XLINKS' MOROCCO-UK POWER PROJECT

Environmental Statement

Volume 2, Chapter 6: Noise and Vibration

Document Number: 6.2.6

PINS Reference: EN010164/APP/6.2

APFP Regulations: 5(2)(a)

November 2024

For Issue

xlinks.co

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
For Issue	Application	RPS	Xlinks 1 Ltd	Xlinks 1 Ltd	November 2024

Prepared by:

RPS

Prepared for:

Xlinks 1 Limited

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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 carried out by National Grid Electricity Transmission. This does not form part of the Proposed Development. However, it is considered cumulatively within the Environmental Impact Assessment as it is necessary to facilitate connection to the national grid.
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 Sites (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 Sites to the new Alverdiscott Substation Connection Development.
HVDC Cables	The High Voltage Direct Current (HVDC) cables which would bring electricity to the UK Converter Sites from the Moroccan Converter Sites.
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.

Term	Meaning
National Grid Electricity Transmission	National Grid Electricity Transmission (NGET) owns and maintains the electricity transmission network in England and Wales.
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 Sites, and road upgrade works.
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 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
AIL	Abnormal Indivisible Load
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

Acronym	Meaning
DMRB	Design Manual Roads and Bridges
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ES	Environmental Statement
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
PEIR	Preliminary Environmental Information Report
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level
ST	Short-term
UK	United Kingdom

Units

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

6 NOISE AND VIBRATION

6.1 Introduction

6.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) undertaken 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'. The ES accompanies the application to the Planning Inspectorate for development consent for the Proposed Development.

6.1.2 This chapter considers the likely noise and vibration impacts and effects of the Proposed Development 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 ES chapter:

- identifies the key legislation, policy and guidance relevant to noise and vibration;
- details the EIA scoping and consultation process undertaken to date for noise and vibration;
- confirms the study area for the assessment, the methodology used to identify baseline environmental conditions, the impact assessment methodology, and identifies any assumptions and limitations encountered in compiling the environmental information;
- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation;
- details the mitigation and/or monitoring measures that are proposed to prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process;
- defines the project design parameters used to inform for the impact assessment;
- presents an assessment of the likely impacts and effects in relation to the construction, operation and maintenance and decommissioning phases of the Proposed Development on noise and vibration; and
- identifies any cumulative, transboundary and/or inter-related effects in relation to the construction, operation and maintenance and decommissioning phases of the Proposed Development on noise and vibration.

6.1.4 This chapter also draws upon additional information to support the assessment contained within:

- Volume 2, Appendix 6.1: Baseline Sound Survey of the ES;
- Volume 2, Appendix 6.2: Construction Noise of the ES; and
- Volume 2, Appendix 6.3: Operational Noise of the ES.

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 of the existence of a statutory nuisance or the likelihood of a statutory nuisance arising or recurring. Section 80 of the EPA provides Local Authorities with the power to serve an abatement notice 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 would be located within the UK Exclusive Economic Zone offshore waters (beyond 12 nautical miles (nm) from the English coast) and inshore waters, with the onshore infrastructure proposed to be located wholly within Devon, England. As set out in Volume 1, Chapter 1: Introduction, of the ES, 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 ES
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*	Noise sensitive receptors within the operational noise study area are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES, 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

Summary of NPS requirement	How and where considered in the ES
• *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* • *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]	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 ES, with the representative levels derived presented in **Table 6.20** 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 6.11** of this chapter and Volume 2, Appendix 6.2: Construction Noise and Vibration, of the ES. Proposed Noise and vibration control measures are contained within the Outline Onshore CEMP (On-CEMP). The final On-CEMP(s) 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 ES. An assessment of the potential impacts on receptors during the most affected operation and maintenance period (night-time) is provided in **section 6.11** of this chapter, with full details of the methodology and results presented in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES. Operational noise criteria will be secured as part of the Converter Site detailed design which is a requirement of the DCO. Prior to the detailed design stage, indicative mitigation measures which may be adopted as part of the detailed design to ensure compliance are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES. The impact assessment in **section 6.10** to **6.12** of this chapter considers receptor sensitivity with details provided in **Table 6.21** of this chapter. The future baseline acoustic environment is considered in **section 6.7** 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 6.10** and **6.12** of this chapter. Full details are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the ES with full details of the proposed traffic flows detailed in Volume 2, Chapter 5: Traffic and Transport of the ES.
'*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*	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.

Summary of NPS requirement	How and where considered in the ES
British Standards and other guidance which also give examples of mitigation strategies.' [Paragraph 5.12.9 of NPS EN-1]	Construction, operation and maintenance, and decommissioning noise and vibration impacts are assessed in **section 6.10** to **6.12** 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). • 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 Revision 2 (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 ES. These measures are contained within the Outline On-CEMP. The final On-CEMP(s) will be secured as a requirement of the DCO. Operational noise criteria will be secured as part of the Converter Site detailed design which is a requirement of the DCO. Details of indicative operational noise mitigation measures which may be adopted as part of the detailed design to ensure compliance are outlined in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES.
'*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]	Details of the mitigation measures adopted as part of the Proposed Development are outlined in **section 6.8** of this chapter. Construction noise and vibration control measures will be outlined in the Outline On-CEMP and confirmed in the final On-CEMP(s) to be secured as Requirement 7 (management plan) of the DCO.

Summary of NPS requirement	How and where considered in the ES
'*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 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]	Operational noise criteria will form part of the detailed design that will be secured as under Requirement 4 (detailed design) 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 ES; and • Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES. The operational noise model has been constructed to include the indicative Converter Site layout and the indicative landscaping scheme (earth modelling) to account for the likely benefit of 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 ES. Details of the site selection process can be found in Volume 1, Chapter 4: Need and Alternatives, of the ES. The full plant design including equipment selections, layouts, and mitigation measures have been assessed in **section 6.10** to **6.12** of this chapter. The 3D acoustic model detailed in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES has been constructed to reflect the likely future topographic changes that would occur through implementation of the indicative landscaping scheme (earth modelling) to account for the likely benefit of screening of noise at the nearest receptors.
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 ES. Construction noise and vibration control measures are presented in the Outline On-CEMP. The final On-CEMP(s) will 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 ES. Operational noise criteria will form part of the detailed design that will be secured under Requirement 4 (detailed design) 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 ES.

Summary of NPS requirement	How and where considered in the ES
	The significance of effects following adoption of these measures is assessed in **section 6.10** to **6.12** 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 6.10** to **6.12** 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 ES.
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 appropriate mitigation options should be considered and adopted where required. [Paragraphs 2.9.37 and 2.9.38 of NPS EN-5]	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 6.10** of this chapter with details provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the ES and Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES.

The National Planning Policy Framework

6.2.14 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019 and 2021 and 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 has been updated and the draft version was published for consultation on 30 July 2024 with the consultation period ending on 24 September 2024 (Ministry of Housing, Communities and Local Government, 2024).

6.2.16 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. This is summarised in **Table 6.2** below:

Table 6.2: Summary of National Guidance

Guidance Paragraph	What is stated
NPPF	
Paragraph 191	*'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.*
Paragraph 193	*'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*

Guidance Paragraph	What is stated
	the site or the wider area to impacts that could arise from the development. In doing so they should: *a) mitigate and reduce to minimum potential adverse impact 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)'.*

6.2.17 The draft NPPF includes similar provisions as the current designated NPPF. The draft NPPF has been reviewed and there are no material updates for noise and vibration.

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 6.3** below. The guidance outlines the need to avoid and prevent the occurrence of significant adverse effects due to noise.

Table 6.3: 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.

Response	Examples of Outcomes	Increasing Effect Level	Action
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.
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 at the County level). 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 6.4**.

Table 6.4: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the ES
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 6.10** to **6.12** 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 ES. An assessment of the cumulative effects is presented in **section 6.13** 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) 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

Scoping

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, operation and maintenance and decommissioning 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 6.5**, together with details of how these issues have been addressed within the ES.

Table 6.5: Summary of Scoping Responses

Comment	How and where considered in the ES
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 6.8** 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 Sites 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 Sites, the Inspectorate is not in a position to agree to scope out this matter as the location of the Converter Sites are not yet known. The Scoping Report does not provide information on the anticipated 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 Sites, as well as any measures to control emissions and confirmation of how these are secured through the DCO or other mechanism*.'	The exact location of each plant item within the Converter Site is not yet known. Significant adverse effects resulting from vibration during the operation of the Converter Sites will be avoided through measures adopted to control vibration at source during the design process. Example measures include avoiding direct contact between the equipment and the ground using vibration isolating pads or by mounting the equipment above ground level. Based on the above, in conjunction with the distances to the nearest receptors, significant effects due to operational vibration from the Converter Sites and have been scoped out.
'*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 6.6**). Full details of this survey are provided in Volume 2, Appendix 6.1: Baseline Sound Survey of the ES.
'*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*	Receptor sensitivity for the purposes of the noise and vibration impact assessments is defined in **Table 6.11** of this chapter. Noise impacts on ecological receptors have been assessed in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES.

Comment	How and where considered in the ES
aspect chapters such as Ecology and Nature Conservation and Historic Environment.'	

