and where this is considered in the ES
assessment should be proportionate to the likely noise impact." **- EN-1, paragraph 5.11.4 (materially the same as draft EN-1, paragraph 5.12.4)**	
"The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered." **- EN-1, paragraph 5.11.5 (materially the same as draft EN-1, paragraph 5.12.6)**	As discussed in **Section 21.3.6**, operational noise impacts from ancillary activities associated with the Offshore Project on offshore human NVSRs are not anticipated. Noise impacts from ancillary activities on onshore human NVSRs will be assessed in the Onshore ES.
"Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies." **- EN-1, paragraph 5.11.6 (materially the same as draft EN-1, paragraph 5.12.7)**	As discussed in **Section 21.3.6**, operational noise impacts from the Offshore Project are not anticipated. The current relevant British Standards (BS) applicable for assessment of operational noise impacts are detailed in **Section 21.2.3**, these will be used in the assessment of operational noise impacts on onshore human NVSRs in the onshore ES.
"The applicant should consult [Environment Agency] EA and [Natural England] NE, or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account" **- EN-1, paragraph 5.11.7 (materially the same as draft EN-1, paragraph 5.12.8)**	Noise effects on marine and terrestrial protected species are considered within **Chapter 12: Marine Mammal and Marine Turtle Ecology, Chapter 13: Offshore Ornithology** and **Chapter 20: Onshore Ecology and Ornithology.**
"The Project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise	The embedded mitigation measures described in **Section 21.3.4.1** and proposed mitigation which will be identified in the Onshore ES will demonstrate good design has been adopted.

Summary	How and where this is considered in the ES
barriers to reduce noise transmission." **EN-1, paragraph 5.11.8**	
"A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the [National Planning Policy Framework] NPPF, and the government's associated planning guidance on noise." **- Draft EN-1 paragraph 5.12.9 duplicates EN-1 paragraph 5.11.8 but incorporates this additional text**	Statutory requirements and the quoted policy are not relevant as impacts are scoped out (see **Section 21.3.6**). The Onshore ES will demonstrate that the development is undertaken in accordance with the statutory requirements for noise.
"The IPC [Infrastructure Planning Commission] should not grant development consent unless it is satisfied that the proposals will meet the following aims: • avoid significant adverse impacts on health and quality of life from noise; • mitigate and minimise other adverse impacts on health and quality of life from noise; and • where possible, contribute to improvements to health and quality of life through the effective management and control of noise." **- EN-1, paragraph 5.11.9 (materially the same as draft EN-1, paragraph 5.12.10)**	These aims are met by adoption of the embedded mitigation described in **Section 21.3.4.1** and proposed mitigation which will be identified in the Onshore ES.

21.2.2 National Planning Policy Framework

6. The NPPF (Ministry of Housing, Communities and Local Government, updated July 2021) is the primary source of national planning guidance in England. Sections relevant to this aspect of the ES are summarised below in **Table 21.2**.

Table 21.2 Summary of NPPF Policy relevant to Noise and Vibration

Summary	How and where this is considered in the ES
"Planning policies and decisions should contribute to and enhance the natural and local environment by: e)……preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise	This requirement will be met by adoption of the embedded mitigation described in **Section 21.3.4.1** and proposed mitigation which will be identified in the Onshore ES.

Summary	How and where this is considered in the ES
pollution" **- NPPF paragraph 174**	
"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason" **- NPPF paragraph 185**	These aims will be met by adoption of the embedded mitigation described in **Section 21.3.4.1** and proposed mitigation which will be identified in the Onshore ES.

21.2.3 Other legislation, policy and guidance

7. The Noise Policy Statement for England (NPSE) document was published by Defra in 2010 and paragraph 1.7 states three policy aims:

8. "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

   - Avoid significant adverse impacts on health and quality of life;
   - Mitigate and minimise adverse impacts on health and quality of life; and
   - Where possible, contribute to the improvement of health and quality of life."

