XLINKS' MOROCCO-UK POWER PROJECT

Environmental Statement

Volume 3, Chapter 1: Benthic Ecology

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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 substation site within which the Alverdiscott Substation sits.
Applicant	Xlinks 1 Limited.
Annex I Habitat	Natural habitat types of community interest whose conservation requires the designation of special areas of conservation (SAC) as defined by the European Commission Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (EC Habitats Directive).
Bipole	A Bipole system is an electrical transmission system that comprises two Direct Current conductors of opposite polarity.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current (DC) to Alternating Current (AC), or vice versa.
HVAC Cables	The High Voltage Alternating Current (HVAC) cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.
HVDC Cables	The High Voltage Direct Current (HVDC) cables which would bring electricity to the UK converter stations from the Moroccan converter stations.
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the Transition Joint Bay inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Marine Pollution Contingency Plan	Provides information and guidance on the actions and reporting requirements in the event of a pollution incident.
National Energy System Operator	National Energy System Operator (NESO) operates the national electricity transmission network across Great Britain. NESO 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 (NGET) owns and maintains the electricity transmission network in England and Wales.
Offshore Cable Corridor	The proposed corridor within which the offshore cables are proposed to be located, which is situated within the United Kingdom Exclusive Economic Zone.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current (HVDC) cables would be located.
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

Term	Meaning
	temporary and permanent infrastructure including temporary compound areas and permanent accesses
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).
Scoping Boundary	The term used to define the boundary used at the time the Environmental Impact Assessment (EIA) Scoping Report was submitted.
Study area	This is an area which is defined for each environmental topic which includes the Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Survey area	The area within which each survey has been undertaken. This may differ from the study area as a survey area will be based on species or survey-specific guidance on the extent of survey required, which may be limited by, for example, habitat conditions, or be defined in terms of buffer areas around an area of potential impact.
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.
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').
Further Terminology	
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Baseline	The status of the environment without the Proposed Development in place.
Benthic	Associated with or occurring on the bottom of the seabed.
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 Environmental Management Plan	A document detailing the overarching management principles for construction, which includes construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Cumulative Effects	The combined effect of the Proposed Development in combination with the effects from other planning applications, on the same receptor or resource.

Term	Meaning
Demersal	Living on or near the seabed.
Duration (of impact)	The time over which an impact occurs. An impact may be described as short, medium or long-term and permanent or temporary.
Dust	Solid particles suspended in air or settled out onto a surface after having been suspended in air, as defined by the Institute of Air Quality Management.
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Elasmobranchs	Fish with a skeletal structure composed of cartilage. Includes species such as sharks, rays and skates.
Electromagnetic Fields	EMFs are part of the natural world, and are produced wherever electricity is generated, transmitted, or used.
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.
European Protected Species	Species (such as bats, great crested newts, otters and dormice) which receive full protection under The Conservation of Species and Habitats Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017.
Fish stock	Any natural population of fish which an isolated and self-perpetuating group of the same species.
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).
Impact	Change that is caused by an action/proposed development, e.g., land clearing (action) during construction which results in habitat loss (impact).
Inter-related effects	Multiple effects on the same receptor as a result of the Proposed Development. These occur when a series of the same effect acts on a receptor over time to produce a potential additive effect or where a number of separate effects, such as noise and habitat loss, affect a single receptor.
Intertidal area	The area between Mean High Water Springs and Mean Low Water Springs.
Kyoto Protocol	The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its parties to reducing greenhouse gas emissions by setting internationally binding emission reduction targets, implemented primarily through national measures but also via wider market-based mechanism.
Landings	Quantitative description of amount of fish returned to port for sale, in terms of value or weight.
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils. The relevant Local Authorities for the Proposed Development are Devon County Council and Torridge District Council.
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.