Preliminary Environmental Information Report

6.3.3 The preliminary findings of the EIA process were published in the Preliminary Environmental Information Report (PEIR) on 16 May 2024. The PEIR was prepared to provide the basis for statutory public consultation under the Planning Act 2008. This included consultation with statutory bodies under section 42 of the Planning Act 2008.

6.3.4 A summary of the key items raised specific to noise and vibration is presented in **Table 6.6,** together with how these issues have been considered in the production of this ES chapter.

Further Engagement

6.3.5 Throughout the EIA process, consultation and engagement (in addition to scoping and Section 42 consultation) with interested parties specific to noise and vibration has been undertaken.

6.3.6 A summary of the key items raised specific to noise and vibration is presented in **Table 6.6,** together with how these issues have been considered in the production of this ES chapter.

Table 6.6: Summary of Section 42 consultation relevant to this chapter

Date	Consultee and type of response	Issues raised	How and where considered in the ES
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 ES. 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 Revision 2 (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).

Date	Consultee and type of response	Issues raised	How and where considered in the ES
July 2024	Natural England	d) **Bird Disturbance**: Noise and lighting can lead to both the displacement and disturbance of wildlife. Potential impacts will need to be fully considered in the Application and mitigation measures will be required to avoid noise and lighting impacts on overwintering birds using the saltmarsh/mudflat habitats, the coast and surrounding fields for feeding and resting. Therefore, we advise a working window of 1st April to 31st August of any given year within the boundary of the SSSI and supporting habitat. If the passage and overwintering period can't be avoided then we advise that noise and lighting mitigation measures should be secured through a Construction Environment Management Plan (CEMP) to avoid disturbance to ecological receptors within the site and beyond the site boundary during construction and will need to be considered in greater detail than currently presented, as part of the application. h) **Fish:** Fish are not a notified feature of the SSSI, but the River Torridge is important for several migratory and resident species protected by legislation. Information produced to support the Appledore clean maritime innovation centre planning application (1/1179/2023/LA. AQASS Ltd data and literature review Jan 2024) highlighted the presence of Allis Shad, Twaite Shad, Bass, European eel, Salmon and Trout. Noise, pollution and sediment disturbance are potential impacts.	An assessment of the effects of construction noise and vibration has been carried out based upon available information, and in accordance with the relevant guidance. The results of the assessment indicate that significant noise and vibration effects on human receptors are not expected. Guidance used to inform the assessment of construction noise is: • 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). The findings of the construction phase noise and vibration assessment are considered to be true for ecological receptors located within the vicinity of the site. Due to an impedance difference between air and water noise does not readily transmit to bodies of water. Adverse noise impacts on underwater ecological receptors are therefore not expected to occur and thus an assessment has been scoped out. Any potential impacts associated with the HDD next to the River Torridge would be short term, therefore, the not significant. Thus, an assessment of impact on fish in the river Torridge has been scoped out.
July 2024	Torridge District Council	**Noise & Air Pollution** In addition to traffic, the construction phase will inevitably	An assessment of noise generated during the construction phase of the Proposed Development has been carried out. This

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		also lead to an increase in dust and noise pollution for residents living in the vicinity of the construction sites. The Council's response to the PEIR sets out detailed comments from its Environmental Protection Team.	assessment has found that noise and vibration associated with the construction phase are not expected to generate significant adverse effects.
July 2024	Torridge District Council	**Volume 2 Chapter 6 Noise and Vibration** outlines a significant number of noise generating activities both during the construction and operational phases. Whilst some data has been provided on noise impact, it is noted that the layout and location of plant and equipment has not yet been finalised. Initial concern is raised with the amount of high level noise activity, such as HDD and trenching works, that may possibly occur during noise sensitive time periods (i.e. night time). Table 6.22 outlines mitigation measures however, several of the measures are to be secured through planning conditions. Whilst it is acknowledged that noise limits, time restrictions and a suitable Construction Environmental Management Plan (CEMP) can be conditioned within the planning consent, there needs to be reliance on robust noise assessments being available to ensure appropriate noise limiting conditions for example. The operational substation suggests a very slight exceedance of noise levels over background at neighbouring dwellings. Despite the low levels, the proposed development should avoid any potential background 'creep' in the locality. Para 6.15 mentions that further baseline surveys will be undertaken to quantify the noise climate on neighbouring amenity. The Environmental Protection Team will require further surveys to be conducted, that accurately evaluate the noise impact, once layout and plant strategy have been	An assessment of noise generated during the construction phase of the Proposed Development has been carried out. This assessment has found that noise and vibration associated with the construction phase are not expected to generate significant adverse effects. An operational noise assessment has been carried out based on an updated layout of the Proposed Development. The assessment has found that with appropriate mitigation measures in place, operational noise levels will not exceed the existing background sound levels at nearby receptors.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		finalised. The methodology referenced in the PEIR, in particular BS4142 and BS5228, is relevant.	
September 2024	Torridge District Council	The overall noise and vibration assessment methodology was discussed with TDC, with information provided on how the assessment has advanced since the PEIR stage. While overall TDC were pleased with the assessment methodologies and how this has been progressed, a query arose regarding how the different timescales of the different types of construction works have been considered in the assessment.	Timescales presented as part of the Project Description, and the Maximum Design Scenario have been reviewed to identify the timescales which have the highest potential of generating adverse impacts, these have been used to inform the noise assessment. DMRB LA111 guidance states that works which occur for less than 10 in 15 consecutive days are not expected to generate significant adverse impacts due to the short-term nature of the works. However, due to the nature of the HDD works, and their potential to operate continuously for a number of days, the potential significant effects from HDD works have been considered with the same scrutiny as longer term activities.

6.4 Study Area

6.4.1 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 ES.

6.4.2 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.

6.4.3 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.'

6.4.4 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.'

6.4.5 The assessment of operation and maintenance noise impacts have been 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.

6.4.6 In summary, the noise and vibration study areas which have been used in the assessment are 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.

6.5 Scope of the assessment

6.5.1 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 6.5** and **Table 6.6**.

6.5.2 Taking into account the scoping and consultation process, **Table 6.7** summarises the impacts considered as part of this assessment.

Table 6.7: Impacts considered within this assessment

Activity	Impacts scoped into the assessment
Construction Phase	
Landfall works	Construction noise and vibration at sensitive receptors from the installation of the transition joint bay and Trenchless Techniques at landfall.
Trenchless techniques	Construction noise at sensitive receptors located in the vicinity of trenchless techniques works along the Onshore HVDC Cable Corridor.
Converter stations	Noise and vibration at sensitive receptors from the construction of the Converter Site and infrastructure.
Open cut trenching and joint bays	Construction noise and vibration at sensitive receptors along the Onshore HVDC Cable Corridor.
Construction traffic (haul road)	Construction noise at sensitive receptors along the Onshore HVDC Cable Corridor.
Construction traffic (local highway network)	Road traffic noise due to increased traffic flows due to construction traffic on local highway network
Operation and Maintenance	
Converter Site and Alverdiscott Substation Connection Development	Operational noise impacts at noise sensitive receptors.

6.5.3 Impacts that are not likely to result in significant effects have been scoped out of the assessment. A summary of the impacts scoped out, together with justification for scoping them out is presented in **Table 6.8**.

Table 6.8: 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 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 Sites will incorporate vibration control as part of the design.
The impact of HDD works at the River Torridge on migratory Fish	Due to the short term nature of the works, HDD works should be planned such that sensitive periods for migratory fish are avoided.
The impact of noise generated during the transportation of Abnormal Indivisible Loads	Abnormal Indivisible Loads (AILs) will be transported on well-trafficked roads which make up the local highway network. It is considered 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 significant adverse effect due to noise.

6.6 Methodology

Relevant Guidance

British Standard 4142

6.6.1 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.

6.6.2 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.'*

6.6.3 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 6.12**.

World Health Organisation (WHO)

6.6.4 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.'

6.6.5 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.

6.6.6 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

6.6.7 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.

6.6.8 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

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

6.6.10 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.

6.6.11 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.

6.6.12 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.

6.6.13 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.

6.6.14 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

6.6.15 The Design Manual for Roads and Bridges (DMRB) LA111 Revision 2 (Highways England, Transport Scotland, Llwyodraeth Cymru Department for Infrastructure, 2020), provides guidance on methods for assessing noise and vibration from construction traffic.

6.6.16 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.

6.6.17 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).

6.6.18 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.

6.6.19 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.'*

6.6.20 Additional guidance is provided for the determination of construction noise impact criteria in terms of the LOAEL and the Significant Observed Adverse Effect Level (SOAEL). These are defined in **Table 6.13** below.

Methodology for baseline studies

Desk studies

6.6.21 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 6.9** below.

Table 6.9: 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

6.6.22 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 ES.

6.6.23 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 6.10** and are presented graphically in Figure 6.1 of Volume 2, Figures, of the ES.

Table 6.10: 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.

Position	Location	Representative Receptor
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 east of Webbery Barton.	Noise-sensitive receptors south west of Webbery.
ST1	Land to east of East 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 Hallsannery Farm.	Noise-sensitive receptors along lane to Hallsannery 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

6.6.24 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).

6.6.25 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 ES.