9. The Explanatory Note contained within the NPSE introduces the following concepts to aid in the establishment of significant effects:

   - No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established.
   - Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected.
   - Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.

10. The aims of the NPSE can therefore be interpreted as follows (within the context of Government policy on sustainable development):

    - The first aim is to avoid noise levels above the SOAEL.
    - To consider situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

11. The NPSE states: "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations". (Paragraph 2.22, NPSE, March 2010).

12. Furthermore, paragraph 2.22 of the NPSE acknowledges that: "Further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise".

21.2.3.1 National Planning Practice Guidance (NPPG) 2019

13. The NPPG (NPPG, July 2019), states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or making decisions about new development, there may also be opportunities to consider improvements to the acoustic environment. No material changes were made to the 2021 NPPF for noise and no update to the NPPG is expected.

21.2.3.2 BS 4142:2014+A1:2019 – Method for rating and assessing industrial and commercial sound

14. This standard describes a method for rating and assessing sound of an industrial and/or commercial nature. This method uses a *rating level* to assess the likely effects from sound of an industrial or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

21.2.3.3 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: noise

15. Part 1 of BS 5228 provides recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels. It also

provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it.

21.2.3.4 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: vibration

16. Part 2 of BS 5228 gives recommendations for basic methods of vibration control on construction and open sites where work activities generate significant vibration levels. It also provides guidance on predicting and assessing vibration levels from construction and a database of measured vibration levels during piling activities.

21.2.3.5 BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration

17. This standard provides guidance regarding the potential for vibration to result in building damage, including basic principles for carrying out vibration measurements and processing the data. It includes guide values for transient and continuous vibration, above which there is a likelihood of cosmetic damage.

21.2.3.6 BS 7445:2003 Part 1 and BS 7445:1991 Part 2 – Description and measurement of environmental noise

18. Provides details of the instrumentation and measurement techniques to be used when assessing environmental noise and defines the basic noise quantity as the continuous A-weighted sound pressure level (L_{Aeq}). Part 2 of BS 7445 replicates International Standards Organisation (ISO) 1996-2.

21.2.3.7 BS 8233:2014 – Guidance on sound insulation and noise reduction for buildings

19. Provides a methodology to calculate the noise levels entering a building through facades and façade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations and are based on World Health Organisation (WHO) recommendations.

21.2.3.8 Calculation of Road Traffic Noise (CRTN) 1988

20. Provides a method for calculating noise levels from the Annual Average Weekday Traffic (AAWT) flows and from measured noise levels. Since publication in 1988 this document has been the accepted standard for predicting noise levels from road traffic in the UK. The calculation methods take account of variables including percentage of heavy goods vehicles (HGVs), road surfacing, gradient, screening by barriers and relative height of source and receiver.

21.2.3.9 Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, Revision 2

21. LA111 Noise and Vibration provides detailed methodologies for the assessment of construction and operational noise and vibration impacts from major road schemes. It provides guideline significance criteria in terms of both absolute noise and vibration levels (LOAELs and SOAELS for use in relation to the NPSE) and the change in noise levels due to a scheme.

21.2.3.10 A guide to measurement and prediction of the equivalent continuous sound level L_{eq}, report by a working party for the technical sub-committee of the Noise Advisory Council (NAC, 1978)

22. Provides a method for the prediction of road traffic noise levels at 10m from the nearside carriageway edge which is similar to the CRTN methodology. In brief, the methodology requires separate calculations to be undertaken for Light Vehicles/Cars and HGVs. The calculated noise levels are added together to establish the overall noise level for a given link. This method can be used when traffic flows are below the minimum at which CRTN is validated.

21.2.3.11 ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation

23. Specifies an engineering method for calculating the attenuation of sound due to propagation outdoors, enabling prediction of sound levels at a specified distance from a source.

21.2.3.12 WHO (1999) Guidelines for Community Noise

24. These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of particular effects, such as sleep disturbance or annoyance, may increase. The guideline values are 50 or 55dB L_{Aeq} during the day, related to annoyance, and 45dB L_{Aeq} or 60dB L_{Amax} at night, related to sleep disturbance.

