XLINKS MOROCCO-UK POWER PROJECT

Preliminary Environmental Information Report

Volume 2, Chapter 6: Noise and Vibration

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Glossary

Term	Meaning
Alverdiscott Substation Connection Development	The development required at the existing Alverdiscott Substation site, which is envisaged to include development of a new 400 kV substation, and other extension modification works to be confirmed by National Grid Electricity Transmission.
Ambient Sound Level, $L_{Aeq,T}$	The steady sound level which, over a period of time *T*, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous sound pressure level.
Background Sound Level, $L_{A90,T}$	The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T*, measured using fast time-weighting, F, and quoted to the nearest whole number of decibels.
Basic Noise Level (BNL)	A measure of traffic source noise prior to development. It is calculated from traffic flows, road speed, and Heavy Goods Vehicle percentage.
Best Practicable Means (BPM)	Adopting the best available methods to reasonably control noise and vibration.
Converter Site	The Converter Site is proposed to be located to the immediate west of the existing Alverdiscott Substation site in north Devon. The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2) and associated infrastructure, buildings and landscaping.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current (DC) to Alternating Current (AC), or vice versa.
Decibel (dB)	A unit used to measure or compare the intensity of a sound by comparing it with a given reference level on a logarithmic scale.
HVAC Cables	The High Voltage Alternating Current (HVAC) cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.
HVDC Cables	The High Voltage Direct Current (HVDC) cables which would bring electricity to the UK converter stations from the Moroccan converter stations.
Impulsivity	A measure of the sharpness of sudden nature of a sound which is short in duration such as a gunshot or a blast.
Intermittency	A measure of the ‘on/off’ nature of a sound source.
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the Transition Joint Bay inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils. The relevant Local Authorities for the Proposed Development are Devon County Council and Torridge District Council.
Logarithmic averaging	A method by which sound levels in decibels (dB) can be averaged. This allows us to account for the fact that higher levels of sound will always dominate in the presence of lower sound levels.
Mean High Water Springs	The height of mean high water during spring tides in a year.
National Grid Electricity Transmission	National Grid Electricity Transmission (NGET) owns and maintains the electricity transmission network in England and Wales.

Term	Meaning
Noise	An unwanted or unexpected sound.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current cables will be located.
Peak Particle Velocity (PPV)	An indicator of the magnitude of ground vibration which refers to the movement of molecular particles within the ground.
Proposed Development	The element of the Xlinks Morocco-UK Power Project within the UK, which includes the offshore cables (from the UK Exclusive Economic Zone to landfall), landfall site, onshore Direct Current and Alternating Current cables, converter stations, road upgrade works and, based on current assumptions, the Alverdiscott Substation Connection Development.
Residual Sound Level	The ambient sound level at a receptor in the absence of influence from the sound source under assessment.
Sound	Fluctuations of pressure within a medium (gas, solid or fluid) within the audible range of loudness and frequencies which excite the sensation of hearing.
Sound Power Level, L_w	The total sound energy emitted by a source per unit time.
Sound Pressure Level, L_p	The amount of force a sound wave exerts on a surface area perpendicular to the direction of travel. A measure of the variation of sound level over a distance.
Specific Sound Level	The equivalent continuous A-weighted sound pressure level produced by the specific noise source at the assessment location over a given reference time internal.
Study area	This is an area which is defined for each environmental topic which includes the Proposed Development Draft Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
The national grid	The network of power transmission lines which connect substations and power stations across Great Britain to points of demand. The network ensures that electricity can be transmitted across the country to meet power demands.
Tonality	A measure of sound quality that correlates to how humans perceive certain frequencies of sound. A sound is considered tonal if the frequency spectrum contains a lot of sound energy at a single frequency.

Acronyms

Acronym	Meaning
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CoPA	Control of Pollution Act
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DMRB	Design Manual Roads and Bridges
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act

Acronym	Meaning
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
LOAEL	Lowest Observed Adverse Effect Level
LT	Long-term
MHWS	Mean High Water Springs
NPS	National Policy Statement
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level
ST	Short-term

Units

Acronym	Meaning
dB	Decibel
m	Metre
mm/s	Millimetres per second
ms	Milliseconds
km	Kilometre
m^2	Square metre
m^3	Cubic metre

6 NOISE AND VIBRATION

6.1 Introduction

6.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the United Kingdom (UK) elements of the Xlinks Morocco-UK Power Project (the 'Project'). For ease of reference, the UK elements of the Project are referred to in this chapter as the 'Proposed Development'.

6.1.2 This chapter considers the potential impacts and effects of the Proposed Development on noise and vibration during the construction, operation and maintenance and decommissioning phases. Specifically, it relates to the onshore elements of the Proposed Development landward of Mean High Water Springs (MHWS).

6.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation undertaken to date;
- presents the potential environmental impacts and effects on all aspects of noise and vibration arising from the Proposed Development, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

6.1.4 This chapter also draws upon information contained within Volume 2, Appendix 6.1: Baseline Sound Survey, of the PEIR.

6.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR and any refinements in design will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

6.2 Legislative and Policy Context

Legislation

Control of Pollution Act 1974

6.2.1 Section 60, Part III of the Control of Pollution Act (CoPA) 1974 refers to the control of noise on construction sites. It outlines legislation by which Local Authorities can control noise from construction sites and prevent noise disturbance.

6.2.2 British Standards (BS) 5228-1:2009+A1:2014 and BS 5228 2:2009+A1:2014 were approved within The Control of Noise (Code of Practice for Construction and

Open Sites) Order 2015 as suitable guidance on appropriate methods for the control of noise from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the CoPA.

6.2.3 The CoPA provides a Local Authority with the power to serve a notice imposing requirements for the way in which construction works are to be carried out in their jurisdiction. This notice can specify the following:

- the plant or machinery permitted for use;
- the hours during which construction work may be undertaken;
- limits for the emission levels of noise and vibration due to the works at any time or spatial position on site; and
- any other change in circumstance.

6.2.4 Section 61, Part III of the CoPA refers to prior consent for work on construction sites. It provides a method by which a contractor can apply for consent to undertake construction works in advance. Providing consent is granted, and compliance is maintained with the stated method and hours of work, no action may be taken by the Local Authority under Section 60.

6.2.5 Section 71, Part III of the CoPA refers to the preparation and approval of codes of practice for minimising noise.

6.2.6 Section 72, Part III of the CoPA refers to Best Practicable Means (BPM), which is defined as:

'In that expression, 'practicable' means reasonably practicable, having regards among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'. Whilst 'Means' includes 'the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures.'

Environmental Protection Act 1990

6.2.7 Section 79 of the Environmental Protection Act (EPA) contains a list of matters that amount to statutory nuisances and places a duty on Local Authorities to regularly inspect areas in their jurisdiction to determine where statutory nuisances may exist.

6.2.8 The Local Authority must serve an abatement notice where it is satisfied that a statutory nuisance does not exist, or likely to occur/recur. Section 80 of the EPA provides Local Authorities with the power to serve an abatement to prohibit or restrict its occurrence or recurrence; and to carry out works or other action necessary to abate the nuisance.

6.2.9 Section 82 of the EPA allows a Magistrates' court to act on a complaint made by any person on the grounds that they are aggrieved by a statutory nuisance, such as noise.

6.2.10 The procedures for appeals against abatement notices are detailed in the Statutory Nuisance (Appeals) Regulations 1995.

Planning Policy Context

6.2.11 The Proposed Development will be located within the UK Exclusive Economic Zone (EEZ) offshore waters (beyond 12 nm from the English coast) and inshore waters, with the onshore infrastructure located wholly within Devon, England. As set out in Volume 1, Chapter 1: Introduction, of the PEIR, the Secretary of State for the Department for Energy Security and Net Zero (DESNZ) has directed that elements of the Proposed Development are to be treated as development for which development consent is required under the Planning Act 2008, as amended.

National Policy Statements

6.2.12 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to the Proposed Development, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero 2023a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero 2023b); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero 2023c).

6.2.13 **Table 6.1** sets out key aspects from the NPSs relevant to the Proposed Development, with particular reference to the need for and approach to consenting such infrastructure.

Table 6.1: Summary of relevant NPS policy

Summary of NPS requirement	How and where considered in the PEIR
NPS EN-1	
'*Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:* • *a description of the noise generating aspects of the development proposal leading to noise impacts* • *identification of noise sensitive receptors 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 day* • *an assessment of the effect of predicted changes in the noise environment on noise-sensitive receptors, including an assessment of any likely impact on health and quality of life*	Noise sensitive receptors within the operational noise study area are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR, as well as details of the noise generating equipment proposed for the operation and maintenance phase of the Proposed Development. A baseline sound survey has been undertaken to characterise the existing acoustic environment and obtain representative background sound levels at these receptors and inform an assessment of the operational noise sources in line with the BS 4142:2014+A1:2019 guidance. Full details of this survey are provided in Volume 2, Appendix 6.1: Baseline Sound Survey, of the PEIR, with the representative levels derived presented in **Table 6.19** of this chapter. The noise generating aspects of the Proposed Development during the construction, operation and maintenance, and decommissioning phases have been identified along with any potential noise and vibration impacts. Full details of the construction activities and associated sources can be found in **section 6.8** of this chapter and Volume 2, Appendix

Summary of NPS requirement	How and where considered in the PEIR
• *all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life*.' [Paragraph 5.12.6 of NPS EN-1]	6.2: Construction Noise and Vibration, of the PEIR. Noise and vibration control measures will be outlined in the Outline Onshore CEMP (On-CEMP) which will be secured as a requirement of the Development Consent Order (DCO) to ensure the construction noise and vibration thresholds are not exceeded. A list of the proposed operational noise sources associated with the Converter Site can be found in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR. An assessment of the potential impacts on receptors during the most affected operation and maintenance period (night-time) is provided in **section 6.9** of this chapter, with full details of the methodology and results presented in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR. Operational noise criteria will be secured as a requirement of the DCO and agreed with the relevant stakeholders. Details of indicative mitigation measures which may be adopted as part of the design to ensure compliance are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR. The impact assessment in **section 6.8** to **6.10** of this chapter considers receptor sensitivity with details provided in **Table 6.20** of this chapter. The future baseline acoustic environment is considered in **section 6.5** of this chapter.
'*Applicants should consider the noise impact of ancillary activities associated with the development, such as increased road or rail traffic movements, or other forms of transportation*.' [Paragraph 5.12.8 of NPS EN-1]	An assessment of the impacts due to increased traffic flows on the local highway networks during the construction and decommissioning phases is presented in **section 6.8** and **6.10** of this chapter. Full details are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR with full details of the proposed traffic flows detailed in Volume 2, Chapter 5: Traffic and Transport of the PEIR.
'*Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.* *For the prediction, assessment and management of construction noise, reference should be made to any British Standards and other guidance which also give examples of mitigation strategies*.' [Paragraph 5.12.9 of NPS EN-1]	The construction, operation and maintenance, and decommissioning phases of the Proposed Development have been assessed using the principles in the relevant BS and nationally accepted guidance. Construction, operation and maintenance, and decommissioning noise and vibration impacts are assessed in **section 6.8** to **6.10** of this chapter. In accordance with best practice, the noise and vibration assessment has been undertaken with reference to the following. • BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound' (British Standards Institution, 2019). • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a).