Receptor sensitivity/value

6.6.26 The criteria for defining sensitivity in this chapter are outlined in **Table 6.11** below.

Table 6.11: 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); • 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); • residential accommodation (night-time); • 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 (daytime); • 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

6.6.27 The criteria for defining magnitude in this chapter are outlined in **Table 6.12** below.

Table 6.12: 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

Magnitude of impact		Definition
	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
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

6.6.28 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 6.13** for determining the LOAEL and SOAEL for construction noise and in **Table 6.14** for determining the magnitude of impact.

Table 6.13: 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 6.14: 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 $\leq L_{Aeq,T} <$ SOAEL
Negligible	$L_{Aeq,T} <$ LOAEL

6.6.29 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.'

6.6.30 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'

6.6.31 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.

6.6.32 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

6.6.33 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.

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

6.6.35 Impact criteria for these changes have been obtained from the guidance in DMRB LA 111 and are presented in **Table 6.15** below.

Table 6.15: Construction traffic criteria

Magnitude of Impact	Increase in 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

6.6.36 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 6.16** in terms of Peak Particle Velocity (PPV) can be used to identify potential significant impacts on nearby receptors.

Table 6.16: Construction vibration criteria

Magnitude of Impact	Vibration Level, Peak Particle Velocity (PPV), mm/s
High	1 ≤ PPV < 10
Medium	0.3 ≤ PPV < 1
Low	0.14 ≤ PPV < 0.3
Negligible	PPV < 0.14

6.6.37 As with construction noise, the durations outlined in **paragraph 6.6.30** above are considered in the assessment of significant effects as per in Section 3 of DMRB LA 111.

Operational Noise

6.6.38 The significance of noise effects associated with the operations and maintenance of the Converter Sites 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 Sites, defined as operational specific sound level plus any acoustic character corrections due to tonality, impulsivity, intermittency, or any other distinct acoustic characteristics.

6.6.39 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.

6.6.40 Based on the above, the following impact criteria in **Table 6.17** have been defined for operational noise.

Table 6.17: 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.	Δ ≥ 10
Medium	A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.	5 ≤ Δ < 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 ≤ Δ < 5

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)
Negligible		-10 ≤ Δ ≤ 0

Significance of Effect

6.6.41 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 6.18**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

6.6.42 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.

6.6.43 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 6.18: 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

6.6.44 Where the magnitude of impact is 'no change', no effect would arise. Where the magnitude of impact is 'Major', a significant effect is expected.

6.6.45 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

6.6.46 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.

6.6.47 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.

6.6.48 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.

6.6.49 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

6.6.50 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 ES 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.

6.6.51 The exact locations of each construction activity are not yet known, however, it has been assumed that:

- Works associated with the transition joint bay construction will be located throughout the compound;
- Works associated with the construction compounds will be located throughout the compounds;

- The Gammaton Road logistics compound will be operational during the construction of the Converter Site;
- Works associated with joint bay construction have been assumed to be located close to residential properties along the entire Onshore HVDC Cable Corridor;
- Works associated with trenchless drilling activities have been assumed to be located within Horizontal Directional Drilling (HDD) compounds; and
- Works associated with transient activities, such as trenching works, have been assessed along the entire Onshore HVDC Cable Corridor.

6.6.52 The assessment methodology set out above is considered to be representative of the maximum design scenario as defined in **Table 6.23**.

Source Data

6.6.53 The following source data in **Table 6.19** has been obtained and used to inform the assessment of noise and vibration impacts at nearby receptors.

Table 6.19: 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 Sites have been provided by the relevant project engineers. • A list of typical plant items for the Converter Sites have been provided along with indicative quantities. Noise emission levels and associated frequency 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

6.6.54 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.

6.6.55 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.

6.6.56 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.

6.7 Baseline Environment

Site-Specific Surveys

6.7.1 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 6.20** below.

6.7.2 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 6.20**.

6.7.3 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.

6.7.4 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.

6.7.5 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.'

6.7.6 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 6.20: 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

6.7.7 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 ES.

6.7.8 Noise sensitive receptors used to inform the noise assessment are shown on Figure 1 of Appendix 6.1.

6.7.9 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.

Future Baseline Conditions

6.7.10 Schedule 4, paragraph 3 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that '*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge'* is included within the ES. This section provides an outline of the likely future baseline conditions in the absence of the Proposed Development.

6.7.11 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.

6.7.12 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.

6.7.13 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

6.7.14 **Table 6.21** identifies the receptors taken forward into the assessment.

Table 6.21: 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)

6.8 Mitigation Measures Adopted as Part of the Proposed Development

6.8.1 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 in Volume 1, Appendix 3.1: Commitments Register of the ES.

- Embedded mitigation. This includes the following.
  - Primary (inherent) mitigation - measures included as part of the Proposed Development 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 DCO and/or marine licences. For example, a reduction in footprint or height.
  - 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*'. Measures such as these would be secured through a Construction Environmental Management Plan or similar.
- 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 would be secured through environmental management plan.

6.8.2 In addition, where relevant, measures have been identified that may result in enhancement of environmental conditions. Such measures are clearly identified within Volume 1, Appendix 3.1: Commitments Register of the ES. The measures relevant to this chapter are summarised in **Table 6.22**.

6.8.3 Embedded measures, albeit indicative at this stage, that will form part of the final design (and/or are established legislative requirements/good practice) have been have been assumed in the initial assessment presented in **section 6.10** to **6.12** below (i.e., the initial determination of impact magnitude and significance of

effects assumes implementation of these measures). Embedded design measures will be controlled by Requirement 4 (detailed design) of the DCO. This ensures that the measures to which the Applicant is committed are taken into account in the assessment of effects.

6.8.4 Where an assessment identifies likely significant adverse effects, further or secondary mitigation measures may be applied. These are measures that could further prevent, reduce and, where possible, offset these effects. They are defined by IEMA as actions that will require further activity in order to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES (referred to as secondary mitigation measures in IEMA, 2016). For further or secondary measures both pre-mitigation and residual effects are presented.

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

Commitment	Measure Adopted	How the Measure Will be Secured
Embedded Measures		
ONS04	An Outline Decommissioning Strategy has been submitted as part of the application for development consent (document reference 7.17), which details that onshore and offshore decommissioning plans will be prepared in accordance with the principles set out in the Outline Decommissioning Strategy, if decommissioning of the Proposed Development is required at the end of the Proposed Development's operational life. The onshore decommissioning plan(s) will be developed in consultation with the relevant authority and in line with the latest available guidance, legislation and any new technologies available at the time of the Proposed Development's decommissioning. The onshore decommissioning plan(s) will include an assessment of the need to remove above ground infrastructure and the decommissioning of below ground infrastructure and include details relevant to flood risk (e.g. maintenance/reinstatement of existing land drainage), pollution prevention and avoidance of ground disturbance. The onshore decommissioning plan(s) will also include provision for the protection (during decommissioning) of any significant archaeological remains within the Onshore Infrastructure Area which were identified and protected from harm during construction.	DCO Schedule 2, Requirement 16 (Decommissioning Strategy)
ONS05	An Outline Construction Traffic Management Plan (CTMP) has been submitted with the application for development consent (document reference 7.12). CTMP(s) will be developed in accordance with the Outline CTMP prior to commencement of construction and agreed with relevant stakeholders. The CTMP(s) will set out reasonably practicable measures that include: • Managing the numbers and routing of HGVs during the construction phase;	DCO Schedule 2, Requirement 8 (Construction Traffic Management Plan)

Commitment	Measure Adopted	How the Measure Will be Secured
	• Managing the movement of construction worker traffic during the construction phase; • Details of measures to manage the safe passage of HGV traffic via the local highway network; and Details of localised road improvements if and where these may be necessary to facilitate the safe use of the existing road network.	
ONS18	The following noise control measures will be incorporated in the design of the converter stations. • The orientation and layout of the converter stations will be considered to minimise noise levels at nearby receptors. • Quieter equipment will be selected, where available and reasonably practicable. • Mitigation measures such as acoustic barriers and enclosures will be specified where necessary. Earth bunds will be created around the Converter Site as part of the ground works required during site preparation. These are an inherent mitigation feature for the site and aid to screen receptors from operational noise.	DCO Schedule 2, Requirement 4 (detailed design approval)
ONS33	An Outline Onshore Construction Environmental Management Plan (On-CEMP) has been prepared as part of the application for development consent (document reference 7.7). On-CEMP(s)) will be developed to align with the prepared Outline On-CEMP. The On-CEMP(s) would include construction noise and vibration limits and Best Practicable Means (as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990) to mitigate disruption caused by construction noise and vibration associated with the Proposed Development as far as reasonably practicable.	DCO Schedule 2, Requirement 7 (Management plans)

6.9 Key Parameters for Assessment

Maximum Design Scenario

6.9.1 The maximum design scenarios identified in **Table 6.23** 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 information provided in Chapter 3: Project Description of the ES. 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. Therefore, this comprises a conservative assessment of a worst case scenario.

