XLINKS' MOROCCO-UK POWER PROJECT

Environmental Statement

Rev01 (Clean)

Volume 1, Chapter 3: Project Description

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Glossary

Term	Meaning
Alverdiscott Substation	The existing National Grid Electricity Transmission substation at Alverdiscott, Devon, which comprises 400 kV and 132 kV electrical substation equipment.
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.
Alverdiscott Substation site	The National Grid Electricity Transmission site within which the Alverdiscott Substation sits.
Applicant	Xlinks 1 Limited.
Bipole	A Bipole system is an electrical transmission system that comprises two Direct Current conductors of opposite polarity (one conductor with positive voltage and one with negative voltage).
Biodiversity Net Gain	An approach to development that leaves biodiversity in a better state than before. Where a development has an impact on biodiversity, developers are encouraged to provide an increase in appropriate natural habitat and ecological features over and above that being affected to ensure that the current loss of biodiversity through development will be halted and ecological networks can be restored.
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Construction Traffic Management Plan	A document detailing the construction traffic routes for heavy goods vehicles and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Converter Site	The Converter Site is proposed to be located to the immediate west of the existing Alverdiscott Substation Site in north Devon. The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2) and associated infrastructure, buildings and landscaping.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current to Alternating Current, or vice versa.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Earthworks	Covers the processes of soil-stripping, ground-levelling, excavation, and landscaping, as defined by the Institute of Air Quality Management.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Horizontal Directional Drilling	Horizontal Directional Drilling (HDD) is a method of installing underground pipelines, cables and service conduit (or ducts) through trenchless methods to avoid obstacles and sensitive features (e.g. roads, watercourses, woodlands, etc.). The term HDD is used here interchangeably with other similar trenchless techniques but excluding micro tunnelling or direct pipe methods.
HVAC Cables	The High Voltage Alternating Current cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.

Term	Meaning
HVAC Cable Corridors	The proposed corridors (for each Bipole) within which the onshore High Voltage Alternating Current cables would be routed between the Converter Site and the Alverdiscott Substation Site.
HVDC Cables	The High Voltage Direct Current cables which would bring electricity to the UK converter stations from the Moroccan converter stations.
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 bays inclusive of all construction works, including the offshore and onshore cable routes, and Landfall compound(s).
Marine Conservation Zone(s)	Marine Conservation Zone(s) are marine nature reserves and are areas that protect a range of nationally important, rare or threatened habitats and species.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Proposed Development.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
National Grid Electricity System Operator	National Grid Electricity System Operator operates the national electricity transmission network across Great Britain. National Grid Electricity System Operator does not distribute electricity to individual premises, but its role in the wholesale market is vital to ensure a reliable, secure and quality supply to all.
National Grid Electricity Transmission	National Grid Electricity Transmission owns and maintains the electricity transmission network in England and Wales.
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023 and adopted in 2024.
Offshore Cable Corridor	The proposed corridor within which the offshore cables are proposed to be located, which is situated within the UK Exclusive Economic Zone.
Onshore Infrastructure Area	The proposed infrastructure area within the Order Limits landward of Mean High Water Springs. The Onshore Infrastructure Area comprises the transition joint bays, onshore HVDC Cables, converter stations, HVAC Cables, highways improvements, utility diversions and associated temporary and permanent infrastructure including temporary compound areas and permanent accesses.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current Cables would be located.
Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project, and which helps to inform consultation responses.
Proposed Development	The element of Xlinks' Morocco-UK Power Project within the UK. The Proposed Development covers all works required to construct and operate the offshore cables (from the UK Exclusive Economic Zone to Landfall), Landfall, onshore Direct Current and Alternating Current cables, converter stations, and highways improvements.
Order Limits	The area within which all offshore and onshore components of the Proposed Development are proposed to be located, including areas required on a temporary basis during construction (such as construction compounds).

Term	Meaning
Special Areas of Conservation	A site designation specified in the Conservation of Habitats and Species Regulations 2017. Each site is designated for one or more of the habitats and species listed in the Regulations. The legislation requires a management plan to be prepared and implemented for each Special Area of Conservation to ensure the favourable conservation status of the habitats or species for which it was designated. In combination with Special Protection Areas and Ramsar sites, these sites contribute to the national site network.
Special Protection Areas	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.
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.
Transition joint bay	A transition joint bay is an underground structure at the landfall area where the offshore cables are jointed to the onshore cables.
Exclusive Economic Zone	An area of the sea, which is under territorial ownership of a single state.
Utility Diversions	Works required by statutory utility providers to re-route infrastructure around the Proposed Development.
Xlinks' Morocco-UK Power Project	The overall scheme from Morocco to the national grid, including all onshore and offshore elements of the transmission network and the generation site in Morocco (referred to as the 'Project').

Acronyms

Acronym	Meaning
AC	Alternating Current
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
CBRA	Cable Burial Risk Assessment
CEMP	Construction Environment Management Plan
CLV	Cable laying vessel
COLREG	International Regulations for the Prevention of Collisions at Sea
CTMP	Construction Traffic Management Plan
DC	Direct Current
Defra	Department for Environment, Food & Rural Affairs
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
FOC	Fibre optic cables
FTE	Full Time Equivalent
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current

Acronym	Meaning
INNS	Invasive non-native species
LAT	Lowest Astronomical Tide
LEMP	Landscape and Ecology Management Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MFE	Mass flow excavation
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
NESO	National Energy System Operator
NGET	National Grid Electricity Transmission
OCC	Offshore Cable Corridor
OHL	Overhead Lines
OOS	Out of Service
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAD	Protocol for Archaeological Discoveries
PLONOR	Pose Little Or No Risk
ROV	Remotely operated vehicle
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UXO	Unexploded Ordnance
VMP	Vessel Management Plan

Units

Units	Meaning
m	Metre
m^2	Square metre
m^3	Cubic metre
mm	Millimetre
kV	Kilovolt
GW	Gigawatt
ha	Hectares
km	Kilometre
km^2	Square kilometre

3 PROJECT DESCRIPTION

3.1 Introduction

3.1.1 This chapter of the Environmental Statement (ES) provides a description of the United Kingdom (UK) elements of Xlinks' Morocco-UK Power Project (the 'Project'). The UK (within the UK Exclusive Economic Zone (EEZ)) elements of the Project are referred to in this chapter as the 'Proposed Development'.

3.1.2 This chapter summarises the key components of infrastructure (both onshore and offshore) for the Proposed Development, as well as a description of the activities associated with their construction, operation and maintenance and decommissioning. The below description has been informed by the current design information and by the understanding of the receiving environment, based on survey and desk study work undertaken to date. The details provided in this ES chapter inform the assessments that have been undertaken and presented within Volumes 2, 3 and 4 of this ES.

3.1.3 The Proposed Development would connect the generation assets in Morocco and associated cable infrastructure (routed through Morocco, Spain, Portugal and France) to the national grid high voltage transmission network, via cable infrastructure and converter stations within UK jurisdiction. This would enable the delivery of an output of up to 3.6 Gigawatts (GW). Further details are provided in Volume 1, Chapter 1: Introduction of the ES.

3.1.4 They key components of the Proposed Development include the following:

- Onshore Elements:
  - Converter stations: two independent converter stations, known as Bipole 1 and Bipole 2, to convert electricity from Direct Current (DC) to Alternating Current (AC) before transmission to the national grid.
  - Onshore High Voltage Alternating Current (HVAC) Cables: these cables would connect the converter stations to the national grid.
  - Onshore High Voltage Direct Current (HVDC) Cables: these cables would link the converter stations to the Landfall.
  - Highways improvements: improvements to the existing road network to facilitate access during construction, operation and maintenance, and decommissioning, including road widening, and new or improved junctions.
  - Temporary and permanent utility connections: temporary and permanent utility connections to the construction compounds and the Converter Site.
  - Permanent utility diversions: permanent diversion of existing utility services within the Onshore Infrastructure Area.
- Landfall:
  - Landfall: the site at Cornborough Range where the offshore cables are jointed to the onshore cables. This term applies to the entire area between Mean Low Water Springs (MLWS) and the transition joint bays, within the Order Limits. This includes all construction works, including the offshore and onshore cable routes, and compound(s) at Landfall.

- Offshore Elements:
  - Offshore HVDC Cables: the cables which would link the converter stations in Morocco to the Landfall, which are located within the UK EEZ.

3.1.5 Mitigation (also referred to as "commitments") and enhancement measures to be adopted as part of the Proposed Development are detailed within Volume 1, Appendix 3.1: Commitments Register of the ES.

3.1.6 The onshore HVDC and HVAC Cables would be completely buried underground for their entire length. It is anticipated that the offshore cables would be buried in the seabed or laid on the seabed with protection. No HVAC overhead lines (OHLs) would be installed as part of the Proposed Development. However, the Proposed Development would require the diversion of existing utilities, including 132 kilovolts (kV) OHLs, 11 kV OHLs, gas and water assets.

3.1.7 In addition to the permanent components outlined within **paragraph 3.1.4**, temporary onshore infrastructure would be required for the construction phase, including construction compounds, welfare and site offices, utility connections, haul roads and construction drainage. If decommissioning of the Proposed Development takes place (see **section 3.14**), similar temporary onshore infrastructure would be required (e.g., decommissioning compounds).

3.2 Project Design Envelope Approach

3.2.1 At this stage of the Environmental Impact Assessment (EIA) and consenting process, design and procurement are still ongoing. Embedded mitigation measures, which are detailed within **section 3.9**, will guide the final design and its construction, operation and maintenance, and decommissioning phases.

3.2.2 It is often the case that where consent is applied for and obtained before detailed design commences, there may be design elements that are unknown to an applicant at the time of application. In such cases, a Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) may be used. The PDE approach defines a design envelope and parameters that are fixed within which the final design will sit. It allows flexibility for elements that will require more detailed design subsequent to submission and approval of the application for development consent, such as siting of infrastructure and construction methods. It also allows the findings of the consultation process and feedback from statutory and non-statutory stakeholders to be considered during the design process, where appropriate.

3.2.3 Within the fixed parameters, individual topic chapters are able to use the PDE in the selection of their maximum design scenario, i.e. a reasonable worst case scenario that sits within the PDE presented in this chapter.

3.2.4 The adoption of this approach allows a meaningful EIA to take place by defining a 'maximum design scenario' (within the limits of the defined PDE) on which to base the identification of likely environmental effects. The maximum design scenario is the realistic worst-case scenario that would give rise to the greatest impact (and subsequent effect) for each topic within the ES. By identifying the maximum design scenario for any given impact it can be concluded that the impact (and therefore the resulting effect) would be no greater for any other design scenario. Each topic has presented the maximum design scenario within their chapter on which their assessment has been based.

3.2.5 Furthermore, this approach utilises a 'Limit of Deviation' in order to provide a proportionate degree of flexibility within the Order Limits to accommodate any changes before the final alignment and design of the Proposed Development (i.e., due to issues highlighted by the EIA process and consultation). For example, in relation to the offshore and onshore cables, the Order Limits identify the extent of the limits of deviation within which the cables may be installed, allowing for flexibility in final routing to avoid any identified utilities or features (e.g., gas mains, archaeology, important habitats, etc.).

3.2.6 The use of the PDE approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DESNZ, 2023a), the NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2023b) and the NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2023c).

3.2.7 This chapter describes the fixed parameters (i.e. PDE) for the Proposed Development, taking into account the policy set out in the NPSs and the advice in the Planning Inspectorate's Advice Note Nine (Planning Inspectorate, 2018). The PDE described within this chapter has been designed to:

- take into account site selection and design refinement work undertaken to date (see Volume 1, Chapter 4: Need and Alternatives, of the ES); and
- include sufficient flexibility to accommodate future stages of design refinement.

3.2.8 The design described within this chapter will continue to be refined, with the final design of the Proposed Development selected after development consent has been granted, from within the parameters set out in this project description chapter of the ES and the DCO.

3.2.9 Each topic chapter of this ES sets out the assumptions made regarding the PDE, relevant to that chapter, and the maximum design scenario for each impact. The methodology for assessment for the Proposed Development is set out in more detail in Volume 1, Chapter 5: Environmental Impact Assessment Methodology of this ES.

3.3 Location

3.3.1 The Proposed Development would be located within the Order Limits shown on Figure 1.1 (See Volume 1, Figures). The Order Limits is approximately 206 km^2 in area.

3.3.2 The onshore elements of the Proposed Development would be located within the Onshore Infrastructure Area and AIL Route Works. The Onshore Infrastructure Area lies within the local authority area of Torridge District Council (and Devon County Council at county level), in north Devon (See Volume 1, Figure 3.1). The Onshore Infrastructure Area comprises all permanent and temporary components in the onshore section of the Proposed Development. This includes the Converter Site and connection to the national grid, utility connections and diversions, permanent highways improvements as well as temporary highways alterations during construction, Onshore HVDC Cable Corridor, HVAC Cable Corridors, temporary compounds and haul roads, and the Landfall.

3.3.3 The offshore elements of the Proposed Development, which includes the Offshore Cable Corridor, would to be located within the Bristol Channel and Celtic Sea, extending from the Landfall to the limit of UK EEZ, south west of the UK (See Volume 1, Figure 3.2).

3.3.4 The following provides further details on the location of the Converter Site (in which both of the proposed converter stations would be located), highways improvements, HVAC Cable Corridors, Onshore HVDC Cable Corridor, Landfall and the Offshore Cable Corridor.

3.4 Consultation Undertaken to Date

3.4.1 Xlinks 1 Limited (the Applicant) has undertaken a programme of statutory and non-statutory consultation to inform the EIA process and the design of the Proposed Development. A summary of the relevant consultation undertaken is presented below. Full details are presented in the Consultation Report (document reference 5.1), submitted as part of the application for development consent.

Scoping

3.4.2 In January 2024, the Applicant submitted a Scoping Report to the Planning Inspectorate, which described the approach to assessment of any likely significant effects for the construction, operation and maintenance, and decommissioning phases of the Proposed Development.

3.4.3 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 comments raised during the scoping process are set out in **Table 3.1**, together with details of how these issues have been addressed within the ES.

Section 42 Responses

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

3.4.5 The Applicant held a statutory consultation from 16 May to 11 July 2024. Key comments raised during statutory consultation are set out in **Table 3.1**, together with details of how these comments have been addressed within the ES.

Community Consultation

3.4.6 As part of the statutory consultation, community consultation was undertaken between 16 May and 11 July and included in-person consultation events and online webinars. Consultees were given opportunities to ask questions, raise concerns and provide feedback via a number of advertised routes including feedback form, email, freepost or in person.

3.4.7 Full details of consultation events, responses and how they have been taken into account in the application are provided in the Consultation Report (document reference 5.1) submitted with the DCO application.

Summary of Consultation Responses Received

3.4.8 Key comments raised during the scoping, statutory consultation phase, and further engagement specific to the project description are set out in **Table 3.1**, together with details of how these comments have been addressed within this chapter and the wider ES.

Table 3.1: Summary of consultation responses including Scoping Responses, s42 responses, and further consultation.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
March 2024	Planning Inspectorate – Scoping Opinion	'*The Applicant should make every attempt to narrow the range of options and explain clearly in the ES which elements of the Proposed Development have yet to be finalised and provide the reasons.* *It is noted that the Scoping Report refers interchangeably to 'maximum design scenario' and 'Project Design Envelope' (PDE) when referencing the use of the Rochdale Envelope approach. The terminology used in the ES should be consistent. The ES should also ensure consistency throughout the ES and any other relevant assessments supporting the application from which the ES draws.* *The Inspectorate advises that flexibility in design should only be sought where absolutely necessary, in the interests of a proportionate ES based on the most realistic and refined PDE possible. The ES should assess the worst case that could potentially be built out in accordance with the Authorised Development of the Development Consent Order (DCO) being applied for*.' (Scoping Opinion ID: 2.1.1)	The approach is set out in **section 3.2**, based on guidance presented in the NPSs and Advice Note 9 (Planning Inspectorate, 2018). This chapter of the ES sets out the Project Design Envelope (PDE) for the elements of the Proposed Development. Each topic chapter in Volumes 2, 3 and 4 of this ES sets out the maximum design scenario for that topic, which is based upon the fixed parameters detailed within the PDE. Through an iterative site selection process and design process, along with statutory and non-statutory consultation, the Applicant has looked to refine the range of options, where possible. The site selection and design evolution is presented within Volume 1, Chapter 4: Needs and Alternatives, of the ES. Some flexibility is retained at the ES stage as the design process remains ongoing. The design would be finalised after development consent has been granted, from within the parameters set out in this project description chapter of the ES and the DCO.
March 2024	Planning Inspectorate – Scoping Opinion	'*The ES should clearly describe the works relating to any overhead lines and structures, where included, and include an assessment of any likely significant effects from such works*.' (Scoping Opinion ID: 2.1.2)	The Proposed Development does not propose the installation of any new overhead lines (OHLs), however, it would include the re-positioning of existing OHLs. Discussions with statutory undertakers have been undertaken to understand the likely extent of third party utility diversions. Further detail on the utility diversions is provided in **paragraph 3.7.44**.
March 2024	Planning Inspectorate – Scoping Opinion	'*It is unclear from the Scoping Report if the two convertor stations would be constructed concurrently or consecutively, and if consecutively, whether there would be a period of no construction in between. The ES should clearly state the anticipated construction programme used for the assessment and ensure aspect chapters are consistent in this regard*.'	The description of the construction activities and programme is detailed within **section 3.6**. This is supported by an indicative construction programme presented within **Plate 3.1**, which shows the approximate timeframes and overlap between each element of the Proposed Development.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		(Scoping Opinion ID: 2.1.3)	
March 2024	Planning Inspectorate – Scoping Opinion	'*The ES should clearly describe the elements of the project to be included in the DCO application. The Applicant should reduce the options for the Proposed Development as far as possible (see also the Inspectorate's comment above regarding flexibility at ID 2.1.2).* *Where included in the DCO, the ES should clearly set out the worst case parameters for the assessment and include an assessment of the likely effects of the proposed Alverdiscott Substation Connection Development in the relevant aspect chapters, for example in relation to landscape and visual impacts*.' (Scoping Opinion ID: 2.1.4)	The key elements of the Proposed Development are summarised within **section 3.1**. This chapter of the ES sets out the design parameters for each element of the Proposed Development. Each topic chapter in Volumes 2, 3 and 4 of this ES sets out the maximum design scenario for that topic. Following discussions with National Grid Electricity Transmission (NGET), the anticipated Alverdiscott Substation Connection Development will be planned and developed by NGET. However, it would be necessary to facilitate a connection to the national grid and thus, the ES considers likely cumulative effects that might arise.
March 2024	Planning Inspectorate – Scoping Opinion	'*The ES should describe the range of burial depths that have been considered as part of the assessment and the degree of confidence in these parameters. It should establish the parameters likely to result in the maximum adverse effects and include an assessment of these to determine likely significance of effects*.' (Scoping Opinion ID: 2.1.6)	This chapter presents the burial depths that have been considered as part of the assessment. **Table 3.9** details the approximate trench depth of the onshore HVDC Cable and HVAC Cable trenches, whilst **Table 3.16** includes the cable burial depth for the Offshore Cable Corridor. Each topic chapter in Volumes 2, 3 and 4 of this ES sets out the maximum design scenario for that topic, including the consideration of burial depths, where relevant.
March 2024	Planning Inspectorate – Scoping Opinion	'*The ES should clearly identify the quantities of dredged material and likely method and location for disposal. Any likely significant effects from offshore waste collection and disposal, including dredging or dredge disposal, should be assessed*.' (Scoping Opinion ID: 2.1.8)	The management of any offshore waste generated via grapnel runs would be undertaken via the final offshore CEMP. The Outline Offshore CEMP is provided with the DCO application (document reference 7.9).
March 2024	Planning Inspectorate – Scoping Opinion	'*Paragraph 4.12.6 states that an Onshore Decommissioning Plan would be developed in a 'timely manner'. The ES should explain the anticipated timescales for production of the Onshore Decommissioning Plan, whether agreement has*	Details regarding the anticipated timescales for the production of the Onshore Decommissioning Plan(s) are included **section 3.14** of this chapter. An Outline Decommissioning Strategy has been submitted as part of the application for development consent

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		been sought with Local Authorities and how it would be secured.' (Scoping Opinion ID: 2.1.11)	(document reference 7.18), which details that onshore and offshore decommissioning plans would be prepared in accordance with the principles set out by the strategy, if decommissioning is required.
March 2024	Planning Inspectorate – Scoping Opinion	'*No direct reference is made to the potential requirement for dewatering activities in Section 4 of the Scoping Report, although it is noted that dewatering is referenced as an example activity in Table 7.4.4 and at paragraph 7.5.54 in respect of potential inter-related effects between the hydrology and flood risk chapter and hydrogeology, geology and ground conditions chapter.* *The ES should provide a full description of any such activities and present an assessment of any resulting likely significant effects, where these could arise…'* (Scoping Opinion ID: 2.1.13)	The potential requirement of dewatering is described within **paragraphs 3.10.50** to **3.10.52**. The potential impact of dewatering activities on reduced groundwater quantity or quality in aquifer units is considered within Volume 2, Chapter 4: Geology, Hydrogeology and Ground Conditions, of the ES.
March 2024	Planning Inspectorate – Scoping Opinion	'*The Scoping Report suggests that crossings of sensitive watercourses may be required. The ES should describe the nature of any proposed works within or in proximity of sensitive watercourses (i.e. main rivers and Ordinary watercourses). Information should be provided regarding the location, scale, and dimensions of any proposed watercourse crossings/ instream structures, as well as the nature of any associated construction works (e.g. dewatering, trenching, and HDD).*' (Scoping Opinion ID: 3.3.21)	Details on the crossing of sensitive watercourses are provided within **paragraphs 3.10.36** to **3.10.37** of this chapter, as well as Volume 1, Appendix 3.2: Onshore Crossing Schedule, of the ES. Mitigation measures regarding the crossing of watercourses are included within the Outline Onshore Construction Environmental Management Plan (On-CEMP) (document reference 7.7).
March 2024	Planning Inspectorate – Scoping Opinion	'*Where cable protection is required, the Inspectorate advises that the ES should identify the options available and provide an assessment of the likely significant effects that would arise from installation of the selected option (or options if flexibility is sought), including impacts from secondary scouring*.' (Scoping Opinion ID: 3.9.13)	The proposed cable protection methods are described in **paragraphs 3.8.53** to **3.8.54** for **o**ffshore cables and assessed in the relevant topic chapters in Volume 3 of this ES. An Outline Cable Burial Risk Assessment is presented as Volume 1, Appendix 3.4 of this ES, and an associated suite of Volume 1 figures provides detail on potential burial techniques along the Offshore Cable Corridor.
March 2024	Planning Inspectorate – Scoping Opinion	'*The Scoping Report states that the offshore cable would be buried, where possible. The ES should include an assessment of the effects of cable protection from methods other than burial, based on the worst case scenario which has*	

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		been defined for the area of cable protection likely to be required. The Applicant is encouraged to seek to agree cable burial depth and protection measures with relevant consultation bodies and stakeholders.' (Scoping Opinion ID: 3.11.4)	Cable burial techniques and details of cable protection including specific review of cable crossing locations have been discussed with consultation bodies, specifically the Joint Nature Conservation Committee, Marine Management Organisation (MMO) and Natural England. Assessment of secondary scouring is presented in Volume 3, Chapter 8: Physical Processes of the ES.
March 2024	Alverdiscott and Huntshaw Parish Council – Scoping Opinion	'*The security and lighting aspects of the Alverdiscott site which are included in sections 4.6.13, 14 & 23, are felt to require further detail. The area, although not a designated Dark Sky area, does enjoy a high degree of night-time darkness at present. The council feels that both these aspects are to a greater or lesser extent connected, and therefore would enquire as to what extent the lighting would impinge upon this (we note that measures to prevent light spill would be considered), and to what extent the security fencing would be lit*.'	Operational lighting at the Converter Site is described in **paragraphs 3.7.41** to **3.7.43.** Further information and requirements for operational lighting are detailed within the Design Principles (document reference 7.4) and would be in accordance with the Institute of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light.
March 2024	Alverdiscott and Huntshaw Parish Council – Scoping Opinion	'*It seems to be unclear as to the time scale for the converter station site, as opposed to the cabling installation from the coast. Could this be more specific, as we have been receiving various comments ranging from eighteen months to six years*.'	Details of the programme for construction are set out in **section 3.6.** This is supported by an indicative construction programme presented within **Plate 3.1**.
March 2024	Littleham and Landcross Parish Council – Scoping Opinion	'*For mitigation, the EIA should include opportunities for working with landowners along the cable route to ensure biodiversity net gain. This is a major opportunity to provide a wildlife corridor from the coast to the Torridge and beyond, which should not be missed*.'	**Section 3.11** of this ES chapter provides details on the on-site biodiversity mitigation and enhancement opportunities, which is also shown on Figure 3.16 (see Volume 1, Figures). The Applicant is also engaging and working with landowners and North Devon Biosphere to identify potential opportunities to deliver off-site biodiversity enhancement. However, any off-site biodiversity enhancements are not assessed as part of the ES (see **paragraph 3.11.4** for further details).