Summary of NPS requirement	How and where considered in the PEIR
	• BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b). • BS 7445:2003 – 'Description and measurement of environmental noise' (British Standards Institution, 2003). • BS 8233:2014 – 'Guidance on sound insulation and noise reduction for buildings' (British Standards Institution, 2014c). • Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988). • Design Manual Roads and Bridges (DMRB)– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymru, Department for Infrastructure, 2020). • ISO 9613-2:1996 – Acoustics – 'Attenuation of sound during propagation outdoors – Part 2: General method of calculation'(International Organisation for Standards, 1996). Details of the potential noise reduction achieved via BPM during the construction and decommissioning phases of the Proposed Development can be found in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR. These measures will be outlined in the Outline On-CEMP to be secured as a requirement of the DCO. Operational noise criteria will be secured as a requirement of the DCO and agreed with the relevant stakeholders. Details of indicative mitigation measures which may be adopted as part of the design to ensure compliance are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR.
'*Applicants should submit a detailed impact assessment and mitigation plan as part of any development plan, including the use of noise mitigation and noise abatement technologies during construction and operation*.' [Paragraph 5.12.12 of NPS EN-1] '*Mitigation measures may include one or more of the following:* • *Engineering: reducing the noise generate at source and/or containing the noise generated* • *Layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose-built barriers, or other buildings* • *Administrative: using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise limits/noise levels, differentiating as appropriate between different*	Details of the mitigation measures adopted as part of the Proposed Development are outlined in **section 6.7** of this chapter. Construction noise and vibration control measures will be outlined in the Outline On-CEMP to be secured as a requirement of the DCO. Operational noise criteria will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The losses associated with the various example mitigation options during the construction, operation and maintenance, and decommissioning phases of the Proposed Development have been considered as part of the assessment of noise impacts. Full details are provided in: • Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR; and • Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR. The operational noise model has been constructed to include the various buildings associated with the Converter Site and any changes in the landscaping

Summary of NPS requirement	How and where considered in the PEIR
times of day, such as evenings and late at night, and taking into account seasonality of wildlife in nearby designated sites • *Insulation: mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building*.' [Paragraph 5.12.14 of NPS EN-1]	to account for any potential screening of noise at the nearest receptors.
'*The project should demonstrate good design through the 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 barriers to reduce noise transmission*.' [Paragraph 5.12.15 of NPS-EN-1].	The design of the Converter Site is discussed in Volume 1, Chapter 3: Project Description, of the PEIR. Details of the site selection process can be found in Volume 1, Chapter 4: Need and Alternatives, of the PEIR. The full plant design including equipment selections, layouts, and mitigation measures have been assessed in **section 6.8** to **6.10** of this chapter. The 3D acoustic model detailed in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR has been constructed using proposed topography data to include the landscaping changes proposed and any potential losses due to screening.
NPS EN-3	
'*Proposals for renewable energy infrastructure should demonstrate good design to mitigate impacts such as noise*.' [Paragraph 2.5.2 of NPS EN-3]	The design of the Converter Site is discussed in Volume 1, Chapter 3: Project Description, of the PEIR. Construction noise and vibration control measures will be presented in the Outline On-CEMP to be secured as a requirement of the DCO. Details of the potential noise reduction achieved via BPM during the construction and decommissioning phases of the Proposed Development can be found in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR. Operational noise criteria will be secured as a requirement of the DCO and agreed with the relevant stakeholders. Details of the potential mitigation measures to be adopted are provided in Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR. The significance of effects following adoption of these measures is assessed in **section 6.8** to **6.10** of this chapter.
'*Applicants should include in an Environmental Statement a noise assessment of the impacts on amenity in the case of excessive noise from a project in line with guidance set out in Section 5.12 in EN-1*.' [Paragraph 2.7.40 of NPS EN-3].	The construction, operation and maintenance, and decommissioning phases of Proposed Development have been assessed using the principles in the relevant BS. The assessment of effects is presented in **section 6.8** to **6.10** of this chapter with details provided in Volume 2, Appendix 6.2: Construction Noise and Vibration of and Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR.
NPS EN-5	
Reference is also made to audible noise effects from substation equipment such as transformers. The guidance states that the relevant assessment methodologies should be adopted and that	The construction, operation and maintenance, and decommissioning phases of Proposed Development have been assessed using the principles in the relevant BS.

Summary of NPS requirement	How and where considered in the PEIR
appropriate mitigation options should be considered and adopted where required. [Paragraphs 2.9.37 and 2.9.38 of NPS EN-5]	The assessment of effects is presented in **section 6.8** of this chapter with details provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR and Volume 2, Appendix 6.3: Operational Noise Assessment, of the PEIR.

The National Planning Policy Framework

6.2.14 The National Planning Policy Framework (NPPF) was published in 2012 and updated most recently in December 2023 (Department for Levelling Up, Housing and Communities, 2023). The NPPF sets out the Government's planning policies for England.

6.2.15 The NPPF does not contain any specific policy or criteria relating to noise and vibration. Instead, it provides a framework for local authorities to produce local and neighbourhood plans to reflect the needs and priorities of communities within their jurisdiction.

6.2.16 Paragraph 180(e) of the NPPF states the following:

'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 pollution or land instability.

[…]'

6.2.17 Paragraph 191 of Section 15 of the NPPF states the following:

'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[65];

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; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

[…]'

[65] *See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)'.*

6.2.18 The Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2021) supports the NPPF and provides guidance across a range of topic areas.

6.2.19 The noise section of the PPG provides outline guidance and refers to general guidance on noise policy and assessment methodology detailed in the NPPF, the Noise Policy Statement for England (NPSE), and British Standards. The NPSE sets out noise management policy in the form of the Government's long-term vision to manage noise and improve health and quality of life.

6.2.20 The following guidance is presented within the PPG on how noise impacts may be determined:

- *'Plan-making and decision making need to take account of the acoustic environment and in doing so consider:*
- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a standard of amenity can be achieved.'*

6.2.21 A noise exposure hierarchy is provided as supplementary guidance in tabular form and is recreated in **Table 6.2** below. The guidance outlines the need to avoid and prevent the occurrence of significant adverse effects due to noise.

Table 6.2: Summary of noise exposure hierarchy from NPSE and PPG

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not present	No effect.	No Observed Effect.	No specific measures required.
No Observed Adverse Effect Level (NOAEL)			
Present and not intrusive	Noise can be heard but does not cause any change in behaviour, attitude, or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect.	No specific measures required.
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect.	Mitigate and reduce to a minimum.

Response	Examples of Outcomes	Increasing Effect Level	Action
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect.	Avoid.
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory.	Unacceptable Adverse Effect.	Prevent.

Local Planning Policy

6.2.22 The onshore elements of the Proposed Development are located within the administrative area of Torridge District Council and Devon County Council. The relevant local planning policies applicable to noise and vibration based on the extent of the study areas for this assessment are summarised in **Table 6.3**.

Table 6.3: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the PEIR
North Devon and Torridge Local Plan 2011-2031		
DM02 – Environmental Protection	'*Development will be supported where it does not result in unacceptable impacts to:* *[…]* *c) noise and vibration.* *[…]*'	The construction, operation and maintenance, and decommissioning phases of the Proposed Development have been assessed using the principles in the relevant BS incorporating indicative noise reduction levels associated with the mitigation measures adopted as part of the development. The assessment of effects is presented in **sections 6.8** to **6.10** of this chapter with details provided in Volume 2, Appendix 6.2: Construction Noise and Vibration of and Volume 2, Appendix 6.3: Operational Noise Assessment of the PEIR. An assessment of the cumulative effects is presented in **section 6.11** of this chapter.
ST16 – Delivering Renewable Energy and Heat	*'(3) Renewable and low carbon energy and heat generating developments (other than wind energy) will be supported in the landscape character types where:* *[…]* *b) there is no significant impact on local amenities* *[…]* *(4) Renewable and low carbon energy development (other than wind energy)*	

Policy	Key provisions	How and where considered in the PEIR
	will be supported where it can demonstrate that the cumulative impact of operational, consented and proposed development on landscape character does not become a significant or defining characteristic of the wider fabric, character and quality of the landscape.'	

6.3 Consultation and Engagement

6.3.1 In January 2024, the Applicant submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction and operation and maintenance phases of the Proposed Development. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Proposed Development would not have the potential to give rise to significant environmental effects in these areas.

6.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 7 March 2024. Key issues raised during the scoping process specific to noise and vibration are listed in **Table 6.4**, together with details of how these issues have been addressed within the PEIR.

Table 6.4: Summary of Scoping Responses

Comment	How and where considered in the PEIR
Planning Inspectorate	
'*The Scoping Report proposes to scope out the impacts on human receptors and heritage assets arising from vibration on the basis that additional vehicle movements during the construction and decommissioning phases are unlikely to generate high levels of vibration. The Inspectorate agrees that significant effects are unlikely and is content that this matter can be scoped out of the ES*.'	An assessment of vibration impacts due to construction traffic has been scoped out of the assessment for the construction and decommissioning phases of the Proposed Development. This is detailed within **Table 6.7** of this chapter.
'*The Scoping Report proposes to scope out impacts on human receptors and heritage assets from vibration on the basis that operation and maintenance of the Proposed Development is unlikely to generate high levels of vibration, and the plant strategy for the converter stations would incorporate vibration control as part of the design.* *The Inspectorate is content that vibration from the operation and maintenance of the onshore cable is unlikely to result in significant effects and agrees this matter can be scoped out of the ES.* *With regards to the converter stations, the Inspectorate is not in a position to agree to scope out this matter as the location of the converter stations are not yet known. The Scoping Report does not provide information on the anticipated*	The exact location of each plant item within the Converter Site is not yet known. A review of the receptor locations relative to the Converter Site and plant strategy will be undertaken as part of the Environmental Statement to ensure there will be no operational vibration impacts at the nearest receptors due to the Converter Site.

Comment	How and where considered in the PEIR
vibration levels from the stations. Accordingly, the ES should include an assessment of these matters or the information demonstrating agreement with relevant stakeholders and the absence of likely significant effects. The ES should describe the potential sources of vibration arising from the operation of the converter stations, as well as any measures to control emissions and confirmation of how these are secured through the DCO or other mechanism.'	
'*The Scoping Report confirms sound surveys have been undertaken to date, with additional sound monitoring to be undertaken in 2024 and that the locations and methodology proposed will be agreed with the relevant stakeholders prior to deployment of the survey equipment. The location of noise monitoring undertaken to date is not presented in the Scoping Report and therefore it is difficult for the Inspectorate to comment on the locations and scope to date. The Inspectorate expects a project-specific baseline survey. The assessment methodology and choice of receptors should be agreed with the relevant local authorities*.'	A project-specific baseline sound survey has been undertaken at locations representative of the nearest sensitive receptors to the Proposed Development. These locations and the subsequent assessment methodology were agreed with Torridge District Council (see **Table 6.5**). Full details of this survey are provided in Volume 2, Appendix 6.1: Baseline Sound Survey of the PEIR.
'*The Scoping Report does not clearly state what constitutes a 'sensitive receptor' for the purposes of the noise and vibration assessment. The ES must include an assessment of noise and vibration impacts on al noise sensitive receptors, including ecological and heritage receptors, where significant effects are likely to occur. The impact assessment should cross-refer to the findings of other relevant aspect chapters such as Ecology and Nature Conservation and Historic Environment*.'	Receptor sensitivity for the purposes of the noise and vibration impact assessments is defined in **Table 6.10** of this chapter. Noise impacts on ecological receptors have been assessed in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the PEIR.

6.3.3 Following scoping, consultation, and engagement with interested parties specific to noise and vibration has continued.

6.3.4 A summary of the key issues raised during consultation activities undertaken to date is presented in **Table 6.5**, together with how these issues have been considered in the production of this PEIR chapter.

Table 6.5: Summary of consultation relevant to noise and vibration

Date	Consultee and type of response	Issues raised	How and where considered in the PEIR
November 2022	Torridge District Council	The assessment methodology for the noise and vibration chapter was discussed, with appropriate British Standards and Local and National Planning Policy agreed for inclusion within the Chapter.	A baseline sound survey has been undertaken to quantify the existing sound climate at the nearest noise-sensitive receptors to the Proposed Development. Full details of this survey are provided in Volume 2, Appendix 6.1: Baseline Sound Survey of the PEIR. An assessment of the potential noise and vibration impacts has been undertaken in line with the following guidance, in accordance with industry best practice. • BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound' (British Standards Institution, 2019). • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a). • BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b). • BS 7445:2003 – 'Description and measurement of environmental noise' (British Standards Institution, 2003). • BS 8233:2014 – 'Guidance on sound insulation and noise reduction for buildings' (British Standards Institution, 2014c). • CRTN (Department for Transport, 1988). • DMRB– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymry, Department for Infrastructure, 2020). • ISO 9613-2:1996 – Acoustics – 'Attenuation of sound during propagation outdoors – Part 2: General method of calculation'(International Organisation for Standards, 1996).