Table 6.23: Maximum design scenario considered for the assessment of 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 pits onshore. 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. **Decommissioning phase** • It has been assumed that the cables will be recovered by pulling the cables through the ducts for recycling.	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. The assessment of vibratory compaction has been undertaken assuming a probability of exceedance of 5%.
Noise and vibration impacts due to the Onshore HVDC Cable Corridor	✓	×	✓	**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		
landward of the transition joint bay.				Onshore HVDC Cable Corridor width will be up to 65 m to allow for plant access, spoil 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 joint bays will be 34 each with an area of 100 m^2. The nominal distance between each link box will be 800 m-1,100 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.	The minimum design scenario is for 6 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		
				HDD • HDD will be undertaken where the Onshore HVDC Cable Corridor crosses obstacles such as major roads, watercourses, and woodland. The minimum number of HDD locations will be 6 (including Landfall). • Major HDD works will be undertaken over a period of 12 months per HDD which are run concurrently. • There will be up to 11 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. Haul road • 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). The construction of the temporary construction compounds and haul road, backfilling of the trenches, and construction of the Converter Sites groundworks may require the use of vibratory compaction techniques. • The predicted levels of vibration have been undertaken at various distances from the boundary of the temporary construction compounds, Proposed Development Order Limits, and Converter Site. • A roller with a mass of up to 20-tonnes may be used to undertake the works. **Decommissioning phase**	

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				• 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 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 Sites.	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 Sites.	✓	✓	✓	**Construction phase** • There will be two Converter Sites with a permanent footprint of 373,000 m^2, including landscaping (e.g. bunds). • The Converter Site 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 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.	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

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
				• Construction works will last up to 72 months. • Cut and fill earthworks will be required to construct the Converter Sites platforms. • The assessment of construction noise impacts has been undertaken from the boundary of the Converter Site. **Operation and maintenance phase** The proposed Converter Site will include two separate Converter Sites (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 +2 dB acoustic character correction has been applied to the level predicted at all receptors where noise from these plant items have the highest contribution, in the assessment of the 'unmitigated scenario'. This corresponds to a 'just perceptible' tonal component in terms of BS 4142:2014+A1:2019. • Tonal components from all plant are expected to be sufficiently attenuated at receptors in the 'mitigated scenario'. No corrections for acoustic characteristics have therefore been applied in the assessment of the 'mitigated scenario'. **Decommissioning phase**	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		
				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

6.10 Assessment of Construction Effects

6.10.1 The impacts of the construction of the Proposed Development have been assessed at nearby residential receptors. The potential impacts arising from the construction phase of the Proposed Development are listed in **Table 6.41**, 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 and Effects due to the Onshore HVDC Cables at Landfall –Transition Joint Bay

6.10.3 The construction works at Landfall will comprise the following:

- transition joint bay excavation;
- transition joint bay wall and base construction;
- connection of the onshore and offshore export cables; and
- backfill over the transition joint bay.

6.10.4 The exact locations where the construction plant will be located is unknown, and thus predictions have been undertaken assuming plant will be spread along the boundary of the landfall compound closest to receptors.

6.10.5 A detailed assessment of the noise impacts of these works, except for compound construction, has been undertaken by constructing a 3D acoustic model of the noise sources associated with these activities within the construction compound at Landfall.

6.10.6 Measures to manage construction noise and vibration are 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. Full details of the construction noise and vibration assessment are provided in Volume 2, Appendix 6.2: Construction Noise and Vibration, of the ES.

Magnitude of Impact

6.10.7 The maximum predicted noise levels from joint bay activities works set out in paragraph 6.10.3 above activity, during the relevant construction period are presented in **Table 6.24** below. As these works are only planned to be undertaken during core working hours, only daytime levels and impacts are presented.

6.10.8 The closest receptor to the transition joint bay works is Old Stables being approximately 200m from the boundary of the transition bay works. As this property is located outside the 100m construction vibration study area, no significant construction vibration effects are likely and hence no vibration assessment has been undertaken for transition joint bay works at Landfall.

Table 6.24: Construction noise impacts due to transition joint bay works near Landfall (daytime)

Receptor	Activity	Predicted Noise Level Laeq,T (dB)	LOAEL (dB)	SOAEL (dB)	Magnitude of impact
Old Stables	Transition joint bay base and wall construction	50	43	65	Minor
The Coach House	Transition joint bay base and wall construction	48	43	65	Negligible

Sensitivity of the Receptor

6.10.9 These receptors to the landfall are residential in nature, which are of a **medium** sensitivity during the daytime. None of these works are proposed to be undertaken during the night-time hours.

Significance of effect

6.10.10 **Table 6.24** identifies that the works which are predicted to give rise to the maximum impacts are those required to construction the joint bay base.

6.10.11 Low and negligible magnitude of impacts are predicted to occur at both residential receptors. Overall, the sensitivity of these remaining residential receptors is **medium** and the magnitude of the impact is **low.** The effects on these will therefore be of **minor adverse** significance which is not significant.

Noise impacts due to the works at the landfall (HDD/trenchless techniques)

6.10.12 The maximum design scenario is represented by HDD drilling as the trenchless technique to be adopted at Landfall.

6.10.13 The predictions have been undertaken based on the works being undertaken within the landfall compound and a 3D acoustic model of the compound constructed based on an indicative layout for the proposed compound.

6.10.14 HDD works have the potential to require occasional night-time working and thus have been assessed against the night-time noise thresholds as well as the daytime and evening periods. The results are presented in **Table 6.25** below.

6.10.15 The closest receptor to the HDD works is Old Stables being approximately 200m from the boundary of the transition bay works. As this property is located outside the 100m construction vibration study area, no significant construction vibration effects are likely and hence no vibration assessment has been undertaken for HDD works at Landfall.

Table 6.25: Construction noise impacts due to HDD at Landfall

Name	HDD (day)				HDD (evening/weekend)				HDD (night-time)			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Old Stables	43	65	33	**Negligible**	38	55	40	**Low**	33	45	40	**Low**
The Coach House	43	65	33	**Negligible**	32	55	38	**Negligible**	33	45	38	**Low**

Sensitivity of the receptor

6.10.16 These receptors to the landfall are residential in nature, which are of a **medium** sensitivity during the daytime and **high** during the nighttime.

Significance of the effect

6.10.17 As shown in **Table 6.25**, **negligible** magnitude of impacts are predicted to occur at the landfall residential receptors during the daytime period due to HDD works, with **negligible to low** magnitude of impacts predicted during the evening/weekend periods and with **low** magnitude of impacts predicted to occur during nighttime. As the receptors are of **medium** sensitivity during the daytime evening/weekend period, the effects will therefore be of **negligible to minor** adverse which is not significant.

6.10.18 During the night-time, the receptors are of high sensitivity and therefore the effects will be of **minor to moderate** adverse. As noted in paragraph 6.1.0.13, night-time works are only planned to be undertaken on an occasional basis. Therefore, the night-time threshold is only predicted exceeded only for a limited duration and would not meet the temporal duration set out in paragraph 6.6.30.

6.10.19 Also, the calculation of noise impacts due to these works has been undertaken assuming that all equipment will be in operation at the boundary of the HDD compound. This is unlikely to be the case as in reality since the works will be spread along the full compound area.

6.10.20 As a consequence, a significant adverse effect on these receptors is unlikely to occur as a result of these nighttime works. Based on professional judgement, the impact during the night-time is likely to reduce to **negligible** magnitude, resulting in an effect of **minor adverse** significance which is not significant.

Noise and Vibration Impacts due to the Onshore HVDC Cable Corridor Landward of the transition joint bay – Open cut trenching, joint bay construction, haul road and associated compounds

6.10.21 The majority of the Onshore HVDC Cable Corridor will be installed using open-cut trenching techniques with joint bays installed at 800—1200m intervals. These works will be supported by compounds and a haul road running along the corridor. Trenchless techniques will be adopted at locations such as major roads, woodland, and rivers. This section considers the impacts associated with the open cut trenching, with trenchless techniques impacts considered in the next section.

6.10.22 Two methodologies have been adopted to determine the noise impacts depending on whether the activity is likely to be concentrated within a single area or spread along sections of the cable corridor. Full details are outlined in Volume 2, Appendix 6.2: Construction noise and vibration of the ES.

6.10.23 Some construction activities will require works to be concentrated to one area along the onshore export cable corridor. The construction noise impacts have

been predicted via 3D acoustic modelling using SoundPLAN v8.2. The construction activities assessed using this method include:

- establishing construction compounds
- joint bays and link boxes excavation;
- joint bays and link boxes wall and base construction;
- jointing of cables in the joint bays and link boxes; and
- backfill over the joint bays and link boxes.

6.10.24 A detailed assessment of the noise impacts due to the works to establish compounds has been undertaken by situating the plant associated with their construction across the compound area. Noise impacts have been determined only at those noise sensitive receptors which are located within 300m of the compounds. As Gammaton Road compound will support the construction of the Converter Site, the impacts associated with the construction of this compound are not presented in this section and are instead presented within the assessment of noise and vibration impacts due to the construction of the Converter Site.

6.10.25 A detailed assessment of the noise impacts associated with the joint bay works been undertaken by constructing a 3D acoustic model and situating the noise sources associated with these activities close to noise sensitive receptors along the entirety of the Onshore HVDC Cable Corridor. Although the exact locations of the joint bays cannot be determined at this stage, the worst case has been assumed by situating the joint bays close to residential dwellings.

6.10.26 Construction noise impacts associated with the operation of the haul road along the Onshore HVDC Cable Corridor works have also been predicted via 3D acoustic modelling using SoundPLAN v8.2. The noise impacts have been determined at the noise sensitive receptor closest to the haul road, to present a worst-case impact from its use.