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
July 2024	Bideford Station - Barnstaple Response Group – Section 42 response	'*Consideration should be given to the requirements for fire and rescue access into and around the buildings for fire-fighting purposes… Early consultation with the Fire Authority and local authority building control is advised when deciding which facilities should be provided. Where appropriate, fire-fighting facilities should include:* • *the provision of vehicular access for fire appliances to the perimeter of the building(s) or site;* • *provision of easy and quick entry to the site/building(s) for fire fighters and their equipment;* • *provision of and access to sufficient supplies of fire-fighting medium (usually water);* • *provision for removing spent fire-fighting extinguishing medium (e.g. drainage).* *Every building should be provided with suitable access for fighting purposes and where access is restricted, fire appliances access to buildings should be discussed with the fire and rescue service at an early stage*.'	The design of the converter station and associated access will comply with all relevant statutory requirements including building regulations, building control requirements and fire safety in consultation with the fire authority. The design will be developed to optimise access to fire dampers, balancing dampers, actuators, sensors and other active components for both planned and emergency access. Protected areas of the external facade would provide a minimum of 60 minutes fire resisting construction. External walls adjacent to the transformers will provide 240 minute fire resisting construction. Private fire main infrastructure, with all necessary central tank, pumphouse and site fire hydrant requirements would be provided and fire alarm systems will be designed in accordance with BS 5839.
July 2024	Alverdiscott & Huntshaw Parish Council – Section 42 response	'*Whilst this proposed development is in a rural area we have evidence and many reports that have resulted in complaints to TDC of noise pollution from the current solar panel installation adjacent to the proposed site. Due to the location and elevation of the proposed site noise and other disturbances have already been shown to detrimentally affect residents and with your development expected to last for 6 years the A&HPC consider the operating hours are crucial in an attempt to maintain the goodwill of the local residents. The PC request proposed operating hours be amended to:* *8am to 6pm Monday to Friday* *8am to 1pm Saturday* *No operations on Sundays and Bank Holidays*.'	The normal working hours are defined in **paragraphs 3.10.7** to **3.10.9,** which would be Monday to Friday 07:00-19:00 and Saturday 07:00-13:00. Start up and close down activities could occur up to an hour either side of these times (i.e., arrival and departure of workforce). Whilst some limited construction activity such as Horizontal Directional Drilling (HDD) and continuous concrete pours may need to occur outside of core hours, these instances are expected to be limited. Construction works at the Converter Site would be managed by an On-CEMP(s), which would be consulted on and approved by Torridge District Council prior to construction. The Outline On-CEMP (document reference 7.7) details measures that would

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
			be adopted to control noise emissions on site and ensure effective communication with local residents.
July 2024	Marine Management Organisation – Section 42 response	*'The ES must include the locations of each specific site within the OCC* [Offshore Cable Corridor] *that may require sand wave levelling. Dredge methodology, volume and impacts should also be provided within the ES. Furthermore, sediment sampling and analysis may be needed at these locations in order to characterise the material at these sites. See comments 10.1 to 10.5 of this document for further details.'*	HDD exit pit construction methods have been refined at ES stage. There will be no removal of cleared / dredged materials (no Trailer Suction Hopper Dredging as indicated at PEIR stage). Exit pits will be cleared of surface sediments (sands) by long-reach excavator from HDD jack-up barge or Mass Flow Excavator (MFE), with pits filled following cable installation through a combination of long-reach excavator and natural infilling (Bideford Bay is an area of active surface sediment movement). Note also the Proposed Development's commitment for all potential sediment disturbance activities in Bideford Bay to avoid peak spring tides and significant wave activity - to limit any potential for sediment mobilisation. Following detailed review of environmental survey data, the Outline Cable Burial Risk Assessment now confirms that there is no requirement for broadscale sandwave levelling. In other words there is no 'pre-sweeping' required in UK waters and all anticipated sandwaves are small enough to enable e.g. conventional jetting to bury below the non-mobile reference layer. Potential for suspended sediment generation and associated impacts are assessed within Volume 3, Chapter 8: Physical Processes of the ES (and the associated chapter appendices).
July 2024	Marine Management Organisation – Section 42 response	*'The MMO recommends the ES includes consideration of the use of local rock material where cable protection measures are required, to encourage colonisation of a more natural benthic assemblage and potentially minimise the impact of cable removal at the decommissioning phase. Should the cable not attain the correct burial depth in an area of coarse*	The source of the rock that will be used for cable protection is currently unknown and will not be finalised until award of principal contractor etc i.e. post application for DCO. The source is highly probable to be either basaltic or granitic in origin i.e. relatively 'inert'. It is unlikely to be feasible to deploy variable

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		sediment, the material used to provide cable protection should be in keeping and typical of the surrounding habitat.'	rock along the course of the Offshore Cable Corridor, not least because of transit distances and reactive, adaptive rock placement at the time of construction. Although a sensible aspiration to adjust materials dependent on surrounding substrates, there are no large scale cable installation projects (to the Applicant's knowledge) that have undertaken such an approach. The likelihood of requiring rock placement is greatest in hard bedrock areas, where rock placement would be most 'in keeping' with surrounding habitats.
July 2024	Marine Management Organisation – Section 42 response	*'It is difficult to discern the specific methodology of the offshore activities, such as the cable laying and burial depth, installation of cable protection, and excavation of trenchworks. A detailed methodology and timeline of the proposed development activities must be included within the Environmental Statement ("ES") in order to enable a full and robust assessment of impacts. The MMO appreciates that it may not be possible to provide specific details, such as the cable burial depth for the whole length of the OCC, however an accurate range of values, including maximums and worst-case scenarios, should be provided.'*	An outline Cable Burial Risk Assessment (CBRA) is presented as an ES appendix (Volume 1, Appendix 3.4 of the ES). The ES Project Description (this chapter) has also been updated. The ES also includes spatial analysis of potential installation methods, including those in proximity to protected sites and relative to habitat data (e.g. Volume 3, Chapter 1: Benthic Ecology of the ES.
July 2024	Marine Management Organisation – Section 42 response	*'Paragraph 3.12.9 of the PEIR states that, where it is not possible to beneficially re-use the material dredged at the HDD exit points, alternative disposal options in line with regulatory and consenting requirements for disposal of dredged material will be adhered to, adding that the PEIR considers the dredging activity only. The ES must include full details of any disposal, with sediment analysis used to support any decisions made. See comments 10.1 to 10.5 for further details.'*	HDD exit pit construction methods have been refined at ES stage. There will be no dredging and removal of materials. Exit pits will be cleared of surface sediments (sands) by long-reach excavator from HDD jack-up barge or using MFE, with pits filled following cable installation through a combination of long-reach excavator and natural infilling (Bideford Bay is an area of active surface sediment movement). No specific chemical sampling planned.
July 2024	Marine Management Organisation – Section 42 response	*'The PEIR includes the use of concrete mattresses as a cable protection method. Often mattresses have some form of plastic included within their design e.g. for handle fronds. The ES should include details of such plastics and consider the*	Pre-cast concrete mattresses may include small quantities of integrated plastic. These plastic components may be used as handles / fixing points and are standard design features for concrete

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		risks of placing plastic infrastructure into the marine environment should they degrade. A construction method statement for the placement of cable protection should be included in the Outline Offshore CEMP.'	mattresses used in the marine environment. The type of plastic will be suitably robust and resistant to deterioration i.e. appropriate for long-term deployment (50+ years minimum) in the marine environment. Mattresses will be covered with rock protection or sediments, which will further reduce potential for deterioration. The potential for associated risks to water quality are considered (and scoped out) within the Environmental Statement (Volume 3, Chapter 8: Physical Processes of the ES. Detailed construction methods will be provided in the Final Offshore CEMP produced by the construction contractor; an outline CEMP is provided at application for DCO.
July 2024	Marine Management Organisation – Section 42 response	*'The PEIR includes the use of concrete mattresses as a cable protection method. Often mattresses have some form of plastic included within their design e.g. for handle fronds. The ES should include details of such plastics and consider the risks of placing plastic infrastructure into the marine environment should they degrade. A construction method statement for the placement of cable protection should be included in the Outline Offshore CEMP.'*	Pre-cast concrete mattresses may include small quantities of integrated plastic. These plastic components may be used as handles / fixing points and are standard design features for concrete mattresses used in the marine environment. The type of plastic will be suitably robust and resistant to deterioration i.e. appropriate for long-term deployment (50+ years minimum) in the marine environment. Mattresses will be covered with rock protection or sediments, which will further reduce potential for deterioration. The potential for associated risks to water quality are considered (and scoped out) within the Environmental Statement (Volume 3, Chapter 8: Physical Processes of the ES (. Detailed construction methods will be provided in the Final Offshore CEMP produced by the construction contractor; an outline offshore CEMP (document reference 7.9) is provided at application for DCO.
July 2024	Marine Management Organisation – Section 42 response	*'Should HDD operations require the use of continuous concrete pours, the potential for and impact of aborted cement should be detailed within the ES and Outline Offshore*	There will be no requirement for any wet concrete pours associated with the landfall HDD or any of the offshore works.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		CEMP. This is to ensure that no waste concrete slurry or wash water from concrete is discharged into the marine environment. Concrete and cement mixing and washing areas must be 10 m away from any watercourse or surface water drain to minimise the risk of run off entering a watercourse.'	
July 2024	Marine Management Organisation – Section 42 response	*'A Bentonite Breakout Plan should also be included within the Outline Onshore CEMP. This should include an assessment of the likelihood of the risk and impact on the marine environment of worst-case scenarios from breakout, stuck drill strings, loss of cement or drill fluid, etc, to the Bristol Channel and/or the River Torridge as a result of the proposed development.'*	An Outline Bentonite Breakout Plan is provided with the application for DCO as document reference 7.21. This breakout plan will be finalised by the HDD contractor.. For info, the ES also now includes results of an intertidal habitats and species survey which is used to characterise an assessment of intertidal species sensitivity (within Volume 3, Chapter 1: Benthic Ecology of the ES.
July 2024	Marine Management Organisation – Section 42 response	*'Furthermore, paragraph 3.8.22 of the PEIR states that sediment will be removed from an area of approximately 15m x 15m around each of the four HDD exit points. The maximum volume of sediment to be removed is not provided. This must be specified in the ES. As with the material to be removed at the two TJBs, the method of disposal has not been provided. The MMO notes, and welcomes, the intention to engage directly with the MMO with regards to dredge and disposal options.'*	HDD pit construction methods have been refined at ES stage. There will be no removal of cleared / dredged materials (no TSHD as indicated at PEIR stage). Exit pits will be cleared of surface sediments (sands) by long-reach excavator from HDD jack-up barge or Mass Flow Excavator (MFE), with pits filled following cable installation through a combination of long-reach excavator and natural infilling (Bideford Bay is an area of active surface sediment movement).
July 2024	Marine Management Organisation – Section 42 response	*'Paragraph 3.8.21 of the PEIR states that drilling fluids that are on the OSPAR list that Pose Little Or No Risk ("PLONOR") to the environment would be used. However, to be able to fully understand the risk to the marine environment, the ES should include details of the use and volume of the chemicals to be used in the HDD, including information regarding their components and their potential for persistence toxicity and bioaccumulation.'*	Bentonite (a preferred "PLONOR" substance) is confirmed as the HDD drill fluid. Bentonite is a standard drilling fluid used across the UK for similar HDD operations. The Applicant can provide the MMO material safety data information if deemed necessary. An Outline Bentonite Breakout Plan (document reference 7.21) is included in the ES. A Bentonite Breakout Plan will be prepared by the HDD contractor based on the Outline Bentonite Breakout Plan which will provide further detail on the use of bentonite as a drilling fluid.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
July 2024	Marine Management Organisation – Section 42 response	*'Paragraph 3.12.7 of the PEIR states that "localised dredging (or other seabed clearance) may be required for seabed preparation at the HDD exit points…A Dredging Management Plan will be developed to limit the seabed disturbance and suspended sediment concentrations and control the generation of sediment plumes". Further clarification is required with regards to 'or other seabed clearance' to ensure it also includes limiting the seabed disturbance, suspended sediment concentrations and generation of sediment plumes as a result of the clearance of sand waves.'*	HDD exit pit construction methods have been refined at ES stage. There will be no removal of cleared / dredged materials (no TSHD as indicated at PEIR stage). Exit pits will be cleared of surface sediments (sands) by long-reach excavator from HDD jack-up barge or Mass Flow Excavator (MFE), with pits filled following cable installation through a combination of long-reach excavator and natural infilling (Bideford Bay is an area of active surface sediment movement). Note also the Proposed Development's commitment for all potential sediment disturbance activities in Bideford Bay to avoid peak spring tides and significant wave activity - to limit any potential for sediment mobilisation. Following detailed review of environmental survey data, the Outline Cable Burial Risk Assessment now confirms that there is no requirement for broadscale sandwave levelling. In other words there is no 'pre-sweeping' required in UK waters and all anticipated sandwaves are small enough to enable e.g. conventional jetting to bury below the non-mobile reference layer. Potential for suspended sediment generation and associated impacts are assessed within Volume 3, Chapter 8: Physical Processes of the ES (and the associated chapter appendices).
July 2024	Marine Management Organisation – Section 42 response	*'The MMO understands that the offshore cables will be jointed to the onshore cables at two TJBs. Paragraph 3.7.149 of the PEIR states that 1,875 cubic metres ("m3") (50m x 15m x 2.5m) of material is to be removed at each of the two TJBs. No description of how the material will be stored or disposed of is provided (including any details of storage or disposal locations, and if stored then how long this will be for). In addition, if the material is disposed of, details on how the*	The transition joint bays would be situated landward of MHWS within the Landfall Compound. The area would be stripped of topsoil and stored in a bund(s) to the edge of the construction corridor. The subsoil would then be excavated and stored in a separate bund separated from the topsoil, in line with the Soil Management Plan(s).

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		TJBs will be filled is also not provided. This information must be included in the ES.'	Further details on the dimensions and installation of the transition joint bays are provided in **paragraphs 3.7.172** to **3.7.177,** as well as **Table 3.14**. Following the installation of the transition joint bays and the backfilling of Cement Bound Sand (CBS) and soil, the excess excavated material would be re-used on site or transported to a registered and controlled recycling centre for re-use off-site. The duration of the Landfall works is presented in **Table 3.3** and **Plate 3.1**.
July 2024	Marine Management Organisation – Section 42 response	*'A clear division between the onshore and offshore elements of the proposed development is also required in the ES.'*	The ES presents the onshore assessments as Volume 2 and the offshore assessments as Volume 3. Chapters such as the Project Description (Volume 1, Chapter 3) where combined, are set out where relevant, with discrete onshore and offshore sections.
July 2024	Marine Management Organisation – Section 42 response	*'The MMO notes the intention to produce a detailed Cable Burial Risk Assessment ("CBRA"). The MMO supports this and will provide comments on this when available.'*	An Outline Cable Burial Risk Assessment is presented as Volume 1, Appendix 3.4 of this ES.
July 2024	Marine Management Organisation – Section 42 response	*'With regards to minimising the potential impacts of HDD activities, a tertiary mitigation measure provided within the PEIR is the use of bentonite to seal fractures and monitor pressure loss, to allow for the rapid identification of potential break outs. Impacts regarding punch out and loss of drilling fluids and cuttings have been minimised by the approach to the construction in that the boreholes are drilled to their full diameter prior to breakthrough to minimise the drilling fluid loss and lowering the flow rate of the fluid during the breakthrough. The impacts of this should be considered within the ES.'*	Thorough impact assessment of the HDD works and activities is contained in the ES, including e.g. Volume 3, Chapter 1: Benthic Ecology of the ES. An Outline Bentonite Breakout Plan (document reference 7.21) is included in the ES. A Bentonite Breakout Plan will be prepared by the HDD contractor based on the Outline Bentonite Breakout Plan.
July 2024	Marine Management Organisation – Section 42 response	*'The MMO notes that the potential risk of all chemicals used, that have a pathway to the marine environment from the construction, operation, maintenance and decommissioning of the proposed development should be considered and assessed within the ES.'*	There are no planned discharges of chemicals to the marine environment. The principal offshore water quality assessment is undertaken in Volume 3, Chapter 8: Physical Processes of the ES. Pollution prevention measures (minimising risk from accidental

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
			spillage for example) will be implemented by the final Offshore Construction Environmental Management Plan (an outline CEMP is presented as part of the application for DCO - document reference 7.9).
July 2024	Marine Management Organisation – Section 42 response	*'The pre-lay cable installation preparation methods (covered at paragraph 3.8.33 of the PEIR) state that there will be "clearance of debris and some local seabed features e.g., boulders and sand waves; and construction of crossing structures over existing in-service cables". However, the following paragraph states that "the preparations will not remove materials from the local area i.e. there will be no dredge arisings or similar. Any seabed preparations will be limited to immediate clearance/flattening only" (paragraph 3.8.34). Please note that the clearance of sand waves is considered as dredging within the 2009 Act5. As such, this activity should be referred to, and treated as, dredging within the ES.'*	Following detailed review of environmental survey data, the Outline Cable Burial Risk Assessment now confirms that there is no requirement for broadscale sandwave levelling. In other words there is no 'pre-sweeping' required in UK waters and all anticipated sandwaves are small enough to enable e.g. conventional jetting to bury below the non-mobile reference layer. Indicative burial methods figures (risk to relevant burial methods) are now provided in the ES (Volume 1 figures) and also in the context of benthic habitats (see figures in Volume 3, Chapter 1: Benthic Ecology of the ES). Noted regarding the definition of sandwave clearance as dredging within the 2009 Act.
July 2024	Natural England – Section 42 response	'*Coastal Erosion: Paragraph 4.8.5 (Volume 2 Chapter 4) states that the drill will pass beneath the SSSI cliffs and foreshore, and the HDD launch pit will be set well back from the coastal path inland with drills emerging at least 1000 m beyond Mean Low Water Springs. Natural England advises that it should be demonstrate through appropriate modelling that the launch pit is located sufficiently away from the coast to ensure that coastal erosion and sea level rise will not be an issue. Similarly, evidence should be presented to demonstrate that cable burial depth across the beach will be sufficient to ensure that cables will not be exposed through beach lowering over the lifetime of the project.*	The North Devon and Somerset Shoreline Management Plan (SMP2) gives an indication of predicted coastal erosion until 2110. The transition joint bays have been sited landward of the predicted extent of coastal erosion at Cornborough within the next 50 to 100 years. Therefore, the cable installation is not expected to be adversely affected over the course of its operational lifetime.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		If coastal erosion predictions, demonstrate that cable protection measures may be required over the lifetime of the project we advise that mitigations measures would be required. *It is important to note that whilst the rate of coastal erosion and cliff recession is currently low at the landfall location, any proposal in the longer term to introduce coastal protection for the landfall site that either damages or obscures the geology of the SSSI is unlikely to be acceptable. And my result in disruption to coastal processes resulting in further damage to the SSSI*.'	
July 2024	Natural England – Section 42 response	'*Frac-out: Natural England advises that a bentonite management plan is required, to not only demonstrate how drilling mud with be contained and disposed of, but also remedial actions should a frac-out occur during HDD. The management plan should not only consider bentonite reaching the sediment surface, but also potential contamination of groundwater*.'	An Outline Bentonite Breakout Plan (document reference 7.20) has been submitted with the DCO application, which outlines the procedures for managing and responding to the realise of bentonite, due to incidents such as frac-out.
July 2024	Natural England – Section 42 response	'*Drill arisings: Natural England seeks further clarity on disposal or otherwise of the rock arising from the HDD reaming process. There is currently no mention of what will happen to the sediment cores recovered in the landfall HDD methodology outlined in Points 3.7.152–3.7.156 (of Volume 1 Chapter 3). We advise further consideration is required of this*.'	An Outline On-CEMP (document reference 7.7, Appendix B) has been submitted with the DCO application, which includes estimated waste arisings and proposed methods of disposal.
July 2024	Historic England – Section 42 responses	'*We note that Volume 1, Chapter 3 Project Description (3.7.17) states that the structure and design of the converter station buildings, including the built form and external materials, will be developed alongside consultation and stakeholder feedback, and that a Design Code will be developed to support the application for development consent. We suggest that this should consider matters such as orientation, shape, height, roof lines, materials, colours and lighting (which is highlighted for inclusion at 3.7.38). We*	Consultation on the detailed design of the Converter Site which includes all matters such as landscaping, access, orientation, massing, rooflines, drainage, lighting etc will be a Requirement of the DCO.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		would also therefore welcome further engagement on design development for the Converter Site.'	
July 2024	Historic England – Section 42 responses	'*…(iii) design of the converter buildings including a Design Code to be secured as a requirement of the DCO. In relation to the latter, architectural design is mentioned, along with materials, colours and finishes. We request that this is expanded to specifically require consideration of how impacts can be mitigated through siting, orientation, shape, height, roof lines and sensitive lighting design. We note that according to the Project Description (Volume 1, Chapter 3) operational outdoor lighting at the Converter Site boundary would normally be restricted to motion-activated security lighting and will be secured through the Design Code*.'	Details on operational lighting are provided in **paragraphs 3.7.41** to **3.7.43** of this ES chapter. The Design Principles (document reference 7.4) forms part of the DCO application and provides the core principles to be followed during the detailed design stages. This includes landscape design principles, which aim to provide screening and soften the visual impact of the converter stations. Detailed design would be finalised post-consent and would require approval from the Local Planning Authority.
July 2024	Devon County Council – Section 42 responses	'*It is also noted that the Environmental Statement should include a description of the nature and quantity of materials and natural resources to be used. Paragraph 3.10.56, Volume 1, Chapter 3 Project Description of the PEIR states that:* *The Outline On-CEMP requires the contractor to identify the main types and quantities of materials required for the Proposed Development in order to assess potential for sourcing materials in an environmentally responsible way. The construction specification would place preference, when options are available, on the use of materials with a high recycled content*.'	The Outline On-CEMP (document reference 7.7, Appendix B) and Outline Greenhouse Gas Reduction Strategy (document reference 7.19) seek to minimise the use of virgin materials and embodied carbon of construction products.
July 2024	Torridge District Council – Section 42 responses	'*Paragraph 3.69 and Plate 3.1 (Indicative Construction Programme) identifies that the construction process for 'Bipole 1' is due to commence in 2027/2028 and 'Bipole 2' is due to commence in 2030/2031. The Programme sets out that the landfall compound and associated access will be 'de-mobilised with the removal of all construction equipment but will remain fenced and secured until the completion of Bipole 2, when further construction work is required at landfall'. Part of the Bipole route is located within the AONB/National Landscape and is also visible from the Coast Path. The*	The construction strategy for the cable connection from coast to the converter stations in Devon is for the groundworks and civil engineering to be completed in a single stage followed by pulling-through of cables. Whilst all onshore cables are installed in one stage, the route length from Morocco is such that the arrival of offshore cables for Bipole 2 will reflect both the offshore route length and later connection date offered by National Grid.

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		supporting documentation identifies a development lag between Bipole 1 and Bipole 2 of approximately two-three years. Such a development lag requires justification as it needs to be demonstrated why all the cabling (particularly the areas within/or in sight from the AONB/National Landscape) cannot be implemented concurrently. In addition, further detail is required about how the 'land' (referenced in 3.69) will be left and maintained within the intervening period.'	The Outline On-CEMP (document reference 7.7) includes details of how the visual appearance of construction compounds would be maintained to minimise visual impacts.
July 2024	Torridge District Council – Section 42 responses	'*Paragraph 3.7.16 and 3.7.17 notes the use of 'cut and fill' to provide a suitable topography Councils external landscape consultant and the developer regarding the design of the project, with landscape being a key factor during such conversations. It is difficult to assess the landscape aspects of the PEIR without detailed drawings, sections, montages etc. The Council understands that the project has been put forward with a 'maximum design approach' (Rochdale) however this has limited the opportunity to examine the project in a meaningful way. In addition, the PEIR notes the use of a 'design code'. The use of design coding has not been discussed with the Council ahead of the PEIR – and so remains a surprise admission. Notwithstanding this, the Council would strongly suggest that a design code would be of limited benefit, where the emphasis should be providing a detailed and finalised scheme which produces the least amount of landscape/character impact possible. for development and landscape*.'	A detailed landscape scheme must be tailored to the detailed design for the two converter stations. The design lead will be the appointed contractor. Since the contractors are not appointed prior to achieving development consent, it is necessary to reserve all matters such as landscaping, access, orientation, massing, rooflines, drainage, lighting etc. Consultation and approval of the detailed design of the Converter Site will be a Requirement of the DCO.
July 2024	Torridge District Council – Section 42 responses	'*Paragraph 3.7.95 provides a 'broad sequence' of events in the lead-up to cable construction. Sub-section (9) refers to the maintenance covers for access to 'joint bays' and 'link boxes' – but provides limited information as to the appearance of joint bays. Given the sensitivity to rural locations throughout the district, these should be recessed as much as possible to limit the adverse impact to surrounding character…* *…details of the joint bays and link boxes are not provided. The detail of these features needs to be plotted on the route*	Details regarding the joint bays and link boxes are provided within **paragraphs 3.7.129** to **3.7.135**. These structures would be situated below ground. The land above the joint bays would be fully reinstated. However, link boxes would include a ground level maintenance cover to allow for access during operation and maintenance. The appointed contractor(s) will be the design lead for the final alignment of cables and precise positioning of

Date	Consultee and Type of Response	Comment	How and Where Addressed in the ES
		so that the overall impact on both visual and practical use of the land can be evaluated.'	joint bays and link boxes. Since the contractors are not appointed prior to achieving development consent, it is necessary to use a parameters approach at this stage.
July 2024	Torridge District Council – Section 42 responses	'*There are a number of construction compounds plotted throughout the cable route. The vast majority of compounds will be in the Countryside and thus be prominent by their very nature. Therefore, care should be taken to limit the intrusion caused, particularly at landfall, as it would be visible from the Coast Path*.'	Where reasonably practicable, measures would be taken to contain and limit the visual intrusion of the onshore construction sites, including the temporary compounds. Where possible, the location and layout of the compounds (e.g., siting of welfare facilities) would be designed to avoid overlooking residential properties. Further details and measures to minimise visual impacts are provided in the Outline On-CEMP (document reference 7.7).

3.5 Proposed Development Parameters

3.5.1 The Order Limits (see Volume 1, Figure 1.1) represent the area within which all components of the Proposed Development would be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).

3.5.2 The Order Limits include the following areas:

- Onshore Infrastructure Area - comprising both temporary and permanent areas (landward of Mean High Water Springs) associated with the following:
  - Converter Site: where the two converter stations are proposed to be located, including temporary and permanent accesses, landscaping, drainage, and other works and utility diversions.
  - HVAC Cable Corridors: where the HVAC Cables are proposed to be located. These corridors would be situated within the boundaries of the Converter Site and existing Alverdiscott Substation Site.
  - Onshore HVDC Cable Corridor: where the onshore HVDC cables are proposed to be located to connect the converter stations to Landfall, including temporary construction compounds, temporary and permanent accesses, utility connections and drainage;
  - Highways improvements: improvements to the existing road network to facilitate access during construction and operation and maintenance, including road widening, and new or improved junctions.
- Abnormal Indivisible Load (AIL) route works – the proposed sections of the AIL routes for the transport of abnormal loads (e.g., transformers and cable drums) from Appledore to the Onshore HVDC Cable Corridor and Converter Site, which require minor works to the highway (e.g., removal of verges, bollards, etc.).
- Landfall – The temporary and permanent areas between MLWS and the transition joint bays.
- Offshore Cable Corridor – where the offshore HVDC Cables are proposed to be located in order to bring electricity from its generation source to the Landfall, which are located within the UK EEZ.

3.5.3 The location of the onshore and offshore infrastructure described above is presented within the Location, Order Limits and Grid Coordinates Plan (document reference 2.1) and Works Plans (document reference 2.3), which form part of the application for development consent. Key summary parameters are presented in **Table 3.2**.

Table 3.2: Key summary parameters for the Proposed Development

Parameter	Maximum Design Parameter
General Parameters	
Order Limits area (km^2)	206
Onshore Infrastructure	
Number of converter stations	2
Maximum height of the converter stations (AGL)	26
Maximum number of HVAC Cables	12
Maximum number of onshore HVDC Cables	4
Maximum number of onshore fibre optic cables	6
Maximum length of HVAC Cable Corridors (km)	1.2
Maximum length of Onshore HVDC Cable Corridor (km)	14.5
Offshore Infrastructure	
Maximum number of offshore HVDC Cables (within the UK EEZ)	4
Maximum number of offshore fibre optic cables (within the UK EEZ)	2
Maximum length of Offshore Cable Corridor (km)	370

Design Changes Since PEIR

3.5.4 As detailed within the Consultation Report (document reference 5.1), following statutory and non-statutory consultation, feedback was considered as part of the site selection and refinement process. As a result of stakeholder feedback and the ongoing refinement and design process, the following changes have been made to the Proposed Development since the publication of the PEIR.

Onshore Design Changes

3.5.5 Changes to the design of the onshore elements of the Proposed Development have included the following improvements that have resulted in an overall reduction in the Order Limits boundary:

- Converter Site:
  - Reduction of Order Limits boundary to reflect better understanding of likely extent of utility diversions.
  - Removal of the Alverdiscott Substation Connection Development, which will now be taken forward and developed by NGET (however, this is still considered cumulatively).
  - Optimisation of the Converter Site operational area to improve:
    - land use efficiency;
    - site access;
    - HVDC cable entry and HVAC cable exit;
    - cut and fill balance; and
    - landscape and habitat treatment.
- Onshore HVDC Cable Corridor

  - Removal of the trenchless crossing option at Littleham Wood. The Onshore HVDC Cable Corridor avoids this area of woodland.
  - Removal of the trenchless crossing option at the Converter Site.
  - Realignment of the trenchless crossings at West Ashridge and the River Torridge.
  - Avoidance of woodland west of East Langdon Farm.
- Construction Logistics and Abnormal Loads
  - Refinement of the expected extent of land affected by the Abnormal Indivisible Loads (AIL).
  - Refinement of the areas of public road subject to either temporary or permanent widening works.
  - Progression of site access designs.
  - Adaptation of cable construction logistics strategy to optimise the use of the A39 west compound.

Offshore Design Changes

3.5.6 There have been no changes to the offshore elements of the Proposed Development between PEIR and ES affecting the Order Limits. However, there have been a number of updates to assumptions used in the impact assessment derived from refinements in detail of construction methodology as follows:

- **Construction parameters:**
  - At PEIR stage the rate of trenching progress for cable burial was presented as ranging from c.50 to 400 m per hour. For ES stage this has been refined to approximately 150 m per hour.
- **Crossings:**
  - We have revised our assumptions on the number of Out of Service (OOS) cables requiring a constructed crossing. Of the 27 OOS cables that will be encountered, we have used a precautionary assessment (worst case) that 5 of these OOS cables will require crossings to be constructed rather than the cables being removed.
- **Dredging and sea bed preparation:**
  - At PEIR stage the potential for localised dredging and removal of dredge arisings was being considered at the HDD exit points (using e.g., Trailer Suction Hopper Dredging). These methods have been discounted prior to the ES assessment. The HDD exit pits will be temporarily cleared of superficial sediments (mainly sands), most likely using long-reach back-hoe from the jack-up barge(s). Following completion of the HDD and installation of the associated cable protection (concrete mattresses at the exit points) the cleared sediments will be refilled – via a combination of further back-hoe work and through natural infilling.
  - The PEIR assessment considered the potential for broadscale removal of mobile sediment features (e.g., sandwaves and large sand ripples) during preparatory seabed flattening, where these features could not be avoided through micro-routing within the offshore route corridor. For the ES assessment, following completion and review of the Cable Burial Risk

Assessment (CBRA) it is now confirmed that there are no known sandwaves or large sand ripples in UK waters that would require pre-sweeping/large-scale flattening. The scale of sandwaves and ripples is such that cable burial below mobile sediment layers is expected to be achieved during normal installation procedures i.e. using MFE and/or 'surface plough'/leveller only.

3.6 Programme

3.6.1 At this stage, the timing of construction activities set out within this ES is indicative.

3.6.2 Construction and commissioning of the Proposed Development would be timed to align with the available connection dates provided by National Energy System Operator (NESO) with the full commissioning (i.e., commercial operation) of Bipole 1 and Bipole 2 anticipated to be 2031 and 2033 respectively. For the purposes of assessment, it is anticipated that the earliest start date for the construction of the Proposed Development would be 2026.

3.6.3 Consistent with the build-out and commissioning of the generation and transmission infrastructure in Morocco together with the connection dates offered by NESO, the Proposed Development would be constructed in a single phase that allows for the staggered commissioning of the two bipoles. However, within the single construction phase, there will be a number of overlapping stages of construction starting and finishing at different times.

Scheduling of Works

Overview

3.6.4 The main construction activities associated with the Proposed Development would be preceded by preliminary activities, which are detailed in **paragraph 3.6.9**.

3.6.5 The Onshore HVDC Cable Corridor east of the River Torridge together with the establishment of the Converter Site require common access infrastructure and related road improvements (i.e., widening of Gammaton Road), which would form the first main construction activity.