Term	Meaning
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.
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023.
Pathway	The link or interaction 'pathway' by which the effect of the activity could influence a receptor
Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.
Policy	A set of decisions by governments and other political actors to influence, change, or frame a problem or issue that has been recognized as in the political realm by policy makers and/or the wider public.
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.
Protected species	A species of animal or plant which it is forbidden by law to harm or destroy.
Ramsar Site	Wetlands of international importance that have been designated under the criteria of the Ramsar Convention. In combination with Special Protection Areas and Special Areas of Conservation, these sites contribute to the national site network.
Receptor	The element of the receiving environment that is affected.
Shellfish	Exoskeleton-bearing aquatic invertebrates including molluscs and crustaceans.
Site of Special Scientific Interest	A site designation specified and protected in the Wildlife and Countryside Act 1981. These sites are of particular scientific interest due to important biological (e.g. a rare species of fauna or flora), geological or physiological features.
Source	The origin of a potential effect (noting that one source may have several impact pathways and associated receptors).
Shipboard Oil Pollution Emergency Plan	A plan detailing the emergency actions to be taken in the event of an oil spill.
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.
Transboundary effects	Effects from a project within one state that affect the environment of another state(s).

Acronyms

Acronym	Meaning
BGS	British Geological Survey
BS	British Standard
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DESNZ	The Department for Energy Security and Net Zero
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
ES	Environmental Statement
EU	European Union
EUNIS	European Nature Information System
FOCI	Features Of Conservation Interest
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
IEMA	Institute for Environmental Management and Assessment
INNS	Invasive Non-native Species
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MAGIC	Multi-Agency Geographic Information for the Countryside
MBES	Multibeam Echosounder
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MINNS	Marine Invasive Non-native Species
MMO	Marine Management Organisation
MNR	Marine Nature Reserves
MPCP	Marine Pollution Contingency Plan
MPS	Marine Policy Statement
NBN	National Biodiversity Network
NERC	Natural Environment and Rural Communities
NESO	National Energy System Operator
NNR	National Nature Reserve
NOROG	Norwegian Oil and Gas Association
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSVMP	Navigational Safety and Vessel Management Plan

Acronym	Meaning
OSPAR	Oslo and Paris Conventions
PAH	Polycyclic Aromatic Hydrocarbon
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PSA	Particle Size Analysis
pSAC	Possible Special Area of Conservation
pSPA	Potential Special Protection Area
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Body
SOPEP	Shipboard Oil Pollution Emergency Plan
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TSS	Traffic Separation Scheme
UK	United Kingdom
UKCP	UK Climate Projections
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
ZOI	Zone of Influence

Units

Units	Meaning
cm	Centimetre
dB	Decibels
°C	Degrees Celsius
GW	Gigawatt
km	Kilometre
km^2	Square Kilometre
kV	Kilovolt
MW	Megawatt
m	Metre
m/s	Metres Per Second (Speed)
mm	Millimetre
mV	Millivolt
nm	Nautical mile

Units	Meaning
%	Percent
m^2	Square metre
t	Tonne
µT	Microtesla
W	Watt

1 BENTHIC ECOLOGY

1.1 Introduction

1.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) undertaken for the United Kingdom (UK) elements of Xlinks' Morocco-UK Power Project (the 'Project'). For ease of reference, the UK elements of the Project are referred to in this chapter as the 'Proposed Development'. The ES accompanies the application to the Planning Inspectorate for development consent for the Proposed Development.

1.1.2 This chapter considers the likely impacts and effects of the Proposed Development on benthic ecology during the construction, operation and maintenance and decommissioning phases. Specifically, it relates to the offshore elements of the Proposed Development seaward of Mean High Water Springs (MHWS).

1.1.3 In particular, this ES chapter:

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

1.1.4 The assessment presented is informed by the following technical chapters and should be read in conjunction with the following ES chapters:

- Volume 1, Chapter 2: Policy and Legislation;
- Volume 1, Chapter 3: Project Description;
- Volume 1, Chapter 5: EIA Methodology;
- Volume 3, Chapter 2: Fish and Shellfish;
- Volume 3, Chapter 3: Commercial Fisheries;

- Volume 3, Chapter 4: Marine Mammals and Sea Turtles;
- Volume 3, Chapter 5: Shipping & Navigation; and
- Volume 3, Chapter 8: Physical Processes.