6.10.27 An alternative method has been adopted whereby construction activities which are likely to be transient and move along the onshore cable route have been predicted at various distances to determine where the impact magnitudes change within the proposed noise study area.

6.10.28 The impact magnitude bands are inserted as spatial buffers around the onshore cable route at the distance at which the impact magnitude changes.

6.10.29 The works assessed using this method include:

- site preparation;
- fencing;
- topsoil strip;
- haul road construction;
- trench excavation and duct installation;
  - trench backfill;
  - trench route and topsoil reinstatement; and
  - haul road removal.

6.10.30 Vibration impacts may occur during dynamic compaction activities required to as part of the construction of the compounds and the haul roads. As there are properties located within 100m of these works, construction vibration predictions

have been undertaken to determine the likelihood of significant effects arising from these activities. As with the noise impact assessment, the vibration impacts associated with the construction of the Gammaton Road compound are presented within the assessment of noise and vibration impacts due to the construction of the Converter Site.

6.10.31 Measures to manage construction noise and vibration are 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.

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

Magnitude of Impact

6.10.33 The noise impacts due to construction activities associated with establishing construction compounds and joint bay works along the Onshore HVDC Cable Corridor are presented in **Table 6.26** below. Noise impacts due to the use of the haul road are presented in **Table 6.27**.

6.10.34 The results of the noise assessment of works spread along the Onshore HVDC Cable Corridor are presented in **Table 6.28** below. The table presents the varying distances from the cable corridor, which are associated with low, medium and high impacts likely to result from individual construction activities and the number of receptors within each of these bands.

6.10.35 The results of the vibration assessment of dynamic compaction works associated with the haul road construction and compounds are presented in **Table 6.29** below.

6.10.36 All works are planned to be undertaken during core hours and thus only daytime levels and impacts are presented.

Table 6.26: Construction noise impacts due to establishing construction compounds and joint bay works along the Onshore HVDC Cable Corridor [1]

Location	Receptor	LOAEL (dB)	SOAEL (dB)	Establishing Compounds - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact	Joint bay works - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact
Zone 1	The Flat	65	75	-	-	27	Negligible
	Coombe	65	75	-	-	28	Negligible
	Coombe Barn	65	75	-	-	30	Negligible
	Fig Cottage	65	75	-	-	31	Negligible
	Chaltaborough	65	75	-	-	30	Negligible
	Chapter House	65	75	-	-	27	Negligible
Zone 2	Shamland	65	75	-	-	24	Negligible
	Shamland Barn	65	75	-	-	34	Negligible
	The Old Smithy	65	75	-	-	46	Negligible
	Forge Cottage	65	75	-	-	51	Negligible
	Oakleigh	65	75	-	-	51	Negligible
	Spry Cottage	65	75	-	-	48	Negligible
	Thistles	65	75	-	-	51	Negligible
	Silver Mist	65	75	-	-	31	Negligible
	Hill House	65	75	40	Negligible	45	Negligible
	Venlea	65	75	40	Negligible	50	Negligible

[1] Construction noise predictions and noise impacts for establishing compound activity at noise residential receptors within 300m of compounds

Location	Receptor	LOAEL (dB)	SOAEL (dB)	Establishing Compounds - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact	Joint bay works - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact
	Beech Cottage	65	75	52	Negligible	12	Negligible
	Bowood Farm	65	75	49	Negligible	17	Negligible
	Lower Bowood	65	75	41	Negligible	13	Negligible
Zone 3	The Warren	47	65	-	-	9	Negligible
	Winscott Barn	47	65	-	-	5	Negligible
	Winscott Barton	47	65	-	-	6	Negligible
	Moor Park	56	65	-	-	18	Negligible
	Moorhead Cottage	56	65	-	-	27	Negligible
	Littlemoor	56	65	-	-	14	Negligible
Zone 4	Hullacott	56	65	-	-	41	Negligible
	Littleham Court	56	65	-	-	35	Negligible
	Littleham Court Manor	56	65	-	-	41	Negligible
	Long Linney	56	65	-	-	36	Negligible
	Robbin Hill Farm	56	65	-	-	45	Negligible
	Dunn Farm	43	65	-	-	16	Negligible
	Newridge	56	65	-	-	28	Negligible
Zone 5	Otter Cottage	43	65	-	-	22	Negligible
	Swallow Cottage	43	65	-	-	26	Negligible
	West Ashridge	43	65	-	-	18	Negligible
	Damn View	43	65	-	-	19	Negligible

Location	Receptor	LOAEL (dB)	SOAEL (dB)	Establishing Compounds - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact	Joint bay works - Maximum Predicted Noise Level $L_{Aeq,T}$ (dB)	Magnitude of impact
	Halsannery Farm House	46	65	-	-	7	Negligible
	Littlecroft	46	65	56	Low	16	Negligible
	Riverside Cottage	46	65	42	Negligible	11	Negligible
	Treetops	46	65	58	Negligible	6	Negligible
Zone 6	April Cottage	46	65	-	-	46	Negligible
	Tennacott Lodge	46	65	-	-	5	Negligible
	Greatwood	46	65	-	-	46	Negligible

Table 6.27: Construction noise from Onshore HVDC Cable Corridor Haul Route

Receptor closest to Onshore HVDC Cable Corridor	Approximate Distance from Haul Road (m)	LOAEL (dB)	SOAEL (dB)	Magnitude of Impact	Magnitude of Impact
Oakleigh	30	65	75	52	Negligible

Table 6.28: Construction noise impact magnitude and number of receptors per band – transient works

Construction Activity	Impact Magnitude Band Distance (m)			Number of receptors per magnitude band		
	High	Medium	Low	High	Medium	Low
Open-cut Trenching Works – Site Preparation/Ground Works	45	80	1,000	1	6	1740

Table 6.29: Construction vibration impact magnitude and number of receptors per band – dynamic compaction works along Onshore HVDC Cable Corridor

Construction Activity	Impact Magnitude Band Distance (m)			Number of receptors per magnitude band		
	High	Medium	Low	High	Medium	Low
Dynamic compaction – compounds	13	71	160	0	1	8
Dynamic compaction – haul road compaction	13	71	160	0	15	50

Sensitivity of the Receptor

6.10.37 The nearest receptors to the Onshore HVDC Cable Corridor are residential in nature, which are of a **medium** sensitivity during the daytime No nighttime working is planned for these works.

Significance of the Effect

6.10.38 The results in **Table 6.26** show that construction noise levels from works associated with construction compound and joint bay construction are negligible at all but one receptor (Littlecroft), at which the compound construction works are predicted to result in a **low** magnitude of impact. As these construction operations will not be carried out at the same time, there will be no combined impact from these construction works.

6.10.39 At the closest receptor to the haul road, as presented in **Table 6-27**, the maximum noise level from its operation is approximately 52 dB(A). This level will reduce with increasing distance from the haul road. As a majority of the receptors currently experience noise levels well in excess of this, the impact of the haul road both in isolation and in combination with construction activities will be **negligible**. However, the use of haul road is likely to result in a **low** magnitude of impact in quieter areas around the Torridge River and Jennett's Reservoir and receptors further to the north of the A39, located in Zone 5 and Zone 1 of the works, respectively.

6.10.40 The joint bay works and use of the haul road will occur simultaneously and therefore there is the potential for combined impacts from them. However, when combined, the resulting combined construction noise levels will remain below the SOAEL and therefore the likely impacts at the properties will remain **negligible** to **low**.

6.10.41 The open-cut trenching works which result in the highest impacts over the greatest distance are site preparation and groundworks. The results in **Table 6.28** identify that one receptor (Woodville Farm) is predicted to experience a **high** impact due to these works, with seven receptors (Forge Cottage, Oakleigh, Thistles, Littleham Court Manor and Robbin Hill Farm) predicted to experience a **medium** impact band of the open-cut trenching works.

6.10.42 However, the calculation of noise impacts due to transient works has been undertaken assuming all equipment will be in operation at the boundary of the Onshore HVDC Cable Corridor. This is unlikely to be the case in reality since the works will be spread along its full width and length. Furthermore, since trenching works along the Onshore HVDC Cable Corridor are likely to be transient in nature, they will not be undertaken at a single location for the full construction period.

6.10.43 As such, the overall construction noise impact is likely to be reduced to **low** at the affected receptors and the effects will be of **minor adverse** significance for standard construction methods which is not significant in EIA terms.

6.10.44 With regard to construction vibration, **Table 6.29** identifies that **medium** impacts are predicted at one receptor (Treetops) during the construction of the compounds with **low** impacts predicted at eight receptors, the latter being located close to the A39 compound. **Table 6.29** also identifies that **medium** impacts are predicted at 15 receptors (properties to the west of Abbotsham) and **low** impacts predicted at 50 receptors during the construction of the haul road.

6.10.45 The assessment of impacts due to construction vibration has been undertaken from the boundary of the haul road and the construction compounds. It is unlikely that the dynamic compaction works will be undertaken for any extended period along these boundaries. Furthermore, any compaction works required will be short-term in duration and thus receptors are unlikely to be affected for durations beyond those in paragraph 6.6.30.

6.10.46 As such, the overall construction noise impact is likely to be reduced to **low** to **negligible** at the affected receptors and the effects will be of **minor adverse to negligible** significance for standard construction methods which is not significant in EIA terms.