25. The Guidance states: "The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. Lower noise levels may be disturbing depending on the nature of the source."

21.2.3.13 WHO (2009) Night Noise Guidelines for Europe

26. These guidelines provide an extension to the WHO Guidelines for Community Noise (1999). Based on evidential review, they conclude that: "Below the level of 30dB $L_{night,outside}$, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40dB $L_{night,outside}$ are harmful to health. However, adverse health effects are observed at levels above 40dB $L_{night,outside}$. Therefore, 40dB $L_{night,outside}$ is equivalent to the LOAEL for night noise."

27. Additionally: "Considering the scientific evidence on the thresholds of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive (2002148/EC), an $L_{night,outside}$ of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. $L_{night,outside}$ value of 55dB is recommended as an interim target for those countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach."

21.2.3.14 WHO (2018) Environmental Noise Guidelines for the European Region

28. The guidance states: "The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. They provide robust public health advice underpinned by evidence, which is essential to drive policy action that will protect communities from the adverse effects of noise."

21.2.3.15 Institute of Environmental Management & Assessment (IEMA), Guidelines for Environmental Noise Impact Assessment (2014)

29. The IEMA 'Guidelines for Environmental Noise Impact Assessment' (IEMA Guidelines) provide guidance on how to undertake a noise impact assessment, with particular focus on the context of an EIA. They describe the process of scoping, defining a baseline, prediction of noise level changes and determination of the significance of the effect. They aim to apply to all types of proposed development.

21.3 Assessment Methodology

21.3.1 Study Area

30. Details of the location of the Offshore Project and the offshore infrastructure are set out within **Chapter 5: Project Description.**

31. The noise and vibration study area is defined by the distance over which impacts on noise and vibration from all the Offshore Project elements (i.e. WTGs, Offshore Export Cable Corridor, Offshore Substation and landfall (up to MWHS)) may occur and by the location of any human NVSRs that may be affected by those potential impacts.

32. The DMRB LA111 states that "*A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors*". On this basis, the assessment of construction noise impacts only extends to NVSRs which are no further than 300m from the Offshore Project.

21.3.2 Approach to Assessment

33. The assessment methodology for noise and vibration differs with that presented in in **Chapter 6: EIA Methodology** and is outlined in the sections below.

21.3.2.1 Impact assessment criteria

34. In general, the potential impacts of noise and vibration in the scope of this assessment can be classified as disturbance to humans and, in the case of vibration, damage to structures.

35. Magnitude of impact criteria depend on the specific noise or vibration impact under assessment. As discussed in **Section 21.3.6**, all potential impacts are scoped out of this assessment; hence, magnitude of impact criteria are not described in this ES. Magnitude of impact criteria for onshore impacts will be described in the Onshore ES.

36. In accordance with the IEMA Guidelines for Environmental Noise Impact Assessment, the sensitivity of receptors to disturbance as a result of noise and vibration effects has been classified. This classification is based on the receptor function, using experience on other projects and professional judgement, as defined in in **Table 21.3**.

Table 21.3 Definition of terms relating to receptor sensitivity

Sensitivity	Definition	Example
High	Receptors where noise or vibration level changes will significantly affect their function.	Certain hospital wards (e.g. operating theatres or high dependency units), recording studios, laboratories with highly vibration sensitive equipment.
Medium	Receptors where noise and/or vibration level changes may cause disturbance, protection is required but some tolerance is expected.	Residential accommodation, private gardens, hospital wards, care homes, schools, libraries, universities, research facilities and national parks (during the day).
Low	Receptors where noise and/or vibration level changes may cause some distraction or disturbance.	Offices, shops (including cafes), outdoor amenity areas during the day (including recreation, public amenity space/play areas), long distance footpaths (including Public Rights of Way (PRoW), dog walking routes, bird watching areas, footpaths and other walking routes, visitor attractions, cycling routes including rural roads), doctor's surgeries, sports facilities where spectator noise is not a normal part of the event and places of worship.
Negligible	Receptors where noise and/or vibration level changes are not expected to be detrimental.	Warehouses, light industry, car parks, and agricultural land.