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

- Volume 1, Appendix 3.1: Commitments Register;
- Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment;
- Volume 1, Appendix 5.2: Transboundary Screening;
- Volume 1, Appendix 5.3: Cumulative Effects Assessment Screening Matrix;
- Volume 3, Appendix 1.1: Offshore Intertidal Survey Report;
- Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations;
- Volume 3, Appendix 7.5: Outline Offshore Archaeological Written Scheme of Investigation;
- Volume 3, Appendix 8.1: Sediment source concentrations and assessment of disturbance; and
- Volume 3, Appendix 8.4: GEOxyz Environmental Report.

1.2 Legislative and Policy Context

Legislation

1.2.1 The following section provides information regarding key legislation that applies to benthic ecology, and which has been considered within the assessment process in this chapter of the ES.

International

- European Commission (EC) Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (EC Habitats Directive);
- Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention');
- Convention on the Conservation of European Wildlife and Natural Habitats (the 'Berne Convention');
- Marine Strategy Framework Directive 2008 (EU Directive 2008/56/EC).
- Ramsar Convention (1976);
- OSPAR Convention (1992);
- Convention on Biological Diversity (1993);
- Espoo Convention (1997);
- EU Invasive Alien Species Regulation (Regulation No 1143/2014);
- The Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022; and
- International Convention for the Prevention of Pollution from Ships (MARPOL).

National

- The Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019);
- Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended);
- Marine Strategy Regulations 2010
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Planning Act 2008 (as amended);
- Marine and Coastal Access Act 2009;
- Infrastructure Planning (EIA) Regulations 2017 (as amended);
- Marine Works (EIA) Regulations 2007 (as amended);
- Environment Act 2021;
- Natural Environment and Rural Communities (NERC) Act 2006 (England); and
- Wildlife and Countryside Act (1981 as amended).

Planning Policy Context

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

National Policy Statements

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

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

1.2.4 **Table 1.1** sets out key aspects from the NPSs relevant to the Proposed Development, with particular reference to the need for and approach to consenting such infrastructure.

Table 1.1: Summary of relevant NPS policy

Summary of NPS requirement	How and where considered in the ES
NPS EN-1	
Para 5.4.17: Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats	The designated sites considered in the assessment are indicated in **Table 1.18**, and key receptors of conservation importance are indicated in **Table 1.19**. Effects of the Proposed Development are considered in **sections 1.10** (construction), **1.11** (operation and maintenance) and **1.12** (decommissioning). A Report to Inform Appropriate Assessment (RIAA) (document reference 7.16) and Marine Conservation Zone (MCZ) Assessment (document reference 7.15) have also been submitted alongside the ES.
Para 5.16.7: The ES should in particular describe any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	Effects on water bodies or protected areas under the Water Framework Directive (WFD) have been considered within a supporting Offshore WFD Assessment (document reference 7.14).
Para 5.4.23: Energy projects will need to ensure vessels used by the project follow existing regulations and guidelines to manage ballast water	Management of ballast water has been considered in **sections 1.8** and **1.9**.
Para 5.4.19: The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests	Burial will be the preferred option for the cable protection, and only when full target burial depth is not possible will additional protection be installed. Where additional rock protection is necessitated, this will be placed within the trench wherever possible i.e. above seabed level rock placement is deemed the final option (**Table 1.20**). Installation of cable protection has the potential to promote local biodiversity if it is colonised by a range of epifaunal organisms. It should be noted, however, that where such change in habitat differ notably from the surrounding habitat, such increases in