Noise and Vibration Impacts due to the Onshore HVDC Cable Corridor landward of the transition joint bay – Trenchless Techniques

6.10.47 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, wooded watercourses and rivers.

6.10.48 The construction noise predictions of trenchless techniques have been undertaken using a 3D acoustics model with the works being located within the HDD compound closest to the receptors, within the established 300 m study area.

6.10.49 Vibratory piling may be required to facilitate the installation of the HDD entry and exit pits. As there are properties within 100m of these works, construction vibration predictions have been undertaken. Impact magnitude bands have been generated to determine the magnitude impact at difference distances during the potential vibratory piling works.

6.10.50 Measures to manage and monitor construction noise and vibration are set out in the Outline On-CEMP (document reference 7.7 Management Plans). The works will be controlled through the final On-CEMP(s) which are Requirement 7 of the DCO. 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.

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

Magnitude of Impact

6.10.52 The noise impacts due to construction activities associated with HDD works along the Onshore HVDC Cable Corridor are presented in **Table 6.30** below. HDD works have the potential to require occasional night-time working and thus have been assessed against the night-time noise thresholds as well as the daytime and evening periods.

The results of the vibration assessment of dynamic vibratory works associated with the HDD entry and exit pits are presented **in Table 6.31** below.

Table 6.30: Construction noise impacts from HDD works along Onshore HVDC Cable Corridor

Location	Receptor	LOAEL (dB)			SOAEL (dB)			Construction Noise Level, $L_{Aeq,T}$ (dB)			Magnitude of Impact		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Zone 1	The Flat	65	58	51	75	65	55	44	48	48	**Negligible**	**Negligible**	**Negligible**
	Coombe	65	58	51	75	65	55	47	48	48	**Negligible**	**Negligible**	**Negligible**
	Coombe Barn	65	58	51	75	65	55	47	49	49	**Negligible**	**Negligible**	**Negligible**
	Fig Cottage	65	58	51	75	65	55	48	50	50	**Negligible**	**Negligible**	**Negligible**
	Chaltaborough	65	58	51	75	65	55	46	47	47	**Negligible**	**Negligible**	**Negligible**
	Chapter House	65	58	51	75	65	55	45	46	46	**Negligible**	**Negligible**	**Negligible**
Zone 2	Shamland	65	58	51	75	65	55	35	38	38	**Negligible**	**Negligible**	**Negligible**
	Shamland Barn	65	58	51	75	65	55	43	46	46	**Negligible**	**Negligible**	**Negligible**
	The Old Smithy	65	58	51	75	65	55	45	46	46	**Negligible**	**Negligible**	**Negligible**
	Forge Cottage	65	58	51	75	65	55	39	44	44	**Negligible**	**Negligible**	**Negligible**
	Oakleigh	65	58	51	75	65	55	41	45	45	**Negligible**	**Negligible**	**Negligible**
	Spry Cottage	65	58	51	75	65	55	40	45	45	**Negligible**	**Negligible**	**Negligible**
	Thistles	65	58	51	75	65	55	43	45	45	**Negligible**	**Negligible**	**Negligible**
	Silver Mist	65	58	51	75	65	55	42	46	46	**Negligible**	**Negligible**	**Negligible**
	Hill House	65	58	51	75	65	55	41	43	43	**Negligible**	**Negligible**	**Negligible**

Location	Receptor	LOAEL (dB)			SOAEL (dB)			Construction Noise Level, $L_{Aeq,T}$ (dB)			Magnitude of Impact		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
	Venlea	65	58	51	75	65	55	36	40	40	**Negligible**	**Negligible**	**Negligible**
	Beech Cottage	65	58	51	75	65	55	42	45	45	**Negligible**	**Negligible**	**Negligible**
	Bowood Farm	65	58	51	75	65	55	45	48	48	**Negligible**	**Negligible**	**Negligible**
	Lower Bowood	65	58	51	75	65	55	34	39	39	**Negligible**	**Negligible**	**Negligible**
Zone 3	The Warren	47	39	37	65	55	45	44	47	47	**Negligible**	**Low**	**Medium**
	Winscott Barn	47	39	37	65	55	45	36	41	41	**Negligible**	**Low**	**Low**
	Winscott Barton	47	39	37	65	55	45	38	44	44	**Negligible**	**Low**	**Low**
	Moor Park	56	46	41	65	55	45	30	33	33	**Negligible**	**Negligible**	**Negligible**
	Moorhead Cottage	56	46	41	65	55	45	31	34	34	**Negligible**	**Negligible**	**Negligible**
	Littlemoor	56	46	41	65	55	45	29	33	33	**Negligible**	**Negligible**	**Negligible**
Zone 4	Dunn Farm	43	40	35	65	55	45	46	50	50	**Low**	**Low**	**Medium**
Zone 5	Otter Cottage	43	40	35	65	55	45	41	45	45	**Negligible**	**Low**	**Low**
	Swallow Cottage	43	40	35	65	55	45	47	48	48	**Low**	**Low**	**Medium**
	West Ashridge	43	40	35	65	55	45	40	42	42	**Negligible**	**Low**	**Low**

Location	Receptor	LOAEL (dB)			SOAEL (dB)			Construction Noise Level, $L_{Aeq,T}$ (dB)			Magnitude of Impact		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
	Damn View	43	40	35	65	55	45	35	42	42	**Negligible**	**Low**	**Low**
	Littlecroft	46	43	41	65	55	45	50	51	51	**Low**	**Low**	**High**
	Riverside Cottage	46	43	41	65	55	45	44	46	46	**Negligible**	**Low**	**Medium**
	Treetops	46	43	41	65	55	45	50	53	53	**Low**	**Low**	**High**
Zone 6	April Cottage	46	43	41	65	55	45	32	38	38	**Negligible**	**Negligible**	**Negligible**
	Tennacott Lodge	46	43	41	65	55	45	38	40	40	**Negligible**	**Negligible**	**Negligible**

Table 6.31: Construction vibration impact magnitude and number of receptors per band – vibratory piling at HDD entry and exit pits

Construction Activity	Impact Magnitude Band Distance (m)			Number of receptors per magnitude band		
	High	Medium	Low	High	Medium	Low
Vibratory piling – HDD entry and exit pits	12	73	186	0	1	14

Sensitivity of the Receptor

6.10.53 The nearest receptors to the Onshore HVDC Cable Corridor are residential in nature, which are of a **medium** sensitivity during the daytime, and a **high** sensitivity during the night-time.

Significance of effect

Effects related to noise

6.10.54 As shown in **Table 6.30** above, the predicted sound levels from HDD activities during the daytime and evening are negligible to low at all receptors. These impacts will result in effects will be of **minor adverse** significance for standard which is not significant in EIA terms.

6.10.55 However, two residential receptors located nearest to the River Torridge HDD compound – west side (Treetops and Littlecroft) are predicted to experience **high** impact of magnitude during the nighttime, should nighttime working be required. **Medium** impacts during the night are predicted at Riverside Cottage which is nearby on the other side of the A386.

6.10.56 Properties in the vicinity of two other HDD crossings (A39 and West Ashridge) are predicted to experience **medium** impacts should nighttime working be required Due to the high sensitivity of residential receptors at night, the effects at these properties will range from between **moderate or major**, to **major adverse** significance which is significant in EIA terms. Therefore, if nighttime working is required, further mitigation will need to be implemented to reduce these impacts and resulting effects.

6.10.57 All remaining receptors in the study area for construction noise are expected to experience a **low** or **negligible** impact due to HDD works during the nighttime. These impacts will result in effects will be of minor adverse significance for standard which is not significant in EIA terms.

Effects related to vibration

6.10.58 The results in **Table 6.31** indicate that no receptors are predicted to be subject to **high** impacts from vibration and **medium** impacts are predicted at only one receptor (Treetops). **Low** impacts are predicted at 14 receptors, which are located close to the HDD crossings at Kenwith Stream, the A39, Winscott Barton, West Ashridge and River Torridge.

6.10.59 Treetops is located approximately 30 m from the boundary of the HDD 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.

6.10.60 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**.

Further Mitigation

6.10.61 The assessment has been undertaken assuming worst case assumptions. This includes assuming the HDD entry pits will be sited in the HDD compound area at ground level closest to the receptors and with no screening between the HDD compound area and the receptors.

6.10.62 As set out in section 1.8 of the Outline On-CEMP, mitigation measures such as mufflers and acoustic enclosures would be implemented as part of BPM, the effect of these measures has been included in the assessment.

6.10.63 Therefore, as indicated by the outcomes of the noise assessment above, there is a need for further mitigation measures to be implemented at the River Torridge HDD compound to reduce the impact at nearby receptors should nighttime working be required. Appropriate mitigation measures will be established at the detailed design stage. Mitigation options which will be explored are expected to include, but not be exclusive to:

- Appropriate compound design to maximise distance between noise sources and receptors where practicable.
- Introduction of screening around construction compounds and dominant noise sources.
- Carrying out HDD works from the eastern side of the River Torridge, away from nearby receptors.
- Minimise the need for nighttime working where practicable.