6.4 Methodology

Relevant Guidance

British Standard 4142

6.4.1 BS 4142:2014+A1:2019 – '*Methods for rating and assessing industrial and commercial sound'* provides a method for rating industrial and commercial sound and a method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

6.4.2 In summary, this Standard provides guidance on determining 'rating sound levels' by correcting the 'specific sound level' from the site or operations under consideration to account for any distinctive acoustic characteristics such as tonality, impulsivity, and intermittency. The Standard provides the following corrections to be applied where each is appropriate.

- *'Tonality - For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*
- *Impulsivity - A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*
- *Intermittency - When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*
- *Other sound characteristics - Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.'*

6.4.3 An initial estimate of the impact of the source is obtained by subtracting the measured background sound level from the rating sound level of the proposed plant at the nearest noise-sensitive receptors. The impact magnitude criteria are presented in **Table 6.11**.

World Health Organisation (WHO)

6.4.4 The World Health Organisation (WHO) 2018 Environmental Noise Guidelines provide recommendations for protecting human health from long-term noise exposure due to various sources. The guidance states the following regarding industrial noise:

'The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid.'

6.4.5 The previous WHO 1999 Community Noise Guidelines may be referred to for the consideration of the following:

- External daytime (7am-11pm) ambient noise limits with an upper limit of 55 dB $L_{Aeq,16h}$; and
- External night-time (11pm-7am) ambient noise limits of 45 dB $L_{Aeq,8h}$, corresponding to the level at which sleep disturbance may occur with windows open.

6.4.6 The WHO Night Noise Guidelines (2009) define effect thresholds or 'lowest observed adverse health effect levels' for both long-term adverse health effects and short-term sleep disturbance as follows:

- No effects expected to occur: External L_{night} level of less than 30 dB(A);
- Adverse effects start to occur (night-time 'lowest observed adverse effect level (LOAEL): External L_{night} level of 40 dB(A); and
- Adverse effects are likely to occur frequently: External L_{night} level of 55 dB(A).

Guidelines for Environmental Noise Impact Assessment

6.4.7 The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment outline the key principles for a noise impact assessment of all development proposals where noise effects are likely to occur.

6.4.8 The guidelines provide specific support on how noise impact assessment fits within the EIA process. They cover:

- how to scope a noise assessment;
- issues to be considered when defining the baseline noise environment;
- prediction of changes in noise levels as a result of implementing development proposals; and
- definition and evaluation of the significance of the effect of changes in noise levels (for use only where the assessment is undertaken within an EIA).

British Standard 5228

6.4.9 This BS comprises the following two parts.

- BS 5228-1:2009+A1:2014 – *'Code of practice for noise and vibration control on construction and open sites'* – Part 1: Noise.
- BS 5228-2:2009+A1:2014 – *'Code of practice for noise and vibration control on construction and open sites'* – Part 2: Vibration.

6.4.10 The Standard provides guidance, information, and procedures for the control of noise and vibration from demolition and construction sites.
BS 5228- 1:2009+A1:2014 and BS 5228-2:2009+A1:2014 provides guidance on appropriate methods for minimising noise from construction and open sites under the relevant sections of the CoPA 1974.

6.4.11 There are no set standards for the definition of the significance of construction noise effects. However, noise example criteria are provided in BS 5228- 1:2009+A1:2014 Annex E and vibration example criteria are provided in BS 5228-2:2009+A1:2014 Annex B.

6.4.12 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on:

- community relations;
- noise and persons on site;
- neighbourhood nuisance;
- project supervision; and
- the control of noise.

6.4.13 The annexes include information on legislative background, noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data for on-site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

6.4.14 BS 5228-2:2009+A1:2014 contains information and recommendations for basic methods of vibration control arising from construction and open sites where work activities/operations generate significant levels of vibration. It includes sections on community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement.
BS 5228- 2:2009+A1:2014 refers to BS ISO 4866:2010; BS 7385-2:1993; BS 6472-1:2008, and BS 6472-2:2008 for further advice on the significance of vibration.

Design Manual for Roads and Bridges – LA 111 – Noise and Vibration

6.4.15 The Design Manual for Roads and Bridges (DMRB) LA111 (Highways England, Transport Scotland, Llwyodraeth Cymru Department for Infrastructure, 2020), provides guidance on methods for assessing noise and vibration from construction traffic.

6.4.16 The magnitude of noise impacts is assessed using the predicted change in the Basic Noise Level (BNL) on the closest public roads to a receptor following the introduction of construction traffic.

6.4.17 The noise change is calculated using the methods outlined in the CRTN (Department for Transport, 1988) which considers the following:

- the change in traffic flow due to construction traffic;
- vehicle speed; and
- the percentage of Heavy Goods Vehicles (HGVs).

6.4.18 The methodology outlined in CRTN is valid for traffic flows greater than 50 movements per hour. The assessment of noise impacts where construction traffic flows on off-road access routes and the proposed haul road are less than 50 per hour has been undertaken with reference to the haul route methodology as detailed in Annex F of BS 5228-1:2009+A1:2014.

6.4.19 Paragraph 3.19 of DMRB LA111 states the following:

'Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- *10 or more days or nights in any 15 consecutive days or nights;*
- *A total number of days exceeding 40 in any 6 consecutive months.'*

6.4.20 Additional guidance is provided for the determination of construction noise impact criteria in terms of the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL). These are defined in **Table 6.12** below.

Scope of the Assessment

6.4.21 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 6.4** and **Table 6.5**.

6.4.22 Taking into account the scoping and consultation process, **Table 6.6** summarises the issues considered as part of this assessment.

Table 6.6: Issues considered within this assessment

Activity	Potential effects scoped into the assessment
Construction Phase	
Landfall works	Construction noise and vibration at sensitive receptors from the installation of the Onshore HVDC Cable Corridor.
Trenchless techniques	Noise at sensitive receptors from the construction using trenchless techniques along the Onshore HVDC Cable Corridor and Converter Site.
Converter stations	Noise and vibration at sensitive receptors from the construction of the Converter Site and infrastructure.
Open cut trenching	Construction noise and vibration at sensitive receptors.
Construction traffic	Noise due to increased traffic flows due to construction traffic on local highway networks.
Operation and Maintenance	
Converter Site and Alverdiscott Substation Connection Development	Operational noise impacts at noise-sensitive receptors.

6.4.23 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in **Table 6.7**.

Table 6.7: Issues scoped out of the assessment

Impact	Justification
The impact on human receptors and heritage assets arising from vibration generated by additional vehicle movements on the local highway network during construction and decommissioning of the Proposed Development	Additional vehicle movements on the local highway network during construction and decommissioning of the Proposed Development are unlikely to generate high levels of vibration.
The impact on human receptors and heritage assets arising from vibration generated during the operation and maintenance of the Proposed Development.	The potential impact of vibration from additional vehicle movements on human receptors and heritage assets during construction of the Proposed Development is unlikely to result in significant effects

Impact	Justification
	and is proposed to be scoped out of the assessment for noise and vibration.
The impact of noise and vibration generated during the operation and maintenance of the HVDC cables and associated infrastructure.	Operation and maintenance of the Proposed Development is unlikely to generate high levels of vibration. The plant strategy for the converter stations will incorporate vibration control as part of the design.

Study Area

6.4.24 The noise and vibration study area focuses on noise and vibration sensitive receptors landward of MHWS where potential impacts are more likely to occur. A brief description of each study area is provided below with graphical representations provided in Figure 6.1 to Figure 6.3 in Volume 2, Figures, of the PEIR.

6.4.25 The noise and vibration study area has been defined in line with best practice guidance and consider the regions in which potential impacts are most likely to occur at receptors sensitive to noise and vibration.

6.4.26 The construction and decommissioning noise and vibration study area has been defined with reference to the guidance in DMRB LA111 – Noise and Vibration. Note 1 of paragraph 3.5 of DMRB LA111 states the following regarding noise sensitive receptors:

'A study area of 300 m from the closest construction activity is normally sufficient to encompass noise sensitive receptors.'

6.4.27 Similarly, Note 1 of paragraph 3.29 of DMRB LA111 states the following regarding vibration sensitive receptors:

'A study area of 100 m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors.'

6.4.28 The assessment of operation and maintenance noise impacts will be undertaken at the noise sensitive receptors most likely to affected by noise during the operation phase of the Proposed Development. These have been identified as being situated within a study area of 500 m from the location of the operational noise sources associated with the Proposed Development.

6.4.29 In summary, the noise and vibration study areas to be used in the assessment will be defined as:

- the area of land temporarily or permanently occupied during the construction, operation and maintenance, and decommissioning of the Proposed Development;
- noise sensitive receptors located within 300 m of construction activities;
- vibration sensitive receptors located within 100 m of construction activities with the potential to generate vibration; and
- noise sensitive receptors located within 500 m of the operational noise sources.

Methodology for Baseline Studies

Desk Studies

6.4.30 Information on the nearest noise sensitive receptors within the noise and vibration study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in **Table 6.8** below.

Table 6.8: Summary of key desktop information

Title	Source	Year	Author
OS Raster 1:25,000	Ordnance Survey	2022	Ordnance Survey
OS Terrain 5	Ordnance Survey	2022	Ordnance Survey
OS AddressBase Plus	Ordnance Survey	2022	Ordnance Survey
Google Earth Imagery	Data SIO, NOAA, U.S Navy, NGA, GEBCO	2022	Google

Site-Specific Surveys

6.4.31 Site specific survey have been undertaken to quantify the baseline sound climate at the nearest noise sensitive receptors to the Proposed Development. A summary of the surveys undertaken to inform the noise and vibration impact assessment is provided below with full details outlined in Volume 2, Appendix 6.1: Baseline Sound Survey, of the PEIR.

6.4.32 A mixture of long-term and short-term sound measurements were undertaken a total of 20 locations across three surveys as outlined in the Scoping Report. The measurement positions are presented in **Table 6.9** and are presented graphically in Figure 6.1 of Volume 2, Figures, of the PEIR. .

Table 6.9: Baseline sound survey locations

Position	Location	Representative Receptor
LT1	Western side of Tower House.	Noise-sensitive receptors near landfall.
LT2	Western boundary of Bowood Farm.	Noise-sensitive receptors to the north of Clovelly Road.
LT3	Northern boundary of the road south east from Knotty Corner.	Noise-sensitive receptors south east of Knotty Corner
LT4	Eastern boundary of land west of Buckland Road.	Noise-sensitive receptors along road from Littleham Cross to Jennetts Bridge.
LT5	Eastern boundary of land east of Dunn Lane.	Noise-sensitive receptors East of Dunn Lane.
LT6	South eastern boundary of land west of Littleham Road.	Noise-sensitive receptors along Littleham Road to the west of the River Torridge.
LT7	Southern boundary of land north of Long Barn.	Noise-sensitive receptors near Long Barn.
LT8	South eastern boundary of land west of Lower Kingdon.	Noise-sensitive receptors near Lower Kingdon.
LT9	Northern boundary of land west of Moorlands.	Noise-sensitive receptors south of Gammaton.
LT10	Northern boundary of land west of Moorlands.	Noise-sensitive receptors south west of Webbery.