3.6.6 Following this, the main construction works would be undertaken, including the Landfall works, construction and installation of Onshore HVDC Cable Corridor, establishment (e.g., cut and fill earthworks) and construction of the Converter Site, construction and installation of HVAC Cable Corridors, and construction of the Offshore Cable Corridor. These construction works also include landscaping, mitigation and restoration works.

3.6.7 Once the Converter Site has been established, the converter station infrastructure serving Bipole 1 would be commenced first reflecting the earlier connection date followed by Bipole 2 at a suitable stagger in the programme. This means that both converter stations would be built in overlapping periods, leading to their sequential commissioning. The construction work would be completed in a single phase and there would be no periods in the programme when construction work at the Converter Site ceases until both bipoles are commissioned.

3.6.8 The stages of the outline construction programme for the Proposed Development are briefly described below but would be confirmed during detailed design.

Preliminary Activities

3.6.9 The main construction activities associated with the Proposed Development would be preceded by preliminary activities and could comprise the following:

- archaeological investigations;
- early planting or landscaping works, where appropriate;
- ecological[1] and archaeological mitigation;
- environmental surveys and monitoring;
- site clearance (including vegetation clearance and site levelling)
- investigations for the purpose of assessing ground conditions such as:
  - pre-entry soil surveys; and
  - drainage surveys.
- erection of fencing and installation of temporary construction drainage;
- remedial work in respect of any contamination or other adverse ground conditions;
- the diversion of existing services and the laying of temporary services;
- the diversion or undergrounding of overhead cabling;
- site security works;
- establishing compounds and the erection of temporary hardstanding, buildings (e.g., welfare facilities), structures or enclosures;
- creation of site accesses;
- temporary display of site notices and site advertisements; and
- receipt and erection of construction plant and equipment.

Main Construction Works

3.6.10 The initial phase of construction works would be expected to commence in late-2026 and would continue through to 2031, and includes the following.

- Cut and fill groundworks for both converter station development platforms at the Converter Site inclusive of screening bund creation.
- Construction and completion of the Onshore HVDC Cable Corridor and Landfall for both bipoles including all mitigation and restoration works, except for the Landfall (see below).
- Laying of offshore cables serving Bipole 1 including pulling cables through to the transition joint bays and jointing.
- Following the construction of the Landfall and jointing of offshore cables for Bipole 1, the Landfall compound and associated access will be de-mobilised pending the arrival of offshore cables for Bipole 2. Demobilisation will comprise

[1] Including works requiring licenses or permits such as habitat removal and protected species exclusion subject to the grant of those licenses

the removal of all construction equipment and machinery but the compound and access will remain fenced and secured until the completion of Bipole 2 cable jointing.

- Construction and commissioning of the Bipole 1 converter station including the associated HVAC cable corridor, perimeter fencing, security and drainage network.
- Landscape works and Biodiversity Enhancement:
  - Planting of habitats in accordance with the Landscape and Ecological Management Plan (LEMP) to implement the mitigation and enhancement strategy.

Bipole 2 completion

3.6.11 Completion of Bipole 2 will continue at a convenient stagger to accommodate the later connection date offered by NESO and would include:

- construction and commissioning of the Bipole 2 converter station including the associated HVAC Cables, perimeter fencing and drainage network;
- laying of offshore cables serving Bipole 2 including pulling cables through to the transition joint bays and jointing;
- restoration of the Landfall compound and associated access; and
- restoration of all other compounds.

3.6.12 Commissioning of Bipole 2 expected to be in 2033.

3.6.13 Therefore, full operation of the Proposed Development is anticipated to occur in 2033, following the commissioning of Bipole 2.

3.6.14 Further details of the likely programme for the Proposed Development are provided in **Table 3.3** and **Plate 3.1**.

Table 3.3: Construction programme for key elements of the Proposed Development

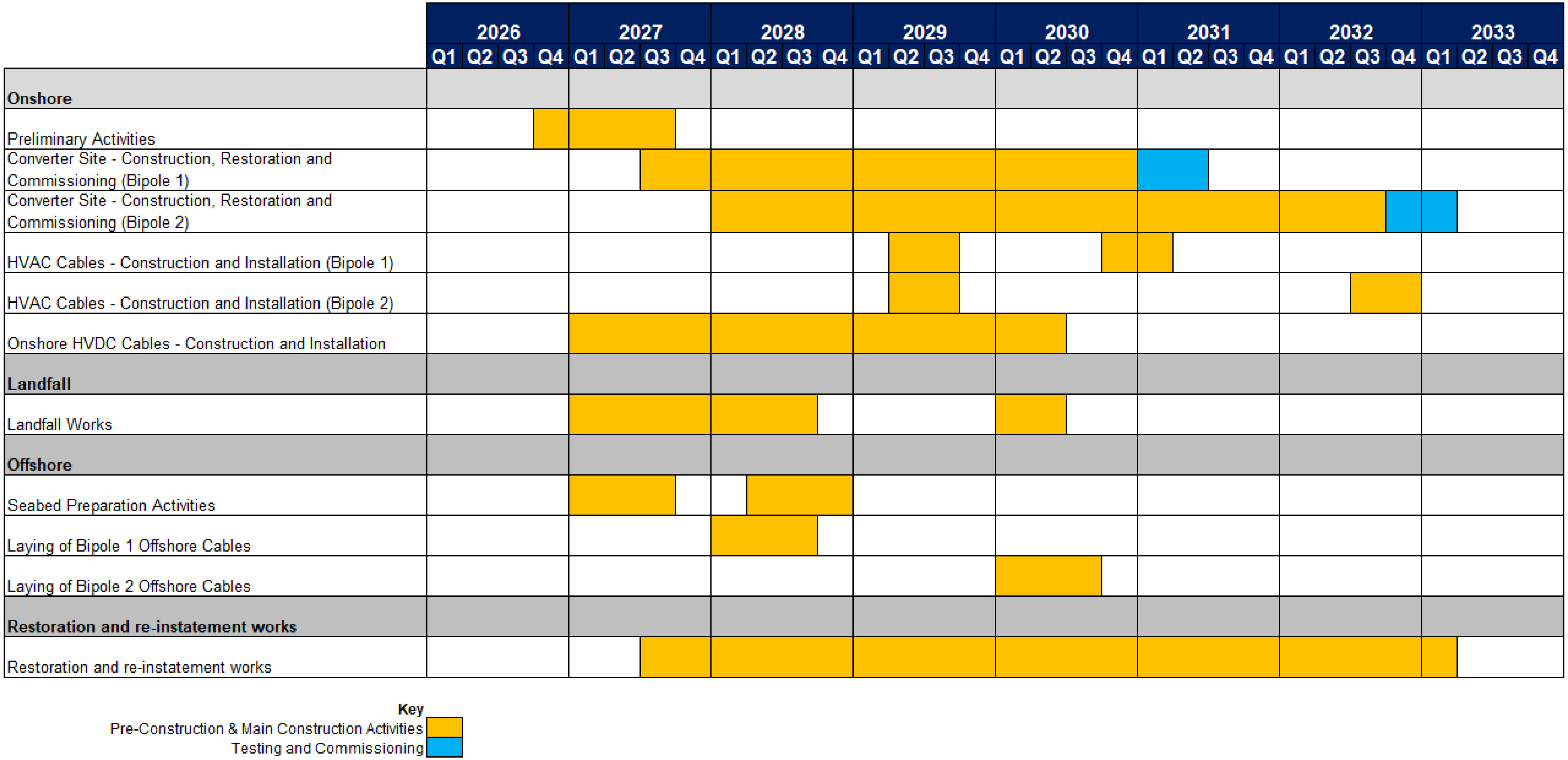
Key Element of the Proposed Development	Expected Duration (working time only) (months)
Converter Site	**72**
Enabling Works	6
Main Works	60
Testing & Commissioning	6
HVAC Cable Corridors	**12**[1]
Construction & Installation of HVAC Cables for Bipole 1	6
Construction & Installation of HVAC Cables for Bipole 2	6
Onshore HVDC Cable Corridor	**36**
Landfall	**24**[2]
Offshore Cable Corridor	**18**[3]

1. The construction and installation of the HVAC cables (per Bipole) would occur over two separate periods of 3 months with a space between these construction periods.

2. Construction works at the Landfall comprise an initial 18 months of works, with a space between the second phase of works. The second phase of works at the Landfall would continue for a further six months.

3. The installation of the Offshore Cable Corridor within the UK EEZ would take place over three separate periods of 6-months. There would be a space between these construction periods.

Plate 3.1: Indicative Construction Programme



3.6.15 Further detail and/or assumptions for the purposes of the presentation of environmental information is provided, where appropriate, in subsequent sections of this chapter.

3.7 Onshore Elements of the Proposed Development

Introduction

3.7.1 As set out in **paragraph 3.5.1**, the permanent onshore infrastructure for the Proposed Development includes the two converter stations, highway improvement works, and HVDC and HVAC Cables which provide connection to both the Landfall and national grid. Additionally, the Proposed Development would require the permanent diversion of existing utilities (i.e., 132 kV and 11 kV OHLs, water and gas assets). As part of the construction of the Proposed Development, temporary infrastructure (such as construction access roads and construction compounds) would also be required. This section sets out the design parameters and the proposed installation and construction methods assessed within this ES for each of these components.

3.7.2 The onshore infrastructure (i.e., converter stations and associated cables), together with temporary construction facilities (such as haul roads and construction compounds), would be located within the Onshore Infrastructure Area shown on Figure 3.1 (See Volume 1, Figures).

3.7.3 The location and siting of the onshore elements of the Proposed Development described in this section have been informed by a site selection and route refinement process, which is set out within Volume 1, Chapter 4: Need and Alternatives, of the ES. This process has considered a wide range of environmental constraints as well as technical and commercial factors.

Converter Site

3.7.4 The proposed converter stations would convert the current of the electricity supplied through the onshore HVDC Cables from DC to AC, to allow a connection to the national grid.

Location

3.7.5 The proposed Converter Site is located to the west and northwest of the Alverdiscott Substation and approximately 2.5 km to the east of East-the-Water. The site would include two converter stations, referred to as Bipole 1 and Bipole 2. Bipole 1 is proposed to be located on the east side of Converter Site, and Bipole 2 is proposed to be sited on the west. The Converter Site centre point grid reference is approximately SS 49760 25350 (See Volume 1, Figure 3.3: Converter Site Location Plan, of the ES).

3.7.6 The total area for the proposed Converter Site including associated access, landscaping and drainage occupies approximately 39.5 ha (395,000 m^2). Land required to construct the Converter Site lies within the same area. The proposed converter stations would be connected to the national grid by HVAC Cables.

3.7.7 The Converter Site is not located within any statutory or non-statutory designation for landscape, ecology or historic environment. The North Devon National Landscape is located approximately 7.3 km to the west at its closest point.

3.7.8 The closest residential properties to the proposed Converter Site are:

- properties at Webbery Farm, which is located approximately 200 m north;
- properties at Higher Kingdon, located approximately 300 m to the west;
- Moorland Cottage, situated approximately 400 m south west;
- The Webbery Manor Estate, situated approximately 500 m north east;
- residential properties at Woodtown, situated approximately 500 m west;
- Rice Mill Cottage, which is located approximately 520 m north east;
- residential properties at Lower Kingdon, which are situated approximately 600 m south; and
- residential properties at Gammaton Moor, approximately 600 m south west.

3.7.9 Land within the Converter Site consists of improved grassland, which is bordered by hedgerows across all boundaries, with two patches of woodland on the south east boundary. The land within the Converter Site also includes permitted solar farm development, which is under construction at the time of writing. The permitted solar farm relates to the planning application 1/1057/2021/FULM and known as Gammaton Moor Solar Farm, which includes a 36 MW solar farm that occupies 63.2 ha of land, 6 ha of which falls within the Proposed Development. Further details are provided within **paragraph 3.7.45**.

3.7.10 It can be noted that existing OHLs, as well as gas and water utilities, pass through the Converter Site. It is anticipated that these OHLs and utilities (gas and water) would have to be re-positioned ahead of main construction works.

3.7.11 Ordnance Survey maps indicate that there are two watercourses located on the east and south east boundary of the Converter Site, which both flow eastwards and connect to an unnamed ordinary watercourse. This watercourse flows in a southerly direction, towards the River Torridge, which is a designated Environment Agency (EA) main river approximately 2.1 km southwest from the Converter Site.

3.7.12 The proposed Converter Site is wholly situated within an area designated as Flood Zone 1, which is an area of low probability of fluvial flooding (less than 1 in 1,000 annual probability). The EAs surface water flood map identifies that the site is wholly located in an area of 'very low risk' of surface water flooding (a chance of less than 0.1%).

3.7.13 The surrounding landscape is predominantly agricultural land, with intermittent trees and areas of deciduous woodland. Within the immediate vicinity, there is the Alverdiscott Substation, Cleave Park Solar Farm, and the permitted / under construction solar farm known as Gammaton Moor Solar Farm. There is no ancient woodland within close proximity to the Converter Site, the closest areas of ancient woodland are as follows:

- Stone Woods (Ancient & Semi-Natural Woodland), which is situated approximately 1.4 km north west;
- Thornpark Copse (Ancient Replanted Woodland), which is located approximately 1.4 km to the south;

- Gustcot Wood consists of both Ancient & Semi-Natural Woodland and Ancient Replanted Woodland, which is approximately 1.6 km south;
- Garnacott Wood (Ancient & Semi-Natural Woodland), which is situated approximately 1.8 km west; and
- Pixey Copse (Ancient & Semi-Natural Woodland), which is located approximately 1.6 km south west.

3.7.14 The closest Scheduled Monuments are an Iron Age enclosure and a Roman marching camp, which are located approximately 160 m west of the Converter Site. Additionally, the Converter Site boundary lies approximately 210 m from the closest listed building at Webbery Barton to the north, which is a Grade II Listed Building.

3.7.15 The topography of the proposed converter site ranges between approximately 140 m Above Ordnance Datum (AOD) in the west to approximately 121 m AOD in the east.

Access

3.7.16 An Outline Construction Traffic Management Plan (CTMP) (document reference 7.12) will be prepared and submitted with the DCO application. This plan will be developed through consultation and stakeholder engagement. A CTMP will be developed in accordance with the Outline CTMP and will include necessary traffic management measures to be adhered to during the construction phase of the Proposed Development.

3.7.17 It is anticipated that construction access to the Converter Site would be routed from the A39, which connects to Barnstaple Street and then Manteo Way. Construction traffic would follow Manteo Way, through East-the-Water to Gammaton Road and connect to the main construction compound between Tennacott Lane and Gammaton Road. From the compound, construction traffic would utilise an off-road haul road that would run adjacent to Gammaton Road and to the minor road leading north from Gammaton Cross towards the Converter Site. This would remove the majority of construction traffic from Gammaton Road/Gammaton Cross.

3.7.18 Some construction traffic would utilise this road during the initial site setup and enabling works, however, following this phase and the development of the haul road, the majority of construction vehicles would be routed along the haul road. This will be detailed within the final CTMP.

3.7.19 The temporary construction access would include the provision of a new access road from the minor road running north south between Gammaton Crossroads and Webbery Barton. The access road would be developed from an existing solar farm access, approximately 350 m to the south of the existing Alverdiscott Substation entrance, and would allow for the two-way movement of Abnormal Indivisible Load (AIL) and Heavy Goods Vehicles (HGV) deliveries to the site.

3.7.20 This access will be retained post-construction as an operational access for the converter stations. Access gates and a control access building would be in place to control access to the Converter Site. Further details on site security is provided within **paragraphs 3.7.29** to **3.7.31**.

3.7.21 Furthermore, internal service roads would be included within the Converter Site, which would have an anticipated maximum width of 11.5 m.

3.7.22 There would be access for traffic required during normal operation, as the proposed converter stations would be operated 24/7 by staff on-site through shifts. The permanent access arrangements for the operation of the Converter Site are detailed within Volume 1, Figure 3.4, of the ES. The Converter Site is anticipated to provide approximately 30 full time-equivalent (FTE) jobs, with up to 15 staff on-site at any one time in the day, reducing to approximately five overnight.

Design

3.7.23 The Converter Site would include two separate converter stations (Bipole 1 and Bipole 2), a main car park, a spare parts building, and a control access building, as well as a temporary construction laydown area during construction (see Volume 1, Figure 3.3: Converter Site Location Plan, of the ES). The proposed purpose-built converter stations will contain the electrical equipment required to convert the transmitted electricity from DC to AC, prior to the connection with the national grid. Each converter station would typically comprise the following:

- control building;
- harmonic filter;
- AC switch yard;
- transformers;
- valve hall and reactor building; and
- DC switch yard.

3.7.24 The design of the proposed Converter Site would require cut and fill earthworks to provide a suitable development platform surrounded by substantial landscape screening. It would create level construction platforms in which each of the converter stations would sit, as well as the creation of bunds to reduce the visual impact of the converter stations from external views. Further information on the cut and fill earthworks is provided within **paragraph 3.7.55**.

3.7.25 The structure and design of the converter station buildings, including the built form and external materials, will be developed alongside consultation and stakeholder feedback. Design principles have been developed as part of the application for development consent (document reference 7.4).

3.7.26 The converter stations would be connected to the national grid via underground HVAC Cables at an anticipated Alverdiscott Substation Connection Development. It is currently anticipated that the required works to develop the Alverdiscott Substation Connection Development would be brought forward and developed by NGET. This ES considers the likely cumulative effects that might arise as a consequence of the expanded substation. Further information regarding the grid connection development project is considered within **paragraph 3.7.46**.

3.7.27 The construction of the converter stations and associated landscaping would also require the alteration of the existing Alverdiscott Substation access road, which provides access to the National Grid site. An indicative layout of the Converter Site is provided in the parameters plan as part of the DCO application (document reference 2.6).

3.7.28 The parameters for the Converter Site are provided in **Table 3.4**, which presents the PDE. The parameters have been established through the consideration of other converter stations.

Table 3.4: Converter Site parameters

Parameter	Maximum Design Parameter
Number of converter stations	2
Height of converter buildings above ground floor level* (excluding lightning protection, aerials, etc.) (m)	26
Combined footprint of converter station platforms (m^2)	130,000
Height of lightning protection above ground floor level* (m)	30
Permanent footprint of converter site (combined) (m^2), including converter station buildings, landscape bunding, planting and drainage.	395,000

*The ground floor level would be a maximum of 127 m Above Ordnance Datum (AOD).

Site Security

3.7.29 The detailed design of the Converter Site would consider guidance and requirements to ensure security of critical national infrastructure, including:

- 'Securing critical national infrastructure: an introduction to UK capability' (UK Defence and Security Exports and Department for Business and Trade, 2023); and
- guidance set out by the National Protective Security Authority (NPSA, 2024).

3.7.30 The Converter Site perimeter would be securely fenced and monitored with security cameras and lighting. The security fencing would have a height of up to 4 m. Additionally, both converter stations would be separated via a second layer of security fencing as complete electrical separation of each bipole would be required.

3.7.31 Operational access for the Converter Site will be via the site access control building to ensure site security.

Fire Safety

3.7.32 The design of the converter station and associated accesses will comply with all relevant statutory requirements including building regulations, building control requirements and fire safety in consultation with the fire authority.

3.7.33 The design will be developed to optimise access to fire dampers, balancing dampers, actuators, sensors and other active components for both planned and emergency access.

3.7.34 Protected areas of the external facade would provide a minimum of 60 minutes fire resisting construction. External walls adjacent to the transformers will provide 240 minute fire resisting construction.

3.7.35 Private fire main infrastructure, with all necessary central tank, pumphouse and site fire hydrant requirements would be provided and fire alarm systems will be designed in accordance with BS 5839.

Landscape and Ecological Planting

3.7.36 An Outline Landscape and Ecology Management Plan (LEMP) accompanies the application for development consent (document reference 7.10). The Outline LEMP includes an illustrative landscape strategy plan that identifies areas of landscape mitigation planting at the Converter Site, as well as along the Onshore HVDC Cable Corridor and road verges. A LEMP will be prepared post consent (as secured in the DCO) and will be agreed with the relevant authorities. This will include details such as the number, location and species of plants, as well as details for their management and maintenance.

3.7.37 Where practical, landscape mitigation planting will be established as early as reasonably practicable in the construction phase.

3.7.38 Additional infill planting would be implemented as necessary to enhance the boundary planting and increase biodiversity. Biodiversity would be targeted through hedgerow enhancement, boundary planting, woodland planting and creating species-rich grassland, which would have a considerably greater biodiversity value than the existing agricultural landscape. Further details are included within Volume 2, Chapter 1: Onshore Ecology and Nature Conservation of the ES and Volume 4, Chapter 2: Landscape, Seascape and Visual Resources of the ES.

Foul Drainage

3.7.39 Foul drainage will be collected in one of the following ways:

- mains connection discharge to a local authority sewer system, if available; or
- septic tank located within the Converter Site boundary.

3.7.40 The preferred method for controlling foul waste will be determined during detailed design and will depend on the availability and cost of a mains connection and the number of visiting hours staff will attend site.

Operational Lighting

3.7.41 Operational lighting at the Converter Site would be designed in accordance with the Design Principles (document reference 7.4), as well as the latest guidance and legislation. Relevant guidance includes the Institute of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light. The design requirements would include measures to ensure safety during operation, whilst minimising impacts on the surrounding landscape.

3.7.42 The details of the location, height, design and luminance of lighting to be used would be provided as part of the detailed design and would be consulted on and approved by Torridge District Council.

3.7.43 The operational lighting would be designed to avoid illumination of areas beyond the operational site. This would include directional lighting to minimise overspill into the surrounding landscape. Operational outdoor lighting at the Converter Site boundary would normally be restricted to motion-activated security lighting.

Utility Diversions

3.7.44 No new OHLs would be required; however, some local diversion and re-connection of existing OHLs may be required. This includes potential diversions and/or undergrounding of existing 132 kV and 11 kV OHLs. In addition, localised diversion of water and gas mains may be required. Discussions with statutory undertakers regarding the potential route options of the OHLs are ongoing. The existing utilities that would require diversion or undergrounding are presented within Volume 1, Figure 3.4: Utilities Diversion Plan, of the ES.

Solar Panels (removal of)

3.7.45 Part of the permitted/under construction solar farm known as Gammaton Moor Solar Farm is situated within the Order Limits. The construction of the Converter Site and part of the Onshore HVDC Cable Corridor would require the removal of approximately 6 ha of solar panels, which would result in the loss of approximately 2.5 MW of installed capacity for the solar farm.

Grid Connection

3.7.46 The Applicant has a Connection Agreement with NESO for connection of 3.6 GW into Alverdiscott Substation in two phases of 1.8 GW each. Each bipole will be connected to newly constructed substation infrastructure via buried HVAC cables (6 per bipole). The Applicant will construct the HVAC Cable Corridor into new connection bays to be constructed by NGET, the precise location of which is currently unknown. The parameters of the HVAC Cable Corridor are provided above.

3.7.47 The development required referred to as the 'Alverdiscott Substation Connection Development, is envisaged to include development of a new 400 kV substation, and other extension/modification works to be confirmed by NGET. However, it should be noted that the Alverdiscott Substation Connection Development will be brought forward by NGET and at present scant information exists about the details of their development. It has been necessary therefore to make assumptions about that development for this ES.

3.7.48 It is anticipated that NGET would utilise the existing land holding to build the 400kV substation to accommodate the connection to the transmission network. It should be noted that that Alverdiscott Substation is both a transmission and distribution facility and therefore in effect has two operators NGET and NGED. It is currently assumed that the 132 kV portion of the existing Alverdiscott Substation will remain unchanged.

3.7.49 In the absence of a confirmed design for the grid connection infrastructure from NGET, the cumulative assessment will assume a combination of reasonable worst case parameters. For example, Air Insulated Switchgear will require a larger footprint to Gas Insulated Switchgear whereas a Gas Insulated Switchgear building of up to 15 m in height is not required for an Air Insulated Switchgear substation.

3.7.50 We have assumed that the maximum development area for the Alverdiscott Substation Connection Development could 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. It should also be noted that the existing 400 kV side of the substation is approximately 1 ha and would be incorporated into the above totals.

Construction

3.7.51 An overview of the key preliminary and main construction activities associated with the development of the Converter Site is provided in **Table 3.5**, which sets out the maximum design parameters for the construction of the converter stations.

Table 3.5: Converter Site – construction parameters

Parameter	Maximum Design Parameter
Construction compound (Gammaton Road) area (m^2)	63,000
Converter construction compound (m^2)	20,000
Maximum area of the Converter Site (m^2)	395,000
Total Duration of Works at the Converter Site (months)	72*

*Works at the Converter Site can be broken down into 6 months for enabling works, 60 months for main works, and 6 months for testing and commissioning)

Preliminary Activities

3.7.52 Prior to the commencement of the onshore construction works, a number of preliminary activities would be required, which are listed in **paragraph 3.6.9** of this ES chapter. This may also include surveys and studies required to inform the final detailed design, outlined below:

- topographic surveys;
- ecological surveys to update EIA findings if required and to inform any protected species mitigation licence(s) that may be required;
- ground investigations (e.g., geotechnical and ground stability surveys);
- soil surveys;
- drainage surveys; and
- targeted archaeological excavations as may be required to confirm the findings of the EIA process. An onshore Written Scheme of Investigation (WSI) would be developed prior to construction, which would detail the surveys and archaeological mitigation requirements during construction.

Converter Site Construction Compounds

3.7.53 Temporary construction compounds would be established to support the construction of the converter stations, which includes the following.

- Main Construction Compound - proposed to be located between Gammaton Road and Tennacott Lane, south of East-the-Water. The compound would include park and ride facilities for contractors working at the Converter Site which would take a number of vehicles off local lanes.
- Converter Site compound – proposed to be situated within the Converter Site, which would include welfare facilities, soil and material storage, and storage of plant and equipment.

3.7.54 The establishment of the construction compounds will follow the process set out in the On-CEMP(s). An Outline On-CEMP is included in the DCO application (document reference 7.7). In summary, topsoil will be stripped and stored, and areas of hardstanding will be formed. Security fencing and lighting will be required at the compounds; task specific lighting may also be required during working hours in the winter months.

Earthworks

3.7.55 To establish the site on which the converter stations would be built, the existing ground surface would be modified by removing (cutting) bulk materials from some areas and building (filling) slopes in others. This 'cut and fill' operation would follow utility diversions and removal of solar panels and it will be the precursor to construction of the converter stations which need a level platform for the formation of the building foundations. The ground levels, upon which the converter stations are to be built, would be reduced from its current level by the cut and fill works with bunds built up around the perimeter. An indicative cut/fill design has been undertaken for both converter station platforms to inform the environmental impact assessment; see the Design Approach Document for further details (document reference 7.3). The final design for the Converter Site inclusive of the earth modelling and associated landscaping scheme will be the subject of consultation and approval by the LPA at the detailed design stage.

3.7.56 In addition to providing a level construction platform upon which each converter station will sit, the bunding will provide visual and noise screening. This would reduce visual and noise impacts associated with the operation of the converter stations. Over time, the planting scheme will increase the level of visual screening offered. An indicative Landscape Strategy Plan is provided as part of the Outline Landscape and Ecology Management Plan (document reference 7.10), which details the landscaping and planting plans at the Converter Site.

3.7.57 The entire area would be stripped of all topsoil and subsoil where required (including any vegetation and loose rocks where necessary). Where waste and excess material is encountered, it would be removed if it is unsuitable for reuse. Once the surface has been cleared, the 'cut and fill' operation would begin. Soil would be stored and managed in accordance with the Construction Code of Practice for Sustainable Use of Soils on Construction Sites (Department for the Environment, Food and Rural Affairs (Defra), 2009) or the latest relevant available government guidance. Any suspected or confirmed contaminated soils will be appropriately separated, contained and tested before removal, if required. Further information is contained in the Outline Soil Management Plan (document reference 7.7, Appendix E).

3.7.58 Excavated material would be utilised where possible, provided the grade and composition is suitable, within the Converter Site for landscaping (i.e., creating mitigation bunds which would reduce the visibility of the converter stations). Where there is excess material, it is anticipated that this material would be converted into products of acceptable quality for use across the Proposed Development (e.g., haul roads and compounds), where feasible. If this is not feasible, or if there is further excess following the development of haul roads and compounds, the remainder would be appropriately transported (with appropriate approvals/ permits) to locations in which it can be either re-used or disposed of at a licensed disposal site. The environmental effects associated with the re-use or disposal of excess excavated material is assessed within the relevant chapters of the ES.

3.7.59 The methodology for earthworks would be set out in the final On-CEMP(s). An Outline On-CEMP is included in the DCO application (see document reference 7.7).