Residual Effects

6.10.64 Further mitigation measures, set out above, will be explored as part of the detailed design stage such that significant adverse effects are sufficiently mitigated and avoided. It is expected that with appropriate mitigation measures in place, the residual effects of the HDD works will have a **low – negligible** impact at the nearest receptors, the effect of which will be **minor adverse**, which is not significant in EIA terms.

Future Monitoring

6.10.65 A noise monitoring strategy may be required as part of the On-CEMP(s) to demonstrate compliance with agreed noise threshold values. These thresholds will be determined in consultation with the local planning authority to ensure protection of nearby noise sensitive receptors in line with BPM.

6.10.66 The noise threshold values are expected to be in keeping with BS5228-1 threshold values for potential significant effects at dwellings which are:

- Night-time: 45 dB(A)
- Evenings and weekends: 55 dB(A)

- Daytime: 65 dB(A)

6.10.67 The relevant limits will be agreed with the local planning authority at the detailed design stage, if the need arises.

Noise and Vibration Impacts due to the Construction of the Converter Site and associated compounds and haul road

6.10.68 An assessment of the noise and vibration impacts during the construction of the Converter Site has been undertaken. These construction works are planned to be undertaken within the Converter Site area and will be supported by a compound located to the north of the site. Gammaton Road compound will serve as a satellite storage site for the Converter Site and therefore the impact of this compound and the haul road connecting the compound to the Converter Site are also included in this assessment.

6.10.69 A detailed assessment of the noise impacts due to the works to establish the compounds has been undertaken by situating the plant associated with their construction across the compound areas.

6.10.70 A detailed assessment of the noise impacts associated with the construction of the Converter Station has been undertaken by constructing a 3D acoustic model using SoundPLAN v8.2 and situating the noise sources associated with these activities close to noise sensitive receptors to it.

6.10.71 Construction noise impacts associated with the operation of the haul road between the Gammaton Road compound and the Converter site have also been predicted via 3D acoustic modelling. The noise impacts have been determined at the noise sensitive receptor closest to the haul road, to present a worst-case impact from its use.

6.10.72 Vibration impacts may occur during dynamic compaction activities required to as part of the construction of the compounds and the haul road. As there are properties located within 100m of these works, construction vibration predictions have been undertaken to determine the likelihood of significant effects arising from these activities.

6.10.73 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.

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

Sensitivity of the Receptor

6.10.75 The nearest receptors to the Gammaton Road compound, the Converter site and the haul road between them 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

6.10.76 The noise levels predicted at the receptors located closest to the receptors, within the set out study areas, are shown in **Table 6.32** below. These works are planned to be undertaken during core hours only.

6.10.77 The results of the vibration assessment of dynamic compaction works associated with the haul road construction and compounds are presented in **Table 6.33** below.

6.10.78 The results of the vibration assessment of dynamic compaction works associated with the haul road construction and compounds are presented in **Table 6.34** below.

Table 6.32:Construction noise impact from construction of Converter Site and associated compounds and haul road

Receptor	LOAEL (dB)	SOAEL (dB)	Loudest construction noise level activity	Predicted Sound Level (dB)	Magnitude of impact
Bay View	46	65	Construction of Gammaton Road Compound	54	Low
Bybury	46	65	Construction of Gammaton Road Compound	49	Low
Webbery Barton	50	65	Building convertor station foundations	49	Negligible

Table 6.33: Construction noise from Converter Station Haul Route

Receptor closest to Haul Road	Approximate Distance from Haul Road (m)	LOAEL (dB)	SOAEL (dB)	Magnitude of Impact	Magnitude of Impact
Bay View	16	65	75	58	Low

Table 6.34: Construction vibration impact magnitude and number of receptors per band - dynamic compaction works for convertor site construction

Construction Activity	Impact Magnitude Band Distance (m)			Number of receptors per magnitude band		
	High	Medium	Low	High	Medium	Low
Dynamic compaction - compounds	13	71	160	0	1	1
Dynamic compaction - haul road compaction	13	71	160	0	1	3

Significance of the Effect

6.10.79 The results in **Table 6.32** show that construction noise levels from works associated with construction of the compounds and Convertor Site works are **low to negligible** at the closest receptors. Due to the distance between the construction compounds and Converter Site, noise due to construction operations will affect different receptors, therefore, there will be no combined impact from these construction works.

6.10.80 At the closest receptor to the haul road, as presented in **Table 6.34**, the maximum noise level from its operation is approximately 58 dB(A) resulting in a **low** impact. This level will reduce with increasing distance from the haul road, with resulting impacts are receptors along the haul route likely to experience **negligible to low** impacts. These impacts are likely to result in **negligible adverse effects** which are not significant in EIA terms.

6.10.81 With regard to construction vibration, **Table 6.34** identifies that medium impacts are predicted at one receptor (Bay View) during the construction of the compounds with low impacts at one receptor (Bybury). **Table 6 29** also identifies that medium impacts are predicted at one receptor (Bay View) and low impacts predicted at 3 receptors (Bybury, Woodville Farm and Woodville Cottage). during the construction of the haul road.

6.10.82 The assessment of impacts due to construction vibration has been undertaken from the boundary of the haul road and the construction compounds. It is unlikely that the dynamic compaction works will be undertaken for any extended period along these boundaries. Furthermore, any compaction works required will be short-term in duration and thus receptors are unlikely to be affected for durations beyond those in paragraph 6.6.30.

6.10.83 As such, the overall construction noise impact is likely to be reduced to **low** to **negligible** at the affected receptors and the effects will be of **minor adverse to negligible** significance for standard construction methods which is not significant in EIA terms.

Noise Impacts due to Construction Traffic on Local Highway Networks

6.10.84 An assessment of construction led traffic noise has been carried out and is shown in Appendix 6.2. Baseline traffic flows on the local highway network have been considered together with predicted construction phase traffic. These have been used to inform a calculation to demonstrate the change in road traffic noise using the calculation procedure outlined in CRTN and DMRB LA111.

6.10.85 Traffic data contained in Chapter 5 Traffic and Transport of this ES has been used to inform an assessment of the change in noise levels on the local road network. Results of the assessment shown in Appendix 6.2 indicates that construction traffic noise will generate a **negligible** impact at majority of nearby receptors. This is considered to be of a **negligible adverse** effect and not significant in EIA terms.

6.10.86 Traffic increases on links 9 (Gammaton Road between Manteo Way and Tennacott Lane) and 16 (Bowood Farm Road between Abbotsham Cross Roundabout and Construction Compound Access 2) are shown to have the potential to generate a **medium** impact. However, there are no receptors located

within 50 m from either link, therefore no adverse impacts will result from this change.

6.10.87 As discussed in Chapter 5 Traffic and Transport of this ES, Abnormal Indivisible Loads (AILs) will transport large components to the Onshore HVDC Cable Corridor and Converter Site.

6.10.88 The AIL transports will use well-trafficked roads such as the A39 and the A386 to access the respective compounds and haul roads. 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 significant 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.

Sensitivity of Receptor

6.10.89 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

6.10.90 Measures to manage construction traffic noise are set out in the Outline On-CEMP which is supported by an Outline CTMP. This may include measures such as noise 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 ES.

6.10.91 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

6.10.92 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.

6.11 Assessment of Operation and Maintenance Effects

6.11.1 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 6.23**, along with the maximum design scenario against which each impact has been assessed.

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

Noise Impacts due to the Converter Site

6.11.3 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.

6.11.4 It has been assumed that six super grid transformers will be required per bipole, with 10 cooling fans per transformer.

6.11.5 Full details are presented in Volume 2, Appendix 6.3: Operational Noise Assessment, of the ES.

Sensitivity of Receptor

6.11.6 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

6.11.7 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 6.35** below.

Table 6.35: 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	20	0	20	-11	Negligible
Little Webbery	30	27	0	27	-3	Negligible
Moorlands	31	26	0	26	-5	Negligible
North Webbery	30	30	0	30	0	Low
Five Acres	30	24	0	24	-6	Negligible
The Granary	30	24	0	24	-6	Negligible
Webbery Barton	30	30	0	30	0	Low
Webbery Cross Cottage	30	28	0	28	-2	Negligible

6.11.8 Adopting the assumed mitigation measures results in operational noise levels which do not exceed the background sound levels.

6.11.9 As such, the impact is predicted to be of local spatial extent and long-term duration. The magnitude of impact is predicted to be **Negligible**.

Significance of Effect

6.11.10 The exact Converter Site 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 the unmitigated operation of the Converter Site 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.

6.11.11 Overall, the magnitude of impact is **negligible** and the sensitivity of the receptor is **high**. The effect will, therefore, be of **minor** adverse significance, which is not significant. Operational noise limits will be derived and secured through the detailed design for the Converter Site as under Requirement 4 of the DCO. These limits will be derived to ensure significant effects are avoided via the implementation of appropriate mitigation and design principles.

6.12 Assessment of Decommissioning Effects

6.12.1 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 6.41**, along with the maximum design scenario against which each impact has been assessed.

6.12.2 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

6.12.3 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

6.12.4 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

6.12.5 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.

6.12.6 An onshore decommissioning plan will be submitted prior to decommissioning.

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

Significance of Effect

6.12.8 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.

6.13 Cumulative Environmental Assessment

6.13.1 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 Screening Matrix). 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.

6.13.2 The noise and vibration CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the ES. 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.