Position	Location	Representative Receptor
ST1	Land to east of Langdon Farm.	Noise-sensitive receptors to the west of Pusehill Road.
ST2	Land to the east of Back Lane.	Noise-sensitive receptors along Pump Lane.
ST3	South western boundary of the road south east from Knotty Corner.	Noise-sensitive receptors south east of Knotty Corner
ST4	South eastern boundary of Halsannery Farm.	Noise-sensitive receptors along lane to Halsannery Centre.
ST5	Northern boundary of land south of Tennacott Lane.	Noise-sensitive receptors along Tennacott Lane.
ST6	North western boundary of land south of Gammaton Road.	Noise-sensitive receptors south on Hillcrest Road.
ST7	North eastern boundary of land south of Woodville Cottage.	Noise-sensitive receptors along Gammaton Road.
ST8	Eastern boundary of land west of Gammaton Cottage.	Noise-sensitive receptors near Gammaton Cross.
ST9	Southern boundary of car park at Tarka Swims.	Noise-sensitive receptors along Gammaton Road near Tarka Swims.
ST10	Northern boundary of land at Deepy Park.	Noise-sensitive receptors near Stony Cross.

Impact Assessment Methodology

Overview

6.4.33 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020).

6.4.34 The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 5: EIA Methodology, of the PEIR.

Receptor Sensitivity/Value

6.4.35 The criteria for defining sensitivity in this chapter are outlined in **Table 6.10** below.

Table 6.10: Sensitivity criteria

Sensitivity	Definition	Examples
Very High	Very high importance and rarity, international scale and very limited potential for substitution.	Receptors which are very highly sensitive to noise and vibration and/or require low internal noise levels such as: • hospital wards containing high-dependency units, operating theatres, sensitive equipment (e.g., MRI scanners);

Sensitivity	Definition	Examples
		• recording studios; and • care homes at night.
High	High importance and rarity, national scale and limited potential for substitution	Receptors which are highly susceptible to noise and vibration disturbance such as: • care homes (daytime); • theatres; and • hospital wards.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution	Receptors where noise and vibration may cause disturbance but a level of tolerance is expected such as: • residential accommodation; • holiday accommodation; • research facilities; and • schools/universities.
Low	Low or medium importance and rarity, local scale	Receptors where noise and vibration may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect such as: • offices; • shops; • GP surgeries; and • sports facilities.
Negligible	Very low importance and rarity, local scale	Receptors where noise and vibration is not expected to be detrimental such as: • industrial facilities; • warehouses; and • car parks.

Magnitude of Impact

6.4.36 The criteria for defining magnitude in this chapter are outlined in **Table 6.11** below.

Table 6.11: Impact magnitude criteria

Magnitude of impact		Definition
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Low	Adverse	Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring

Magnitude of impact		Definition
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to, or positive addition of one or more characteristics, features or elements

Construction and Decommissioning Noise

6.4.37 Impact criteria for construction noise have been determined in accordance with the guidance in DMRB LA111 and Annex E of BS 5228-1:2009+A1:2014. DMRB LA 111 provides the following guidance in **Table 6.12** for determining the LOAEL and SOAEL for construction noise and in **Table 6.13** for determining the magnitude of impact.

Table 6.12: Construction time period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL
Weekdays (7am-7pm) and Saturdays (7am-1pm)	Baseline noise levels, $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014.
Evening (7pm-11pm) and Weekends (1pm-11pm on Saturdays and 7am-11pm on Sundays)		
Night (11pm-7am)		

Table 6.13: Magnitude of impact and construction noise descriptions

Magnitude of Impact	Construction Noise Level
High	$L_{Aeq,T} \geq$ SOAEL + 5 dB
Medium	SOAEL $\leq L_{Aeq,T} <$ SOAEL +5 dB
Low	LOAEL $L_{Aeq,T} <$ SOAEL
Negligible	$L_{Aeq,T} <$ LOAEL

6.4.38 The threshold levels which quantify the LOAEL and SOAEL have been derived from Example Method 2 in Annex E 3.3 of BS 5228-1:2009+A1:2014 which states the following:

'Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.'

6.4.39 Section 3 of DMRB LA 111 provides alternative durations when considering the significance of effect of transient construction works. Since many of the construction works undertaken are indeed likely to be transient in nature, the following durations are considered in the assessment of significant effects:

'Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

1) 10 or more days in any 15 consecutive days or nights;

2) a total number of days exceeding 40 in any 6 consecutive months'

6.4.40 Given the low ambient sound climate in the area surrounding the Proposed Development, the lower cut-off values above provide the SOAEL against which construction noise impacts will be assessed.

6.4.41 The core construction working hours proposed are 7am-7pm on weekdays and 7am-1pm on Saturdays. However, some construction activities may require works outside of these times and thus criteria have been derived for all possible construction periods outlined in BS 5228:2009+A1:2014.

Construction Traffic

6.4.42 There may be a change in local noise levels due to contributions from construction traffic on local road networks and temporary diversion networks during the construction of the Proposed Development.

6.4.43 The impact assessment will take account of the absolute level of the road traffic noise and the existing sound levels at the nearest receptors.

6.4.44 Impact criteria for these changes have been obtained from the guidance in DMRB LA 111 and are presented in **Table 6.14** below.

Table 6.14: Construction traffic criteria

Magnitude of Impact	Increase in Basic Noise Level (BNL) of closest public road used for construction traffic (dB)
High	BNL ≥ 5
Medium	3 ≤ BNL < 5
Low	1 ≤ BNL < 3
Negligible	BNL < 1

Construction Vibration

6.4.45 Impact criteria for vibration from construction have been identified based on guidance provided in BS 5228-2:2009+A1:2014. The following outline criteria defined in **Table 6.15** in terms of Peak Particle Velocity (PPV) can be used to identify potential significant impacts on nearby receptors.

Table 6.15: Construction vibration criteria

Magnitude of Impact	Vibration Level, Peak Particle Velocity (PPV), mm/s
High	1 ≤ PPV < 10
Medium	0.3 ≤ PPV < 1
Low	PPV < 0.3
Negligible	1 ≤ PPV < 10

6.4.46 As with construction noise, the durations outlined in paragraph **6.4.39** above are considered in the assessment of significant effects as per in Section 3 of DMRB LA 111.

Operational Noise

6.4.47 The significance of noise effects associated with the operations and maintenance of the converter stations has been determined based upon the methodology outlined in BS 4142:2014+A1:2019. This methodology includes calculating the operational rating sound level $L_{Ar,Tr}$ predicted at nearby receptors due to the operation of the converter stations, defined as operational specific sound level plus any acoustic character corrections due to tonality, impulsivity, intermittency, or any other distinct acoustic characteristics.

6.4.48 The rating sound level is then compared to the representative background sound level $L_{A90,T}$ at the nearest receptors which is obtained via measurements of the baseline acoustic environment. The difference between the rating sound level and the representative background sound level is used to determine the impacts which can be assessed in accordance with Section 11 of BS 4142:2014+A1:2019, with consideration also required for the context in which the sound has been assessed.

6.4.49 Based on the above, the following impact criteria in **Table 6.16** have been defined for operational noise.

Table 6.16: Operational noise criteria

Magnitude of Impact	BS 4142:2014+A1:2019 semantic description	Difference Δ between rating sound level $L_{Ar,Tr}$ and background sound level $L_{A90,T}$ (dB)
High	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.	$\Delta \geq 10$
Medium	A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.	$5 \leq \Delta < 10$
Low	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.	$0 \leq \Delta < 5$
Negligible		$-10 \leq \Delta \leq 0$

Significance of Effect

6.4.50 The significance of the effect upon noise and vibration has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in **Table 6.17**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

6.4.51 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

6.4.52 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations

Table 6.17: Assessment Matrix

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

6.4.53 Where the magnitude of impact is 'no change', no effect would arise.

6.4.54 The definitions for significance of effect levels are described as follows.

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
- Moderate: These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Assumptions and Limitations of the Assessment

Baseline Sound Survey

6.4.55 All sound surveys are limited by the instrumentation used to undertake the measurements. Uncertainty may arise as a result of the internal processes within the sound level meter to measure and process the measured data into the relevant noise indices. However, modern sound level meters are precision instruments.

6.4.56 The equipment used for the baseline sound survey are Class 1 instruments. According to BS EN 61672-1:2003, this has a sampling cycle of 100 milliseconds (ms) and a measurement range of A-weighted levels between 25 dB and 138 dB. The uncertainty due to fluctuations in temperature and humidity is ≤0.5 dB. The

accuracy of the equipment used has been monitored via calibration both prior to and upon completion of the survey at each position.

6.4.57 There may be temporal and seasonal variations to the local sound climate. The temporal variation has been accounted for by undertaking long-term measurements over a period of 1-week at a time of year when baseline noise levels are considered likely to be typical of the annual average. The survey period adopted allows for statistical analysis of any temporal variations in the noise climate to reduce uncertainty in the derivation of representative sound levels at nearby receptors.

6.4.58 Any influence due to human error has been minimised by ensuring that all sound monitoring equipment was installed discreetly and securely. Installing the equipment securely minimises any movement of the microphone diaphragm with the wind, and ensuring the equipment is discreet minimises interference with the equipment by the general public. All measurements were undertaken at a minimum height of 1.5 m above local ground level and 3.5 m from other reflective surfaces to minimise interference from reflected sound waves.

Construction Noise and Vibration Assessment

6.4.59 An indicative construction plant and equipment list has been generated based on experience with similar developments. Full details are contained in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR which includes details of the indicative quantities, estimated percentage of operation during construction activities, and typical noise spectra for each item obtained from BS 5228:2009+A1:2014.

6.4.60 The exact locations of each construction activity have not yet been confirmed. As such, construction noise and vibration levels have been calculated at varying distances from the boundary of the temporary construction compounds or relevant indicative works area, representing the maximum design scenario as defined in **Table 6.21**.

6.4.61 This is a standard approach and is considered both robust and acceptable at this stage.

Source Data

6.4.62 The following source data in **Table 6.18** has been obtained and used to inform the assessment of noise and vibration impacts at nearby receptors.

Table 6.18: Source data information

Project Phase	Source Data
Construction and decommissioning	• An indicative construction plant and equipment list has been generated based on experience with similar developments. Typical noise emission levels and spectra have been obtained from BS 5228:2009+A1:2019. • Predictions of construction traffic flows have been provided by the project traffic consultants and have been used to inform the potential noise impacts due to the increased vehicular flows on local highway networks during construction.
Operation and maintenance	• A layout and outline plant strategy for the converter stations have been provided by the relevant project engineers. • A list of typical plant items for the converter stations have been provided along with indicative quantities. Noise emission levels and associated frequency

Project Phase	Source Data
	content have been obtained from similar projects. This is a standard approach and is considered acceptable.
Digital mapping and location data	• The following OS digital mapping and location data have been used as part of this assessment: – OS Mastermap; – OS AddressBase Plus; and – OS Terrain 5.

Prediction Methods

6.4.63 Uncertainty and limitations may arise during the modelling process due to the sound propagation models used to inform the calculations. The sound levels at the nearest receptors have been calculated using the internationally accepted guidance within ISO 9613-2:1996 which is implemented by the 3D acoustic modelling software (SoundPLAN) used to predict noise levels from the Proposed Development. This standard claims an accuracy of ±3 dB for source heights up to 30 m and propagation distances between 100 m and 1 km.

6.4.64 The assessment of onshore construction noise impacts has been undertaken using typical source noise levels obtained from BS 5228-1:2009+A1:2019. The actual noise levels of the plant items may vary to those used in the assessment. In cases where there are multiple noise spectra for the same equipment, the highest reasonable level has been selected for the assessment of impacts.

6.4.65 Vibration levels have been predicted at varying distances from the relevant construction activities using methods outlined in BS 5228-2:2009+A1:2014. These methods are applicable within a limited distance range and equipment parameters (e.g. piling hammer energy, width of vibratory roller). This has been considered within the assessment and conservative assumptions adopted for the equipment used.

6.5 Baseline Environment

Site-Specific Surveys

6.5.1 The baseline sound surveys were undertaken in November 2022, March 2023, and June 2023 to quantify the baseline sound climate at the nearest noise-sensitive receptors to the Proposed Development landward of MHWS. These positions are presented alongside the survey results in **Table 6.19** below.