Surface Water Drainage

Temporary Drainage

- Onshore HVDC Cable Corridor**:** Temporary drainage will be installed during the initial mobilisation stage (preliminary activities) to ensure that exposed soils/subsoils are not able to cause turbid runoff to nearby aquatic receptors. Cut-off drains, silt fences, settling ponds and soakaways will be installed where required as soon as access to the land is permitted and prior to fencing and soil stripping.
- Compounds**:** As above, installation of temporary drainage is a precursor to soil stripping and fencing. Where required temporary utility connections such as foul drainage will be installed and where not possible other arrangements for foul drainage will be made prior to the occupation of the compounds. Where impermeable surfaces are used in compounds/accesses/haul roads, suitable surface water drainage conveyance and attenuation will be installed. If possible, runoff will be directed to constructed soakaways and/or harvested for other uses during construction.
- Converter site**:** Prior to the commencement of cut and fill operations, existing field drains will be diverted where intercepted; cut off ditches/drains will be provided to intercept field surface runoff where required.
- Dewatering**:** Where dewatering of excavations is required, suitable settlement provisions will be installed. Water quality (turbidity) will be monitored prior to discharge at a controlled rate to suitable soakaways or existing watercourses/drains. Where excavations at the Converter Site result in a re-profiling of the water table, rates of discharge will be agreed in advance with the Lead Local Flood Authority (LLFA) and the Environment Agency (EA).

3.7.60 The design of the temporary drainage measures and agreed rates and locations of discharge will be set out in the relevant section of the On-CEMP and agreed with the relevant authorities prior to construction.

3.7.61 The key principles are set out in the Outline On-CEMP (document reference 7.7).

Operational Drainage

3.7.62 During the operation and maintenance phase of the Proposed Development, the drainage within the Converter Site would be managed in accordance with the Operational Drainage Strategy that will be agreed with the local authority (as secured within the DCO).

3.7.63 The Outline Drainage Strategy (document reference 7.22) includes measures to ensure that existing discharge rates are maintained. This will include measures to limit discharge rates and attenuate flows to maintain greenfield runoff rates at the converter stations. It will also include measures to control surface water runoff, including measures to prevent flooding of the working areas or surrounding areas and to ensure any runoff is treated appropriately. The operational drainage strategy will be developed in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority (LLFA).

3.7.64 Details ensuring appropriate drainage systems are utilised during the construction of the Proposed Development as well as effective drainage strategies for temporary construction compounds will be included within the On-CEMP(s) prior to the commencement of construction.

Construction Lighting

3.7.65 Construction site lighting would only operate when required and would be designed, positioned and directed to avoid unnecessary illumination of adjacent properties, sensitive ecological receptors and users of public footpaths. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be detailed within the On-CEMP(s). The design of the construction site lighting will accord with the details provided in the Outline On-CEMP. Where necessary, light shield guards would be used to prevent light spill.

Highways Improvements and Site Access

3.7.66 The access strategy for the Proposed Development comprises both temporary and permanent alterations to roads. During construction, traffic would be routed to one of five main temporary compounds accessed directly from the highway each of which will require new or improved junctions. Compound junctions have been designed to accommodate access for regular construction HGVs as well as AILs.

3.7.67 Arrivals at compounds will be directed along off-road haul routes to the work site thereby relieving construction traffic from Devon lanes. This also applies to the Converter Site where arrivals at the Gammaton Road compound (see below) will be directed to a smaller compound at the Converter Site via an off-road route.

3.7.68 The Converter Site also requires a permanent access which will be subject to detailed design. The access road will be designed permit two-way movement of HGV deliveries to the site. This access will be retained post-construction as an operational access for the converter stations, with access gates and a control access building in place to control access to the Converter Site. During operation, contingency is required for the possible replacement of large components delivered as AILs such as a transformer. Therefore, both the Converter Site access junction and the roads approaching it from the south will be designed to facilitate this.

3.7.69 The following improvements are proposed on both the public highway and on private land as part of the Proposed Development, noting that the improvements are subject to further detailed design. As such all potential improvements are included below and may be refined through detailed design.

- Cornborough Sewage Treatment Works access road: expanded junction and widened private track to provide access to the onshore HVDC Cable Corridor north of Kenwith Stream HDD and the Landfall HDD compound.
- A39 West: A compound access will be created off the unnamed road to Abbotsham approximately 120 m west of the A39 Abbotsham Cross roundabout. This access will be used as the main logistics base for the onshore HVDC Cable Corridor as well as the HDD under the A39 and the haul road leading to the south side of Kenwith Stream HDD.

- A39 East: A site access will be created on the unnamed road towards Littleham approximately 165 m south of Clovelly Road[2]. This access will be used for all HVDC works west of West Ashridge HDD.
- A386: this includes the improvement of an existing junction along the A386 with an unnamed road towards Littleham to provide access to the River Torridge horizontal directional drilling (HDD) compound and the haul road along the onshore HVDC cable route between the River Torridge and West Ashridge HDDs.
- Gammaton Road Compound: a new access will be created approximately 70 m east of Tennacott Lane. Gammaton Road compound will be used to serve the Converter Site as well as HVDC cable construction east of the River Torridge HDD.
- Road improvement works at Gammaton Moor, including the following.
  - Temporary symmetrical widening of Gammaton Road (south side) between Manteo Way and the Gammaton Road compound access enable full two-way movement of construction vehicles.
  - Permanent widening pinch points along Gammaton Road in selective locations (south side only) to facilitate the movement of AILs during operation.
  - Reserved rights to install a temporary junction west of Gammaton Moor Crossroads and a section of private temporary track connecting Gammaton Road with the unnamed road to the Converter Site. The private track would only be used by AILs destined for the Converter Site and as such will be gated and locked during use. The land would be fully restored after use.
  - Permanent asymmetric widening of the unnamed road north of Gammaton Crossroads towards the Converter Site access to enable full two-way running during operation.
- Temporary alterations to the highway verge and street furniture to allow the passage of AILs as follows.
  - Transformer AIL route: between Appledore Newquay Dock and the Gammaton Road compound including oversail of private land on Hubbastone Road and Wooda Road and removal of street furniture on the A386 Churchill Road and Manteo Way.
  - Cable drum AIL[3] routes.
    - Route 1 towards the Cornborough STW access point.
    - Route 2 towards the A39 West compound.
    - Route 2a towards the A39 East compound.
    - Route 3 towards the A386 compound.
    - Route 4 towards the Gammaton Road compound.

[2] Please note that two alternatives (existing and future baseline) have been proposed for this access because a new housing development on the east side of the road may have been completed before Xlinks' construction programme begins.

[3] Cable drum AIL routes will also be used for other loads that may comprise AILs which are smaller than the cable drum transports such as drill rigs, mobile cranes or other large construction plant.

3.7.70 The proposed improvements to the local highway network have been considered within the EIA process and associated AIL movements have been assessed in Volume 2, Chapter 5: Traffic and Transport of the ES, in accordance with established methodology and in consultation with relevant stakeholders.

3.7.71 The proposed surface access improvements are presented in Volume 1, Figure 3.5: Highways Improvements.

HVDC Cable Corridor

Cable Corridor Location

3.7.72 The onshore HVDC Cables would provide a cable connection between the transition joint bays, at the Landfall, and the proposed converter stations. An Onshore HVDC Cable Corridor has been identified, within which the HVDC Cables are proposed to be located, as shown on Figure 3.1 (see Volume 1, Figures).

3.7.73 A single Onshore HVDC Cable Corridor is anticipated for the Proposed Development, which would include the installation of the HVDC Cables in cable circuits (with each circuit typically comprising two power cables and up to three fibre optic cables).

3.7.74 The Onshore HVDC Cable Corridor stretches for approximately 14.5 km and has been divided into seven zones, dictated by existing engineering restrictions (including major roads, rivers, etc.), running from the Landfall to the Converter Site. This is summarised below and accompanied by Figure 3.1: Onshore Infrastructure Area (see Volume 1, Figures).

Zone 1 – Landfall to Kenwith Stream

3.7.75 The initial section of the Onshore HVDC Cable Corridor is routed from the transition joint bays at the Landfall at Cornborough Range. It runs east towards the south of the Cornborough Sewage Treatment Works where it then diverts south towards Rickard's Down and Kenwith Stream.

3.7.76 The Onshore HVDC Cable Corridor would require an HDD to cross Kenwith Stream, which is situated just south of Rickard's Down, flowing from south-west to north-east, towards the River Torridge.

3.7.77 An access road would be created to the east of Cornborough Sewage Treatment Works which would enable vehicle access to the Onshore HVDC Cable Corridor and site from the B3236.

Zone 2 – Kenwith Stream to A39

3.7.78 Following the HDD at Kenwith Stream, the Onshore HVDC Cable Corridor continues south, passing to the east of Chapter House and west of Abbotsham. Minor roads in this zone will be crossed using open trench techniques utilising a temporary road closure with road plates that can be put in place to facilitate access as required.

3.7.79 The Onshore HVDC Cable Corridor continues south towards the A39, where HDD techniques will be required to cross beneath the major road at a section approximately 250 m south west from the Abbotsham Cross roundabout. The A39 construction compound would be located just north of the Abbotsham Cross roundabout, and would be utilised as a general compound. There would also be two HDD compounds to the immediate north and south of the A39, to allow for trenchless installation of the HVDC cables.

Zone 3 – A39 to Littleham Cross

3.7.80 Following this trenchless crossing at the A39, the Onshore HVDC Cable Corridor continues from the HDD compound (south of the A39) in a south/south east direction.

3.7.81 The Onshore HVDC Cable Corridor then passes to the north of Moorhead and continues south east towards Winscott Barton, where the use of HDD (or other trenchless techniques) could be required to past beneath suspected archaeological assets. The potential effects on archaeological assets are considered within Volume 2, Chapter 2: Historic Environment, of the ES.

3.7.82 The Onshore HVDC Cable Corridor then routes towards Littleham Cross.

Zone 4 – Littleham Cross to West Ashridge

3.7.83 Littleham Wood is situated to the west of Robin Hill Farm and to the east of Buckland Road. At this location, the Onshore HVDC Cable Corridor is routed to the south of Littleham Wood before continuing east. The Onshore HVDC Cable Corridor passes between Robin Hill Farm and Littleham, passes to the south of Dunn Farm and continues east.

3.7.84 Another HDD would be required to pass a small stream with wooded banks, 290 m south of Jennetts reservoir and to the west of West Ashridge, which feeds into Jennetts reservoir. Once again, HDD compounds would be situated on either side of the HDD corridor.

Zone 5 – West Ashridge to River Torridge

3.7.85 Following the trenchless crossing at West Ashridge, the Onshore HVDC Cable Corridor passes to the south of Ashridge Cottage and to the west of Hallsannery Farmhouse before arriving at the HDD compound to the west of the River Torridge and A386.

3.7.86 The Onshore HVDC Cable Corridor would cross under the River Torridge via HDD (or other trenchless techniques). The entry and exit pits of the trenchless crossing would be situated on farmland on the either side of the River Torridge. The Onshore HVDC Cable Corridor would be directed beneath the A386, River Torridge and Tarka Trail, before emerging to the east of the river.

3.7.87 This section of the Onshore HVDC Cable Corridor would avoid the Hallsannery County Wildlife Site, the Kynoch's Foreshore Local Nature Reserve and Lodge Plantation woodland. There would be no surface works affecting the Tarka Trail and the HDD ducts would be located at a significant depth below the river bed (minimum depth of 15 m), thus reducing the potential risk of harm to protected species and habitats.

Zone 6 – River Torridge to Gammaton Moor

3.7.88 The HVDC Cables would emerge at the HDD compound on the east side of the River Torridge. The Onshore HVDC Cable Corridor then continues east, passing north of April Cottage (also known as Tennacott Lodge) and Tennacott Farm and crossing Tennacott Lane.

3.7.89 The Onshore HVDC Cable Corridor would continue in a south east direction along Gammaton Road, passing on the south and west side of Woodville Farm, until it reaches Gammaton Moor.

3.7.90 The main construction compound would be created on the eastern side of Tennacott Lane, on a triangular area of land to the south of Gammaton Road and Bideford Business Park. This construction compound would include park and ride facilities for contractors working at both the Converter Site and the Onshore HVDC Cable Corridor, which would take a number of vehicles off local lanes.

Zone 7 – Gammaton Moor to Converter Site

3.7.91 At this section of the Onshore HVDC Cable Corridor, the HVDC Cables are routed in a northern direction, crossing Gammaton Road just after passing south of the Bideford and District Angling Club Lake and then crossing a further two unnamed roads before reaching the southern boundary of the Converter Site.

3.7.92 At this location, the HVDC Cables would be installed via open-cut trenching, whilst avoiding the area of the woodland adjacent to the southern boundary of the Converter Site. However, this approach would require the removal of some hedgerow along the southern boundary of the site.

3.7.93 A haul road would be created from the Converter Site to Gammaton Road for construction vehicles and AIL access. When construction is completed, all land used for haul routes, compounds, cable installation and other works would be restored to their former condition. The Proposed Development also includes the widening of road sections from Gammaton Cross and along the minor road leading north towards the Converter Site, which is detailed within **paragraphs 3.7.66 to 3.7.71.**

Onshore HVDC Cable Corridor Details

3.7.94 As detailed above, the Onshore HVDC Cable Corridor would include the installation of the HVDC Cables in cable circuits. A circuit containing two HVDC Cables alongside each other forms a bipole. A bipole system is an electrical transmission system that comprises two DC conductors.

3.7.95 The Onshore HVDC Cable Corridor is currently anticipated to have a maximum temporary width of up to 65 m during construction, within which the permanent cables will be located. This would allow for construction plant access, spoil and materials laydown.

3.7.96 The typical permanent cable corridor width is expected to be 32 m; however, the permanent easement would be wider in some instances. For example, at HDD locations the cable ducts are installed further apart.

3.7.97 The Onshore HVDC Cable Corridor would comprise two bipoles which are each fitted within a trench, giving a total of two trenches. Each bipole trench would include two HVDC Cables and up to three fibreoptic cables, giving a total of up to ten cables for the Onshore HVDC Cable Corridor.

3.7.98 The onshore HVDC Cables utilised within the Proposed Development would be the cross-linked polyethylene (XLPE) type with a typical diameter of *circa*. 156 mm. The onshore export cables themselves will consist of copper or aluminium conductors wrapped with various materials for insulation, protection, and sealing. The operating voltage of the power cables is expected to be 525 kV.

3.7.99 The proposed Onshore HVDC Cable Corridor will also require access tracks (referred to as 'haul roads') to allow the movement of construction vehicles and the installation of the cable circuits, in addition to other related works such as temporary compounds and laydown areas. Operational access may also be required along the Onshore HVDC Cable Corridor, in the event of any cable faults that require repair or replacement works.

3.7.100 The Onshore HVDC Cable Corridor will be approximately 14.5 km in length. The maximum design parameters for the Onshore HVDC Cables are provided in **Table 3.6.**

Table 3.6: Onshore HVDC Cable Corridor parameters

Parameter	Maximum Design Parameter
Length of HVDC cable corridor (km)	14.5
Number of HVDC Cables	4
Number of fibre optic cables	6
Number of cable trenches	2
Permanent cable corridor width for trenched methods (m)	32
Voltage (kV)	525
Diameter of power duct (mm)	250
Diameter of fibre optic duct (mm)	60
Diameter of HVDC cable (mm)	156

HVAC Cable Corridors

HVAC Cable Corridors Location

3.7.101 The connection between the converter stations and the national grid would be achieved by the HVAC cables over a maximum length of 1.2 km.

3.7.102 The HVAC cables would be located within the HVAC cable corridors, which are situated within the bounds of the Converter Site and Alverdiscott Substation Site (see Volume 1, Figure 3.1). The HVAC cable corridors would include the installation of HVAC cables in cable circuits (with each circuit typically comprising three power cables). It is anticipated that two cable circuits (six cables), buried across two separate trenches would form one bipole for the AC system, and may include communication cables.

3.7.103 Each HVAC bipole system would be connected to the corresponding converter station (Bipole 1 and Bipole 2) and routed within separate cable corridors towards the Alverdiscott Substation site. However, it is expected that the two corridors would converge prior to connection with the Alverdiscott Substation Connection Development, to the east of the Converter Site. The final routing of each HVAC bipole would be refined with consideration of the final layout of the Converter Site as well as the Alverdiscott Substation Connection Development that will be developed by NGET (as detailed in **paragraph 3.7.47**).

HVAC Cable Corridors Details

3.7.104 Each cable corridor for the HVAC cables is currently anticipated to have a maximum temporary width of up to 32.5 m during construction, within which the permanent cables will be located. This would allow for construction plant access, spoil and materials laydown. Therefore, the HVAC cable corridors would have a maximum combined width of 65 m.

3.7.105 The typical permanent cable corridor width is expected to be 15 m for each HVAC cable corridor.

3.7.106 The HVAC cables utilised within the Proposed Development would be the XLPE type with a typical diameter of *circa* 155 mm. The operating voltage of the cables is expected to be 400 kV.

3.7.107 The parameters for the onshore HVAC cables are provided in **Table 3.7**.

Table 3.7: HVAC Cable Corridors parameters

Parameter	Maximum Design Parameter
Length of HVAC cable connection route (km)	1.2
Maximum number of HVAC cables	12
Maximum number of cable trenches	4
Permanent cable corridor width (m)	15 m for each bipole
Temporary construction corridor width (m)	32.5 m for each bipole
Maximum voltage (kV)	400
Diameter of power duct (mm)	250
Diameter of HVAC cables (mm)	155
Type of cable	XLPE

Cable Construction

3.7.108 Cable construction and installation of the onshore cables is anticipated to be undertaken in the following broad sequence. However, some sequencing may differ once the contractor(s) is appointed. Sequencing may vary between the construction and installation of the HVDC Cables and the construction and installation of the HVAC cables. However, variances in sequencing would not alter the assessment of likely significant effects.

1. Completion of any pre-construction surveys.
2. Ecological preliminary works (for instance, hedgerow removal).
3. Establishment of construction compounds, including temporary utility installation, and new access points from the highway where required.
4. Installation of fencing around the construction areas.
5. Site preparation works, installation of drainage, topsoil removal and storage, establishment of temporary compounds, installation of temporary haul roads.
6. HDD works at identified locations (see further detail below).
7. Trench excavation works, installation of backfill materials and installation of ducts and protective tape and tiles.
8. Backfilling of trench to subsoil level.

9. Excavation and construction of joint bays and link boxes along the route. The link boxes include maintenance covers for access.
10. Installation of power and fibre optic cables though installed ducts between joint bays and installation of link boxes and inspection covers.
11. Jointing together of cables at joint bay locations.
12. Removal of construction drainage, removal of haul roads, removal of temporary compounds and fencing.
13. Replacement of topsoil along the cable corridor and reinstatement to previous land use.
14. Removal of temporary access points and planting of any sections of replacement hedgerow.
15. Removal and reinstatement of construction compounds.

3.7.109 Further detail is provided in the following sections, with details of environmental management measures provided in **section 3.8**.

Pre-construction surveys

3.7.110 Prior to the commencement of the onshore construction works, a number of preliminary activities would be required, which are listed in paragraph 3.6.11 of this ES chapter. This may also include surveys and studies may be required to inform the final detailed design, detailed below:

- topographic surveys;
- ecological surveys to update EIA findings and inform any protected species mitigation licence(s) that may be required;
- ground investigations (e.g., geotechnical and ground stability surveys);
- soil surveys;
- drainage surveys; and
- targeted archaeological excavations to confirm the findings of the EIA process and the development of an onshore WSI.

3.7.111 Any targeted investigations will be undertaken in accordance with industry best practice and applicable guidelines.

Temporary Construction Compounds

3.7.112 Construction compounds will be established early in the construction programme, as part of the preliminary activities. Temporary construction compound locations are shown on Figure 3.7 (See Volume 1, Figures).

3.7.113 Compounds are likely to include offices, welfare facilities and stores, as well as acting as a staging post and secure storage for equipment and component deliveries, as well as for laydown and storage of materials and plant that will be dispersed along the linear construction corridor.

3.7.114 Construction compounds will be prepared by removing and storing topsoil and then constructing hardstanding areas using crushed stone or other surfacing as appropriate. Drainage, fencing, hoarding and lighting etc will also be installed.

3.7.115 Where trenchless techniques, such as HDD are used for minor crossings, HDD operations (the drilling rig, associated equipment and the drill entry and exit pit) will be accommodated within the cable corridor.

3.7.116 The following temporary construction compounds will be required:

- Main construction compound: proposed to be situated between Gammaton Road and Tennacott Lane, south of East-the-Water. The compound would be utilised as the main logistics base for the Converter Site.
- Secondary construction compound: proposed to be located adjacent to the A39, south west from the Abbotsham Cross roundabout. The compound would be utilised as the main logistics base for all construction work across the onshore HVDC Cable Corridor. This compound may also include a HDD drilling site for the A39 crossing.
- Landfall compound: this compound would be situated at the Landfall (Cornborough Range). Initial landfall works would last for a period of 18 months. Following this, the compound and access would be de-mobilised with the removal of all construction equipment but will remain fenced and secured until the second period of works.
- River Torridge HDD Compounds.
- Converter compound: detail provided within **paragraph 3.7.53.**

3.7.117 Where required, temporary utility connections will be established for the compounds to provide power, potable water, surface water and foul drainage and communications services. The need for these temporary services will be determined by the contractor prior to compound establishment.

3.7.118 Following the completion of construction, the temporary construction compounds would be removed and the land restored to its former condition.

Table 3.8: Summary of temporary construction compounds parameters

Construction Compound	Maximum Design Parameter		
	Number	Compound Size	Duration
Construction Compound (Gammaton Road)	1	63,000 m^2	72 months
Secondary Construction Compound (A39 Compound)	1	48,000 m^2	36 months
Landfall Compound	1	10,000 m^2	36 months*
HDD Compounds (excluding Landfall compound)	10	10,000 m^2	12 months
Converter Compound	1	20,000 m^2	72 months

*The landfall compound would be in use for the initial 18 months, where the trenchless crossing would be installed beneath the Mermaid's Pool to Rowden Gut SSSI, beach and the South West Coastal Path. Following this, there would be a gap (12 months) between the second phase of works, which would continue for a further six months.

Cable Installation – Key Methods

3.7.119 The main construction techniques for the installation of the onshore HVDC and HVAC cables would include the following:

- The Proposed Development would predominantly utilise open cut methods of cable installation.

- HDD (or other trenchless techniques) (detailed in **paragraph 3.7.141**) would be utilised in locations where the cable corridor crosses obstacles, such as major roads and woodland. HDD would also be utilised where the Onshore HVDC Cable Corridor crosses certain watercourses, which are detailed in **paragraph 3.7.145**.
- Cable jointing would be required where two cable lengths meet as the length of the cable supplied on the cable drum transport would be approximately 1 km, due to weight limits. This is discussed further in **paragraph 3.7.126**.

3.7.120 Open cut methods of cable installation would involve the excavation of a trench and laying ducts in preparation of cable installation (pulling the cable through previously installed ducts). Cables are installed by winching them into the pre-installed ducts.

3.7.121 Across agricultural land (and excluding joint bays) the HVDC Cables would be buried in underground ducts at an approximate depth of 1.4 m. The approximate burial depth may be exceeded at joint bays and where the route is required to cross beneath features such as pipelines, land drains, highways or rivers using trenchless construction techniques.

3.7.122 The diameter of power (AC and DC) ducts would be approximately 300 mm, whereas the diameter of the fibreoptic cable ducts would be approximately 110 mm.

3.7.123 As the cable corridor would be fully ducted, the cable lengths could be installed following the infill of trenches, which allows for quick trenching and restoration of land to the previous land-use. This would benefit both the environment and landowner.

3.7.124 Following the infilling of the trenches, cables would be installed by winching them into the pre-installed ducts, which have been fitted underground via the methods highlighted above.

3.7.125 The parameters for the onshore cable installation is provided in **Table 3.9**.

Table 3.9: Onshore HVDC and HVAC Cables – Construction parameters

Parameter	Maximum Design Parameter	
	HVDC Cable Corridor	HVAC Cable Corridor
Trench width at base (m)	1.6	2.1
Trench width at surface (m)	4.3	4.9
Approximate depth of trench (m)	1.4	1.4
Target trench depth to top of protective tile (m)	0.9	0.9
Trench depth of specialised backfill (m)	0.5	0.5
Width of construction cable corridor (temporary) (m)	65	65 (32.5 m per bipole)
Number of haul roads	1	1
Width of haul road (m) excluding passing bays	7	7
Duration of works (months)	36	12

Cable Joint Bays and Link Boxes

3.7.126 Cables would be supplied from the factory on cable drums whose manageable transport dimensions determine the available section length. Where two cable lengths meet, they would need to be jointed together in a joint bay. Joint bays are typically concrete lined pits, situated below ground, that provide a clean and dry environment for jointing sections of cable together.

3.7.127 The key steps are:

- cutting the two cables to be jointed to length;
- stripping back the various layers of sheath, screen and insulation;
- preparing the conductor for jointing and then jointing either by a compression ferrule for copper conductor or by welding for aluminium conductor; and
- assembling a pre-fabricated joint housing around the cables that is then filled with an insulating material such as silicone rubber.

3.7.128 Cable joints would be required approximately every 800 m to 1,100 m along the route.

Joint Bays

3.7.129 The joint bays would be approximately 20 m long, with a width of approximately 5 m and a floor depth of 1.4 m. There will be one joint bay per section for each bipole, therefore 17 joint bays per bipole would be required based on a distance of 800 m between joint bays. Each joint bay will house two HVDC cable joints.

3.7.130 Joint bays are typically concrete lined pits, situated below ground, that provide a clean and dry environment for jointing sections of cable together. The joint bay is backfilled in the same manner as the rest of the route with Cement Bonded Sand, protective covers and warning tape with indigenous backfill to the surface. The land above the joint bays would be fully reinstated, and would not include maintenance covers and thus, would not be visible during operation and maintenance. The joint bays would only require access during the operation and maintenance phase in the event of a cable failure requiring replacement (further details on cable repair are provided in **paragraphs 3.13.8** to **3.13.9**).

3.7.131 In terms of the HVAC section of the cable corridor, it is anticipated due to the relatively short length that no joints will be required. If joint bays are required for the HVAC route, an equivalent of the DC cable joint bay will be installed.

3.7.132 The maximum design parameters for the joint bays is set out in **Table 3.10**. This provides a summary of the parameters for the typical joint bays along the Onshore HVDC Cable Corridor, excluding the Landfall.

Table 3.10: Joint bay parameters (excluding transition joint bays)

Parameter	Maximum Design Parameter
Number of joint bays	34
Width (m)	5
Length (m)	20
Depth (m)	1.4
Area of joint bay (m^2) (below ground)	100

Parameter	Maximum Design Parameter
Volume of material excavated per joint bay (per circuit) (m^3)	140
Nominal Distance between Jointing Bays (m)	800-1,100

Link Boxes

3.7.133 Link boxes are smaller pits compared to joint bays, which house connections between the cable shielding, joints for fibre optic cables and other auxiliary equipment. Link boxes would be situated close to the joint bay locations.

3.7.134 Link boxes allow electrical access to the cable sheath for maintenance testing and fault finding purposes. Therefore, maintenance covers would be required at link box locations, which would be visible during operation. The maintenance covers will be a typical ground level chamber cover to allow access to link boxes during the operation and maintenance.

3.7.135 The parameters for the link boxes is set out in **Table 3.11**.

Table 3.11: Link box parameters

Parameter	Maximum Design Parameter
Number of link boxes	34
Width (m)	1.5
Length (m)	1.5
Depth (m)	1.4
Area of link box (m^2) (below ground)	2.25
Volume of material excavated per link box (per circuit) (m^3)	3.15
Nominal Distance between link boxes (m)	800-1,100

Cable Protection

3.7.136 Onshore HVDC and HVAC buried cables will be protected from accidental damage by excavation in several ways, typically being a combination as follows:

Warning Tape and Tiles

3.7.137 A continuous length of protective covers will sit directly above each cable duct backfill. The covers are typically red in colour and bear warning text. Approximately 100 mm above the covers, a bright yellow band of plastic warning tape will be laid. The exception to this arrangement will be at trenchless crossings.

Above Ground Cable Markers and Signage

3.7.138 Similar to cross country gas pipelines, the buried cables will be marked at road crossings, watercourse crossings and field boundaries by warning markers and/or signs.

3.7.139 Marker posts buried in the ground are typically around 1.1 m long by 0.25 m wide with at least 50% or more of the post visible above ground. They will include signage to indicate the high voltage cable danger with telephone contact information.

Cable Crossings

3.7.140 The Onshore HVDC Cable Corridor will cross existing infrastructure and obstacles such as roads, rivers and other utilities. All major crossings, such as major roads and river crossings will be undertaken using trenchless technologies.

3.7.141 Trenchless crossing methods include auger boring, HDD, thrust boring, and micro-tunnelling. For the purposes of impact assessment, HDD has been assumed for the major crossings detailed within Figure 3.6 (see Volume 1, Figures). This is the 'reasonable worst case' assumption of construction effects. However, contractors may select trenchless or trenched crossing techniques at other minor features in order to minimise any disruption caused and thereby lessen any impacts identified as part of the EIA process.

3.7.142 HDD involves drilling underneath the obstacle. HDD can avoid physical disturbance to above-ground or shallow below-ground features by drilling under them but typically has a higher cost than open-cut trenching and is most suited to straight sections. HDD drilling would involve drilling of bores using an HDD rig up to approximately 250 tonnes.