37. Regarding sensitivity to vibration damage, classification by sensitivity is not considered appropriate or necessary. BS 7385-2, Section 5 'Factors to be considered in building response' states that this depends on "*the type of foundation, underlying ground conditions, the building construction and the state of repair of the building*". In Section 7.5.2 'Important buildings', the standard states that *"Important buildings which are difficult to repair may require special consideration on a case-by-case basis. A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.*"

38. The significance of the effect upon noise and vibration is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 21.4**.

Table 21.4 Significance of an impact - resulting from each combination of receptor sensitivity and the magnitude of the effect upon it

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

21.3.3 Worst-Case Scenario

39. In accordance with the assessment approach to the Project Design Envelope (PDE), or 'Rochdale Envelope', set out in **Chapter 6: EIA Methodology**, the impact assessment for noise and vibration has been undertaken based on a realistic worst-case scenario of predicted impacts. The PDE for the Offshore Project is detailed in **Chapter 5: Project Description**.

40. **Table 21.5** presents the realistic worst-case scenario elements considered for the assessment of noise and vibration.

Table 21.5 Definition of realistic worst-case scenario details relevant to the assessment of impacts in relation to noise and vibration

Impact	Realistic worst-case scenario
Construction	
Construction works causing noise or vibration level increases at sensitive receptors	**Construction duration anticipated to be 28 months**
	Landfall open trenching (up to MHWS) (temporary works) physical parameters: 2 export cables Trench width= 0.5m Length of trenching = 270m Total area of cables = 270m^2
	Duration Open trenching: approximately 2 days
	Landfall trenchless technique (up to MHWS) (temporary works) physical parameters: Trenchless technique length = 500m -1,500m Trenchless technique to include 12 hours / 7 days working where required.
	Duration: Trenchless technique: approximately 32 days
Operation	
None	N/a

Impact	Realistic worst-case scenario
Decommissioning	
Decommissioning works causing noise or vibration level increases at sensitive receptors	No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. The onshore substation will likely be removed and be reused or recycled. It is anticipated that the onshore cable would be decommissioned (de-energised) and either the cables and jointing bays left in situ or removed depending on the requirements for decommissioning approved by the Local Planning Authority. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. For the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.

21.3.4 Summary of Mitigation

21.3.4.1 Embedded Mitigation

41. This section outlines the embedded mitigation relevant to the noise and vibration assessment, which has been incorporated into the design of the Offshore Project (**Table 21.6**). Where other mitigation measures are proposed, these are detailed in the impact assessment

Table 21.6 Embedded mitigation measures relevant to the noise and vibration assessment

Component/Activity	Mitigation embedded into the design of the Offshore Project
Mitigation by site selection	The Offshore Development Area has been defined following an extensive site selection process, which has accounted for environmental, engineering, planning and land requirements to identify an optimal project location. The site selection process is described in detail in **Chapter 4: Site Selection and Assessment of Alternatives**. The site selection process has included consideration of the nearby residential properties and other NVSRs and distances to these have been maximised, particularly in relation to the location of the onshore substation zone.
Construction phase noise and vibration	Commitment to Best Practicable Means (BPM) implemented during the construction phase, detailed in the Construction Environmental

Component/Activity	Mitigation embedded into the design of the Offshore Project
	Management Plan (CEMP). An Outline CEMP for the Offshore Project is provided in **Appendix 5.A**.

21.3.5 Baseline Data Sources

21.3.5.1 Desktop Study

42. A desk study was undertaken to obtain information on noise and vibration. Data were acquired within the study area through a detailed desktop review of existing studies and datasets.