6.5.2 The baseline sound survey detailed above was undertaken in June 2023 at positions deemed suitably representative of the nearest noise-sensitive receptors for the Proposed Development landward of MHWS. These positions are presented alongside the survey results in **Table 6.19**.

6.5.3 The results are presented as the following noise indices.

- $L_{Aeq,16h}$ – 16-hour daytime ambient sound level used to characterise the average level over the period between 7am and 11pm.
- $L_{Aeq,12h}$ – 12-hour daytime ambient sound level used to characterise the average level over the period between 7am and 7pm.

- $L_{Aeq,4h}$ – 4-hour evening ambient sound level used to characterise the average level over the period between 7pm and 11pm.
- $L_{Aeq,8h}$ – 8-hour night-time ambient sound level used to characterise the average level over the period between 11pm and 7am.
- $L_{A90,1h}$ – 1-hour daytime background sound level used to characterise the level exceeded for 90% of a 1-hour period between 7am and 11pm.
- $L_{A90,15min}$ – 15-minute night-time background sound level used to characterise the level exceeded for 90% of a 15-minute period between 7am and 11pm.

6.5.4 Representative ambient sound levels have been derived in accordance with the guidance presented in BS 4142:2014+A1:2019. The residual sound levels, $L_{Aeq,T}$, have been calculated by logarithmically-averaging the measured sound data over 16-hour and 8-hour periods for the day and night-time, respectively.

6.5.5 The representative background sound levels, $L_{A90,T}$, have been derived through statistical analysis of the measured background sound level data with reference to the guidance in BS 4142:2014+A1:2019 which states the following:

'A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.'

6.5.6 Histograms of the cumulative frequency of occurrence plotted against the range of $L_{A90,T}$ levels during the relevant periods have been generated from the baseline survey data to estimate the representative background sound levels at the nearest noise-sensitive receptors and compared with the time-history graphs.

Table 6.19: Baseline Sound Survey results

Position	Measured Sound Level (dB)					
	Day			Evening	Night	
	$L_{Aeq,16h}$ (7am-11pm)	$L_{Aeq,12h}$ (7am-7pm)	$L_{A90,1h}$ (7am-11pm)	$L_{Aeq,4h}$ (7pm-11pm)	$L_{Aeq,8h}$ (11pm-7am)	$L_{A90,1h}$ (11pm-7am)
LT1	-	-	-	-	-	-
LT2	64	65	45	61	53	35
LT3	48	49	33	45	41	29
LT4	55	56	41	50	43	33
LT5	45	46	32	40	37	30
LT6	49	49	35	47	44	33
LT7	45	45	36	43	39	36
LT8	40	41	31	31	30	28
LT9	41	42	33	36	35	31
LT10	48	50	36	49	48	30

6.5.7 The existing sound climate is dominated primarily by distant traffic on local roads. Further details of the surveys and survey findings are presented in Volume 2, Appendix 6.1: Baseline Sound Survey, of the PEIR.

6.5.8 The sound level meter at LT1 malfunctioned and recorded for less than a full 24-hour period. As such, the data has not been used to inform the assessment works.

Future Baseline Conditions

6.5.9 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires 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 Environmental Statement. In the event that the Proposed Development does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

6.5.10 As the proportion of road traffic vehicles which are electrically powered increases, it is possible that traffic noise levels may reduce slightly due to the lower engine-noise levels, although on open roads and motorways, there will still be influence from noise due to tyre-road interaction and aerodynamic deflections over the vehicle surface.

6.5.11 The study area comprises a mixture of fields and farmland with residential settlement areas and open roads. As such, it is not anticipated that the future baseline scenario will change significantly in the absence of the development.

6.5.12 National planning policy (such as the NPPF, NPSE and PPG-N) require that all reasonable steps are taken to mitigate and minimise adverse noise effects on health. As such, any future developments will be required to demonstrate compliance with these requirements.

Key Receptors

6.5.13 **Table 6.20** identifies the receptors taken forward into the assessment.

Table 6.20: Key receptors taken forward to assessment

Receptor	Description	Sensitivity/Value
Residential receptors	Residential dwellings currently occupied including residential dwellings, houses in multiple occupation, and residential institutions such as care homes.	Medium (Daytime) High (Night-time)

6.6 Key Parameters for Assessment

Maximum Design Scenario

6.6.1 The maximum design scenarios identified in **Table 6.21** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project Description, of the PEIR. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g., different infrastructure layout), to that assessed here be taken forward in the final design scheme. Therefore, this comprises a conservative assessment of a worst case scenario.

Table 6.21: Maximum design scenario considered for the assessment of potential impacts

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Noise and vibration impacts due to the onshore export cable at landfall.	✓	×	✓	**Construction phase** Horizontal Directional Drilling (HDD) will be adopted at landfall to join the offshore and onshore cables in the Transition Joint Bay (TJB) • Each TJB will require an excavation area of approximately 750 m^2 and buried to a depth of approximately 2.5 m. The maximum area of concrete slab required for each TJB will be approximately 150 m^2 with a thickness of 0.3 m. • The volume of excavated material per TJB will be 1,875 m^3. • The installation will require a temporary construction compound with an area of approximately 10,000 m^2. The compound will require vibratory compaction works. • There will be four entry and exit pits. The volume of excavated material per exit pit will be approximately 75 m^3. • The HDD works will be undertaken over approximately 2.1 km. The works will be split over two phases for a total of 24 months (Initial 18 months of works, and a second phase of 6 months, following a gap in works). • Major HDD works may require 24-hour works dependent upon requirements. • Vibratory piling techniques will be used for the installation of the HDD entry/exit pits. **Decommissioning phase** • It has been assumed that the cables will be recovered by pulling the cables through the ducts for recycling. Piles will be removed using vibratory extraction and a mobile crane.	HDD techniques require equipment with high noise emission levels. It has been assumed that all construction plant will operate close to the boundary of the landfall construction compound nearest to noise-sensitive receptors. The works have potential for night-time working and thus the assessment has been undertaken with reference to the night-time construction noise impact magnitude criteria. Typical noise levels for the indicative construction plant list have been obtained from the equipment details outlined in BS 5228:2009-1+A1:2014. The assessment of construction vibration impacts has been undertaken based on the guidance in BS 5228:2009-2+A1:2014. A 16-tonne vibratory roller with drum width 2.2 m has been assumed for the dynamic compaction works which is the upper limit at which the equations presented in BS 5228 are valid. Both the assessment of vibratory compaction and vibratory piling impacts have been undertaken assuming a probability of exceedance of 50%.
Noise and vibration impacts due to the Onshore HVDC Cable Corridor landward of the transition joint bay.	✓	×	✓	**Construction phase** Open cut trenching • Onshore HVDC Cable Corridor: – The Onshore HVDC Cable Corridor will be approximately 14.5 km in length with a permanent corridor width of around 32 m for trenched methods. The temporary	The maximum area required for the construction of the HVAC cables and Onshore HVDC Cable Corridor and associated infrastructure represent the largest construction area. The working hours and duration of construction present the maximum design scenario for noise generation.

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				Onshore HVDC Cable Corridor width will be up to 65 m to allow for plant access, spoils and materials laydown. The maximum number of trenches will be 2 and the maximum number of HVDC cables will be 4. There will also be a maximum of 6 fibre-optic cables. – The trenches will have a width of 1.6 m at the base and 4.3 m at the surface. The depth of the trenches will be approximately 1.4 m. – The maximum number of link boxes will be 34 each with an area of 2.25 m^2. The nominal distance between each link box will be 800 m-1,100 m – The duration of construction works will be around 36 months. • Onshore HVAC cables: – The onshore HVAC cables will be located in the cable corridor and will be approximately 1.2 km in length with a permanent corridor width of 30 m and a temporary corridor width of up to 65 m. The maximum number of trenches will be 4 and the maximum number of HVAC cables will be 12. – The trenches will have a width of 2.1 m at the base and 4.9 m at the surface. The depth of the trench will be approximately 1.4 m. – The duration of construction works will be around 24 months in total (split across two periods of 12 months). <u>Construction compounds</u> • There will be main construction compound of area 63,000 m^2 on Gammaton Road for a period of up to 72 months. • A secondary compound will be located near the A39 with an area of 48,000 m^2 for a period of up to 36 months. <u>HDD</u> • HDD will be undertaken where the Onshore HVDC Cable Corridor crosses obstacles such as major roads,	The maximum design scenario is for up to 7 trenchless technique locations on the Onshore HVDC Cable Corridor. Trenchless techniques requires plant with higher noise levels. Where 24-hour work is deemed necessary, the following indicative plant items and operations would be required: • trenchless technique locations may require 24-hour works with generators in operation to power security lighting; • water/mud pumps will be in operation 24-hours a day; and • mixing and recycling systems will operate 24-hours a day. An indicative construction plant list has been applied and typical noise levels obtained from BS 5228:2009-1+A1:2014. It is unlikely that the works will be undertaken along the boundary of the construction compounds however this represents the shortest distance to nearby receptors.

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				watercourses, and woodland. The maximum number of HDD locations will be 7 (excluding landfall). • Major HDD works will be undertaken over a period of 12 months per HDD which are run concurrently. • There will be up to 16 HDD compounds with an area of 10,000 m^2 for a duration of 36 months. • The permanent corridor width at HDD locations will be approximately 60 m. <u>Haul road</u> • There is one haul road within the Onshore HVDC Cable Corridor. • The width of the haul road will be approximately 7 m (excluding passing bays). <u>The construction of the temporary construction compounds and haul road, backfilling of the trenches, and construction of the converter stations groundworks may require the use of vibratory compaction techniques.</u> • The predicted levels of vibration have been undertaken at various distances from the boundary of the temporary construction compounds, Proposed Development Draft Order Limits, and Converter Site. • A roller with a mass of up to 20-tonnes may be used to undertake the works. **Decommissioning phase** • It has been assumed that the cables will be recovered by pulling the cables through the ducts for recycling. Piles will be removed using vibratory extraction and a mobile crane. • Decommissioning has been assessed on the basis that the concrete foundations may be broken up using hydraulic peckers and breakers as well as a pulveriser. The demolished materials may be processed on-site using	

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				crushers and screens for disposal as recycled materials. This is unlikely to generate high levels of vibration.	
The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phases for the Proposed Development on human receptors.	✓	×	✓	**Construction phase** Construction traffic (HGVs, construction plant, etc.) will contribute to increased vehicular flows on local highway networks thus leading to a potential increase in local traffic noise levels. • The construction traffic noise assessment has been based on the calculation of absolute noise levels due to construction traffic on the haul road for the Proposed Development which runs the length of the Onshore HVDC Cable Corridor from the landfall site to the converter stations.	The calculation of absolute noise levels at the receptors as opposed to the change in the BNL on local highway networks represents the maximum design scenario.
Noise impacts due to the converter stations.	✓	✓	✓	**Construction phase** • There will be two converter stations with a permanent footprint of 373,000 m^2, including landscaping (e.g. bunds). • The converter station buildings will have a footprint of approximately 130,000 m^2 and a height of up to 26 m. • Access to the Converter Site will be via the existing Alverdiscott Substation site entrance from the minor road running from north to south between Gammaton Crossroads and Webbery Barton. • The Converter Site construction compound will be situated within the Converter Site and have an area of approximately 20,000 m^2. • Construction works will last up to 72 months. • Cut and fill earthworks will be required to construct the converter stations platforms. • The assessment of construction noise impacts has been undertaken from the boundary of the Converter Site.	The maximum permanent footprint represents the largest possible construction area. The working hours and duration of construction represent the maximum design scenario for noise generation. It is unlikely that the works will be undertaken along the boundary of the construction compounds and Converter Site however this represents the shortest distance to nearby receptors. A detailed assessment of the operation of the Proposed Development has been undertaken by applying representative frequency content for similar plant items to the indicative, broadband (single-figure) noise levels provided by the Applicant. The acoustic characteristics may not be as influential once the plant is enclosed within acoustic enclosures however this represents the maximum design scenario.