3.7.143 Depending on the size of the duct and the ground conditions encountered, the drilling operations would take place in a series of stages:

- Drill initial small pilot hole.
- The diameter of the pilot hole is enlarged by a larger cutting tool. Bentonite is pumped to the drilling head during the drilling process to stabilise the hole and ensure that it does not collapse.
- The duct is placed inside the borehole and the cable is pulled through. These ducts are either constructed offsite or will be constructed onsite, then pulled through the drilled hole either by the HDD rig or by separate winches.

3.7.144 HDD would generally be undertaken from two temporary construction compounds located either side of each crossing. These compounds would generally be 10,000 m^2 in size and would be suitably located for the drilling works required. Volume 1, Figure 3.6 details the locations of HDD crossings and associated temporary construction compounds.

3.7.145 It is expected that there would be approximately six trenchless cable crossings via HDD within the onshore section of the Proposed Development, including the HDD at Landfall. It is currently proposed that the following features will be crossed by HDD (or other trenchless methodologies):

- The Mermaid's Pool to Rowden Gut SSSI, situated along the coastline at the Landfall, Cornborough Range.
- The following watercourses/woodland:
  - Kenwith Stream, situated just south of Rickard's Down and approximately 300 m north of Abbotsham.
  - A small stream, 290 m south of Jennetts reservoir and to the west of West Ashridge, which feeds into Jennetts reservoir.
  - River Torridge, to the south of Bideford (to note, one HDD will cross both the River Torridge and A386).
- The following major roads:

  - A39, at a section approximately 250 m south west from the Abbotsham Cross roundabout and north west from High Park Farm.
  - A386, to the south of Bideford (as stated above, one HDD will cross both the River Torridge and A386).
- A site of suspected archaeological assets at Winscott Barton.

3.7.146 Where possible, HDD crossings will be undertaken by lower impact methods, in order to minimise construction impacts beyond the immediate location of works. HDD crossings would be undertaken concurrently (at the same time) along the Onshore HVDC Cable Corridor.

3.7.147 The design parameters of the HVDC cable corridor are shown below within **Table 3.12.**

Table 3.12: Summary of the HDD Parameters

Parameters	Maximum Design Parameter
General Details	
Number of HDD Locations	6 (including Landfall)
Number of compounds per HDD	2 (located at either end of HDD)
Approximate HDD compound size (m^2)	10,000
Typical (HVDC) HDD Parameters (per HDD)	
Number of HDD drills	6
Number of Power Cable Ducts	4
Number of Fibre Optic Ducts	6
Diameter of Power Cable Ducts (mm)	450
Diameter of Fibre Optic Ducts (mm)	110

Construction Access

3.7.148 During construction, the A39 would be used as the primary artery for construction access, which would connect construction vehicles to the A386, B3236, and Barnstaple Road into Manteo Way (See Volume 1, Figure 3.7). These roads would be utilised for construction traffic before leading vehicles onto temporary haul roads along the cable corridor. Temporary internal haul routes would be constructed along sections of the cable corridor to remove frequent vehicle movements from the public highway. The Access Routes Plan is shown within Volume 1, Figure 3.7.

3.7.149 As there are a number of constraints associated with the narrow roads located within the local area, three main construction compounds along the Onshore HVDC Cable Corridor have been situated in areas easily accessible from the A39, A386 and Manteo Way respectively. This would allow construction vehicles to be directed towards the relevant compounds whilst reducing movements along minor roads. Figure 3.7, Figure 3.8 and Figure 3.1 (See Volume 1, Figures) show the main access points and construction compounds.

3.7.150 A CTMP would be produced prior to the commencement of main construction, which would include measures to ensure that construction traffic impacts are minimised (e.g., minimising traffic congestion, restrictions on timing of vehicle movements, etc.). The CTMP would be developed in accordance with the outline CTMP, which is provided as part of the DCO (document reference 7.12).

3.7.151 It is expected that vehicle types utilising the public highway during construction would include a mixture of cars, vans, articulated HGVs, rigid HGVs including concrete trucks, and AIL. Additionally, vehicle movements generated during the separate cable pull-in and jointing operation would include HGVs bearing winches, cranes, cars and vans. Further details are provided within Volume 2, Chapter 5: Traffic and Transport, of the ES.

Abnormal Indivisible Loads (AILs)

3.7.152 The Proposed Development would require the use of Abnormal Indivisible Loads (AILs) for the delivery of cable drums and transformers.

3.7.153 The AILs would travel along proposed routes that are approved by the relevant highway authority and would require police escort along the public highway. AILs are proposed to use the same route to the Onshore HVDC Cable Corridor and same compounds as described above. Access junctions into the compounds will be designed to accommodate the cable drum and transformer AILs.

3.7.154 Cable drums and transformers are proposed to arrive via sea at Appledore Quay for onward transport to the cable corridor and Converter Site. Routes to site are shown on Volume 1, Figure 3.7.

3.7.155 The AIL routes identified in Figure 3.8 (see Volume 1, Figures) form a separate element to the Onshore Infrastructure Area. It is anticipated that works along the AIL routes, outside of the Onshore Infrastructure Area, would be limited to minor works, such as the removal of bollards, road islands and vegetation. As such, the AIL routes have only been considered within individual topic chapters where there would be potential for likely significant effects.

Restoration of Cable Corridor

3.7.156 As set out in **paragraph 3.7.96**, the permanent corridor width for the HVDC cable corridor would typically be 32 m, however, this would be exceeded at HDD locations where the ducts would be installed further apart.

3.7.157 In terms of above ground features, once the installation work is completed, the haul road(s) will be removed and the ground reinstated to its previous use using stored subsoil and topsoil. All temporary construction compounds and temporary fencing will be removed, field drainage and/or irrigation will be reinstated and the land will be restored to its original condition. Where practicable, consideration will be given to early restoration of sections of the Onshore HVDC Cable Corridor.

3.7.158 Hedgerows would be replanted using locally sourced native species, where practicable. Suitably qualified and experienced contractors would be used to undertake the reinstatement, which would be based on restoring the hedge to match the remaining hedgerow at each location. Where appropriate, enhancement (such as planting of additional suitable species) may be undertaken. This would be detailed within the LEMP, which would be developed in accordance with the Outline LEMP (document reference 7.10).

3.7.159 Joint bays will be completely buried, with the land above reinstated. A standard size manhole cover will be provided on the surface for link boxes for access during the operation and maintenance phase.

Landfall Works

3.7.160 The Landfall for the Proposed Development is located at Cornborough Range on the North Devon coast, to the south-west of Cornborough and approximately 4 km west of Bideford (see Figure 3.1). This part of the site lies within the North Devon Coast National Landscape and the Heritage Coast. The Mermaid's Pool to Rowden Gut SSSI is also situated along the coastline.

3.7.161 Landfall refers to the area where the offshore HVDC Cables come ashore (i.e., make landfall) and are jointed to the onshore HVDC Cables via the transition joint bays. This would be undertaken using trenchless techniques (e.g., HDD) that allows for installation under sensitive features and avoidance of direct impact to Mermaid's Pool to Rowden Gut SSSI and the South West Coastal Path. Further details are set out in **paragraphs 3.7.163** to **3.7.171**.

3.7.162 The Landfall comprises the area within the Order Limits between MLWS and the transition joint bays. This includes all compounds required to facilitate the construction works within the Landfall (see Volume 1, Figure 3.1).

Horizontal Directional Drilling - Landfall

3.7.163 As detailed above, the offshore cables between the transition joint bays and MLWS would be installed using the HDD trenchless technique.

3.7.164 HDD bores will be drilled under the seabed and shoreline, and lined with underground ducts to allow the offshore HVDC Cables to be pulled through (from the sea towards the land) and connected to the onshore HVDC Cables at the transition joint bays.

3.7.165 A bore would be drilled below ground and beneath the seabed surface for each power cable. A fibre optic cable (FOC) can be installed within the same bore as the power cable. A small pilot borehole would initially be used, which is then enlarged by a larger cutting tool. A duct would be placed inside the borehole, through which the cable is pulled.

3.7.166 The ducts at Landfall are slightly larger than the usual typical onshore ducts as the offshore cables are armoured for extra protection from physical damage and would be approximately 450 mm (for DC cables) and 11N0 mm (for fibre optic cables) in diameter.

3.7.167 The installation would require a temporary construction compound (up to 10,000 m^2) and associated temporary utility services, which would contain all necessary plant and equipment plus parking and welfare facilities required for the Landfall construction works.

3.7.168 A total of 4No. 600 mm bores will be completed which is anticipated to take approximately 12 months depending upon bore length and rock resistance.

3.7.169 Once the drilling work has completed and the ducts installed, the HDD rig(s) and associated equipment will be removed. The compound will be taken-up leaving a much smaller prepared area for the subsequent cable pulling operations.

3.7.170 Cable pulling will be undertaken in two stages to reflect the arrival of the offshore HVDC cables from Morocco. This will happen in two stages reflecting the offshore cable laying programme.

3.7.171 Once the drilling works are complete, the transition joint bay structures would be completed. Up to two transition joint bays would be required (one per bipole).

Table 3.13: Landfall parameters

Parameter	Maximum Design Parameter
Maximum length of HDD from entry to exit pit (m)	2,110
Minimum length of HDD from entry to exit pit (m)	672
Trenchless external bore diameter (mm)	600
Number of Power Cable Ducts	4
Number of Fibre Optic Ducts	6 (includes two spares)
Diameter of Power Cable Ducts (mm)	450
Diameter of Fibre Ducts (mm)	110
Temporary construction compound (m^2)	10,000
Duration of HDD works (months)	12
Duration of cable pulling operations (each bipole) (months)	6
Entry and Exit Pits	
Number of entry pits (onshore)	4
HDD entry pit area (m^2) – per entry pit	25 (5 m x 5 m)
HDD entry pit excavated volume (m^3) – per entry pit	75
Number of exit pits (offshore)	4
HDD exit pit area (m^2) – per exit pit	225 (15 m x 15 m)

Transition Joint Bays

3.7.172 The offshore cables will be jointed to the onshore cables at two transition joint bays situated within the Landfall Compound. The transition joint bays would be underground chambers constructed of reinforced concrete base, walls and roof, which is then backfilled on completion of the jointing process, which provides a secure and stable environment for the cable joints.

3.7.173 In preparation of the installation of the transition joint bays, the area would be stripped of topsoil and stored in a bund(s) to the edge of the construction corridor. The subsoil would then be excavated and stored in a separate bund separated from the topsoil. The movement and storage of topsoil and subsoil would be undertaken in accordance with the Soil Management Plan(s). The transition joint bays will have a concrete base installed to act as a stable working platform for the jointing works and to support the joints on completion.

3.7.174 Each transition joint bay at Landfall would require an excavation area of approximately 750 m^2 (50 m x 15 m) and would be buried at a maximum approximate depth of 2.5 m. However, the maximum area of concrete slab required for each transition joint bay would be 150 m^2 (30 m x 5 m) with a thickness of 0.3 m, totalling 300 m^2 for both.

3.7.175 Following the installation of the transition joint bays and jointing of cables, the excavated area would be backfilled by CBS and the excavated soil. Any excess excavated material would be re-used on site or transported to a registered and controlled recycling centre for re-use off-site.

3.7.176 The transition joint bays would not require access during operation and maintenance. However, each transition joint bay will contain an underground link box, contained within an underground chamber and will be accessible via an inspection cover at ground level.

3.7.177 All underground assets will be installed in line with current best practice guidance, which provides guidance on the minimum burial depth in the relevant land-use types (e.g., to allow the ongoing use of the land for agricultural activities).

Table 3.14: Transition joint bay parameters

Parameter	Maximum Design Parameter
Maximum number of transition joint bays	2
Maximum construction area of transition joint bays (each) (m^2)	750
Maximum depth of transition joint bays (each) (m)	2.5
Maximum volume of transition joint bay excavation (m^3) (each)	1875

3.8 Offshore Elements of the Proposed Development

3.8.1 As set out in **paragraph 3.5.1**, the offshore infrastructure for the Proposed Development includes the HVDC Cables located within the UK EEZ. This section sets out the design parameters and the proposed installation and construction methods for the offshore infrastructure, which form the basis of the ES assessments.

3.8.2 The offshore infrastructure (i.e. HVDC Cables) will be located within the Offshore Cable Corridor presented in Figure 3.2 (See Volume 1, Figures).

3.8.3 The location and siting of the offshore elements of the Proposed Development described in this section have been informed by a site selection and route optimisation process, which is set out within Volume 1, Chapter 4: Need and Alternatives, of the ES. Multiple desktop studies and marine investigation surveys have been completed and route optimisation had consideration for water depth, seabed (benthic) features and geohazards, metocean influences, external stakeholders (e.g. seabed leaseholders, general fishing activities, shipping etc) and environmental constraints such as marine protected areas including Special Areas of Conservation, Special Protection Areas, and Marine Conservation Zones.

Offshore Cable Corridor

3.8.4 The extent of the Offshore Cable Corridor assessed in this ES is from the UK EEZ boundary to the Landfall at Cornborough Range on the north Devon coast. The total length of the Offshore Cable Corridor in UK waters is approximately 370 km.

3.8.5 The Offshore Cable Corridor has a nominal width of 500 m extending up to 1,500 m at some crossing locations (where the cable needs to cross existing power and telecoms cables for example) to provide the cables with sufficient space to cross the existing assets as close to 90 degrees as possible (and reduce the footprint of the crossing on the seabed). The Offshore Cable Corridor width is also extended to 1,500 m at the western edge of The Crown Estate's Project Development Area 3 (Offshore Wind Leasing Round 5) to ensure this area can be avoided if necessary.

3.8.6 The Offshore Cable Corridor is consistent with that presented within the EIA Scoping Report and that presented in the PEIR. The width of the Offshore Cable

Corridor will allow some flexibility for micro-routing of the final cables within it. Flexibility for micro-routing within the Offshore Cable Corridor will be retained until cable installation, to:

- allow for the final precise cable route to adapt to the conditions encountered during pre-construction surveys and selection of specific installation methods (noting that extensive seabed characterisation surveys and an Outline Cable Burial Risk Assessment – Volume 1, Appendix 3.4 of the ES - have been undertaken);
- allow potential micro-routing comments from relevant stakeholders to be addressed, including e.g. Historic England inputs via the Archaeological Outline Offshore Written Scheme of Investigation; and
- allow the flexibility to avoid currently unforeseen hazards (such as potential unexploded ordinance (UXO) identified during the pre-cable lay geophysical survey).

Offshore Cable Design

3.8.7 The offshore cables would consist of four 525 kV HVDC marine power cables which would be installed for the majority of the cable route as two bundled pairs (Bipole 1 and Bipole 2). The bundled pairs would be separated into four individual cables a short distance before the Landfall HDD entry points, to allow each cable to be pulled onshore through individual HDD ducts.

3.8.8 Each offshore HVDC cable would have a diameter of approximately 177.5 mm and an approximate weight of 70 kg/m in air. Each cable pair (forming a bipole) would facilitate the transfer of 1.8 GW to the national grid, resulting in a total of 3.6 GW power supply into the UK.

3.8.9 In addition to the four HVDC marine power cables, two FOC would provide a cable monitoring fibre system (Distributed Acoustic Sensing and/or Distributed Temperature Sensing). Each FOC would be approximately 35-40 mm in diameter and laid together with the marine cables within a shared trench (one FOC per cable bundle). FOC repeaters would be required approximately every 70 km along the Offshore Cable Corridor (four to five repeaters per bipole). At each repeater location, there would likely be a spur of FOC installed adjacent to the cables for the installation of the repeaters and ongoing maintenance purposes. The spur of FOC at each repeater location would be equal to the water depth at the repeater location.

3.8.10 The FOC spurs and repeaters would be buried to the same depth as the HVDC Cables in accordance with the Outline Cable Burial Risk Assessment (CBRA) (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES). It is assumed that the FOC spurs would be buried using the same, or less intrusive, methods as the HVDC Cables (lesser trench width required for FOC burial). The FOC repeaters would be buried broadly parallel to the HVDC Cables, within the boundary of the Offshore Cable Corridor taking place soon after the HVDC cable works.

3.8.11 At the Landfall, the FOCs would be installed alongside an HVDC Cable within a HDD duct, i.e. adjacent to one of the power cables within the same HDD duct.

Programme and installation Schedule

3.8.12 The following dates are indicative at this time, and may be influenced by e.g. weather limitations of the Cable Laying Vessel (CLV):

- **2027:**
  - Horizontal Directional Drilling (HDD) at the proposed Landfall is scheduled to commence in Q1 of 2027.
  - Pre-lay works for Bipole 1 (first cable bundle) such as route clearance and boulder removal are anticipated to take place in 2027 ahead of cable lay and protection works.
- **2027-2028:** Cable lay works for Bipole 1 are scheduled to begin in 2027. It is anticipated that these works would be completed in three sections each taking approximately one month. It is currently envisaged that one section will be laid in Q3 2027 and two sections will be laid in 2028.
- **2029:** For Bipole 2 (second cable bundle), offshore works would begin with pre-lay works in 2029.
- **2030:** The three sections of bipole 2 are currently scheduled to be laid in 2030.

3.8.13 Burial and protection activities would progress broadly in parallel with the expectation that cable lay and the start of burial would be just a few days apart (noting that burial and protection activities would take longer to complete than the cable lay).

3.8.14 Guard vessels would be provisioned for any periods after the cable has been laid, but has not yet been buried or protected, to minimise the risk of interactions with other marine traffic.

Construction Phase

Horizontal Directional Drilling – Marine Works

3.8.15 The cables would be installed at the Landfall using a HDD technique to avoid disturbance of the intertidal zone, the beach and the foreshore including coastal cliffs. This section provides a summary of the marine elements of the HDD works.

3.8.16 The HDD drill direction would be started on land and directed out to sea. For each borehole, a pilot hole would be drilled (at c. 20 m below seabed level) to within approximately 50 m of the seabed exit points. The drilled bore would then be widened to its full intended diameter before the remainder of the bore is drilled. Redundant drilling fluid and cuttings would be removed and disposed of responsibly, in accordance with waste regulations, from the land-based works.

3.8.17 The primary HDD activity that interacts with the marine environment is the breakthrough, or 'punchout', of the drill from underneath the seabed.

3.8.18 During breakthrough, drilling fluid and cuttings would be released into the immediate marine environment. The use of drilling fluids that are on the OSPAR PLONOR list (Pose Little Or No Risk to the environment) would be prioritised to minimise the risk to the marine environment during breakthrough. The volume of drilling fluid and cuttings lost during breakthrough is minimised by the adopted construction approach i.e. the boreholes having already been drilled to their full diameter prior to breakthrough of the seabed and the continuous removal of drilling fluid and cuttings during this operation. Lower drilling fluid flow rates are also used during breakthrough to minimise the loss of drilling fluid.

3.8.19 There will be no requirement for any wet concrete pours associated with the Landfall HDD or any of the offshore works.

3.8.20 An excavated 'exit pit' may be required at HDD exit points on the seabed to clear unconsolidated sediment layers (sand and pebbles) that may jam HDD equipment on breakthrough or prevent subsequent duct installation once the boreholes have been drilled. Localised clearance of unconsolidated sediments are expected to be undertaken by either a back-hoe dredger (long arm barge mounted excavator), or MFE. Sediment will be cleared from an area of approximately 15 m x 15 m around the exit points.

3.8.21 Sediments will be cleared, rather than removed offsite (as was proposed at PEIR stage). Thus sediments will not be removed from Bideford Bay, with exit pits refilled via a combination of manual infilling (long arm barge mounted excavator) and by natural infilling of sediments (which would be expected to be rapid given the extensive mobility of surface sediments in Bideford Bay).

3.8.22 Exit points in the marine environment for the four drills are currently being considered between approx. 5 m water depth (approximately 500 m offshore) and 10 m water depth (approximately 1,800 m offshore). Volume 1, Figure 3.9 of the ES presents a plan of the landfall HDD that shows this enveloped area.

3.8.23 Following installation, cable ducts at the exit pits will be protected using the material excavated from the 'exit pit'. If concrete mattresses or rock protection are needed at the final duct exits this will be highly localised and all such protection would be below seabed level. Away from the exit pits, cables will be protected and buried in trenches, as elsewhere. The sandy sediments of Bideford Bay mean that achieving target depth burial is highly likely, with trenches infilled with the excavated sandy sediments; thus supplementary cable rock protection is highly unlikely to be required in Bideford Bay (c.f. e.g. Volume 1, Figure 3.15: Indicative rock placement along Offshore Cable Corridor).

3.8.24 Dependant on the contractor's final design and depth of the boreholes, there would be up to a 40 m separation between adjacent drill exit points for cables on the same circuit, and approximately a 50 m separation between circuits (i.e., all four exit points would be within an area of the seabed of approximately 130 to 150 m width).

3.8.25 The HDD installation would be undertaken ahead of cable lay, likely commencing in Q1 2027 (avoiding the winter period). Active working on HDD exit pits would also be avoided during peak Spring tides; this is embedded mitigation to minimise the disturbance of suspended sediments (see Volume 3, Chapter 8: Physical Processes of the ES).

HDD Duct Installation

3.8.26 Following drilling of the four boreholes, ducting would be installed in each bore. Three methods are being considered for the installation of ducting: pulling the ducting from either onshore or offshore or pushing the ducting through the boreholes from onshore.

3.8.27 A pulled installation with a pulling winch onshore requires a complete string of duct to be towed (afloat) from offshore to the HDD exit points and pulled onshore through the boreholes. If the pulling winch is located offshore, then the string of duct can be fabricated at the HDD onshore site as the duct is pulled offshore.

3.8.28 A pushed installation involves the fabrication of the ducts at the HDD onshore site with the ducts fed into the entry points and driven through the boreholes using a pipe thruster. The project design team have rejected any option of moving ducting across the beach, which would effectively be isolated from the HDD works. The choice of the HDD installation method avoids potential impacts to designated sites and the intertidal zone as detailed in **Section 3.9**.

3.8.29 All methods of duct installation require marine vessels, however, the pull method would require additional vessels relative to the push method (as described in Volume 3, Chapter 5: Shipping and Navigation of the ES).

Pre-Lay Marine Surveys

3.8.30 The baseline UK marine investigation surveys, that included geophysical surveys, subtidal drop-down video surveys and subtidal grab surveys have been completed and have informed the environmental baseline for this ES (see e.g. Appendix 8.4 GEOxyz Environmental Report of the ES).

3.8.31 Prior to cable installation (commencing in 2027), additional ground condition surveys may be required by the Contractor. These are unlikely to be required to further characterise the environmental baseline (given the high resolution baseline data collection already compiled for the Offshore Cable Corridor within UK waters), but may be required for micro-routing purposes or to identify any UXO within the Offshore Cable Corridor that may need to be avoided or cleared. If required, UXO clearance (removal or detonation) would be undertaken by a specialist contractor and any such works would be subject to a separate consenting process at the time such need is identified. The approach to consenting of UXO has been discussed with the MMO, following Scoping Opinion responses, and the MMO confirmed their preference and expectation for separate licensing of UXO survey and any UXO removal, separate to the DCO/deemed Marine Licence. As such, consideration of effects from activities associated with UXO clearance have been excluded from this Environmental Statement.

Route Preparation

3.8.32 The marine baseline investigation surveys (see e.g. Appendix 8.4 GEOxyz Environmental Report of the ES) and any pre cable laying ground condition survey would inform the requirements for, and extent of, seabed preparation and clearance along the Offshore Cable Corridor in UK waters. Types of seabed preparation that could be required prior to cable installation include:

- Clearance of debris and some local seabed features e.g. boulders;
- Clearance of OOS cables; and
- Construction of crossing structures over existing in-service cables.

3.8.33 Seabed preparations will not remove bed materials from the local area i.e. there will be no dredge arisings or similar. Any seabed preparations will be limited to immediate clearance / highly localised flattening only.

Seabed Debris

3.8.34 Where deemed necessary, marine debris such as abandoned, lost or discarded fishing gear that may impede the cable installation operations, would be cleared from the cable route prior to installation. This would require a pre-lay grapnel run involving towing a heavy grapnel hook of circa 1 m total width, at a max penetration depth of circa 1 m, along the centre line of each bundled cable pair route to clear debris. It is anticipated that the pre-lay grapnel run would extend along the entire Offshore Cable Corridor apart from at live cable crossings (the locations of which are shown on Volume 1, Figure 3.10). The only exception will be if the cable is installed by pre-cut trenching by plough whereby a pre-lay grapnel run is not required, but this is currently not known.

3.8.35 Debris collected during the grapnel run would be recovered on board the vessel for onshore disposal at appropriately licensed disposal facilities.

3.8.36 There are currently 27 anticipated crossings of OOS cables along the UK Offshore Cable Corridor. A section of the OOS cables would be cut and removed where possible, which is consistent with Natural England's preference (Natural England, 2022) i.e. prevents the need for mandatory external cable protection at these OOS crossings. Liaison with the asset owners for the OOS cables is underway, with the expectation that agreements for cable removal will be in place for the majority.

3.8.37 As a worst case, it is assumed for ES assessment purposes that x5 of the OOS cables will require crossings (5 OOS cables x 2 bipoles = 10 OOS cable crossing protection structures in total). Should any OOS cable crossings be required, this will be confirmed to the MMO (and Natural England) post DCO approval, prior to construction.

Sandwaves and Large Ripples

3.8.38 The CBRA has determined that there are no sandwaves or large sand ripples in UK waters that would require pre-sweeping / large-scale flattening. The scale of sandwaves and ripples is such that cable burial below mobile sediment layers is expected to be achieved during normal installation procedures i.e. using MFE and/or 'surface plough'/leveller.

3.8.39 MFE utilises a jetting tool that uses high flow water jets to temporarily displace and suspend sediments for localised seabed excavation and levelling. Based on the provisional assessment of the geophysical survey data, the MFE is anticipated to be deployed infrequently (based on seabed type), potentially most appropriate to the seabed conditions in Bideford Bay.

3.8.40 Localised seabed levelling, where required, would be more likely undertaken by a pre-lay trench plough, with a swath width of 10-15 m (per trench). For the purpose of this ES, the entire 370 km UK Offshore Cable Corridor length is assumed to require deployment of the pre-lay trench plough. The assumed (worst case) area for pre-lay trench clearance is 11,100,000 m^2 (15 [width] x 370,000 [length] x 2 [number]).

Boulder Clearance

3.8.41 Areas of boulder fields have been identified along the route (as presented on Volume 1, Figure 3.11: Boulder densities along Offshore Cable Corridor), which will prevent burial of the cable bundles where they cannot be avoided by micro-routing. In these areas, a pre-lay plough and / or boulder grab may be deployed for boulder clearance purposes, to increase the likelihood of successful burial. It is anticipated that boulder clearance would be done by boulder grab in areas of low boulder density and by pre-lay plough in areas of high boulder density, however this is not prescriptive as the use of tools may be swapped due to operational requirements (for example a small area of low density boulders may be cleared by plough if between areas of high density boulder fields or vice versa).

3.8.42 The pre-lay plough has a boulder clearance swath width of 10-15 m. It is anticipated that up to approximately 200 km of the route may need deployment of the pre-lay plough for boulder removal. Any moved boulders would remain within the limits of the Offshore Cable Corridor.

Trench Ploughing

3.8.43 The pre-lay plough can also perform pre-cut trenching, to produce an initial trench to enable subsequent cable burial. The pre-lay plough has capability to perform boulder clearance, pre-cut trenching and backfill services (after cable lay). The pre-lay plough can operate in each mode independently or carry out the boulder clearance and pre-cut trenching activities simultaneously. During boulder clearance surface boulders are unearthed and relocated to an outer spoil berm. Siphoned soil from pre-lay plough trenching is relocated to an inner spoil berm to be used to backfill the trench after cable lay.

3.8.44 The profile of the pre-lay plough trench would be 500 mm (width) x 700 mm (depth) at its base, with a further 'Y' shaped profile where the cut depth is >700 mm. Where ground conditions allow the pre-lay plough can trench down to the target cable burial depth of approximately 1.5 m.

3.8.45 The disturbance width (swath) of the pre-lay plough in pre-cut trenching and backfill modes is 15 m.

Cable Installation Methods

3.8.46 The HVDC cables would be installed as two bundled pairs from a CLV. The specific CLV(s) that would install the HVDC cables is unknown at this stage and would be determined by the selected Cable Contractor. Based on CLV(s) currently in operation, it is anticipated that two turntables would be mounted on the CLV(s), each holding up to approximately 160 km of HVDC cable. As the CLV travels along the route, the two turntables release cable at the same rate and the two cables are bundled together at the stern of the vessel and fed overboard. An additional cable tank would contain the fibre optic cables, which would be installed as part of the bundle. Tensioners control the cable tension and cameras monitor the cable to ensure it is laid safely on target.

3.8.47 Based on the initial assessment of the geotechnical and geophysical survey data as part of the CBRA (outline CBRA presented as Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES), the cables will be buried along the entire route. For 220 km of the route it is anticipated that the cables will be protected by trenching and covered by natural sediments. It is anticipated that additional protection would be required along approximately 150 km of the route. Further details are provided in the following sections.