Summary of NPS requirement	How and where considered in the ES
	biodiversity may not be perceived as being beneficial (**section 1.11**).
NPS EN-3 (NPS EN-3 Section 2.8, despite referring directly to offshore wind, contains policy relevant to the Proposed Development. Specifically, NPS EN-3 Section 2.8 (paragraph 2.8.4) references offshore transmission cabling similar to the Proposed Development proposals.	
Para 2.8.103: Applicants should assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity, as well as negative effects.	Burial will be the preferred option for the cable protection, and only when full target depth burial is not possible will additional protection be installed. Where additional rock protection is necessitated, this will be placed within the trench wherever possible i.e. above seabed level rock placement is deemed the final option (**Table 1.20**). Installation of cable protection has the potential to promote local biodiversity if it is colonised by a range of epifaunal organisms. It should be noted, however, that where such change in habitat differs notably from the surrounding habitat, such increases in biodiversity may not be perceived as being beneficial (**section 1.11**).
Para 2.8.104: Applicants should consult at an early stage of pre-application with relevant statutory consultees, as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance, mitigation and compensation options should be undertaken.	Consultation with relevant statutory consultees has been considered in **section 1.3**.
Para 2.8.98: Applicants should have regard to the specific ecological and biodiversity considerations that pertain to proposed offshore renewable energy infrastructure developments, namely intertidal and subtidal seabed habitats and species.	Key benthic ecology receptors have been considered in **section 1.7**.
Para 2.8.113: Assessments should also include effects such as the scouring that may result from the proposed development and how that might impact sensitive species and habitats.	Scour has been considered in **sections 1.9** and **1.11**.
Para 2.8.123: Applicant assessment of the effects of installing cable across the intertidal/coastal zone should demonstrate compliance with mitigation measures identified by The Crown Estate (TCE) in any plan-level HRA produced as part of its leasing round and include information, where relevant, about: *• any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice;*	Effects considered in the ES encompass those listed. Effects of the Proposed Development on benthic ecology during construction (installation) have been considered in **section 1.10**, effects during operation have been assessed in **section 1.11**, and effects during

Summary of NPS requirement	How and where considered in the ES
• any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice; *• potential loss of habitat;* *• disturbance during cable installation, maintenance/repairs and removal (decommissioning);* *• increased suspended sediment loads in the intertidal zone during installation and maintenance/repairs;* *• predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data; and* *• Protected sites.*	decommissioning have been considered in **section 1.12**.
Para 2.8.126: Applicant assessment of the effects on the subtidal environment should include: *• loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes, e.g. sandwave/boulder/UXO clearance;* *• environmental appraisal of inter-array and export cable routes and installation/maintenance methods, including predicted loss of habitat due to predicted scour and scour/cable protection and sandwave/boulder/UXO clearance;* *• habitat disturbance from construction and maintenance/repair vessels' extendable legs and anchors;* *• increased suspended sediment loads during construction and from maintenance/repairs;* *• predicted rates at which the subtidal zone might recover from temporary effects;* *• potential impacts from EMF on benthic fauna;* *• protected sites; and* *• potential for invasive/non-native species introduction*	Effects considered in the ES encompass those listed. Effects of the Proposed Development on benthic ecology during construction (installation) have been considered in **section 1.10**, effects during operation have been assessed in **section 1.11**, and effects during decommissioning have been considered in **section 1.12**.
NPS EN-5	
Para 2.14.2: In the assessments of their designs, applicants should demonstrate: *• how environmental, community and other impacts have been considered and how adverse impacts have followed the mitigation hierarchy i.e. avoidance, reduction and mitigation of adverse impacts through good design; and* *• how enhancements to the environment post construction will be achieved including demonstrating consideration of how proposals can contribute towards biodiversity net gain (as set out in Section 4.5 of EN-1 and the Environment Act 2021), as well as wider environmental improvements in line with the Environmental Improvement Plan and environmental targets (paragraph 4.2.29 of EN-1).In addition, all applicants are encouraged to demonstrate how the construction planning for the proposals has been coordinated with that for other similar projects in the area on a similar timeline.*	Proposed mitigation measures adopted as part of the Proposed Development are indicated in **section 1.8**. Environmental, community and other impacts from the Proposed Development on benthic ecology have been considered in **sections 1.10**, **1.11** and **1.12**. Cumulative impacts with other plans and projects have been considered in **section 1.13**.