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				Operation and maintenance phase The proposed Converter Site will include two separate converter stations (Bipole 1 and Bipole 2). • The noise generating electrical equipment sited externally will comprise the following: – Transformers – AC filter reactors – AC filter capacitors – Valve cooling banks – Air-handling units • The transformers have tonal components at the lower frequencies of their noise emission spectra. A +4 dB acoustic character correction has been applied to the level predicted at all receptors where noise from these plant items have the highest contribution. This corresponds to a 'clearly perceptible' tonal component in terms of BS 4142:2014+A1:2019. • The Alverdicott Substation Connection Development has been assessed assuming an Air Insulated Switchgear substation comprising two super grid transformers. **Decommissioning phase** The Converter Site will be removed, and any waste recycled or disposed of. • Decommissioning has been assessed on the basis that the concrete foundations will be broken up using hydraulic breakers and munchers. The demolished materials may be processed on-site using crushers and screens for disposal as recycled materials. • Lorries will be used to remove the materials and equipment from the site.	

[1] C=construction, O=operation and maintenance, D=decommissioning

6.7 Mitigation Measures Adopted as Part of the Proposed Development

6.7.1 For the purposes of the EIA process, the term 'Measures adopted as part of the Proposed Development is used to include the following types of mitigation measures (adapted from IEMA, 2016). These measures are set out within Volume 1, Appendix 3.1: Draft Mitigation Schedule, of the PEIR.

- Primary (inherent) mitigation – measures included as part of the project design. IEMA describes these as 'modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the Development Consent Order (DCO). For example, a reduction in footprint or height.
- Secondary (foreseeable) mitigation. IEMA describes these as 'actions that will require further activity in order to achieve the anticipated outcome'. These include measures required to reduce the significance of environmental effects (such as lighting limits) and may be secured through an environmental management plan.
- Tertiary (inexorable) mitigation. IEMA describes these as 'actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects'. It may be helpful to secure such measures through a Construction Environmental Management Plan (CEMP) or similar.

6.7.2 The measures adopted as part of the Proposed Development to reduce the potential for impacts due to noise and vibration are outlined in **Table 6.22** below. These measures are considered inherently as part of the Proposed Development and have thus been considered in the assessment of significant effects presented in **section 6.8** to **6.10** below.

Table 6.22: Mitigation measures adopted as part of the Proposed Development

Measure Adopted	How the Measure Will be Secured
Primary Measures	
The following noise control measures will be considered in the design of the converter stations. • The orientation and layout of the converter stations will be considered in order to minimise noise levels at nearby receptors. • Quieter equipment will be selected, where available and practicable and mitigation measures such as acoustic barriers and enclosures will be specified where necessary.	Operational noise limits to be derived which will inform the design principles for the converter stations.
Tertiary Measures	
Onshore Construction Environmental Management Plan (On-CEMP). The On-CEMP will include construction noise and vibration	Secured as a requirement of the DCO.

Measure Adopted	How the Measure Will be Secured
limits and BPM to mitigate noise and vibration from construction activities associated with the Proposed Development.	
An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. CTMP(s) will be developed in accordance with the Outline CTMP prior to construction.	Secured as a requirement of the DCO.
Best Practicable Means (as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990) will be implemented during the construction, operation, maintenance aspects of the Proposed Development to ensure that noise levels are minimised within all reasonably foreseeable circumstances. For the construction phase these will be detailed within the Outline Onshore CEMP.	Measures to be included within the Outline On-CEMP(s) and the design of the converter stations to ensure compliance with operational noise criteria.
An Outline Onshore Decommissioning Strategy would be developed in a timely manner in consultation with the relevant stakeholders and prior to commencement of construction. The Onshore Decommissioning Plan(s) would be developed in accordance with the Outline Onshore Decommissioning Strategy prior to decommissioning. and in line with the latest available guidance.	Secured as a requirement of the DCO.

6.8 Assessment of Construction Effects

6.8.1 The impacts of the construction of the Proposed Development have been assessed. The potential impacts arising from the construction phase of the Proposed Development are listed in **Table 6.28**, along with the maximum design scenario against which each impact has been assessed.

6.8.2 A description of the potential effect on receptors caused by each identified impact is given below.

Noise and Vibration Impacts due to the Onshore HVDC Cables at Landfall.

6.8.3 The exact locations where works will be carried out is not yet known and thus predictions have been undertaken from the proposed boundary of the Onshore Infrastructure Area. Impact magnitude bands have been generated to count the number of receptors likely affected by each of the proposed construction activities.

6.8.4 A more detailed assessment of the noise impacts due to trenchless techniques has been undertaken by constructing a 3D acoustic model of the noise sources associated with HDD activities within the construction compound at landfall.

6.8.5 Measures to manage construction noise and vibration will be set out in the Outline On-CEMP. Example measures and the typical losses achievable by these measures have been included in the assessment based on the guidance in BS 5228-1:2009+A1:2014.

6.8.6 Full details of the construction noise and vibration assessment are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR.

Sensitivity of the Receptor

6.8.7 The nearest receptors to the landfall are residential in nature and the majority of construction works are proposed to be undertaken during the daytime. As such the receptors are considered to be of **medium** sensitivity for all works except trenchless techniques.

6.8.8 The trenchless techniques works are likely to require night-time working. As such, the receptors are considered to be of **high** sensitivity at night.

Magnitude of Impact

6.8.9 The open-cut trenching works which give the highest impacts over the greatest distance are the rock cutting works and earthworks. High impacts are predicted to occur up to a distance of 40-42 m from the proposed construction activities, with medium impacts occurring up to 72-74 m from construction activities.

6.8.10 However, there are no receptors situated within these impact magnitude bands. The nearest residential receptor to landfall is The Old Stables situated approximately 175 m from the boundary of the Onshore Infrastructure Area.

6.8.11 As such, the impact for open-cut trenching works is predicted to be of local spatial extent and short-term duration. The magnitude is predicted to be **negligible**.

6.8.12 The trenchless techniques proposed at landfall have been assessed assuming HDD as the technique adopted. The nearest receptors are The Old Stables and The Coach House which have been assessed against the night-time threshold values.

6.8.13 The impacts due to HDD are predicted to be of local spatial extent and short-term duration. The magnitude of impact is predicted to be **negligible.**

6.8.14 Vibration impacts may occur during dynamic compaction activities required to as part of the construction of the compound and the haul road. No high or medium impacts are predicted beyond 60 m for either activity. As outlined in paragraph **6.8.10** above, the nearest receptors are situated approximately 175 m from the boundary of the Onshore Infrastructure Area. As such, the impacts are predicted to be **negligible**.

Significance of the Effect

6.8.15 As discussed, the exact plant and location of the works are not yet known and thus there is a high degree of uncertainty to the significance of effects determined. This has been addressed by adopting precautionary thresholds and considering the distances at which the various effects might occur.

6.8.16 An Outline CEMP will include measures for the control of construction noise such as set working hours, barriers, quieter equipment, and acoustic enclosures for loud plant items. These measures have been accounted for within the assessment of noise impacts.

6.8.17 Overall, the magnitude of the impact for open-cut trenching techniques is **negligible** and the sensitivity of the receptor is **medium**. The effect will, therefore, be of negligible or minor adverse significance. Since the exact nature of the construction activities is not yet known, there is a degree of uncertainty to the assessment of noise impacts. As such, the overall effect is predicted to be of **minor** adverse significance which is not significant.

6.8.18 The magnitude of impact for HDD activities is **negligible** and the sensitivity of the receptor is **high**. The effect will therefore be of **minor** adverse significance which is not significant.

6.8.19 Finally, the magnitude of impact for vibratory works at landfall is **negligible** and the sensitivity of the receptor is **medium**. The effect is thus predicted to be of negligible or minor adverse significance. The assessment of vibration impacts has been undertaken assuming worst-case operation conditions and thus the overall significance is predicted to be of **negligible** adverse significance which is not significant.

Noise and Vibration Impacts due to the Onshore HVDC Cable Corridor Landward of the Transition Joint Bay

6.8.20 The majority of the Onshore HVDC Cable Corridor will be installed using open-cut trenching techniques with trenchless techniques adopted at locations such as major roads, woodland, and rivers.

6.8.21 The exact locations where works will be carried out is not yet known and thus predictions of noise impacts due to open-cut trenching have been undertaken from the boundary of the Onshore Infrastructure Area. Impact magnitude bands have been generated to count the number of receptors likely affected by each of the proposed construction activities.

6.8.22 A more detailed assessment of the noise impacts due to trenchless techniques has been undertaken by constructing a 3D acoustic model of the noise sources associated with HDD activities within the construction compounds.

6.8.23 Measures to manage construction noise and vibration will be set out in the Outline On-CEMP. Example measures and the typical losses achievable by these measures have been included in the assessment based on the guidance in BS 5228-1:2009+A1:2014.

6.8.24 Full details of the construction noise and vibration assessment are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR.

Sensitivity of the Receptor

6.8.25 The nearest receptors to the Onshore HVDC Cable Corridor are residential in nature and the majority of construction works are proposed to be undertaken during the daytime. As such the receptors are considered to be of **medium** sensitivity for all works except trenchless techniques.

6.8.26 The trenchless techniques works are likely to require night-time working. As such, the receptors are considered to be of **high** sensitivity at night.

Magnitude of Impact

6.8.27 The distances at which the magnitude of impact changes and the number of receptors per impact magnitude band for each of the construction activities are presented in **Table 6.23** below.

Table 6.23: Construction noise impact magnitude and number of receptors per impact magnitude band

Activity	Impact Magnitude Band Distance (m)			Number of Receptors per Impact Magnitude Band		
	High	Medium	Low	High	Medium	Low
Utility Diversions	34	60	860	28	29	1,666
Site Set-Up	38	67	960	34	31	1,961
Earthworks	40	72	1,021	34	35	2,284
Road Formation	22	40	569	13	21	974
Signs and Lighting	33	60	834	27	30	1,618
Rock Cutting	42	74	1,059	37	36	2,550

6.8.28 As with the works undertaken at landfall, the activities required for open-cut trenching techniques which are likely to generate noise impacts over the greatest distances are the rock cutting works and the earthworks.

6.8.29 High impacts are predicted at up to 37 receptors along the Onshore HVDC Cable Corridor, with medium impacts predicted at up to 36 receptors.

6.8.30 The assessment has been undertaken assuming all construction plant will be operating simultaneously at the boundary of the Onshore Infrastructure Area. This is unlikely to be the case with plant items more likely to be spread along the section of the Onshore HVDC Cable Corridor under construction.

6.8.31 Secondly, some of the receptors identified are situated along the access routes and thus are unlikely to be affected by open-cut trenching works since the separation distance will be greater than that assessed.

6.8.32 Finally, the works are likely to be transient in nature and will not be undertaken at a single location for an extended period.

6.8.33 Considering the above, the impact due to open-cut trenching works is predicted to be of local spatial extent and short-term in duration. The magnitude of impact is predicted to be **low**.

6.8.34 The assessment of noise impacts due to HDD works has been undertaken by constructing a 3D acoustic model of the noise sources associated with HDD activities within the construction compounds.

6.8.35 The impacts at all receptors during the daytime and evening periods are predicted to be negligible to low. However, high impacts are predicted at the residential dwelling to the north of the River Torridge compound named Treetops during the night-time due to the close proximity of this receptor to the construction compound where HDD plant is likely to be in operation. The levels predicted exceed the construction noise threshold value by +7 dB.

6.8.36 As such, the impacts due to HDD are predicted to be of local spatial extent and short-term duration, with the magnitude of impact predicted to be **high**.

6.8.37 Vibration impacts due to the dynamic compaction and vibratory piling techniques required within the construction compounds are predicted to be low at distances greater than 26 m from the boundary of the Onshore Infrastructure Area.