Cable Burial Method

3.8.48 Burying the cables would provide protection and avoid damage and future entanglement with fishing equipment or other marine users. Burial techniques available include trench ploughing (above), trench jetting, or mechanical trench excavation. Ground conditions suggest that trench jetting is unsuitable for the majority of the Offshore Cable Corridor, with potential exception of shallow coastal areas in Bideford Bay, or used as a remedial measure to be applied following mechanical trenching. Mechanical trenching (mechanical cutter mounted on a remotely operated vehicle (ROV)) is expected to be the main burial method in UK waters. The burial risk (as determined by the CBRA) along the Offshore Cable Corridor associated with trench jetting, mechanical trench excavation, and ploughing is shown on Volume 1, Figures 3.12 to 3.14.

3.8.49 Once the cables have been laid on the seabed (by the CLV), the ROV is lowered to the seabed until it straddles the cable bundle lying on the seabed. Where the mechanical cutter is deployed, the tool would lift the cables up above the seabed safely out of the way of the burial tool and would then feed the cables into the trench behind the tool. Where the water jetting ROV is deployed, two jetting legs (also known as swords) would extend down either side of the cable bundle and fluidise the seabed immediately below the cable bundle enabling it to sink under its own weight.

3.8.50 Cable burial depth would be monitored as the burial tool progresses. Where the target burial depth is not achieved on first pass of the tool, a second pass may be required using e.g. the water jet.

3.8.51 The footprint of the mechanical cutter ROV on the seabed is up to 126 m^2 (10 m width and 12.6 m in length) and the water jet ROV up to 55.2 m^2 (6 m width and 9.2 m length).

3.8.52 The average rate of trenching is typically 150 m per hour.

Additional Cable Protection

3.8.53 Preliminary investigations (outline CBRA, Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES) indicate that there is significant burial risk (due to e.g. hard seabed and / or boulder fields, the locations of which are shown on Volume 1, Figure 3.11) that may reduce the ability to protect the cables using the ROV tools for approximately 150 km of the total length of the Offshore Cable Corridor. In these areas, the pre-lay plough may pass through prior to cable lay to determine if a trench can be produced, followed by at least one pass of the mechanical cutter after the cable bundles had been surface laid with the aim of producing a trench that can be backfilled back to / close to the seabed surface. In areas where this is not possible, the final option would be for the cable to be covered with a layer of rock protection that extends above the level of the surrounding seabed (a rock berm). Indicative / estimated rock placement across the Offshore Cable Corridor is shown on Volume 1, Figure 3.15, as interpreted from burial assessment considerations; see e.g. the outline CBRA (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES).

3.8.54 Where required, rock protection would consist of rock ranging from coarse gravel to cobbles and be up to approximately 1 m high above the seabed. The rock source is currently not known but is highly probable to be either basaltic or granitic in origin (this will be dependent on selected rock placement contractor). Where possible rock placement would be limited to within trench and level with the existing seabed. Where rock berms are required (rock placement above sea bed level up to 1 m height), these would be constructed according to industry standards (including International Cable Protection Committee (ICPC) recommendations). Rock berms are only anticipated to be required in areas of shallow rock and boulder fields where the introduction of gravel/cobbles would not be a highly significant change of habitat i.e. rock placement will be least likely to be required where the baseline sea bed substrates are e.g. fine sands.

Cable Crossings

3.8.55 Where the cables cross other in-service cables, the cable would not be buried in a trench. The trench depth would taper to seabed level at a suitable distance from the in-service cable to be crossed and the Proposed Development cable would cross above the in-service cable. The Proposed Development cable would then be buried again on the other side of the in-service cable.

3.8.56 Where the Proposed Development cable crosses in-service cables, whether buried or surface laid, a layer of separation in the form of a pre-lay rock berm or pre-lay concrete mattress may be installed over the crossed asset. The Proposed Development cable would then also require protection in the form of a post-lay rock berm. The height of the concrete mattress and rock berm would be approximately 1.4 m above the seabed. The use of mattresses is anticipated to be very limited. Where they are necessary mattresses would be pre-formed, marine-grade concrete mattresses designed for very long-term deployment. Most of these specialist mattresses have integrated plastic handles / ropes for ease of deployment and installation. Given the specific design of these mattresses for long-term marine deployment, the potential for plastic degradation over time is assumed negligible, and due to the fact that mattresses will be covered with a rock berm / overlying sediments, any risk of degradation into the marine environment of plastics is further reduced. All crossings and crossing agreements would be in line with industry standards (including ICPC recommendations).

3.8.57 There are x20 active or planned cable crossings, the locations of which are shown on Volume 1, Figure 3.10. There are 18 planned crossings of active fibre optic cables (15 cables but three are crossed twice), one crossing of a fibre optic cable where installation is currently under way and one crossing of a planned power cable. (Thus, 20 in-service assets x 2 bipoles = 40 in-service asset crossing protection structures in total.)

3.8.58 As outlined in **paragraph 3.8.36**, there are also x27 OOS cables that cross the Offshore Cable Corridor which will have a short section removed where possible. As a worst case (given removal conversations with historical asset owners are ongoing), it is assumed that x5 of the OOS cables will require crossings (5 OOS cables x 2 bipoles = 10 OOS cable crossing protection structures in total).

3.8.59 The total asset crossing protection structures (across both bipoles) = 50 (40 in-service asset crossing protection structures and 10 OOS cable crossing protection structures). Precautionary dimensions for these crossings are assumed in this ES (e.g. in benthic ecology disturbance considerations – Volume 3, Chapter 1:Benthic Ecology of the ES) - a crossing approach length of 250 m either side of an existing asset is assumed. The crossing footprint for ES assessment purposes is 3500 m^2 per crossing which is considered a precautionary/worst case overall area estimate based on 500 m length x 7 m width (recognising that width may extend out to c.9.5m width in the immediate vicinity of the other asset). The total crossing footprint is assumed to be (3500 x 50) 175,000 m^2 (taken to be representative of a worst case footprint area). As suggested above the dimensions are considered precautionary and it is likely that the length of most crossings would be less than the maximum suggested here.

Cable Burial Depth, Width and Spacing

3.8.60 The intended depth at which the cables would be buried is up to a depth of 1.6 m, as detailed in the CBRA (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES). The outline CBRA finds an average target depth of 1.5 m, and average minimum depth of 0.8 m (n=42).

3.8.61 The width of the trench in which the cable bundles would be buried typically ranges from 0.5 to 1.5 m. The infrequent cable joints and FOC repeaters would require a short additional trench laid broadly parallel to the main cable. The trench width required for these infrequent FOC repeater cables would be narrower than the main trench (<50 cm).

Installation Vessels

3.8.62 Cable installation activities would be undertaken on a 24 hour / 7 day basis, unless interrupted by weather or other disruptions. This would maximise the available operational weather windows, vessel and equipment time, and minimise navigational impacts on other users of the sea.

3.8.63 A description of likely vessel groups to be utilised during the installation activities of the Proposed Development is provided below:

- Vessels for pre and post-installation survey works;
- Workboats/construction vessels and tugs for all works including route clearance/preparation, trenching, installation of rock protection/concrete mattresses, duct installation, cable pull and floating in, and dive support, depending on requirements. These workboats often deploy ROVs and would utilise geophysical survey and positioning equipment to monitor the progress of the works, and for positioning of any ROVs or other underwater equipment needed to complete the works;
- CLVs for cable laying;
- Guard vessels – as necessary, these would accompany the CLV to maintain surveillance around the worksite ensuring other vessels are kept clear i.e. reducing the risk of collision; guard vessels would also be deployed to protect the cable prior to burial;
- Rock placement vessel – where rock placement is required for additional cable protection (e.g. at cable crossings), a rock placement vessel may be used. Such vessels feature a rock storage hopper and equipment by which rock can be placed *in-situ* on the seabed, such as fall pipes; and
- Jack up vessel / multi-cat vessel – for the HDD works (breakthrough, duct push/pull and duct sealing works) near the landfall, jack up vessels would be deployed to enable stable and safe marine works in the subtidal environment.

3.8.64 The precise number of vessels to be used is to be determined by the Cable Contractor, however, indicative vessel types and numbers are presented in **Table 3.15**.

Table 3.15: Indicative construction phase vessel numbers

Vessel Type	Anticipated Total Number	Key Construction Activities	Indicative Total Number of Days	Comments
Cable lay vessel	2	Cable installation	144	Maximum of 2 at crossover, but only one laying at a time
Construction support vessel e.g. trenching support	5	Pre-lay trenching Cable protection	457	5 construction support vessels in total (cable protection + pre-lay trenching)
Rock protection vessel	2	Rock placement/ protection	352	
Jack-up barge	2	Landfall/HDD works Cable pull-through	120	
Guard vessel	20	Guard	3500	Up to 20, but likely much less on account of phased works
Survey vessel	2	UXO clearance Boulder clearance	90	2 survey vessels in total (UXO + boulder clearance)
Small tug	1	Pre-lay grapnel run	51	Included in the 20 'Guard vessel' numbers above, as will be complete ahead of any lay/ protection

Offshore Works Design Parameters

3.8.65 The design parameters of the offshore works are provided below in **Table 3.16**.

Table 3.16: Offshore Works Design Parameters

Infrastructure	Key Parameter	Maximum / Critical Design Parameter
Offshore Cable Corridor	Length of Offshore Cable Corridor from Mean High Water Springs to the EEZ	370 km
	Width of Offshore Cable Corridor	500 m (extending up to 1,500 m at some locations to provision for greater micro-routing flexibility e.g. at crossings)
Offshore Cable Design	Number of HVDC marine power cables	4
	Number of FOC	2
	Number of cable bundles or bipoles (one bundle is two HVDC Cables and one FOC)	2
	Number or FOC repeaters	Up to 5 per bundle (approximately one every 70 km along each bundle in UK waters)
	Number of FOC spurs	Up to 5 per bundle (at repeater locations)
HDD Marine Works	Number of HDD boreholes	4

Infrastructure	Key Parameter	Maximum / Critical Design Parameter
	Number of offshore exit pits	4
	Sediment clearance around each exit pit	Approximately 15 m x 15 m
	Exit pit overlying water depth (m LAT)	5 m (approximately 500 m offshore) or 10 m (approximately 1,800 m offshore)
	Separation between exit points for cables on the same circuit	40 m
	Separation between circuits	50 m
	Drilling fluid	Bentonite
Route Preparation	Width of grapnel hook for removal of seabed debris	Approximately 1 m
	Max penetration depth of grapnel hook	Approximately 1 m
	Swath width of 'pre-lay plough' for boulder clearance (where required)	Up to 15 m
	Swath width of 'pre-lay plough' for pre-lay trenching (where required)	Up to 15 m
Cable Installation	Number of cable trenches	2
	Cable burial depth	Target 1.5 m
	Trench width	0.5 – 1.5 m
	Cable trench spacing	50 – 180 m (up to 250 m in certain areas e.g. areas of high shipping density)
	Footprint of mechanical cutter ROV	up to 126 m^2 (10 m width and 12.6 m in length)
	Footprint of water jet ROV	up to 55.2 m^2 (6 m width and 9.2 m length)
	Number of OOS cable crossings (per bipole)	27 (with up to 5 OOS assets requiring crossing structures)
	Number of in-service cable crossings (per bipole)	20
	Maximum footprint of cable crossing structures	Approximately 3,500 m^2 (500 m length; 7 m wide)
	Cable installation working hours	24 hours / 7 day basis
	Rock berms	Installed as last resort where burial not possible – up to approximately 1 m high
	Rock berms at crossings	Up to approximately 1.4 m high
	Expected number of vessels for cable installation	CLV – 1 (briefly 2 at changeovers); construction support e.g. trenching vessels – up to 5; guard vessels – up to 20 across entire Offshore Cable Corridor; Rock placement vessels – 2

3.9 Embedded Mitigation Measures

3.9.1 The EIA Regulations require a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment. A number of embedded mitigation measures are proposed which form part of the Proposed Development. These include measures that are part of the design itself such as modifications to the location or design aspects and also those measures required to meet other legislative requirements or standard practices.

3.9.2 For the purposes of the EIA process, the mitigation measures proposed as part of the Proposed Development include the following types of mitigation measures (adapted from the Institute of Environmental Management and Assessment (IEMA), 2016).

- 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 Proposed Development 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*'. It may be helpful to secure such measures 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 may be secured through an environmental management plan.

3.9.3 The following tables provide a list of embedded mitigation measures (primary and tertiary measures) that would be utilised as part of the Proposed Development. Additional mitigation measures, specific to individual topics, are provided within individual topic chapters and in Volume 1, Appendix 3.1: Commitments Register.

Table 3.17: Onshore embedded (primary and tertiary) mitigation measures

Commitment Reference	Commitment / Mitigation Measure	How will it be Secured?
Embedded Mitigation		
ONS01	The site selection and route refinement process for the Proposed Development has considered the locations of statutory and non-statutory designated sites, recreational resources and special category land, which have been directly avoided, where reasonably practicable. Where this has not been possible, the design of the Proposed Development includes measures to minimise impacts, such as the use of trenchless construction techniques, for example, at the Landfall and to cross the River Torridge. Where reasonably practicable, protected and unprotected areas of woodland, mature and protected trees (i.e. veteran trees), as well as other ecologically sensitive habitats have and will be avoided.	DCO Schedule 1, Authorised Development.
ONS02	The following infrastructure, sensitive sites/features and recreational resources are proposed to be crossed using trenchless methodologies, as set out within the Onshore Crossing Schedule to be submitted as part of the application for development consent: • The Mermaid's Pool to Rowden Gut Site of Special Scientific Interest (SSSI), the beach and the South West Coastal Path, situated along the coastline at the landfall, Cornborough Range. • The following watercourses/woodland: – Kenwith Stream, situated just south of Rickard's Down and approximately 300 m north of Abbotsham. – A small stream, 290 m south of Jennetts reservoir and to the west of West Ashridge, which feeds into Jennetts reservoir. – River Torridge, to the south of Bideford (to note, one HDD will cross the River Torridge, A386 and the Tarka Trail). • The following major roads: – A39, at a section approximately 250 m south west from the Abbotsham Cross roundabout and north west from High Park Farm. – A386, to the south of Bideford (as stated above, one HDD will cross both the River Torridge and A386). • A site of suspected archaeological assets at Winscott Barton.	DCO Schedule 1, Work No. 9 and Associated Development. DCO Schedule 2, Requirement 7 (Management plans).
ONS03	The Onshore HVDC Cables and HVAC Cables will be completely buried underground for the entire length. Joint bays will be completely buried, with the land above reinstated. A maintenance cover will be provided on the surface for link boxes for access during the operation and maintenance phase.	DCO Schedule 2, Requirement 7 (Management plans)

Commitment Reference	Commitment / Mitigation Measure	How will it be Secured?
ONS04	An Outline Decommissioning Strategy has been submitted as part of the application for development consent (document reference 7.18), 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)
ONS12	All temporary working areas for the landfall, Onshore HVDC Cable Corridor, Converter Site, temporary compounds and HVAC Cable Corridors would be clearly marked and secured with appropriate fencing. This would be carried out in accordance with the Outline On-CEMP (document reference 7.7) and in accordance with Construction (Design and Management) Regulations 2015 requirements.	DCO Schedule 2, Requirement 7 (Management plans).
ONS13	Haul road(s) would be installed within the temporary working area of the Onshore HVDC Cable Corridor to minimise impacts during construction on agricultural land and reduce the number of construction vehicles on the local road network, as reasonably practicable.	DCO Schedule 1, Work No. 3 DCO Schedule 2, Requirement 8 (Construction Traffic Management Plan) DCO Schedule 2, Requirement 7 (Management plans)
ONS14	The Onshore HVDC Cables and HVAC Cables would be installed within the respective cable corridors in cable ducts, as opposed to using a direct lay installation method. This allows timely closure of trenches pending later installation (pulling-through) and jointing of cables.	DCO Schedule 2, Requirement 7 (Management plans)
ONS15	The design of the proposed Converter Site would include cut and fill earthworks to provide a suitable development platform for the converter stations whilst utilising the local topography to integrate the buildings in the landscape. Additional visual screening in the form of constructed earth bunds and planting would further reduce the landscape and visual impact of the converter	DCO Schedule 2, Requirement 4 (Detailed design approval); DCO Schedule 2, Requirement 7 (Management plans)

Commitment Reference	Commitment / Mitigation Measure	How will it be Secured?
	stations. The design of the landscaping would be detailed and stakeholders feedback incorporated as far as reasonably practicable.	
ONS16	The main construction compounds along the Onshore HVDC Cable Corridor would include the following: • the A39 compound situated next to the Abbotsham Cross roundabout; and • the Gammaton Road compound, which is situated between Tennacott Lane and Gammaton Road, and to the south of East-the-Water. These construction compounds would form the main compounds for the construction workforce and are situated in areas easily accessible from the A39 and Manteo Way, respectively. This would allow construction vehicles to be directed towards the relevant compounds whilst reducing movements along minor roads as far as reasonably practicable.	DCO Schedule 1, Works No. 2 DCO Schedule 2, Requirement 8 (Construction Traffic Management Plan)
ONS27	The Converter Site would be designed in line with the Design Principles Document (document reference 7.4) that accompanies the application for development consent. The design of the converter station will comply with all relevant statutory requirements including building regulations, building control requirements and fire safety in consultation with the fire authority as far as reasonably practicable.	DCO Schedule 2, Requirement 4 (detailed design approval)
ONS32	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) would be developed in accordance with the Outline On-CEMP. The On-CEMP(s) would incorporate measures to ensure that any potential environmental impacts would be minimised during construction. The On-CEMP(s) would include measures to maintain and address the following topics: • ecology and nature conservation (including protected species and invasive species); • surface water and groundwater environment (including flood protection and control, drainage, and pollution prevention); • transport and access; • noise management measures; • air quality and dust management; • land use and recreation; • landscape and visual; • historic environment; • climate change; • waste management; • site security; and	DCO Schedule 2, Requirement 7 (Management plans)

Commitment Reference	Commitment / Mitigation Measure	How will it be Secured?
	• health and safety.	
ONS38	Post-construction, the working area would be reinstated to pre-existing condition as far as reasonably practicable, in line with the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298), Institute of Quarrying (IQ) Good Practice Guide for Handling Soils in Mineral Workings (IQ, 2021) and British Society of Soil Science (BSSS) Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (BSSS, 2022). All haul roads, temporary construction compounds and temporary fencing would be removed, field drainage and/or irrigation would be reinstated in consultation with landowners, and the land would be reinstated to its original condition, as far as reasonably practicable. Where practicable, consideration would be given to early restoration of sections of the Onshore HVDC Cable Corridor.	DCO Schedule 2, Requirement 7 (Management plans)
ONS86	Construction site lighting would only operate when required and would be designed, positioned and directed to avoid unnecessary illumination of adjacent properties, sensitive ecological receptors and users of public footpaths as far as reasonably practicable. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be detailed within the Onshore Construction Environmental Management Plan(s) (On-CEMP(s)). The design of the construction site lighting will accord with the details provided in the Outline On-CEMP.	DCO Schedule 2, Requirement 7 (Management plans)
ONS87	Operational lighting at the Converter Site would be designed in accordance with the Design Principles Statement (document reference 7.4), as well as the latest guidance and legislation. The details of the location, height, design and luminance of lighting to be used would be provided as part of the detailed design. The operational lighting would be designed to avoid illumination of areas beyond the operational site as far as reasonably practicable. The design would include: - directional lighting to minimise overspill into the surrounding landscape. - operational outdoor lighting at the Converter Site boundary normally set to motion-activated security lighting.	DCO Schedule 2, Requirement 4 (Detailed design approval)
ONS88	Normal construction working hours would be Monday to Friday 07:00-19:00 and Saturday 07:00-13:00. However, some operations may require work to take place outside these times. For example, abnormal indivisible loads (AIL) may be encouraged or required to travel overnight and crossings of roads may be constructed overnight to minimise disruption to traffic. In certain circumstances, specific works may have to be undertaken on a continuous working basis (00:00 to 00:00, Monday to Sunday). During this period, the contractor may undertake	DCO Schedule 2, Requirement 12 (Construction hours) DCO Schedule 2, Requirement 7 (Management plans)

Commitment Reference	Commitment / Mitigation Measure	How will it be Secured?
	activities that require continuous working hours, which will be notified to the relevant local authority in writing. These activities include, but may not be limited to: • HDD (or other trenchless technology) operations. These activities may require 24-hour machinery operation, dependent on the ground conditions; • continuous concrete pours; • converter station component installation; • oil filling of transformers at the converter stations; • jointing operations along the Onshore HVDC Cable Corridor; and • testing and commissioning. The normal working hours exclude start up and close down activities, which could take place up to one hour either side of the normal working hours. This includes the following activities: • arrival and departure of the workforce at the site and movement around the main Proposed Development that does not require the use of plant; • site inspections and safety checks; and • site housekeeping that does not require the use of plant.	

Table 3.18: Offshore embedded (and foreseeable) mitigation measures

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
Embedded Mitigation		
OFF01	Cables will be buried (where possible) up to a maximum of approximately 1.6 m below the seabed, as informed by detailed Cable Burial Risk Assessment (CBRA). The average target depth is 1.5 m. Only when full burial is not possible will additional protection be installed.	Design parameters set out in the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF02	Cable protection measures - Where possible introduced cable protection i.e. rock placement (and potentially concrete mattresses), would be kept level with the seabed, and if above the seabed would be kept to a maximum of c.1 m above seabed level (excluding crossings) as far as reasonably practicable.	Design parameters set out in the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF03	Micro-routing of the offshore cables, within the defined Order Limits, will be undertaken to minimise any potential damage to geogenic and biogenic Annex I habitats, to avoid sand waves or large ripples (that would otherwise require pre-lay seabed flattening), and to avoid direct impacts as far as reasonably practicable on archaeology and cultural heritage assets and submerged land surfaces.	Set out as 'Further Commitments' in the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF04	All ships subject to the Ballast Water Management Convention (2017) requirements will be obliged to conduct ballast water management in accordance with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022.	Regulatory requirement. Also pre-requisite of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF05	An Offshore CEMP will set out the detailed approach to offshore construction activities and would implement those measures and environmental commitments identified in the EIA as far as reasonably practicable. The following measures will be included in the Offshore CEMP: marine pollution prevention; waste management; marine invasive species (via the Offshore Biosecurity Plan); and dropped object procedures. An Outline Offshore CEMP (document reference 7.9) forms part of the application for DCO (with a final Offshore CEMP finalised by the offshore contractor).	The Outline Offshore CEMP (document ref. 7.9) is a requirement of the Deemed Marine Licence.
OFF06	An Offshore Biosecurity Plan will be implemented as far as reasonably practicable, which will incorporate a biosecurity risk assessment (to assess the likelihood of introducing Marine Invasive Non-Native Species during all phases of the Proposed Development). An outline Offshore Biosecurity Plan (document reference 7.19) forms part of the application for DCO (with a final Offshore Biosecurity Plan finalised by the offshore contractor).	The Offshore Biosecurity Plan is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
		in the Deemed Marine Licence.
OFF07	A Marine Pollution Contingency Plan (MPCP) will form part of the final Offshore CEMP and will include measures to minimise as far as reasonably practicable the impact of any pollution events arising from the Proposed Development, and will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL).	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF08	For compliance with the requirements of MARPOL, all Proposed Development vessels with a gross tonnage (GT) above 400 tonnes will require a Shipboard Oil Pollution Emergency Plan (SOPEP) detailing the emergency actions to be taken in the event of an oil spill.	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF09	HDD methods will be employed to avoid as far as reasonably practicable any direct disturbance of the intertidal zone, the beach and the coastal cliffs.	Works Activity as set out in the Deemed Marine Licence.
OFF10	The HDD drill system will be designed to allow for the monitoring of pressure loss and therefore provision for the rapid identification of potential break out.	Outline Bentonite Breakout Plan requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF11	The Navigational Safety and Vessel Management Plan (NSVMP) will confirm the types and numbers of vessels that would be engaged on the Proposed Development and consider vessel coordination including indicative transit route planning. The NSVMP will include protocols for vessel communications, lighting and maintenance of "safe" distances (which will be monitored by guard vessels during the construction period). An outline NSVMP is provided as Volume 3, Appendix 5.2 Navigational Safety and Vessel Management Plan of the ES; the NSVMP will be updated to final by the offshore construction contractor.	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF12	Route optimisation studies, including multiple desktop studies and marine investigation surveys, have informed the routing of the Offshore Cable Corridor to avoid sensitive locations where possible and as far as reasonably practicable (including known sites of archaeological interest).	The Offshore Cable Corridor is defined in the deemed Marine Licence authorised scheme grid coordinates.
OFF13	A Fisheries Liaison Officer (FLO) will be appointed throughout the construction phase. The FLO will support ongoing liaison between the Applicant and commercial fishery stakeholders.	Listed requirement of the Deemed Marine Licence.
OFF14	Compliance with international legislation will be expected of all Proposed Development vessels as set out in the Navigational Safety and Vessel Management Plan. This includes the International Regulations for Preventing Collisions at Sea (COLREGs) 1972 and International Convention for the Safety of Life at Sea (SOLAS) 1974.	Via common legislation. Also pre-requisite of the Outline Offshore CEMP (document ref. 7.9), secured

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
		in the Deemed Marine Licence.
OFF15	Cable installation vessels and support vessels will display appropriate lights and marks at all times, and where possible, broadcast their status on AIS (Automatic Identification System). This will include indication of the nature of the work in progress and highlight their restricted manoeuvrability.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF16	Guard vessel(s) will be employed to work alongside the installation vessel(s) during the construction period. These will alert as far as reasonably practicable third-party vessels to the presence of the installation activity and provide support in the event of an emergency.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF17	Passing vessels will be requested to maintain a "safe" distance from installation vessels restricted in manoeuvrability. This will be monitored where required by guard vessel(s). Procedures will be set out in the final Navigational Safety and Vessel Management Plan (an Outline Navigational Safety and Vessel Management Plan is presented with the application for DCO, as Volume 3, Appendix 5.2).	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF18	Data will be shared with the UK Hydrographic Office and the Marine Management Organisation in accordance with the Deemed Marine Licence, for inclusion on Admiralty Charts (with associated note/warning about anchoring, trawling or seabed interaction).	Data sharing with UKHO provisioned on Deemed Marine Licence.
OFF19	A dropped objects procedure will be put in place detailing the requirements and procedures for vessel operators to identify, record, notify the MMO and, as far as reasonably practicable where required by the procedure, recover dropped objects. The dropped objects procedure will form part of the final Offshore CEMP which will be finalised by the offshore contractor).	Via the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF21	Compass deviation effects will be minimised as far as reasonably practicable through cable design (bundled bipole installation) and burial. If there are any changes in the design and it cannot be demonstrated that MCA requirements for compass deviation can be met, a post-construction compass deviation survey will be undertaken.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF22	Relevant policy guidance on water depth reduction has been followed during the design of the project. During final engineering design and construction, should any areas be identified where cable protection is required and the Maritime and Coastguard Agency (MCA) condition of no more than 5% reduction in water depth is not achievable as far as reasonably practicable, a location specific review of impacts to shipping and consultations with the MCA will be carried out to agree additional mitigations as required.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
OFF23	Information pertinent to navigation will be promulgated via NtM, Kingfisher bulletins, the Kingfisher Information Service – Offshore Renewable & Cable Awareness (KIS-ORCA) service, Radio Navigational Warnings on Very High Frequency (VHF) radio, Navigational Telex (NAVTEX), and/or broadcast warnings in advance of and during the offshore works. Details to be set out in the Navigational Safety and Vessel Management Plan.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF24	Regular liaison will be undertaken with the pilotage service at Bideford to reduce potential for any impact on vessel access and disruption to local shipping activities as far as reasonably practicable.	Via NSVMP which is a requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF25	Cable crossing and proximity agreements will to be entered into with asset owners as far as reasonably practicable. Crossing design will adhere to industry standard to minimise fishing gear snagging risk.	Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF27	Protocol for Archaeological Discoveries (PAD) - Additional unknown or unexpected cultural heritage and marine heritage features identified during the project stages will be reported utilising the project specific PAD, which is appended to the ES (Volume 3, Appendix 7.6 Protocol for Archaeological Discoveries of the ES) and which is an integrated requirement of the OOWSI.	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence. Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF28	An Offshore Outline Archaeological Written Scheme of Investigation (OOWSI) accompanies the ES, with site-specific WSIs produced prior to commencing construction to inform specific investigation activities to record cultural heritage assets and subsequently the production of a post-excavation report and, if warranted, further dissemination of results, i.e. publication in relevant journals or the production of a monograph. An OOWSI is presented within the application for DCO as Volume 3, Appendix 7.5 Outline Offshore Archaeological Written Scheme of Investigation of the ES.	Specified requirement of the Deemed Marine Licence.
OFF29	100m Archaeological Exclusion Zones (zone in which no construction activities will take place) are committed around the extents of known (x1 site identified) wreck sites and anomalies of archaeological interest. This commitment will lead to archaeological preservation in-situ.	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence.
OFF30	100m Archaeological Exclusion Zones (zone in which no construction activities will take place) are committed around the recorded point locations of a) previously recorded sites that have not been seen in the geophysical data but at which archaeological material is likely to be present, possibly buried; and b) around magnetic anomalies interpreted (based on their magnetic anomalies) as substantial ferrous debris	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence.