The National Planning Policy Framework

1.2.5 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021 and 2023 (Department for Levelling Up, Housing and Communities, 2023). The NPPF sets out the Government's planning policies for England.

1.2.6 The NPPF has been updated and the draft version was published for consultation on 30 July 2024 with the consultation period ending on 24 September 2024 (Ministry of Housing, Communities and Local Government, 2024). This draft version has been reviewed and considered where necessary.

1.2.7 **Table 1.2.**

Table 1.2: Summary of NPPF requirements relevant to this chapter

Policy	Key provisions	How and where considered in the ES
15 Conserving and enhancing the natural environment	Paragraph 180: *Planning policies and decisions should contribute to and enhance the natural and local environment by [inter alia] … protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); … [and] recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services; … [and] minimising impacts on and providing net gains for biodiversity; …[and] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*	The potential for the Proposed Development to have adverse effects on Benthic Ecology are assessed in this chapter. Statutory protected sites and their associated features of interest which could be impacted by the Proposed Development activities are considered in **sections 1.10**, **1.11** and **1.12**. In addition, a Report to Inform Appropriate Assessment (RIAA) has been submitted alongside the ES (document reference 7.16). Furthermore, a Marine Conservation Zone (MCZ) Assessment has been undertaken which has been submitted alongside the ES (document reference 7.15).
	Paragraph 181*: Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries*	Locally, nationally, and internationally designated sites have all been considered in this ES chapter where designations include benthic features. Details of relevant designated sites are provided in **section 1.7**, **Table 1.18**. The Offshore Cable Corridor avoids all designated sites with the exception of the Bristol Channel Approaches SAC, which is assessed within this chapter with respect to potential impacts to benthic ecology In addition, a RIAA is submitted alongside the ES (document reference 7.16). Furthermore, an MCZ Assessment has been undertaken which is submitted alongside the ES (document reference 7.15).
	Paragraph 185*: To protect and enhance biodiversity and geodiversity, plans should: a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks,*	Impacts to biodiversity are considered in **sections 1.10**, **1.11** and **1.12**. The Offshore Cable Corridor avoids all designated sites with the exception of the Bristol Channel Approaches SAC, which

Policy	Key provisions	How and where considered in the ES
	including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity	is assessed within this chapter with respect to potential impacts to benthic ecology In addition, a RIAA has been submitted alongside the ES (document reference 7.16). Furthermore, an MCZ Assessment has been undertaken which has been submitted alongside the ES (document reference 7.15).
	Paragraph 186*: When determining planning applications, local planning authorities should apply the following principles: a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; b) development on land within or outside a Site of Special Scientific Interest (SSSIs), and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest; c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate*	Consideration has been given to relevant designated sites in the project design (see Volume 1, Chapter 3: Project Description of the ES). Taw-Torridge Estuary SSSI is the only SSSI relevant to benthic habitats in the vicinity of the Proposed Development, and is located at a distance of approximately 5 km from the Proposed Development.

Policy	Key provisions	How and where considered in the ES
	Paragraph 187*: The following should be given the same protection as habitats sites: a) potential Special Protection Areas and possible Special Areas of Conservation; b) listed or proposed Ramsar sites; and c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*	Routing of the Offshore Cable Corridor has been designed to avoid protected habitats where possible. The Offshore Cable Corridor avoids all designated sites with the exception of the Bristol Channel Approaches SAC, which is assessed within this chapter with respect to potential impacts to benthic ecology as part of conservation objective 3 for the site. A desk-based exercise has not identified any relevant potential SPAs and possible SACs and none have been identified through consultations undertaken with e.g. Natural England and the Joint Nature Conservation Committee (JNCC). Details of relevant designated sites are provided in **section 1.7**, **Table 1.18**.