6.8.38 No receptors are predicted to be subject to high impacts and medium impacts are predicted at only one receptor. This receptor is Robin Hill Farm Cottages and is located approximately 25 m from the boundary of the construction compound. The

assessment of vibration impacts has been undertaken based on worst-case assumptions from the boundary of the construction compound. It is likely the vibratory works will be undertaken at a greater distance than that which has been assessed and thus vibration impacts are likely to be lower than predicted.

6.8.39 Considering the above, the impacts due to vibration are predicted to be of local spatial extent and short-term duration. The magnitude of impact is predicted to be **low**.

Significance of the Effect

6.8.40 As discussed, the exact plant and location of the works are not yet known and thus there is a high degree of uncertainty to the significance of effects determined. This has been addressed by adopting precautionary thresholds and considering the distances at which the various effects might occur.

6.8.41 An Outline On-CEMP will include measures for the control of construction noise such as set working hours, barriers, quieter equipment, and acoustic enclosures for loud plant items. These measures have been accounted for within the assessment of noise impacts.

6.8.42 Overall, the magnitude of the impact for open-cut trenching techniques is **low** and the sensitivity of the receptor is **medium**. The effect will, therefore, be of negligible or **minor** adverse significance which is not significant.

6.8.43 The magnitude of impact due to HDD works is predicted to be **high** and the sensitive of the receptor is **high**. The effect will therefore be of **major** adverse significance which is significant.

6.8.44 The impacts due to vibration are predicted to be **low** and the sensitivity of the receptor is **medium**. The effect will thus be of **minor** adverse significance which is not significant.

Further Mitigation

6.8.45 A bespoke method statement for HDD (or alternative trenchless techniques) in close proximity to noise and vibration sensitive receptors will be developed to ensure suitable noise and vibration limits can be met at Treetops. This may include works being limited to daytime/evening periods or enhanced acoustic mitigation measures adopted to undertake the works. With suitable measures in place, the effect may be reduced to **minor** adverse, which is not significant.

Future Monitoring

6.8.46 Depending on the locations of the construction works and the activities required, a noise monitoring strategy will be agreed as part of the Outline CEMP and with the relevant stakeholders to ensure compliance with the agreed noise threshold values.

Noise and Vibration Impacts due to the Construction of the Converter Stations

6.8.47 An assessment of the noise and vibration impacts during the construction of the Converter Site has been undertaken by predicting the distances at which the

magnitude changes from the boundary of the Converter Site. The number of receptors has then been calculated within each noise impact magnitude band to assess the overall impacts.

6.8.48 Measures to manage construction noise and vibration will be set out in the Outline CEMP. Example measures and the typical losses achievable by these measures have been included in the assessment based on the guidance in BS 5228-1:2009+A1:2014.

6.8.49 Full details of the construction noise and vibration assessment are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR.

Sensitivity of the Receptor

6.8.50 The nearest receptors to the Converter Site are residential in nature and the construction works are proposed to be undertaken during the daytime. As such the receptors are considered to be of **medium** sensitivity.

Magnitude of Impact

6.8.51 The distances at which the magnitude of impact changes and the number of receptors per impact magnitude band for each of the construction activities are presented in **Table 6.24** below.

Table 6.24: Construction noise impact magnitude and number of receptors per impact magnitude band

Activity	Impact Magnitude Band Distance (m)			Number of Receptors per Impact Magnitude Band		
	High	Medium	Low	High	Medium	Low
Substructure	95	170	2,400	0	0	230
Super Structure	100	176	2,489	0	0	244
Culvert	25	45	620	0	0	37
Demolition	21	39	539	0	0	27

6.8.52 There are no receptors which are predicted to be subjected to high or medium noise impacts during the construction phase for the Converter Site. Similarly, there are no high or vibration impacts predicted.

6.8.53 As such, the impact is predicted to be of local spatial extent, short-term duration, and the magnitude of impact is predicted to be **low**.

Significance of the Effect

6.8.54 As discussed, the exact plant and location of the works are not yet known and thus there is a high degree of uncertainty to the significance of effects determined. This has been addressed by adopting precautionary thresholds and considering the distances at which the various effects might occur.

6.8.55 An Outline On-CEMP will include measures for the control of construction noise such as set working hours, barriers, quieter equipment, and acoustic enclosures for loud plant items. These measures have been accounted for within the assessment of noise impacts.

6.8.56 Overall, the magnitude of the impact is **low** and the sensitivity of the receptor is **medium**. The effect will, therefore, be of negligible or **minor** adverse significance which is not significant.

Noise Impacts due to Construction Traffic on Local Highway Networks

6.8.57 Baseline traffic flows on the local highway networks are too low to accurately predict the existing traffic noise levels using the calculation procedure outlined in CRTN. As such, an assessment of the change in BNL, as outlined in DMRB, has not been possible.

6.8.58 The construction traffic noise assessment has thus been based on the calculation of absolute noise levels due to construction traffic on the haul road for the Proposed Development with runs the length of the Onshore HVDC Cable Corridor from the landfall site to the Converter Site.

6.8.59 Abnormal Indivisible Loads (AILs) may be required to transport components to the site during the construction phase of the Proposed Development.

6.8.60 The proposed route for AILs on the local highway network is shown on Figure 1. The number of AILs required during the construction phase is not yet known. As such, no assessment has been undertaken as part of the PEIR.

6.8.61 The AILs will travel from the main highways and use the haul road to access the various areas of the Proposed Development. The influence on AILs whilst travelling on the haul road will be considered as part of the Environmental Statement.

6.8.62 The AIL is proposed to be limited to well-trafficked roads such as the A39 and the A386. It is unlikely that the introduction of AILs as additional vehicles on the local highway network will increase the existing traffic noise levels sufficiently to result in significance adverse effects due to noise. As such, it is proposed that the impact of noise due to AILs on the local highway network be scoped out of the assessment for the Environmental Statement.

6.8.63 Full details of the construction traffic noise assessment are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the PEIR.

Sensitivity of Receptor

6.8.64 The nearest receptors to the haul road are residential in nature and the construction works are proposed to be undertaken during the daytime. As such the receptors are considered to be of **medium** sensitivity.

Magnitude of Impact

6.8.65 There are a number of receptors in close proximity to the proposed haul road. However, construction works along the cable route are transient, and thus the impacts will be short-term.

6.8.66 Measures to manage construction traffic noise will be set out in the Outline CEMP which will be supported by an Outline CTMP. This may include measures such as barriers, speed restrictions, and a limit to vehicular movements. The measures to be adopted to control construction traffic are presented in Volume 2, Chapter 5: Traffic and Transport, of the PEIR.

6.8.67 The impact is predicted to be of local spatial extent and short-term duration. The magnitude of impact will be **low**.

Significance of the Effect

6.8.68 The number of construction vehicles along the haul road may be subject to change as the design is refined and thus there is a high degree of uncertainty to the significance of effects determined. This has been addressed by adopting a conservative methodology in the prediction of absolute noise levels at nearby receptors.

6.8.69 As such, overall the sensitivity of receptors is **medium** and the magnitude of the impacts is **low**. The effects will therefore be of **minor** adverse significance which is not significant.

6.9 Assessment of Operation and Maintenance Effects

6.9.1 The impacts of the operation and maintenance phase of the Proposed Development have been assessed. The potential impacts arising from the operation and maintenance phase of the Proposed Development are listed in **Table 6.21**, along with the maximum design scenario against which each impact has been assessed.

6.9.2 A description of the potential effect on receptors caused by each identified impact is given below.

Noise Impacts due to the Converter Site

6.9.3 An assessment of the likely noise impacts has been undertaken by constructing a 3D acoustic model of the site and assuming upper-range sound power levels for the proposed plant strategy. Indicative mitigation measures have been incorporated to the assessment.

6.9.4 Consideration has also been given to the contribution of the Alverdiscott Substation Connection Development to the predicted noise levels at receptors. It has been assumed that four super grid transformers will be required, each with 12 cooling fans.

6.9.5 Full details are presented in Volume 2, Appendix 6.: Operational Noise Assessment, of the PEIR.

Sensitivity of Receptor

6.9.6 The Converter Site will be in continuous operation 24/7 and the nearest receptors are residential in nature. The receptors are thus considered to be of **high** sensitivity.

Magnitude of Impact

6.9.7 The results of the operational noise impact assessment during the night-time period (where background sound levels are lower) with the indicative mitigation measures included are presented in **Table 6.25** below.

Table 6.25: Operational noise assessment

Receptor	Background Sound Level, $L_{A90,T}$ (dB)	Specific Sound Level, $L_{Aeq,T}$ (dB)	Acoustic Character Correction (dB)	Rating Level, $L_{Ar,T}$ (dB)	Difference Between Rating Level and Background Level (dB)	Magnitude of Impact
Kingdon Cottage	31	25	0	25	-6	Negligible
Moorlands	31	28	0	28	-3	Negligible
North Webbery	30	32	0	32	+2	Low
The Grannary	30	28	0	28	-2	Negligible
Webbery Barton	30	31	0	31	1	Low

6.9.8 Adopting the assumed mitigation measures results in operational noise levels which do not exceed the background sound levels by more than +2 dB.

6.9.9 As such, the impact is predicted to be of local spatial extent and short-term duration. The magnitude of impact is predicted to be **low**.

Significance of Effect

6.9.10 The exact converter stations plant strategy is not yet known and thus upper range sound power levels have been assumed for each plant item. However, due to the low existing background sound levels at receptors for the Converter Site and Alverdiscott Substation Connection Development, the operation of the converter stations and substation unmitigated may generate noise emission levels in excess of the background levels. However, mitigation will be incorporated as part of the design and, as such, noise levels will be reduced to a level where any significant adverse effects are avoided.

6.9.11 Overall, the magnitude of impact is **low** and the sensitivity of the receptor is **high**. The effect will, therefore, be of minor or moderate adverse significance. Operational noise limits will be derived and secured as a requirement of the DCO which will inform the design principles for the converter stations and Alverdiscott Substation Connection Development. These limits will be derived to ensure significant effects are avoided via the implementation of appropriate mitigation and design principles. As such, the effect will be of **minor** adverse significance which is not significant.

6.10 Assessment of Decommissioning Effects

6.10.1 The impacts of the decommissioning phase of the Proposed Development have been assessed. The potential impacts arising from the operation and maintenance phase of the Proposed Development are listed in **Table 6.16**, along with the maximum design scenario against which each impact has been assessed.

6.10.2 A description of the potential effect on receptors caused by each identified impact is given below.

Noise and Vibration Impacts During the Decommissioning of the Proposed Development

6.10.3 The activities required during the decommissioning phase include the following.

- The cables may be recovered by pulling the cables through the ducts for recycling. Piles will be removed using vibratory extraction and a mobile crane.
- Concrete foundations may be broken up using hydraulic peckers and breakers as well as a pulveriser. The demolished materials may be processed on-site using crushers and screens for disposal as recycled materials.
- Lorries will be used to remove the materials and equipment from the site.

Sensitivity of Receptor

6.10.4 It is unlikely that decommissioning works will be undertaken outside of the standard construction working hours and thus the receptors are deemed to be of **medium** sensitivity.

Magnitude of Impact

6.10.5 Decommissioning is likely to operate within the parameters identified for construction. As such, decommissioning activities will be limited to within the construction working areas and require a duration no greater than the activities assessed as part of the construction phase.

6.10.6 An onshore decommissioning plan will be submitted prior to decommissioning in accordance with a requirement in the DCO.

6.10.7 The impact will be of local spatial extent and short-term duration. The magnitude of impact is deemed to be **low**.

Significance of Effect

6.10.8 Overall, the magnitude of impact is **low** and the sensitivity of the receptors is **medium**. The effect will therefore be of **minor** adverse significance which is not significant.