43. The sources of information presented in **Table 21.7** were consulted to inform the noise and vibration assessment.

Table 21.7 Data sources used to inform the noise and vibration assessment

Source	Summary
Google Maps aerial photography	Onshore Noise and Vibration Study Area (2021)
Environment Agency Lidar topographical data	Onshore Noise and Vibration Study Area (2020)
Local Authority Local Plans	Onshore Noise and Vibration Study Area (2008 & 2015)
Ordnance Survey mapping	Onshore Noise and Vibration Study Area (2022)

21.3.6 Scope

44. Upon consideration of the baseline environment, the project description outlined in **Chapter 5: Project Description**, and Scoping Opinion, potential impacts upon noise and vibration have been scoped in or out. These impacts are outlined, together with a justification for why they are or are not considered further, in **Table 21.8**.

45. As mentioned in **Section 21.1**, the scope of this assessment is to consider noise and vibration impacts on human NVSRs. Potential noise and vibration impacts of the Offshore Project on other sensitive receptors are assessed in the following chapters, as relevant:

- **Chapter 12: Marine Mammal and Marine Turtle Ecology**
- **Chapter 13: Offshore Ornithology**
- **Chapter 20: Onshore Ecology and Ornithology**.

46. The Windfarm Site is approximately 52km from shore at its nearest point. At this separation distance, noise and vibration impacts from construction or operational

activities in the Windfarm site on onshore human NVSRs will be negligible. Hence, impacts from the Windfarm Site on onshore human NVSRs are scoped out.

47. With regard to offshore human receptors, these would be other sea users (i.e. commercial fishermen, aggregates workers and recreational or commercial sailors only) (see **Chapter 14: Commercial Fisheries, Chapter 15: Shipping and Navigation** and **Chapter 18: Infrastructure and Other Users**). These users would have a limited exposure to noise during construction and operation due to the receptors being mobile and only within range of audibility for a short time, and they would potentially be within a noisy environment themselves (e.g. with generators, engines and winches on their own vessels). Any noise and vibration impacts from the Windfarm Site on offshore human NVSRs would be considered negligible on this basis and are therefore scoped out.

48. There are onshore human NVSRs within 300m of the landfall (up to MHWS) site. These therefore have the potential to be impacted by noise from landfall (up to MHWS) and nearshore construction works. These impacts are assessed in separate ES for the Onshore Project and therefore construction phase noise and vibration impacts on human NVSRs are scoped out.

49. Once the Offshore Project is operational, the only components located in nearshore locations would be buried cable at the landfall (up to MHWS) site, which will not emit perceptible levels of operational noise or vibration. Hence, operational phase noise and vibration impacts on human NVSRs are scoped out.

50. On the basis that all potential noise and vibration impacts are scoped out of this assessment, cumulative effects are also scoped out.

Table 21.8 Summary of impacts scoped out relating to noise and vibration

Potential Impact	Justification
Offshore Project construction and operational noise and vibration affecting offshore human receptors	Given the nature of human offshore receptors (only intermittently exposed to noise, likely to be experiencing high baseline noise levels), any potential impacts would be negligible. See **paragraph 47** for further justification.
Offshore Project construction noise and vibration affecting onshore human receptors	As discussed in paragraph 48, construction noise and vibration impacts from landfall (up to MHWS) and nearshore works (up to 300m from the onshore human NSRs) will be addressed in the Onshore ES. Noise and vibration impacts at onshore human receptors due to construction of the Offshore

Potential Impact	Justification
	Project at distances beyond 300m are anticipated to be negligible and hence scoped out.
Offshore Project operational noise and vibration affecting onshore human receptors	The only sources of noise or vibration associated with the Offshore Project are the Wind Turbine Generators and Offshore Substation, which will be at least 52km from the shore. At this distance, operational noise and vibration emissions will be imperceptible at onshore human NVSRs.
Cumulative effects	Offshore Project noise and vibration impacts scoped out; hence, cumulative effects scoped out. Cumulative effects due to other projects in the vicinity of the landfall (up to MHWS) and nearshore works will be assessed in the Onshore ES.
Transboundary impacts	It is considered unlikely that there would be any significant noise impacts in European Union (EU) Member States as a result of the Offshore Project, due to the localised nature of the noise sources.