Marine Policy

UK Marine Policy Statement

1.2.8 The UK Marine Policy Statement was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made (HM Government, 2011).

1.2.9 The high-level marine objective "Living within environmental limits" includes the following requirements which are relevant to benthic ecology.

- Biodiversity is protected, conserved and where appropriate recovered and loss has been halted;
- Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems;
- Our oceans support viable populations of representative, rare, vulnerable, and valued species.

South West Inshore and South West Offshore Marine Plans

1.2.10 **Table 1.3** presents a summary of the specific policies set out in the South West Inshore and South West Offshore Marine Plans (MMO, 2021) relevant to this chapter.

Table 1.3: Summary of inshore and offshore marine plan policies relevant to this chapter

Policy	Key provisions	How and where considered in the ES
SW-MPA-1	*Proposals that may have adverse impacts on the objectives of marine*	The designated sites considered in the assessment are indicated in **Table 1.18**,

Policy	Key provisions	How and where considered in the ES
	protected areas must demonstrate that they will, in order of preference: *a) avoid* *b) minimise* *c) mitigate* *- adverse impacts, with due regard given to statutory advice on an ecologically coherent network.*	and key receptors of conservation importance are indicated in **Table 1.19**. Effects of the Proposed Development are considered in **sections 1.10**, **1.11** and **1.12**. A RIAA (document reference 7.16) and MCZ Assessment (document reference 7.15) have also been submitted alongside the ES.
SW-BIO-1	*Proposals that may have significant adverse impacts on the distribution of priority habitats and priority species must demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate* *- adverse impacts so they are no longer significant* *d) compensate for significant adverse impacts that cannot be mitigated.*	Key receptors of conservation importance are indicated in **Table 1.19** and **section 1.7**. Impacts from the Proposed Development on priority habitats and species have been considered in **sections 1.10**, **1.11** and **1.12**.
SW-BIO-2	*Proposals that enhance or facilitate native species or habitat adaptation or connectivity, or native species migration, will be supported. Proposals that may cause significant adverse impacts on native species or habitat adaptation or connectivity, or native species migration, must demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate - adverse impacts so they are no longer significant* *d) compensate for significant adverse impacts that cannot be mitigated.*	The proposed cable route has avoided interaction with protected sites as far as possible, the only protected site that the footprint of the Offshore Cable Corridor falls within is the Bristol Channel Approaches SAC (**section 1.7**). Any areas of Annex I habitat (outside protected sites) will be avoided via micro-routing of the cable installation as far as possible (**section 1.8**). The potential for introduction of Invasive Non-Native Species (INNS) has been assessed in **sections 1.10**, **1.11** and **1.12**.
SW-BIO-3	*Proposals must take account of the space required for coastal habitats, where important in their own right and/or for ecosystem functioning and provision of ecosystem services, and demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate* *d) compensate for - net habitat loss.*	Effects on coastal habitats due to the Proposed Development have been considered in **section 1.10**.
SW-HAB-1	*Proposals that may have direct adverse impacts on deep sea habitats must demonstrate that they will, in order of preference:*	Effects on deep sea habitats due to the Proposed Development have been considered in **sections 1.10**, **1.11** and **1.12**.