6.11 Cumulative Environmental Assessment

6.11.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Proposed Development together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 1, Appendix 5.3: CEA Matrix, of the PEIR). Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

6.11.2 The noise and vibration CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA Methodology, of the PEIR. As part of the assessment, all projects and plans considered alongside the Proposed

Development have been allocated into ‘tiers’ reflecting their current stage within the planning and development process.

- Tier 1
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact
- Tier 2
  - Scoping report has been submitted
- Tier 3
  - Scoping report has not been submitted
  - Identified in the relevant Development Plan
  - Identified in other plans and programmes.

6.11.3 This tiered approach is adopted to provide a clear assessment of the Proposed Development alongside other projects, plans and activities.

6.11.4 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 6.26**.

Table 6.26: List of cumulative developments considered within the CEA

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
Tier 1						
1/1266/2022/REMM	Pending	0.2	Reserved matters application for details of appearance, landscaping, layout and scale in respect of a proposal for 276 no. dwellings, associated infrastructure and open space pursuant outline planning permission	Unavailable	Unavailable	Yes
1/1057/2021/FULM	Permitted	Partially within the Proposed Development Draft Order Limits	Installation and operation of a solar farm together with all associated works, equipment and infrastructure	Unavailable	Unavailable	Yes

Cumulative Effects Assessment

6.11.5 A description of the significance of cumulative effects upon noise and vibration receptors arising from construction and operation is given below.

Construction

Tier 1 Projects

6.11.6 There is no specific information available as part of application 1/1266/2022/REM regarding construction. Torridge Council's decision notice for the outline planning application (ref: 1/1086/2017/OUTM) outlines a planning condition requiring that a construction method statement be prepared prior to commencement of any construction works. This method statement will likely include measures by which construction noise and vibration will be controlled via the implementation of BPM.

6.11.7 The nearest common receptor between development 1/1266/2022/REM and the Proposed Development is Bowood House situated approximately 80 m from the Onshore Infrastructure Area and approximately 220 m from development 1/1266/2022/REM. As such, there is unlikely to be any cumulative noise and vibration effects during the construction phase.

6.11.8 The EIA Scoping Opinion received from Torridge Council for application 1/1057/2021/FULM shows noise to be scoped out of the EIA since significant effects are unlikely to occur during the construction phase.

6.11.9 A Construction, Decommissioning and Traffic Management Method Statement was submitted as part of the planning application with section 6.2 outlining the construction working hours to be during the daytime only and a commitment for the appointed contractors to conform to the construction noise code of practice outlined in BS 5228:2009+A1:2014. This method statement also outlines that the loudest construction activity is the installation of the mounting frames for the solar PV panels using solar pile driving techniques which will last for 6-8 weeks.

6.11.10 The nearest common receptor between solar farm development 1/1057/2021/FULM and the Proposed Development is Kingdon Cottage situated approximately 725 m west of the solar farm and 300 m from the Proposed Development. Given the large separation distances between the solar farm and nearest receptors and the commitment to control noise and vibration, it is unlikely that there will be any significant cumulative effects during the construction phase.

6.11.11 Overall, the magnitude of impact is **low** and the sensitivity of receptors is **medium** the cumulative effects during construction are considered to be of **minor** adverse significance which is not significant in EIA terms.

Operation and Maintenance

Tier 1 Projects

6.11.12 A noise impact assessment was submitted as part of the planning application for the solar farm development (1/1057/2021/FULM) which provides an assessment of the potential noise impacts during the operation and maintenance phase of the development.

6.11.13 The common receptors between the solar farm and the Proposed Development which are included in the noise impact assessment are outlined in **Table 6.27** below along with an assessment of the cumulative operational noise levels at these receptors.

6.11.14 The noise impact assessment report states the solar farm is likely to be operational between 4:30am and approximately 1-hour after sunset. Since this assessment period includes the night-time period adopted for the assessment of operational noise effects for the Proposed Development, an assessment against the night-time criteria is presented for the assessment of cumulative effects.

Table 6.27: Cumulative operational noise assessment.

Receptor	Background Sound Level, $L_{A90,T}$ (dB)	Rating Level $L_{Ar,T}$ (dB)		Cumulative Noise Level (Db)	Difference Between Cumulative Level and Background Level (dB)
		Proposed Development	Solar Farm Development		
Kingdon Cottage	31	25	21	27	-4
Moorlands	31	28	25	30	-1
Webbery Barton	30	32	20	32	+2

6.11.15 The results in **Table 6.27** above show that no cumulative noise impacts are predicted during the operation and maintenance phase of the two developments.

6.11.16 Overall, the magnitude of impact is **low** and the sensitivity of the receptor is **high**. The cumulative effect is thus predicted to be of minor or moderate adverse significance. Since the cumulative noise level predicted at these receptors is primarily influenced by the operation of the Converter Site which is proposed to be controlled to comply with an operational noise limit as a requirement of the DCO, the effect is considered to be of **minor** adverse significance which is not significant.

Decommissioning

Tier 1 Projects

6.11.17 Since development 1/1266/2022/REM is residential in nature, no cumulative decommissioning effects are predicted.

6.11.18 The Construction, Decommissioning and Traffic Management Method Statement submitted as part of application 1/1057/2021/FULM contains details of the decommissioning activities required. However, construction and decommissioning were not included as part of the noise assessment since these effects were scoped out of the EIA. As such, no significant effects are likely to occur.

6.11.19 Overall, the magnitude of impact is **low** and the sensitivity of the receptor is **medium**. The effect is thus considered to be of **minor** adverse significance which is not significant.

6.12 Transboundary Effects

6.12.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to noise and vibration from the Proposed Development upon the interests of other states (see Volume 1, Appendix 5.2: Transboundary Screening).

6.13 Inter-related Effects

6.13.1 Inter-relationships are the impacts and associated effects of different aspects of the Proposed Development on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Proposed Development (construction, operation and maintenance), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g., construction noise effects from piling and operational substation noise).
- Receptor led effects: Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on noise and vibration such as direct habitat loss or disturbance, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

6.13.2 The increased traffic flows due to construction traffic are in-built to the baseline scenario. The assessment of inter-related effects between noise and vibration and ecology and historic environment can be found in the following chapters:

- Volume 2, Chapter 1: Onshore Ecology and Nature Conservation, of the PEIR; and
- Volume 2, Chapter 2: Historic Environment, of the PEIR.

6.13.3 Further details of inter-related effects are provided in Volume 4, Chapter 5: Inter-related effects.

6.14 Summary of Impacts, Mitigation Measures and Monitoring

6.14.1 Information on noise and vibration within the study area was collected through desktop reviews of the onshore infrastructure area, consultation with the relevant Local Authorities and Planning Inspectorate, and baseline sound surveys.

6.14.2 **Table 6.28** presents a summary of the impacts, measures adopted as part of the Proposed Development and residual effects in respect to noise and vibration. The impacts assessed include.

- Noise and vibration impacts due to the onshore export cable at landfall.

- Noise and vibration impacts due to the Onshore HVDC Cable Corridor landward of the transition joint bay.
- The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phases for the Proposed Development on human receptors.
- Noise impacts due to the converter stations.

6.14.3 Overall, it is concluded that there will be the following significant effects arising from the Proposed Development during the construction, operation and maintenance or decommissioning phases.

- Noise impacts due to the Onshore HVDC Cable Corridor landward of the transition joint bay (due to HDD).

6.14.4 **Table 6.29** presents a summary of the potential cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include:

- Noise and vibration impacts due to the Onshore HVDC Cable Corridor landward of the transition joint bay; and
- Noise impacts due to the converter stations.

6.14.5 Overall, it is concluded that there will be no significant cumulative effects from the Proposed Development alongside other projects/plans.

6.14.6 No potential transboundary impacts have been identified in regard to effects of the Proposed Development:

Table 6.28: Summary of potential environmental effects

Receptor	Sensitivity of Receptor	Description of Impact	Short/Medium/Long Term	Magnitude of Impact	Significance of Effect	Significant/Not significant	Notes
Construction phase							
Residential receptors.	Medium	Construction noise and vibration impacts due to open-cut trenching works and the construction of the Converter Site.	Short-term	Low	Minor adverse	Not significant	Construction noise and vibration will be controlled via BPM as outlined in the Outline CEMP.
Residential receptors.	High	Construction noise and vibration impacts due to HDD.	Short-term	High	Major adverse	Significant	A bespoke method statement for HDD (or alternative trenchless techniques) near noise and vibration sensitive receptors where significant effects are identified will be developed to ensure suitable noise and vibration limits can be met. This may include works being limited to daytime/evening periods or enhanced acoustic mitigation measures adopted to undertake the works. With suitable measures in place, the effect may be reduced to minor adverse, which is not significant
Residential receptors.	Medium	Noise impacts due to construction traffic.	Short-term	Low	Minor adverse	Not significant	Construction traffic will be controlled via a Construction Traffic Management Plan as outlined in the Outline CEMP.

Receptor	Sensitivity of Receptor	Description of Impact	Short/Medium/Long Term	Magnitude of Impact	Significance of Effect	Significant/Not significant	Notes
Operation and Maintenance Phase							
Residential receptors	High	Operational noise impacts due to the Converter Site and the Alverdiscott Substation Connection Development.	Long-term	Low	Minor adverse	Not significant	Operational noise levels will be controlled to as part of the design to ensure compliance with an operational noise limit to be secured as a requirement of the DCO.
Decommissioning phase							
Residential receptors	Medium	Decommissioning noise and vibration impacts	Short-term	Low	Minor adverse	Not significant	Decommissioning is likely to operate within the parameters identified for construction. As such, decommissioning activities will be limited to within the construction working areas and require a duration no greater than the activities assessed as part of the construction phase. A Onshore Decommissioning Plan will be submitted prior to decommissioning in accordance with a requirement in the DCO.

Table 6.29: Summary of potential cumulative environmental effects

Receptor	Sensitivity of Receptor	Description of Impact	Short/Medium/Long Term	Magnitude of Impact	Significance of Effect	Significant/Not Significant	Notes
Construction Phase							
Residential Receptors	Medium	Construction noise and vibration impacts	Short-term	Low	Minor adverse	Not significant	Construction noise and vibration impacts due to the Proposed Development will be controlled via BPM as outlined in the Outline CEMP. The other developments considered will comply with a similar CEMP or construction method statement to control noise and vibration impacts at nearby receptors.
Operation and Maintenance Phase							
Residential Receptors	High	Operational noise impacts due to the converter site and solar farm development	Long-term	Low	Minor adverse	Not significant	The dominant sources of noise in the assessment of cumulative operational noise effects were shown to be associated with the Converter Site. Operational noise levels will be controlled to as part of the design to ensure compliance with an operational noise limit to be secured as a requirement of the DCO.
Decommissioning Phase							
Residential Receptors	Medium	Decommissioning noise and vibration impacts	Short-term	Low	Minor adverse	Not significant	Decommissioning is likely to operate within the parameters identified for construction. As such,

Receptor	Sensitivity of Receptor	Description of Impact	Short/Medium/Long Term	Magnitude of Impact	Significance of Effect	Significant/Not Significant	Notes
							decommissioning activities will be limited to within the construction working areas and require a duration no greater than the activities assessed as part of the construction phase. A decommissioning plan will be submitted prior to decommissioning in accordance with a requirement in the DCO.

6.15 Next Steps

6.15.1 The design of the Proposed Development will continue to be refined during the EIA process. The layout and plant strategy proposed for the Alverdiscott Substation Connection Development will be progressed and included as part of the assessment for the Environmental Statement.

6.15.2 Additional baseline survey measurements will be undertaken to quantify the noise climate at human and recreational receptors, where each is necessary, to ensure all relevant noise impact criteria are suitably representative following design refinement.

6.15.3 Operational noise limits will be derived and agreed with the Local Planning Authority to be secured as a requirement of the DCO.

6.15.4 The assessment of noise impacts due to increased traffic flows on local highway networks will be updated following refinement of the traffic and transport assessment.

6.16 References

Legislation

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

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