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
	but buried with no surface expression. There are x3 such point locations identified (in total). This commitment will lead to archaeological preservation in-situ.	
OFF31	30m Archaeological Exclusion Zones (zone in which no construction activities will take place) are committed around the extent of likely anthropogenic debris. There are x1 such points identified. This commitment will lead to archaeological preservation in-situ.	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence.
OFF32	Geophysical anomalies identified within the offshore archaeological assessment will be avoided where possible by micro-routing as far as reasonably practicable. Where this is not possible the Offshore Written Scheme of Investigation will provide the framework for potential further actions (an Outline Offshore Archaeological Written Scheme of Investigation is presented with the application for DCO as document ref. 6.3.7.5). This commitment will lead to archaeological preservation in-situ.	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence.
OFF33	Further investigation of identified anomalies and previously recorded sites that cannot be avoided by micro-routing of design will be undertaken within the framework of the Offshore Written Scheme of Investigation (an Outline Offshore Archaeological Written Scheme of Investigation is presented with the application for DCO as document ref. 6.3.7.5).	OOWSI (document ref. 6.3), secured in the Deemed Marine Licence.
OFF34	All potential sediment disturbance activities in Bideford Bay are to avoid peak spring tides and significant wave activity, to limit any potential for sediment mobilisation as far as reasonably practicable. These activities would include the excavation / sediment clearance at the HDD exit pits and trenching works.	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF36	All construction activities undertaken on the seabed including boulder clearance activities (inclusive of the depositing of moved boulders) will remain entirely within the Offshore Cable Corridor, and a minimum distance of 20 m from any Marine Conservation Zone boundary.	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF37	Ministry of Defence (Defence Infrastructure Organisation) will be provided with details of as laid rock protection and post-installation survey data.	Specified requirement of the Deemed Marine Licence.
Secondary (Foreseeable) Mitigation		
OFF20	The dedicated project FLO will engage with local fishers to minimise potential disruption as far as reasonably practicable. Any claim of loss of / or damage to fishing gear will be processed, in line with protocols laid out within the guidance produced by the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) and "Recommendations for Fisheries Liaison: Best Practice", in particular section 9: Dealing with claims for loss or damage of gear (Further mitigation).	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.
OFF26	Archaeological assessment of available data - Offshore geophysical surveys (including future UXO surveys as necessitated) and any additional offshore geotechnical campaigns undertaken pre-construction (if required) will be subject to archaeological review, where relevant in consultation with Historic England. Relevant results from geotechnical surveys will be released / shared with Archaeology	Outline Offshore Archaeological Written Scheme of Investigation (OOWSI) (document ref.

Commitment Number	Commitment / Mitigation Measure	How will it be secured?
	Data Service (ADS), with the aim to enhance the paleogeographic knowledge and understanding of the area as far as reasonably practicable.	6.3), secured in the Deemed Marine Licence.
OFF35	Geophysical survey and associated marine archaeological review of these data will be undertaken of the area to the east of blocks U28 and U29 where there are data gaps. (These data gaps were introduced following expansion of the Offshore Cable Corridor to allow flexibility and increased separation distance from potential future infrastructure in The Crown Estate's Project Development Area 3) Final micro-routing in this area would rely on post-consent geophysical surveys undertaken at the time of/in combination with the Unexploded Ordnance surveys.	Requirement of the Outline Offshore CEMP (document ref. 7.9), secured in the Deemed Marine Licence.

3.10 Onshore Construction Environmental Management (including Landfall)

Introduction

3.10.1 The Landfall and onshore elements of the Proposed Development would be constructed in an environmentally sensitive manner. They would meet the requirements of all relevant legislation, codes of practice and standards as identified in the topic chapters of this ES and would limit the adverse effects on the local community and environment as far as reasonably practicable.

3.10.2 Key environmental principles and measures during construction of the onshore works are set out in this section. Details of all mitigation measures proposed at this stage of the EIA process are provided within Volume 1, Appendix 3.1: Commitments Register, of the ES.

Construction Environmental Management

3.10.3 Construction of the Proposed Development would be managed through the On-CEMP(s) that set out the principles of good environmental management to be followed in order to avoid or minimise environmental impacts. This includes principles for the management of construction noise, dust, traffic, materials storage and waste management, drainage and ecological protection.

3.10.4 An Outline On-CEMP has been developed and submitted as part of the DCO application (document reference 7.7). The Outline On-CEMP would be developed into a final On-CEMP(s), which would be agreed with Torridge District Council prior to the commencement of construction. The final On-CEMP(s) shall include the measures set out in the Outline On-CEMP, together with any further detail available at that time.

3.10.5 The final On-CEMP(s) would be supported by detailed Construction Method Statements to be produced by the lead construction contractor(s), which would provide method statements for construction activities detailing how the requirements for the final On-CEMP(s) are met.

3.10.6 In a similar manner, a CTMP(s) would be produced by onshore main works Contractors prior to the commencement of construction, based on the Outline CTMP (document reference 7.12) which has been developed and provided as part of the application for development consent.

Construction Working Hours

3.10.7 Normal construction working hours would be Monday to Friday 07:00-19:00 and Saturday 07:00-13:00. However, some operations may require work to take place outside these times. For example, abnormal indivisible loads (AIL) may be encouraged or required to travel overnight and crossings of roads may be constructed overnight to minimise disruption to traffic.

3.10.8 In certain circumstances, specific works may have to be undertaken on a continuous working basis (00:00 to 00:00, Monday to Sunday). During this period, the contractor may undertake activities that require continuous working hours, which will be notified to the relevant local authority in writing. These activities include, but may not be limited to:

- HDD (or other trenchless technology) operations. These activities may require 24-hour machinery operation, dependent on the ground conditions;
- continuous concrete pours;
- converter station component installation;
- oil filling of transformers at the converter stations;
- jointing operations along the Onshore HVDC Cable Corridor; and
- testing and commissioning.

3.10.9 The normal working hours exclude start up and close down activities, which could take place up to one hour either side of the normal working hours. This includes the following activities:

- arrival and departure of the workforce at the site and movement around the main Proposed Development that does not require the use of plant;
- site inspections and safety checks; and
- site housekeeping that does not require the use of plant.

Construction Working Areas and Laydown

3.10.10 The main construction working, and laydown areas would be contained within the Proposed Development site boundaries. Temporary construction compounds would be required along the Onshore HVDC Cable Corridor and at the Converter Site. Details regarding the temporary construction compounds are provided in **paragraphs 3.7.112 to 3.7.118**.

3.10.11 In line with National Highways' water preferred policy (National Highways, 2019) for transporting AILs, it is anticipated that Appledore Quay, Bideford would be used for import and storage of transformers, cable drums and potentially other large items. The AIL routes considered within this ES are presented within Volume 1, Figure 3.8.

Construction Fencing

3.10.12 All temporary working areas within the Order Limits, including the Onshore HVDC Cable Corridor, Converter Site (including HVAC cable works), and Landfall, would be clearly marked and secured with appropriate fencing to restrict unauthorised access. Security at the Converter Site would be carefully managed during construction commensurate with its state of completion.

3.10.13 Where possible, allowances would be made for private land access, livestock crossing and relevant ecological constraints in consultation with individual landowners.

3.10.14 The type of temporary fencing to be used would be dependent on the land use. Fencing would be installed as part of the early construction works. Fencing details would be confirmed during detailed design in consultation with affected landowners

3.10.15 Furthermore, construction compounds may employ hoardings at the perimeter or at task specific locations.

3.10.16 All boundary fences/screens would be maintained in a tidy condition and would be fit for purpose.

3.10.17 All temporary screening and fencing would be removed as soon as reasonably practicable after completion of the works.

3.10.18 Where possible, access to construction areas would be limited to specified entry points and all personnel entries/exits would be recorded for security and health and safety purposes.

3.10.19 Where the haul road meets a public highway, it would be gated or otherwise secured, where feasible and necessary, to prevent unauthorised access. Further details relating to construction traffic are included within the Outline CTMP (document reference 7.12), which forms part of the application for development consent.

Lighting

3.10.20 External lighting of the construction areas would only operate when required and would be designed, positioned and directed to ensure:

- the necessary levels of lighting for safe working are provided; and
- the unnecessary illumination of adjacent properties, sensitive ecological receptors and users of public footpaths, would be avoided.

3.10.21 In accordance with the Bat Conservation Trust recommendations, lighting would be directed away from features with potential for roosting, foraging and commuting bats.

3.10.22 Lighting during construction would take into account the requirements set out in BS EB 12464-2:2014 (BSI, 2014). Lighting units would be designed to minimise light illumination outside the construction works area. This would be achieved through the use of directional and task orientated lighting which would be fully shielded where possible. In addition, when lighting is not required it would be switched off.

3.10.23 However, outside normal working hours, motion-activated directional security lighting may be used at the Converter Site and where required/on demand for the buried Onshore HVDC Cable Corridor, and at the construction compound areas. This is to ensure the safety and security of the site.

3.10.24 Further details on the design of construction lighting would be included within the On-CEMP(s), which would be developed in accordance with the Outline On-CEMP (document reference 7.7).

Cable Crossings

Hedgerow Crossings

3.10.25 The design of the Proposed Development has considered the location of important ecological features, such as woodland, important hedgerows, and watercourses.

3.10.26 Design of the Onshore HVDC Cable Corridor has sought to minimise the impact on mature vegetation both through routing choice and narrowing the route where it crosses important hedgerows (including Devon hedgerows). However, where hedgerows and trees are affected by the construction of the Onshore HVDC

Cable Corridor they would be removed, except for sections of the route where HDD is proposed (such as beneath substantial areas of woodland). In addition, hedgerow removal may be required to allow for access and to meet visibility requirements at access points within the construction work areas.

3.10.27 Hedgerows would be removed outside of the bird nesting season so that nesting birds are not disturbed. Hedgerow removal would be carried out under a European Protected Species licence and would utilise a two-phased clearance to ensure the protection of dormice. The Proposed Development would include the full reinstatement of hedges on a "like for like" basis that would be undertaken on completion of cabling works. Where appropriate, hedgerow enhancement would be carried out to improve the habitats and increase biodiversity and outside within the Order Limits.

3.10.28 An Outline LEMP has been developed as part of the DCO (document reference 7.10). The Outline LEMP includes a plan to monitor establishment and progress of newly created habitats (and those areas where reinstatement has been undertaken), along with ongoing management measures to ensure that new habitats fully develop and remain functional into the future. The final LEMP(s) and associated measures would be developed in accordance with the Outline LEMP and in line with consultation and stakeholder feedback.

3.10.29 As stated in **paragraph 3.10.26**, the typical corridor width would be reduced when crossing important hedgerows (as defined by the Hedgerows Regulations 1997) or where other constraints create a 'pinch point'. The reduced width would be achieved through engineering techniques such as:

- using lower thermal resistivity backfill in the cable trench; and/or
- removing spoil to a storage area further up or down the cable corridor (away from the reduced working width location), thereby negating the need to store spoil adjacent to the trenches.

3.10.30 Further details on hedgerow removal are presented in Volume 2, Chapter 1: Onshore Ecology and Nature Conservation, of the ES.

Road Crossings

3.10.31 Where the Onshore HVDC Cable Corridor crosses local roads and private accesses, access to properties and settlements would be retained. Where diversions on the existing road network are readily available, temporary road closures may be undertaken.

3.10.32 Road closures will be phased in order to ensure that access is retained to all villages and properties. Further details are provided within the Outline CTMP (document reference 7.12).

3.10.33 Most minor roads under 4 m in width would be closed for short periods over approximately 1-2 days per cable trench. Traffic would be controlled by either putting in place a diversion if there are alternative roads to facilitate access.

3.10.34 A temporary construction haul road would be constructed within the Onshore HVDC Cable Corridor to enable access along the corridor from the temporary construction compounds. In instances where the haul road crosses sections of the existing road network, measures will be implemented through the CTMP to manage the road crossings.

3.10.35 HDD would be required for the crossing of major roads (e.g., A39), as detailed within **paragraph 3.7.140**.

Watercourse Crossings

3.10.36 As detailed within **paragraph 3.7.125**, the Proposed Development includes the crossing of the following watercourses via HDD (or other trenchless methodologies):

- Kenwith Stream;
- an unnamed watercourse 290 m south of Jennetts Reservoir and to the west of West Ashridge, which feeds into Jennetts Reservoir; and
- the River Torridge.

3.10.37 However, where required, trenched techniques may be used for the crossing of field drains, ditches and small streams. In these instances, measures would be implemented to protect water quality and flow and these are detailed within the Outline On-CEMP (document reference 7.7).

3.10.38 Temporary haul roads serving the Onshore HVDC Cable Corridor during the construction phase may require the installation of temporary crossings over ordinary watercourses. In these instances, a temporary culvert bridge crossing would be required. The dimensions of temporary culvert bridge crossings for the haul road will be a maximum 3 m in diameter and 10 m in length.

Woodland Crossings

3.10.39 As part of the site selection process, the design of the Proposed Development has considered the locations of woodland, mature and protected trees (e.g. veteran trees), as well as other ecologically sensitive habitats. This has involved the avoidance of woodland areas, as far as possible.

3.10.40 The following areas of woodland are situated within the Order Limits:

- Wooded area associated with the unnamed watercourse that flows into Jennetts Reservoir, to the west of West Ashridge – At this location, an HDD would be required to pass beneath the watercourse and wooded banks.
- Lodge Plantation Unconfirmed Wildlife Site (UWS), to the immediate east of the River Torridge – At this location, an HDD would be routed beneath the River Torridge, Tarka Trail and the Lodge Plantation UWS. Construction working areas associated with this crossing would be located outside of any designated areas.

Construction Workforce and Access

3.10.41 Access would be required for HGVs, AILs for certain items (drill rigs, transformers, cable drums, large cranes or construction plant) and for construction workforce traffic. Cable corridor construction traffic would enter and leave at the main compound locations before moving along the route on purpose built temporary haul roads.

3.10.42 Access to the Converter Site during construction may similarly utilise the Onshore HVDC Cable Corridor in addition to the minor road network depending upon the sequencing of the proposed road widening.

3.10.43 The construction workforce is expected to be up to 400 FTE workers. The indicative programme is detailed within **Plate 3.1**.

3.10.44 This would be managed through CTMP(s), which would be agreed with Torridge District Council prior to the commencement of construction. Construction workforce traffic would use the A39 as far as possible to minimise travel along local roads. However, some local roads would need to be used to reach some parts of the cable corridor. Temporary internal haul routes would be constructed along sections off the cable route to remove frequent vehicle movements from the public highway.

3.10.45 Measures would be implemented to minimise dust, mud and debris associated with the movement of construction vehicles. These measures would be implemented through the final CEMP(s) and CTMP(s).

3.10.46 On completion of construction, temporary vehicle accesses would be reinstated to the original highway.

Construction Drainage

3.10.47 The construction phase would incorporate pollution prevention and flood response measures to ensure that the potential for any temporary effects on water quality or flood risk are reduced as far as practicable.

3.10.48 Such measures would be implemented through the Pollution Prevention Plan and Construction Drainage Strategy that would be appended to the On-CEMP(s). An outline version of the Pollution Prevention Plan forms Appendix A to the Outline On-CEMP (document reference 7.7). The Outline On-CEMP also includes details relating to the Construction Drainage Strategy, to be developed prior to construction.

3.10.49 Measures would include but not limited to the following:

- installation of suitable facilities to remove material (e.g., mud and dust) from wheels;
- use of sediment fences along existing watercourses/waterbodies when working nearby to reduce sediment load;
- covers for lorries transporting materials to/from site to prevent releases of dust/sediment to watercourses/drains;
- bulk storage areas to be secured and provided with secondary containment (in accordance with the Oil Storage Regulations and best practice);
- storage of oils and chemicals away from existing watercourses, including drainage ditches or ponds;
- concrete to be stored and handled appropriately to prevent release to drains;
- treatment of any runoff water that gathers in the trenches would be pumped via settling tanks or ponds to remove any sediment;
- obtain consent/permit for any works (e.g., discharge of surface water, dewatering, etc.) that may affect surface water and/or groundwater. The conditions of the consent will be specified to ensure that construction does not result in significant alteration to the hydrological regime or an increase in fluvial risk;

- use of a documented spill procedure and use of spill kits kept in the vicinity of chemical/oil storage;
- storage of stockpiled materials on an impermeable surface to prevent leaching of contaminants and use of covers when not in use to prevent materials being dispersed and to protect from rain; and
- stockpiles to be kept to minimum possible size with gaps to allow surface water runoff to pass through.

Dewatering

3.10.50 The construction of the transition joint bays, onshore HVDC Cables, HVAC Cables and associated joint bays or link boxes would require dry excavations. Therefore, the dewatering of open trenches and excavations may be required where shallow groundwater is encountered. Dewatering refers to the process of removing or draining groundwater or surface water from a trench, watercourse, ditch, etc.

3.10.51 The groundwater removed by dewatering would be pumped to an appropriate location to allow any sediments present to be settled, prior to discharge to purpose built soakaways or local surface watercourses or across ground away from the excavations.

3.10.52 In the event that trenches need dewatering, water from such activities would be discharged in agreement with Devon County Council and/or the Environment Agency to a local drainage ditch or watercourse and/or spread over ground. This would be undertaken in accordance with measures agreed through the On-CEMP and Pollution Prevention Plan.

Construction Waste

3.10.53 Waste will be generated as a result of the Proposed Development, with most waste expected to be generated during the construction and decommissioning phases. In accordance with Government policy contained in NPS EN-1 (DESNZ, 2023a), consideration will be given to the types and quantities of waste that will be generated.

3.10.54 Procedures for handling waste materials will be set out in the following plans.

- Site and Resource Waste Management Plan (SRWMP) to be developed in accordance with the Outline SRWMP, appended to the Outline On-CEMP (document reference 7.7). The SRWMP will describe quantities of likely waste type arising from the Proposed Development and how they will be managed (i.e., reuse, recycling, recovery or disposal). The SRWMP will also describe the duty of care requirements and identify potential management facilities in the vicinity of the Proposed Development.
- Offshore CEMP(s) to be developed in accordance with the Outline Offshore CEMP (document reference 7.9).

3.10.55 The above documents will be updated as further detailed design information becomes available prior to construction.

3.10.56 Given the history of the majority of the route as agricultural use, potential contamination from former use of agrochemicals or other agricultural activities cannot be discounted. In addition, there are some potentially contaminative historical sources, including a quarry, lime kilns and a former rifle range, along the cable route. These are explored further within Volume 2, Chapter 4: Geology, Hydrogeology and Ground Conditions of the ES. Measures to manage contaminated land are outlined in the Outline On-CEMP (document reference 7.7).

3.10.57 Construction of the cable corridors would require the excavation of spoil. During construction, excavated material would be stored temporarily alongside the trenches in the cable corridor working width prior to replacement within the trench. In the event that any material from the site is identified as not being suitable for use on site, some material may need to be transported away from the site to a suitably licensed site.

3.10.58 Furthermore, preparation of the Converter Site would involve significant cut and fill operations. The intention will be to reuse excavated material across the Proposed Development. However, where there is excess material, the remainder would be appropriately transported (with appropriate approvals/ permits) to locations in which it can be either re-used or disposed of at a licensed disposal site.

Use of Natural Resources – Construction

3.10.59 The Outline On-CEMP requires the contractor to identify the main types and quantities of materials required for the Proposed Development in order to assess potential for sourcing materials in an environmentally responsible way. The construction specification would place preference, when options are available, on the use of materials with a high recycled content.

3.10.60 The Considerate Contractors Scheme includes measures relating to the use of resources, including categories in relation to minimising the use of water. All timbers used as primary structural elements would be required to be Forest Stewardship Council certified.

3.10.61 The construction process would take into account the principles of good practice in soil handling and restoration set out in the following documents, wherever possible, to reduce the possibility of damage to soil materials during the construction process:

- Ministry of Agriculture, Fisheries and Food (2000) Soil Handling Guide; and
- Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (including the Toolbox Talks).

Local Community Liaison

3.10.62 The Applicant will establish an approach for liaising with the local community and stakeholders during the construction process, which will build on the engagement undertaken prior to and throughout the EIA process. A Project website, email address and phone number will remain in place.

3.10.63 A Community Liaison Plan will be developed will be developed prior to the commencement of main construction in consultation with the LPA. The Community Liaison Plan will set out a management framework to be followed by the Applicant and contractors during construction, ensuring proactive communication with all relevant stakeholders and relevant parties (e.g., local residents). It would ensure communication with the local community is appropriate, timely and easily understood.

3.10.64 The plan will include provision for a Community Liaison Officer, who will actively work with the local community to ensure the local community is kept up to date with progress and that any queries arising are dealt with appropriately. The plan will also include a procedure for dealing with enquiries or complaints from the public, local authorities or statutory consultees.

3.10.65 A Community Liaison Officer will be provided as the main point of contact for landowners, to provide project updates and to resolve any queries arising during the construction phase.

Site Clearance Following Construction

3.10.66 Following construction, all temporary working areas and associated temporary accesses will be removed and the land re-instated to its previous use using stored subsoil and topsoil, in line with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298).

3.10.67 All temporary construction compounds and temporary fencing will be removed, field drainage and/or irrigation reinstated and the land restored to its original condition. Where practicable, consideration will be given to early restoration of sections of the Onshore HVDC Cable Corridor.

3.10.68 Where vegetation, hedgerows and trees are removed from working areas, construction compounds or haul roads, they will be replaced/reinstated following the completion of construction, where possible. Further details will be included within a LEMP.

3.11 Biodiversity Mitigation and Enhancement

3.11.1 The Applicant aims to mitigate for effects on habitats arising as a result of the Proposed Development and to explore potential habitat and biodiversity enhancements. The development of biodiversity and enhancement proposals will consider relevant green infrastructure strategies and plans, including but not limited to the North Devon Biosphere Nature Recovery Plan (2021).

3.11.2 Figure 3.16 (Volume 1, Figures) shows the areas that have been identified within the Order Limits where current habitat conditions are anticipated to provide an opportunity to improve habitat quality or where improvements can be made to habitats identified as functionally linked to designated sites. These areas would help provide biodiversity mitigation and enhancement across the Proposed Development.

3.11.3 At present, the areas of opportunity subject to landowner agreement are shown on Figure 3.16 (Volume 1, Figures) and are briefly listed below:

- Hedgerow enhancement and reinstatement on arable land:
  - west of Abbotsham before the A39 trenchless crossing;
  - south of the A39 trenchless crossing and west of the Littleham road;
  - west side of Buckland road;
  - south of Robin Hill Farm;
  - surrounding the Torridge HDD west compound;
  - east of the Torridge HDD east compound; and

    - south of Gammaton Road.
- New hedgerows:
    - on pasture land north of Littleham road and west of Buckland Road
- Realignment and enhancement of roadside hedgerows:
    - on land bordering the road improvements along Gammaton Road and the unnamed road to the Converter Site
- New woodland planting:
    - to the immediate east of Lodge Plantation on the east side of the Torridge; and
    - extending woodland along the north / northwest boundary at Hallsannery on the west side of the Torridge.

3.11.4 The Applicant is engaging and working with landowners and North Devon Biosphere to identify potential opportunities for delivering biodiversity enhancement off-site (e.g., funding to undertake biodiversity improvements). Any off-site enhancements may be delivered through different funding streams and timescales and are not considered as necessary mitigation to offset likely significant effects. As such, any off-site biodiversity enhancements are not assessed as part of the ES.

3.12 Offshore Construction Environmental Management

3.12.1 The Applicant would adopt best practice environmental management measures for the offshore elements of the Proposed Development, in line with the requirements of all relevant legislation, codes of practice and standards as identified in the topic chapters of this ES to actively limit adverse effects on the marine environment. A key aspect of this approach is the development of an Offshore CEMP(s) prepared prior to commencement of construction to outline how construction of the Proposed Development would avoid, minimise or mitigate any adverse effects. The Offshore CEMP(s) will detail the best practice approach to offshore activities and would implement those measures and environmental commitments identified in the EIA. The Offshore CEMP(s) will be developed in accordance with an Outline Offshore CEMP submitted with the DCO application (document reference 7.9). Prior to construction the updated Offshore CEMP will be submitted to the MMO for approval.

3.12.2 Key environmental principles and measures during construction of the offshore works are set out in this section (and the Outline Offshore CEMP is submitted with the DCO application as document reference 7.9). Details of all mitigation measures proposed at this stage of the EIA process are provided within Volume 1, Appendix 3.1: Commitments Register of the ES.

Marine Pollution Prevention

3.12.3 Detailed plans for the prevention of pollution at sea, and the management of any such incidents will be developed for the Proposed Development.

3.12.4 The Offshore CEMP will require the following plans to be produced post consent by the Contractor, to limit the potential for pollution incidents to the marine environment and coastal waters:

- Marine Pollution Contingency Plan (MPCP); and
- Shipboard Oil Pollution Emergency Plan (SOPEP) (for vessels greater than 400 GT).

3.12.5 The production of the above plans will be a requirement of the Marine Licence and will be submitted to the marine licencing authority for approval prior to construction.

3.12.6 All project vessels would have control measures and shipboard plans in place. In addition, project vessels would be compliant with the requirements of the following international agreements:

- International Convention for the Prevention of Pollution from Ships (MARPOL Convention).
- International Regulations for the Prevention of Collisions at Sea (COLREGS).
- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention).

3.12.7 Drilling fluids required for HDD operations would be carefully managed to minimise the risk of unplanned breakouts into the marine environment and coastal waters. The use of best practice drilling fluids such as bentonite (OSPAR PLONOR list substance) would be prioritised.

3.12.8 No sanitary discharges will be made from project vessels, with no anticipated route to effect designated bathing waters on the Devon coast or beyond.

Dredging / Management of Sediment Disturbance

3.12.9 There will be no dredge 'arisings' i.e. no collection and movement of dredged material within the marine environment. Furthermore review of the CBRA (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES) and the baseline environmental survey data (e.g. Volume 3, Appendix 8.4 GEOxyz Environmental Report of the ES) confirms that there will be no requirement for 'sandwave sweeping' i.e. broadscale sandwave clearance, in UK waters (which would be classed as dredging under the Marine and Coastal Access Act 2009).

3.12.10 Boulder clearance activity will be localised i.e. movement of isolated boulders from the immediate path of the final cable lay, to the adjacent seabed within the Offshore Cable Corridor.

3.12.11 The Proposed Development construction activities, including use of MFE and the trenching activities are expected to cause local sediment disturbance, which is assessed as part of this ES.

3.12.12 At the PEIR assessment stage the potential for localised dredging (and removal) at the HDD exit points, using e.g. Trailer Suction Hopper Dredging was being considered. These methods have been discounted prior to the ES assessment. The HDD exit pits will be temporarily cleared of superficial sediments (mainly sands), most likely using long-reach back-hoe from the jack-up barge(s). Following completion of the HDD and installation of the associated cable protection (concrete mattresses at the exit points) the cleared sediments will be refilled – via a combination of further back-hoe work and through natural infilling.

3.12.13 A Dredging Management Plan will be developed by the construction contractor to limit seabed disturbance and suspended sediment concentrations and control the generation of sediment plumes. A framework for the dredging management plan is included in the Outline Offshore CEMP (document reference 7.9).

Vessel Management

3.12.14 The installation of the cables would require various vessels including:

- pre-installation survey vessels;
- workboats / tugs;
- CLVs;
- guard vessels;
- trenching support vessel ('construction support' vessel);
- rock placement vessels; and
- jack up vessels.

3.12.15 To ensure the safe navigation and operation of project vessels and the safety of other marine users, a Vessel Management Plan (VMP) will be adhered to. An outline VMP has been produced to accompany the application for DCO (presented as Volume 3, Appendix 5.2: Outline Navigational Safety and Vessel Management Plan of the ES). The VMP will remain a live document and will be updated post consent ahead of construction activities. The VMP will include plans or due consideration of navigation safety, and lighting and markings.

3.12.16 The VMP, and adherence to it will be a requirement of the deemed Marine Licence and will be submitted to the marine licencing authority for approval prior to construction.

3.12.17 The final VMP will identify measures to be implemented through the final Offshore CEMP including, but not limited to:

- the implementation of safety exclusion zones;
- appropriate notification of activities to other marine users;
- a clear process of marine coordination of all project vessels and vessel activity including vessel transit planning; and
- appropriate marking and lighting of vessels.

3.12.18 Where vessel anchoring is required, designated anchoring areas and protocols would be employed during offshore construction activities to minimise physical disturbance of the seabed.

Waste Management

3.12.19 Prior to cable installation, a pre-lay grapnel run is expected along the majority of the Offshore Cable Corridor (the centreline of the final trench lines) to clear the seabed of debris. Debris would be retrieved onboard the vessel for later onshore disposal.