21.3.7 Consultation

51. Consultation has been a key part of the development of the Offshore Project. Consultation regarding noise and vibration has been conducted throughout the EIA. An overview of the project consultation process is presented within **Chapter 7: Consultation**.

52. A summary of the key issues raised during consultation specific to noise and vibration is outlined below in **Table 21.9**, together with how these issues have been considered in the production of this ES.

Table 21.9 Consultation responses

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
MMO	30 May 2022 – Scoping Opinion Response	The Applicant states "Due to the limited pathway for offshore airborne noise to impact receptors it is proposed that offshore airborne noise is scoped out of the EIA for further consideration. Noting that the main impacts from noise to ecological receptors occur from underwater noise, which is to be assessed in other relevant aspects chapters." On the basis of the information	Underwater noise impacts on ecological receptors are assessed in **Chapter 12: Marine Mammal and Marine Turtle Ecology** and **Chapter 11: Fish and Shellfish Ecology**. Airborne noise impacts on ecological receptors

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
		presented in paragraphs 817- 820 about the types of offshore activity, and the distance of these activities from the nearest onshore receptors (at circa 30km), the MMO agrees that offshore airborne noise impacts are unlikely to result in significant effects during construction, operation and decommissioning, and can be scoped out of the ES Impacts that are generated nearer to onshore receptors, ie activity associated with the laying/ removal of nearshore cable, should be scoped into the ES where there is potential to result in likely significant effects. The MMO notes that this matter is proposed to be scoped into the ES as part of the assessment of onshore noise and vibration. The MMO is content that the main impacts from noise to ecological receptors occur from underwater noise, which is to be assessed in other relevant aspects chapters	are assessed in **Chapter 13: Offshore Ornithology** and **Chapter 20: Onshore Ecology and Ornithology**. Airborne noise and vibration impacts on onshore human NVSRs are scoped out of this assessment of the Offshore Project and will be assessed in the Onshore ES.

21.4 Existing Environment

53. This section describes the existing environment in relation to noise and vibration associated with the White Cross study area. It has been informed by a review of the sources listed in **Table 21.7**.

21.4.1 Current baseline

54. A baseline noise survey will be undertaken to identify noise levels in the vicinity of the human NVSRs around the proposed landfall (up to MHWS). Details of the baseline noise survey including measurement methodology, monitoring locations and summary of the collated data will be presented in the Onshore ES. The Scoping Report for the Offshore Project (Offshore Wind Ltd, 2022) identified that "*The study area is predominantly rural in nature with few major noise sources and therefore baseline noise levels are likely to be low. Baseline noise levels are likely to be higher*

at locations in proximity to the following identified noise sources across the study area:

- *A39*
- *Royal Marines Barracks Chivenor*"

55. An additional potential source of high baseline noise levels has been identified to be the Ministry of Defence training area at Braunton Burrows.

56. At the NVSRs around the landfall (up to MHWS) location, sources contributing to the baseline are likely to comprise road traffic on the B3231, natural sounds such as waves and birdcall, people and animals on Saunton Beach and farm activity.

21.4.2 Do Nothing Scenario

57. The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the ES (EIA Regulations, Schedule 4, paragraph 3). From the point of assessment, over the course of the development and operational lifetime of the Offshore Project (operational lifetime anticipated to be a minimum of 25 years), long-term trends mean that the condition of the baseline environment is expected to evolve. This section provides a qualitative description of the evolution of the baseline environment, on the assumption that the Offshore Project is not constructed, using available information and scientific knowledge of noise and vibration.

58. As discussed in **Section 21.2**, UK planning policy such as the NPPF (para. 185) requires that new development incorporates mitigation measures to reduce potential adverse noise impacts to a minimum; hence, in general, developments which significantly increase noise in the study area would not be expected to be granted consent. In addition to planning controls there is a clear trend for noise from vehicle, commercial and industrial sources to be driven down in compliance with stricter legislation and guidance as well as consumer expectations.