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

6.13.4 The CEA also considers the Proposed Development and the Alverdiscott Substation Connection Development together. This is because the NGET

substation will be required for the connection of the Proposed Development to the national grid.

6.13.5 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 6.36**. The locations of such projects, plans and activities are presented at Figure 6.4 Cumulative Effects Assessment Scope.

Table 6.36: 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	Under construction	0	Solar Farm at Webbery Barton	Underway	Unavailable	Yes
Tier 3						
Alverdiscott Substation Connection Development	Unknown	0	Extension of the existing Alverdiscott Substation (400kV side) to provide new connection bays for the Proposed Development.	Unavailable	Unavailable	Yes

Scope of Cumulative Effects Assessment

6.13.6 The cumulative effects presented and assessed in this section have been based on the Project Design Envelope set out in Volume 1, Chapter 3: Project Description of the ES as well as the information available on other projects and plans. The maximum design scenario as described for the Proposed Development (see **Table 6.23**) has been assessed cumulatively with the projects/plans set out above in **Table 6.36**, with worst-case assumptions made where necessary.

6.13.7 The CEA has considered the Proposed Development, alongside the Alverdiscott Substation Connection Development to be built by NGET at the existing Alverdiscott Substation Site. The assessed design of NGET substation has been based upon a combination of reasonable worst-case parameters, as detailed within Volume 1, Chapter 3: Project Description of the ES. The development area for the NGET substation would comprise up to 3.8 ha of land. Within that area it is assumed that the substation itself will occupy a footprint of approximately 2.8 ha, with a maximum height of 15 m, excluding connecting tower structures. If further information becomes available for the NGET substation that would be useful to this CEA it would only serve to reduce the anticipated effects having already assumed a worst-case.

Cumulative Effects Assessment

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

Construction

Tier 1 Projects

6.13.9 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.

6.13.10 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.

Tier 3 – Alverdiscott Substation Connection Development

6.13.11 It is understood that the Alverdiscott Substation Connection Development may be under construction at the same time as the Proposed Development. Therefore, a cumulative assessment has been carried out to consider the two sites being constructed concurrently.

6.13.12 The plant and equipment used for the construction phase of the substation are not yet known, however, based on previous experience on similar sites worst-case assumptions have been made to inform the noise assessment.

6.13.13 It has been assumed that the groundworks will generate the most noise associated with the substation, therefore, the equipment used for the construction of the Construction Compounds has been used to inform the cumulative noise assessment.

6.13.14 Noise modelling has been carried out, with the simultaneous construction of the Proposed Development and the substation. The results of this are shown on the table below.

Table 6.37: Cumulative construction noise impact

Receptor	Daytime SOAEL Threshold (dB)	Daytime LOAEL Threshold (dB)	Cumulative Predicted Sound Level (dB)
Webbery Barton	65	50	52

6.13.15 The cumulative magnitude of impact associated with the construction of the Converter Station, and the Alverdiscott Substation is **low**, while the sensitivity of the receptor is **medium**. The cumulative effects of construction of the Converter Station and the substation are therefore considered to be of **minor** adverse significance, which is not significant in EIA terms.

Operation and Maintenance

Tier 1 Projects

Webbery Barton Solar Farm

6.13.16 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.

6.13.17 The common receptors between the solar farm and the Proposed Development which are included in the noise impact assessment are outlined in **Table 6.39** below along with an assessment of the cumulative operational noise levels at these receptors.

6.13.18 The noise impact assessment report states the solar farm is likely to be operational between 4:30 am 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.

Tier 3 - Alverdiscott Substation Connection Development

6.13.19 The Alverdiscott Substation Connection Development (Alverdiscott) is understood to be proposed to operate in conjunction with the Proposed Development. The exact design paraments of Alverdiscott are not yet known, however, reasonable assumptions based on previous experience with similar projects have been made to inform the equipment incorporated in the development.

6.13.20 It is expected that the most significant noise sources associated with Alverdiscott will be the Super Grid Transformers. Auxiliary equipment such as standby generators and circuit breakers are also likely to be installed at the substation, however these are expected to operate only during an emergency, and therefore have not been considered as part of the assessment.

6.13.21 Four transformers have been assumed with a maximum unmitigated sound power level under load (National Grid, 2021) as presented in **Table 6.38** below.

Table 6.38: Alverdiscott substation connection development plant

Plant Item	Quantity	Modelled Height (m)	A-Weighted Sound Power Level, L_W, dB(A)	Modelled Source Type
Super Grid Transformer	2	5	88	Industrial Building
Transformer Cooling Fans	30	5	84	Point

6.13.22 The indicative sound power levels in the table above have been adopted to inform the assessment of noise impacts and recommend limiting levels for the Alverdiscott Substation Connection Development which set out to avoid significant adverse effects.

Specific Sound Levels

6.13.23 The specific sound levels, generated by the developments assessed cumulatively with the Proposed Development – Webbery Barton Solar Farm and Alverdiscott Substation Connection Development, are set out in the **Table 6.39** below.

Table 6.39: Specific sound levels from nearby developments

Receptor	Rating Level $L_{Ar,T}$ (dB)		Cumulative Specific Level (dB)
	Alverdiscott	Solar Farm Development	
Kingdon Cottage	18	21	23
Moorlands	15	25	25
Webbery Barton	26	20	27

Cumulative Operational Noise Assessment

6.13.24 A cumulative operational noise assessment, comprising the Proposed Development and the nearby developments, has been carried out and is shown in **Table 6.40** below.

Table 6.40: 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	Nearby Developments		
Kingdon Cottage	31	20	23	25	-6
Moorlands	31	26	25	29	-2
Webbery Barton	30	28	27	31	+1

6.13.25 The results in **Table 6.40** above show that no cumulative noise impacts are predicted during the operation and maintenance phase of the three developments, except for an increase at Webbery Barton, for which the magnitude of impact is **low**.

6.13.26 Overall, the magnitude of impact is **low** and the sensitivity of the receptor is **high** during the night-time. The cumulative effect is thus predicted to be of minor or moderate 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** significance which is not significant.

Decommissioning

Tier 1 Projects

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

6.13.28 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.

6.13.29 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.

6.14 Transboundary Effects

6.14.1 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).

6.15 Inter-related Effects

6.15.1 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, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases.
- Receptor led effects: Assessment of the scope for all relevant effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.

6.15.2 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 ES; and
- Volume 2, Chapter 2: Historic Environment, of the ES.

6.15.3 A description of the likely interactive effects arising from the Proposed Development on noise and vibration is provided in Volume 4, Chapter 5: Inter-related effects of the ES.

6.16 Summary of Impacts, Mitigation Measures and Monitoring

6.16.1 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.

6.16.2 **Table 6.41** 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 Sites.

6.16.3 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).

6.16.4 **Table 6.42** 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 Sites.

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

6.16.6 No potential transboundary impacts have been identified in regard to effects of the Proposed Development.

Table 6.41: Summary of environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Construction Phase Noise Impacts (excluding HDD)	✓	×	✓	*All required mitigation will be included in the On-CEMP. BPM will be set out to mitigate noise and vibration from construction activities.*	*C: Medium* *D: Medium*	*C: Low* *D: Low*	*C: Minor Adverse* *D: Minor Adverse*	*None*	*C: Minor Adverse* *D: Minor Adverse*	*None*
Construction Phase Noise Impacts (HDD)	✓	×	✓	*All required mitigation will be included in the On-CEMP. BPM will be set out to mitigate noise and vibration from construction activities.*	*C(day): Medium* *C(night): High* *D (day): Medium* *D (night): High*	*C (day): Low* *C (Night): High* *D (day): Low* *D (night): Low*	*C (day): Minor Adverse* *C (night): Moderate Adverse* *D(day): Minor Adverse* *D (night): Minor adverse*	*Mufflers, acoustic barriers and siting of HDD entry pits further away from the properties or reversing the drill direction where practicable.*	*C: Minor Adverse* *D: Minor Adverse*	*A noise monitoring strategy will be agreed as part of the On-CEMP*
Construction Phase Vibration Impacts (all)	✓	×	✓	*All required mitigation will be included in the On-CEMP. BPM will be set out to mitigate noise and vibration from construction activities.*	*C: Medium* *D: Medium*	*C: Low* *D: Low*	*C: Minor Adverse* *D: Minor Adverse*	*None*	*C: Minor Adverse* *D: Minor Adverse*	*None*
Operational phase Noise Impacts	×	✓	×	*Acoustic enclosures, attenuators and silencers, and acoustic barriers (as to be included in detailed design)*	*O: Medium/High*	*O: Low*	*O: Minor Adverse*	*None*	*O: Minor Adverse*	*None*

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

Table 6.42: Summary of cumulative environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Tier 1										
Construction Phase Noise and Vibration Impacts	✓	×	✓	*Site specific CEMP and BPM*	*C: Medium* *D: Medium*	*C: Low* *D: Low*	*C: Minor Adverse*	None	*C: Minor Adverse*	*None*
Operational phase Noise Impacts	×	✓	×	*Site specific acoustic attenuation and screening (as to be included in detailed design)*	*O: Medium/High*	*O: Low*	*O: Minor or Moderate Adverse*	*None*	*O: Minor or Moderate Adverse*	*None*

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

6.17 References

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