3.12.20 In the case of marked abandoned, lost or discarded fishing gear, these would be returned to the MMO / relevant Inshore Fisheries and Conservation Authority (IFCA) for return to the owner of the marked gear. Unmarked gear and other debris retrieved on deck would be disposed of onshore at appropriate disposal facilities.

3.12.21 At OOS cable crossings, a section of the OOS cable would be cut and removed. The cut section would be recovered onboard the vessel and transported ashore for disposal at an appropriate onshore facility.

3.12.22 The majority of HDD drill arisings and used fluid from HDD will be collected and disposed of responsibly from the landward drill entry site. It should be noted that a small volume of drill fluid will be lost when the HDD breaks through the seabed. Drill fluids such as bentonite (OSPAR PLONOR list substance) will be utilised.

3.12.23 The above measures will be confirmed and implemented via the final offshore CEMP and an embedded Offshore Waste Management Plan, produced post consent by the Contractor. The production of this plan will be a requirement of the deemed Marine Licence and will be submitted to the marine licencing authority for approval prior to construction.

3.12.24 In addition, all project vessels would be required to comply with the Convention on the Prevention of Pollution from Ships (MARPOL Convention), which requires vessels to comply with regulations regarding the prevention of pollution and the discharge of sewage and garbage at sea.

Cable Protection

3.12.25 Where the cable cannot be buried at cable crossings or on account of the bed characteristics, cable protection in the form of a rock berm or concrete mattresses would be required.

3.12.26 The placement of such cable protection can result in the loss of seabed habitat and the permanent change to a new seabed type. The requirement for such protection measures will be carefully planned and mapped out to minimise the area of seabed affected at each location and protection measures would only be deployed where considered necessary for the safe operation of the Proposed Development and other marine users.

3.12.27 Volume 1, Figure 3.15 presents the indicative rock placement along the Offshore Cable Corridor. The benthic assessment (Volume 3, Chapter 1: Benthic Ecology of this ES) assesses the extent of potential habitat loss and characterises the impact of this.

3.12.28 Design of crossings will adhere to industry best practice guidance.

Marine and Coastal Water Invasive Species

3.12.29 Measures to prevent the introduction and spread of marine and coastal water invasive non-native species (INNS) would be implemented through the Offshore CEMP) and associated Biosecurity Plan.

3.12.30 A Biosecurity Risk Assessment will be undertaken to identify potential pathways of introduction, and critical control points for preventing the spread of INNS.

3.12.31 All project vessels (where relevant) would be compliant with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention).

Dropped Objects Procedures

3.12.32 Objects dropped overboard during the construction activities can pose a significant hazard to the marine and coastal environment and other marine users. The potential for objects to be dropped or otherwise accidentally deposited should be minimised as far as reasonably practicable.

3.12.33 A dropped objects procedure would be produced post consent by the Contractor within the final Offshore CEMP, detailing the requirements and procedures for vessel operators to identify, record, notify the MMO and, where possible, recover dropped objects. The production and adherence of this procedure will be a requirement of the deemed Marine Licence and will be submitted to the marine licencing authority for approval prior to construction.

Marine and Coastal Water Archaeology and Cultural Heritage

3.12.34 The ES identifies sites of potential archaeological importance.

3.12.35 Additional unknown or unexpected cultural heritage and marine heritage receptors identified during construction will be reported utilising the project specific PAD, which is presented as part of the ES (Volume 3, Appendix 7.6: Protocol for Archaeological Discoveries). The adherence to the protocol will be a requirement of the deemed Marine Licence.

3.12.36 All offshore phases of the Proposed Development will be guided by the framework of action dictated by the Outline Offshore Archaeological WSI. The Outline Offshore Archaeological WSI sets out the expectations and protocols to be followed regarding e.g. reporting and recording of archaeological features during construction activities.

3.12.37 Archaeological mitigation leading to preservation *in-situ* will be advocated. Archaeological Exclusion Zones of at least 30 m (up to 100 m for sites of e.g. known wrecks) will be implemented during construction around known sites of archaeological significance. A series of anomalies of potential archaeological interest have been identified as part of the ES studies (see Volume 3, Chapter 7: Marine Archaeology and Cultural Heritage, of the ES) and these will be avoided where possible. Where potential for disturbance of these features remains further investigations will be undertaken in line with the Outline Offshore Archaeological WSI.

Noise and Vibration

3.12.38 There is the potential for noise and vibration to be generated during construction activities. Notably the offshore works do not include any percussive construction techniques, such as piling. In general, the construction activities are low risk with regards potential to generate noise and vibration.

3.12.39 The ES identifies offshore receptors that are potentially sensitive to noise and vibration impacts together with mitigation measures where required (see Volume 3, Chapter 1: Benthic Ecology, Volume 3, Chapter 2: Fish and Shellfish Ecology, and Volume 3, Chapter 4: Marine Mammals and Turtles of the ES).

3.12.40 Mitigation measures include implementation of the final VMP which will dictate the rules for appropriate vessel movements, including transit routes and speeds.

3.12.41 The final offshore CEMP will also include commitment to undertake any post-consent activities that may have potential for noise and vibration impacts, in an appropriate and responsible manner (e.g. adhering to Joint Nature Conservation Committee guidelines for minimising the risk of injury to marine mammals). Post-consent activities with potential for noise and vibration impacts include pre-construction, contractor led geophysical surveys, and also UXO removal (if required).

3.12.42 Note, marine licence applications would be made for any targeted UXO geophysical survey, and separately for any resultant UXO removal/detonation. Any UXO investigation and clearance works would be undertaken ahead of the main construction activities and thus, may be addressed separately (in advance and by separate contractors) to the final offshore CEMP.

Marine and Coastal Water Ecology

3.12.43 The ES identifies areas of conservation / protection and sensitivities associated with e.g. benthic ecology (see Volume 3, Chapter 1: Benthic Ecology of the ES), fisheries (see Volume 3, Chapter 2: Fish and Shellfish Ecology of the ES) and marine mammal (Volume 3, Chapter 4: Marine mammals & Turtles of the ES) receptors, and sets out measures for avoiding or minimising potential for impact as appropriate. The final offshore CEMP will include any mitigation measures to be adopted. This will enable communication of awareness of any sensitive areas and potentially sensitive features to the project team (including construction contractors). The procedures to be adopted in the event of an incident in proximity to these features will also be set out in the final offshore CEMP.

Emissions to Air

3.12.44 For offshore construction, vessel emissions must comply with MARPOL Annex VI requirements in relation to ozone depleting substances regulations, nitrogen oxide, sulphur oxide and particulate and volatile organic compounds. Where relevant, vessels shall have a valid International Air Pollution Prevention certificate.

3.13 Operation and Maintenance

3.13.1 The Proposed Development would be designed to operate on a continuous basis throughout the year. Details of the operation and maintenance activities associated with the Proposed Development, including converter stations, onshore cable route (HVDC and HVAC), and offshore cable route, are presented below.

Converter Site

3.13.2 The proposed converter stations are likely to be operated 24/7 by staff on-site through shifts, which would include personnel for operation, maintenance, asset management, and security. The converter site is anticipated to provide approximately 30 FTE jobs, with up to 15 staff on-site at any one time in the day, reducing to approximately five overnight.

3.13.3 Operation and maintenance staff would be required to undertake routine on-site checks, as well as preventative and corrective works on a regular basis. As part of the general maintenance, there would likely be requirements for replacement or upgrade of components, however, this would be infrequent. In these instances, additional deliveries and vehicles would be required, which may include HGV movements.

3.13.4 During periods of annual (once a year) or biannual (twice a year) maintenance, there may be additional maintenance staff required on-site (approximately 30 to 40 visitors) for 1-2 weeks per converter station. These maintenance periods would comprise sequentially switching off each converter station, whilst carrying out necessary checks, testing and replacement of electrical equipment and components.

Onshore Cable Route

3.13.5 Following completion of construction, access to the cable route for inspection would be over agricultural land from existing access points.

3.13.6 The operation and maintenance requirements for the onshore HVDC and HVAC Cables would involve infrequent on-site inspections of the link boxes, which would be situated at intervals along the onshore route. The operation and maintenance would also include corrective maintenance activities (e.g. repairs due to cable failure). The cables would be continuously monitored remotely.

3.13.7 It is not expected that the transition joint bays at the Landfall would need to be accessed during the operation and maintenance phase. However, link boxes would be provided with inspection covers to allow for access. Link boxes would require access in the event of a cable failure requiring replacement or repair, and for testing purposes.

3.13.8 In the event of a cable failure, access to link boxes would be required to identify where along the cable section the fault has occurred. Once this is detected, a maintenance team would be required to excavate, remove and replace the section of damaged cable. The extent of repair works required would depend on the circumstances, however, may involve the following:

- replacement of a whole cable section between existing joint bays; or
- excavation of a limited section of cable length and replacement, requiring the creation of additional joint bays.

3.13.9 Cable repair in this way would be a mirror of construction whereby a section of cable is winched through the duct from one joint bay to another. Temporary construction access to the joint bays at either end would be created i.e., laying of short sections of haul roads and construction compounds.

Offshore Cable Route

Inspection Surveys

3.13.10 The preferred installation methods are designed to minimise the number of cable inspection surveys that would be required. However, some cable inspection surveys are expected during the operational lifetime of the Proposed Development.

3.13.11 Following the installation of each Bipole an 'as-built' survey shall be conducted along the entirety of the subsea cable route. This survey shall involve the use of a single survey vessel equipped with an inspection ROV and geophysical survey equipment including Multibeam Echo Sounder (MBES) and Side Scan Sonar (SSS) and check:

- Status of the cable within its buried sections of the route,
- Status of rock protection and rock berms
- Condition of the seabed around the cable, include sandwaves and scars
- Fishing gear

3.13.12 Following the 'as-built' surveys, routine inspection surveys would be required under the following survey schedule:

- Routine surveys of the offshore submarine cables shall commence two years from the commissioning of the first Bipole.
- If no issues are found, the next follow up survey would be in three years, with the interval increasing by one year each time, until the period between surveys reaches five years.
- If no issues are found, routine surveying is likely to be conducted on a five-year basis.
- If an issue is found, it will be flagged for further investigation, mobilisation of repair or remediation, as appropriate.
- Following this, subject to the identified issue, associated risk and mitigation, the surveys might remain at this interval or reduce to an appropriate level (this could mean that the next survey is undertaken just one or two years from the last one).

Maintenance and Repair

3.13.13 There may be a requirement to undertake unplanned maintenance works in the event of failure of components of the system or if a cable becomes exposed due to changes in seabed morphology or the activities of third parties.

3.13.14 Repair works for cable failure would require the exposure of the cable at the point of failure, which would require de-burial of the cable from the trench. The cable would then be cut, recovered to the surface, repaired using a section of spare cable and redeployed for reburial using similar methods to those used for installation.

3.13.15 Given additional cable length would need to be added to join the cut ends at the surface, the relayed cable would take up a greater footprint than the original cable through incorporation of a 'repair loop'. Any additional footprint associated with repaired sections would be anticipated to fall within the Offshore Cable Corridor.

Table 3.19: Offshore operation and maintenance vessel movements

Vessel Type	Total Number of Days Required		
	Inspection Surveys	Maintenance and Repair	Total
Survey Vessel	420	5	425
Guard Vessel	0	70	70
Trenching Support Vessel	0	15	15
Cable Lay Vessel	0	20	20
Rock Protection Vessel	0	5	5

3.14 Decommissioning

3.14.1 The Applicant is seeking consent for the installation, operation and maintenance of two converter stations and associated infrastructure, including HVDC and HVAC Cables, and highways improvements. The Applicant is not seeking consent for decommissioning and any consent required for decommissioning would be sought at the appropriate time.

3.14.2 The converter stations would be designed, manufactured and installed for a minimum operational lifetime, which is currently anticipated to be 50 years. Taking account of ongoing repairs and maintenance, the operational lifetime of the onshore and offshore electricity cables (including both HVDC and HVAC) is anticipated to exceed that of the converter stations. The highways improvements would not have a forecast end of life and would not be decommissioned.

3.14.3 For the electricity infrastructure only, the end of the operational lifetime is anticipated to be 50 years from date of full commissioning. Subject to relevant additional consents and legislative requirements, it is anticipated that potential refurbishment and operational life extension of the Proposed Development may occur. This potential refurbishment and extension of operational life would be considered closer to the end of the initial operational lifetime.

3.14.4 In the event that the operational lifetime of the Proposed Development is not extended, decommissioning would take place (under separate consent). The decommissioning sequence would generally be the reverse of the construction sequence and involve similar types and numbers of vehicles, vessels and equipment. Therefore, it is likely that the effects of decommissioning on the environment would be no worse than those effects identified during the construction phase. Notwithstanding, decommissioning effects are presented in the relevant sections of this ES, whilst noting as above that decommissioning consents do not form part of the current application for DCO and would be sought at the appropriate time.

3.14.5 An Outline Decommissioning Strategy, which provides an overview of the strategy for decommissioning, has been developed and submitted as part of the application for development consent (document reference 7.18). The Outline Decommissioning Strategy details that decommissioning plans covering the onshore and offshore elements would be developed if decommissioning is required. If required, the decommissioning plans would be developed in accordance with the Outline Decommissioning Strategy, and would be agreed with the local planning authority prior to commencement of decommissioning activities. These plans are not included as part of the DCO.

3.14.6 The following sections provide details on the approach to decommissioning for the main components of the Proposed Development.

Onshore Electrical Infrastructure Decommissioning

3.14.7 An Onshore Decommissioning Plan(s) would be developed in a timely manner in consultation with the relevant stakeholders and prior to commencement of decommissioning (outside of the DCO process). It would consider the latest best practice and new technologies, in preparation of decommissioning occurring.

3.14.8 The Onshore Decommissioning Plan(s) would include provisions for the removal of all above ground infrastructure and the decommissioning of below ground infrastructure. The plan would focus on details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The approach and methodologies to be implemented would be in accordance with the latest available guidance, legislation and any new technologies at the time of the Proposed Development's decommissioning.

3.14.9 Waste from the decommissioning of the Proposed Development would be managed in accordance with the principles of the waste hierarchy (i.e., avoid, reduce, reuse, recycle, recover and disposal).

Converter Stations

3.14.10 The operation of the converter stations are intended to form permanent elements of electrical infrastructure serving the national grid, however as stated above, the minimum operational lifetime is currently anticipated to be 50 years. It is likely that this operational lifetime could be extended through refurbishment and the replacement of equipment, rather than decommissioning.

3.14.11 If the operation of the Proposed Development does not continue beyond 50 years, the converter stations would be decommissioned. If complete decommissioning is required, then all the electrical infrastructure and buildings would be removed and any waste arising recycled or disposed of in accordance with the waste hierarchy and relevant regulations at the time of decommissioning. The Converter Site may be re-purposed for an alternate use (separately agreed and consented) or would be reinstated as far as possible to a suitable use, in accordance with the Onshore Decommissioning Plan(s).

3.14.12 For the purposes of EIA, decommissioning of the converter stations is assumed to be similar to the construction and in reverse sequence.

Onshore HVDC and HVAC Cables

3.14.13 If the Proposed Development is required to be decommissioned, the underground electricity (HVDC and HVAC) cables would be decommissioned. HVDC and HVAC Cables may be recovered and removed by pulling the cables through the ducts (e.g., for recycling). Otherwise, they would be left in place in the ground with the cable ends cut, sealed and securely buried as a precautionary measure.

3.14.14 Cable ducts, joint bays and link boxes would be left in-situ, to minimise environmental disturbance.

3.14.15 The decommissioning of the HVDC and HVAC Cables would require the construction of temporary accesses to the cable joint bays, where the cables would be removed and cut into manageable lengths. Following removal, cables would be transported to an appropriately licensed recycling or waste disposal facility.

3.14.16 Following decommissioning of the HVDC and HVAC Cables, cable ducts would be sealed and the working areas and temporary accesses would be restored to the original condition.

Offshore Decommissioning

3.14.17 The current anticipated lifetime of the Proposed Development (operational phase) is 50 years, following which the Proposed Development may be decommissioned. The Applicant is not seeking consent for decommissioning and any consent required for decommissioning would be sought at the appropriate time.

3.14.18 If decommissioning is required, the options for decommissioning the cables would be evaluated at the time of decommissioning, with the available technologies of the time reviewed fully (in recognition that engineering technologies are ever evolving). The least environmentally damaging decommissioning option, is (in general) to de-energise the cable, disconnect it from any wider system, and secure it in place to be left *in-situ*, thereby avoiding unnecessary seabed disturbance.

3.14.19 However, other options may include the requirement for full or partial removal of the cables. The methods for removal would be broadly similar to those used during the construction phase with the potential for the cables to be removed by direct pulling, rather than de-burial. The requirement for any removal could also apply to other infrastructure installed as part of the project i.e. cable protection. The footprint of decommissioning activities (disturbance footprint at the sea bed) is anticipated to be less than that of the construction phase.

3.14.20 The framework of environmental permitting and all applicable UK and International legislation at the time of decommissioning (and the preparation of the decommissioning plans) would be adhered to.

3.14.21 Once the final decommissioning timescales and measures are known, an environmental assessment (EIA or similar) would be performed prior to the decommissioning phase (i.e. in approximately 50 years' time) to assess the potential impacts that may arise. This would inform any licence applications for decommissioning (separate to this application for DCO).

Outline Decommissioning Strategy

3.14.22 An Outline Decommissioning Strategy containing the anticipated approach to, and methods associated with decommissioning has been prepared in parallel to this ES (document reference 7.18).

3.14.23 It is recognised however, that the final Offshore Decommissioning Plan(s) would:

a. be developed in the years that precede decommissioning (separate to the current application for DCO); and

b. be subject to EIA or similar environmental appraisal and permitting at that time (separate to the current application for DCO).

3.14.24 The Outline Decommissioning Strategy represents an initial statement of:

- the measures, methods and timescales for decommissioning the offshore cables including the potential parts to be removed and the potential methods of removal, the parts to remain *in-situ* and the measures to make them safe, and the measures for the clearance of debris and the restoration of the sea bed;
- the methods of providing post-decommissioning verification that the decommissioning has been completed satisfactorily; and
- the measures for post-decommissioning monitoring, maintenance and management of the seabed.

3.14.25 The Outline Decommissioning Strategy would form the basis for the final Offshore Decommissioning Plan(s) for the offshore elements of the Proposed Development, which would be developed in consultation with The Crown Estate and other international stakeholders in line with the following decommissioning principles.

- The measures and methods for any decommissioning would comply with any legal obligations referred to in the development consent.
- All sections of the offshore cables would be removed except for any sections which it is preferable to leave *in-situ* having regard to minimising risk to the safety of surface or subsurface navigation, other uses and users of the sea, the marine environment including living resources, and health and safety.
- The Applicant would comply with any national or international requirements in relation to leaving the offshore cables *in-situ*.
- The seabed would be restored, as reasonably as possible and to the extent reasonably practicable, to the condition that it was in before the offshore cables were installed.

3.14.26 Due to the unknown element of what policies and processes would be in place when the Proposed Development reaches the end of its feasible life, the Outline Decommissioning Strategy would be reviewed, as part of the future consenting process, to ensure that all legislation at the time of decommissioning would be adhered to. The final decommissioning plans would be prepared ahead of decommissioning (separate to the current application for DCO).

3.14.27 The Applicant would commence further consultation with stakeholders ahead of decommissioning, in preparation of the final decommissioning plans (separate to the current application for DCO). This may be informed by the required permit applications at the time.

3.14.28 Prior to decommissioning, a contingency plan would be developed for resolving the potential issue of cables becoming exposed post-decommissioning.

3.14.29 The decision as to whether to recover a cable or leave *in-situ* would be taken at the appropriate time. The methods available for removal of out-of-service cables are summarised below.

Cable Recovery

3.14.30 All offshore cables, sections of offshore cables, or cable ends which are exposed at the time of decommissioning, or likely to become exposed, would be recovered, unless studies show that they would not pose an enduring threat to other seabed users. This would be determined by survey(s) prior to decommissioning of the Proposed Development (including the operational phase surveys over the course of the 50 year lifetime).

3.14.31 Any sub-sea trenches left after cable removal would be filled by natural tidal action. Exposed cable ends would be weighted down and then allowed to naturally rebury.

3.14.32 To recover a cable first it is necessary to obtain one end which is used to pull the cable out of the seabed by applying traction to it from a cable engine on the recovering ship or barge. To obtain an end, the cable would likely be cut at the seabed as, considering the weight of the cables, it is unlikely that a bight of cable can be brought to the surface. Methods that can be used to obtain a single end include using an ROV and or crane with grab tooling (preferred), using divers, or using special cable hooks called "grapnels".

ROV grab method

3.14.33 Initial exposure of the cables is needed prior to grabbing. This can be done by excavating a pit using water jets mounted on the ROV or an MFE. The pit size need only be sufficient to allow the ROV access to cut the cables and attach a clamp (a "cable gripper") and lifting rope to the cables. Once the cable is exposed, cut and gripped, the ROV does not take any further part in the operation, although it may be used to monitor the recovery if deemed necessary. If the seabed is particularly consolidated above the cables, the ROV water jets or MFE can be used to weaken the soil along the route line and reduce the resistance on the cables.

Diver method

3.14.34 This is essentially the same as the ROV method except that the operations are diver controlled. The operation is again precise but the downsides of diver operations, e.g., human safety, depth limitations and weather dependency, are significant. This operation can only be carried out in shallow water and, for safety reasons, the use of divers should be avoided as far as possible.

Grapnel method

3.14.35 Grapnels come in various configurations that can cut, hook and hold a cable, whether it is exposed on the seabed or buried into it. Various types and sizes of grapnels are used for different cable sizes, burial depths and soil conditions. The grappling process is essentially the same in all cases, with the grapnel towed across the seabed at right angles to the cable line, with the point of the device penetrating into the seabed at the expected depth of the cable. Initially a grapnel fitted with cutting blades is used to cut the cable and then another is used to hook and hold it a safe distance away from the cut end. In this way a small loop of cable is recovered to the ship and recovery can be started. At the time of drafting, no grapnel exists that can both cut and hold (one end of) a cable in a single operation for a large power cable.

3.14.36 The main advantage of grapnel recovery is that it is a relatively simple operation that has been used over many years. The main downside is that the grapnels may be dragged across the seabed for some distance before the cable is hooked, creating wider physical disturbance. Grapnel operations may also be restricted by the proximity of other cables or other infrastructure.

3.14.37 Deployment of a grapnel is unlikely for the Proposed Development's cable, however it is presented here as a fallback option in the event that e.g. a cable is dropped or lost. An ROV or crane grab is more likely to be deployed.

3.14.38 Any perpendicular grapnel runs would only take place in locations approved following benthic ecology and marine archaeology expert review (review undertaken in preparation of any Final (offshore) Decommissioning Plan) i.e. areas of low environmental sensitivity would be identified for potential cable recovery by grapnel (if necessary) to avoid 'new' disturbance of receptors.

Cable recovery

3.14.39 Once a viable cable end has been recovered, the cable or cables are then recovered to the vessel in what is, in effect, a reversal of the cable lay operation; however only one vessel is usually necessary (unless burial conditions dictate the use of a de-burial system ahead of the recovery vessel). Once the ship's capacity has been reached, the cable end is abandoned to the seabed, with a marker buoy attached where appropriate, and the ship returns to port to discharge the recovered cable.

Crossings

3.14.40 Due to the protection methods employed at crossings, typically rock placement or concrete mattresses, the recovery of cable at these locations can be more complex. The presence of other, potentially still operational, assets can be a complicating factor. Where the other assets are operational at the time of decommissioning, and most likely in the case of other crossings, the likelihood is that leaving the cables in place would be the safest and most environmentally sensitive option. The use of an MFE can be used to remove rock berms at crossings and at other cable protection locations, but this is anticipated to be more damaging to the seabed than leaving *in-situ* given benthic habitats associated with the rock berms would be well-established.

Landfall Sections

3.14.41 Recovery of the section of cable associated with the Landfall HDD is anticipated to be relatively straightforward. Cutting the cables at the seaward end and attaching a winch to the landward end should enable the cables to be pulled out of the HDD ducts and recovered intact onshore. These cables would then be transported in sections to appropriate recycling facilities.

3.14.42 Removal of the ducts below the Mean High Water Springs mark would be considerably riskier and would, with current techniques, entail both environmental and safety risks. It is therefore expected that, in line with the decommissioning principle of ensuring minimal environmental disturbance, the ducts would be left *in-situ*. Note, prior to decommissioning, available technologies would be reviewed, to inform the final decommissioning strategy regarding the HDD ducts.

De-burial

3.14.43 As the cables are planned to be buried along the entire route, they may require de-burial in order to speed up the recovery process. A smaller ship preceding the main recovery ship using a tool such as a MFE is one possibility. Alternatively, a bespoke tool that allows for simultaneous de-burial and recovery from the same ship may be available in the future. The Applicant would benefit from the experience and learnings provided by the large number of decommissioning operations due to be undertaken in the intervening decades (i.e., decommissioning of similar but older assets).

3.14.44 It is assumed that the de-burial (and the entire decommissioning) footprint would be less than the Proposed Development construction phase footprint.

Offshore Decommissioning Schedule

3.14.45 The preparation of the final Offshore Decommissioning Plan(s) would be prepared (under separate consent) with sufficient time to allow for the environmental assessments (e.g., EIA, decommissioning Non-Statutory Environmental Statement or similar) to be assessed as part of a later consent. The final Offshore Decommissioning Plan(s) would therefore be prepared prior to the proposed shutdown and decommissioning of the offshore elements of the Proposed Development.

3.14.46 Should the Proposed Development be decommissioned early, or the life of the project be extended, the decommissioning programme would be adjusted accordingly. The final Offshore Decommissioning Plan(s) is expected to be informed by and include references to relevant surveys performed during the construction and operation and maintenance phases of the Proposed Development.

Post-Decommissioning – Additional Surveys & Seabed Clearance

3.14.47 Following decommissioning, surveys would be carried out to show that the route has been cleared and left in a safe condition (as part of later consenting processes). It is likely that recovery operations would be monitored by ROV and this may prove adequate to show that the cables have been cleared and the seabed left in a safe condition. However, additional surveys, including side-scan, magnetometer and bathymetric surveys, may be required (with possible use of drop-down video or ROV to ground truth the data where necessary).

3.14.48 The final Offshore Decommissioning Plan(s) (prepared as part of a later consent process) would contain details of any requirements on post-decommissioning monitoring, maintenance and remediation.

3.15 Accidents and Disasters

3.15.1 The EIA Regulations require consideration of, where relevant, the potential for significant effects to arise from the vulnerability of the Proposed Development to major accidents and disasters and the risk of major accidents and/or disasters resulting from the Proposed Development.

3.15.2 The potential for major accidents and disasters arising from the construction, operation and maintenance and decommissioning phases of the Proposed Development has been considered in the topic chapters of this ES. Where necessary, the ES has also considered the potential impacts of major accidents and disasters (e.g. extreme climate events, flood risk, etc.) on the Proposed Development. In particular the following effects have been identified within specific chapters of the ES:

- Reduction in groundwater quality and quantity resulting from accidental spillage:
  - Volume 2, Chapter 4: Geology, Hydrogeology and Ground Conditions.
- Impact of accidental pollution on quality of surface water and watercourses:
  - Volume 2, Chapter 3: Hydrology and Flood Risk.
- Increased flood risk:
  - Volume 2, Chapter 3: Hydrology and Flood Risk.
- The vulnerability of the Proposed Development to climate change:
  - Volume 4, Chapter 1: Climate Change.
- Accidental pollution:
  - Volume 2, Chapter 1: Onshore Ecology and Nature Conservation.
  - Volume 3, Chapter 5: Shipping and Navigation.
  - Volume 3, Chapter 1: Benthic Ecology.
- Impact of construction traffic on accidents and safety:
  - Volume 2, Chapter 5: Traffic and Transport.
- Impact of Abnormal Indivisible Loads on safety:
  - Volume 2, Chapter 5: Traffic and Transport.
- Risk of vessel anchor and gear snagging:
  - Volume 3, Chapter 6: Shipping and Navigation.
- Reduction of under keel clearance:
  - Volume 3, Chapter 6: Shipping and Navigation.
- Risk of accidental frack-out during HDD:
  - Volume 3, Chapter 1: Benthic Ecology.

3.15.3 During construction, normal construction good practice would be followed to ensure on-site safety of the workforce in accordance with the Construction (Design and Management) Regulations 2015. Independent health and safety advisors would be employed by the contractor(s) during construction to report on the site's safety. It would be required that these reports take place monthly with the reports being provided to the Applicant.

3.16 Next Steps

3.16.1 This chapter sets out the design parameters and the proposed installation and construction, operation and maintenance and decommissioning methods assessed within this ES.

3.16.2 The location and siting of the Proposed Development has been informed by a site selection and route refinement process, which is summarised in Volume 1, Chapter 4: Need and Alternatives, of the ES. This process has considered a wide range of environmental constraints as well as technical and commercial factors.

3.16.3 The design described within this chapter will continue to be refined, taking into account the findings of pre-construction surveys. The final design for the Proposed Development will be developed after development consent has been granted, from within the parameters set out in this project description chapter of the ES and the DCO.

3.17 References

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