59. The sources likely to be contributing to the baseline noise climate at the NVSRs around the landfall (up to MHWS) site are identified in **para 55**. Road traffic noise levels depend on road traffic flows and individual vehicle noise levels. Traffic flows are generally expected to increase in line with expectations for macro-economic expansion; however, as discussed above, vehicle noise levels are expected to

reduce over time. Farm machinery noise levels would also be expected to reduce as old equipment is replaced with newer, quieter versions.

60. It is reasonable to anticipate that the trend for increased economic activity to increase baseline noise levels would be balanced out by the effect of planning controls and reductions in source noise emissions. This would result in no change in overall baseline conditions in the study area.

21.5 Potential impacts during construction, operation and maintenance, and decommissioning

61. As discussed in **Section 21.3.6**, all potential noise and vibration impacts, during all phases of the Offshore Project, are scoped out of this assessment.

21.6 Potential cumulative effects during construction, operation and maintenance, and decommissioning

62. As discussed in **Section 21.3.6**, all potential cumulative noise and vibration effects, during all phases of the Offshore Project, are scoped out of this assessment.

21.7 Transboundary Impacts

63. The Scoping Report identified that there was no potential for significant transboundary effects regarding noise and vibration from the Offshore Project upon the interests of other EEA States and this is not discussed further.

21.8 Inter-relationships

64. Inter-relationship impacts are covered as part of the assessment and consider impacts from the construction, operation or decommissioning of the Offshore Project on the same receptor (or group). A description of the process to identify and assess these effects is presented in **Chapter 6: EIA Methodology**. The potential inter-relationship effects that could arise in relation to onshore noise and vibration include both:

- **Project lifetime effects:** Effects arising throughout more than one phase of the Offshore Project (construction, operation, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation
- **Receptor led effects:** Assessment of the scope for all relevant effects to interact, spatially and temporally, to create inter-related effects on a receptor

(or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

65. As noise and vibration impacts are scoped out of this assessment, inter-relationship impacts are not anticipated.

21.9 Interactions

66. Where noise and vibration impacts are anticipated, these have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. As no noise and vibration impacts are anticipated within the scope of this assessment, synergistic impacts are not anticipated.

21.10 Summary

67. This chapter has investigated the potential effects on human noise and vibration sensitive receptors arising from the Offshore Project seaward of MHWS. The range of potential impacts and associated effects considered has been informed by the Scoping Opinion and reference to existing policy and guidance. The impacts considered include those brought about directly as well as indirectly.

68. Potential Offshore Project noise and vibration effects on ecological receptors are assessed in **Chapter 12: Marine Mammal and Marine Turtle Ecology**, **Chapter 13: Offshore Ornithology** and **Chapter 20: Onshore Ecology and Ornithology** of this ES.

69. **Table 21.10** presents a summary of the impacts assessed within this ES chapter, any commitments made, and mitigation required and the residual effects.

70. The potential for noise and vibration impacts of the Offshore Project on offshore human NVSRs is considered negligible and therefore is scoped out of this assessment. The only potential noise and vibration impact of the Offshore Project on onshore human NVSRs is associated with landfall to MHWS and nearshore construction works. These are assessed in the Onshore ES; hence, all Offshore Project noise and vibration impacts are scoped out of this assessment.

71. As the noise and vibration impacts are scoped out, an assessment of cumulative effects from the Offshore Project and other developments and activities has not been undertaken.

72. The screening of transboundary impacts identified that there was no potential for significant transboundary effects regarding noise and vibration from the Offshore Project upon the interests of other European Economic Area (EEA) States.

Table 21.10 Summary of potential impacts for onshore noise and vibration during construction, operation, maintenance and decommissioning of the Offshore Project

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect
Construction						
Impact 1: disturbance due to construction noise and vibration	Offshore human NVSRs	Scoped out			No mitigation required	Negligible
	Onshore human NVSRs	Scoped out, will be assessed in Onshore ES				
Impact 2: disturbance due to construction road traffic noise	Onshore human NVSRs	Scoped out, will be assessed in Onshore ES				
Operation and Maintenance						
Impact 1: disturbance due to operational noise and vibration	Offshore human NVSRs	Scoped out			No mitigation required	Negligible
	Onshore human NVSRs	Scoped out, will be assessed in Onshore ES				
Decommissioning						
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. An Onshore Decommissioning Plan will be provided. It is anticipated that the onshore cable would be decommissioned (de-energised) and either the cables and jointing bays left in situ or removed depending on the requirements of the Onshore Decommissioning Plan approved by the Local Planning Authority. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.						
Cumulative						
Scoped out						

21.11 References

BSI (2008). British Standards Institution [BS] 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting, BSI, London.

BSI (2014). British Standards Institution [BS] 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise". Available at: https://www.warrington.gov.uk/sites/default/files/2020-08/cf53_bs_5228_pt1-2009a1-2014.pdf

BSI (2014). British Standards Institution [BS] 5228-2: 2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration". Available at: https://www.thenbs.com/PublicationIndex/Documents/Details?DocId=306725

BSI (2019). British Standards Institution [BS] 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound, BSI, London. Available at: https://shop.bsigroup.com/products/methods-for-rating-and-assessing-industrial-and-commercial-sound/standard

BSI (2003). British Standards Institution [BS] 7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedures. BSI, London. Available at: https://www.thenbs.com/PublicationIndex/Documents/Details?DocId=282127

BSI (2014). British Standards Institution [BS] 8233: Sound Insulation and Noise Reduction for Buildings. BSI, London. Available at: https://knowledge.bsigroup.com/products/guidance-on-sound-insulation-and-noise-reduction-for-buildings/standard.

BSI (1993). BS 7385-2 – Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration. Available at: https://www.thenbs.com/PublicationIndex/Documents/Details?DocId=200525

DEFRA (2010). Noise Policy Statement for England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

Department for Business, Energy, and Industrial Strategy (2021). Draft Overarching National Policy Statement for Energy (EN-1).

Department for Business, Energy, and Industrial Strategy (2021). Draft National Policy Statement for Renewable Energy Infrastructure (EN-3).

Department of Energy and Climate Change (2011). Overarching NPS for Energy (EN-1).

Department of Energy and Climate Change (2011). NPS for Renewable Energy Infrastructure (EN-3).

Department of Transport, Welsh Office (1988). Calculation of Road Traffic Noise. HMSO, London.

Environmental Protection Act (1990). HMSO, London. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Environmental Protection, England (2018). The Environmental Noise (England) (Amendment) Regulations 2018. HMSO, London. Available at: https://www.legislation.gov.uk/uksi/2018/1089/made

Highways England (2020). Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA111 Noise and Vibration (formerly HD213/11, IAN 185/15) Revision 2. Highways England. Available at: https://www.standardsforhighways.co.uk/prod/attachments/cc8cfcf7-c235-4052-8d32-d5398796b364?inline=true

International Organization for Standardization (1996). ISO9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. ISO, Switzerland. Available at: https://www.iso.org/standard/20649.html

Ministry of Housing, Communities & Local Government (2021). National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf.

Ministry of Housing, Communities & Local Government (2019). National Planning Practice Guidance for Noise. Available at: https://www.gov.uk/guidance/noise--2

PINS (2018). Planning Inspectorate Advice Note Nine: Rochdale Envelope. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/.

World Health Organization (1999). Guidelines for Community Noise. Available at: https://apps.who.int/iris/handle/10665/66217

World Health Organization (2009). Night Noise Guidelines for Europe. Available at: https://apps.who.int/iris/handle/10665/326486

World Health Organization (2009). Environmental Noise Guidelines for the European Region. Available at: https://apps.who.int/iris/handle/10665/279952