Policy	Key provisions	How and where considered in the ES
	a) avoid *b) minimise* *c) mitigate - direct adverse impacts on deep sea habitats.*	
SW-INNS-1	*Proposals must put in place appropriate measures to avoid or minimise significant adverse impacts that would arise through the introduction and transport of invasive non-native species, particularly when:* *1) moving equipment, boats or livestock (for example fish or shellfish) from one water body to another* *2) introducing structures suitable for settlement of invasive non-native species, or the spread of invasive non-native species known to exist in the area.*	The potential effects of INNS on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10**, **1.11** and **1.12**. Proposed embedded measures adopted as part of the final design for the Proposed Development to avoid or minimise the risk of introduction and spread of INNS are indicated in **section 1.8** and are outlined in a project-specific Outline Offshore Biosecurity Plan (document reference 7.19). Vessels transiting between international waters will adhere to the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022 as outlined in the Outline Offshore CEMP (document reference 7.9).
SW-UWN-2	*Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate - adverse impacts on highly mobile species so they are no longer significant.* *If it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding.*	The potential effects of underwater noise and vibration on benthic ecology receptors due to the Proposed Development have been assessed in **section 1.10**, with no significant effects noted. The Final Offshore CEMP will also include standard best practice measures to avoid / minimise any noise during construction (an Outline Offshore CEMP is included as part of the application for development consent (document reference 7.9), with the Final Offshore CEMP to be produced post consent by the contractor)

Local Planning Policy

1.2.11 The onshore elements of the Proposed Development are located within the administrative area of Torridge District Council (and Devon County Council at the County level). The relevant local planning policies applicable to benthic ecology based on the extent of the study area for this assessment are summarised in **Table 1.4**.

Table 1.4: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the ES
North Devon and Torridge Local Plan 2011-2031		

Policy	Key provisions	How and where considered in the ES
ST09: Coast and Estuary strategy	*The integrity of the coast and estuary as an important wildlife corridor will be protected and enhanced. The importance of the undeveloped coastal, estuarine and marine environments, including the North Devon Coast Areas of Outstanding Natural Beauty, will be recognised through supporting designations, plans and policies. The undeveloped character of the Heritage Coasts will be protected*	Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10**, **1.11** and **1.12**.
ST14: Enhancing Environmental Assets	*The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: (a) providing a net gain in northern Devon's biodiversity where possible, through positive management of an enhanced and expanded network of designated sites and green infrastructure, including retention and enhancement of critical environmental capital; (b) protecting the hierarchy of designated sites in accordance with their status; (c) conserving European protected species and the habitats on which they depend; … (h) recognising the importance of the undeveloped coastal, estuarine and marine environments through supporting designations, plans and policies that aim to protect and enhance northern Devon's coastline; (i) conserving and enhancing the robustness of northern Devon's ecosystems and the range of ecosystem services they provide.*	Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10**, **1.11** and **1.12**. Locally, nationally, and internationally designated sites have all been considered where designations include benthic features. Details of relevant designated sites are provided in **section 1.7**, **Table 1.18**. In addition, a RIAA has been submitted alongside the ES (document reference 7.16). Furthermore, an MCZ Assessment has been undertaken which has been submitted alongside the ES (document reference 7.15). Burial will be the preferred option for the cable protection, and only when full target burial depth and backfilling is not possible will additional protection be installed. Where additional rock protection is necessitated, this will be placed within the trench wherever possible i.e. rock placement above seabed level is deemed the final option (**Table 1.20**). Installation of cable protection (e.g. rock placement) has the potential to promote local biodiversity if it is colonised by a range of epifaunal organisms. It should be noted, however, that where such change in habitat differs notably from the pre-construction habitat that was present (e.g. change from soft to hard substrate), it cannot be assumed that such localised increases in biodiversity will be perceived as being beneficial. Consequently, it is likely not to be considered to represent net gain (**section 1.11**).

North Devon Biosphere Reserve

1.2.12 The Proposed Development is located within the North Devon Biosphere Reserve, which is recognised under UNESCO's Man and the Biosphere (MAB) Programme and designated as an area for testing and demonstrating sustainable development on a sub-regional scale.

1.2.13 The North Devon Biosphere Reserve consists of three zones; a core zone centred around Braunton Burrows SAC / SSSI, a buffer zone consisting of the Taw-Torridge Estuary (as far as Barnstaple and Bideford), and a transition zone formed by the catchment area of the rivers and streams that drain to the North Coast of Devon in addition to an area of sea as far out as Lundy.

1.2.14 The Biosphere Reserve is overseen by the North Devon Biosphere Reserve Partnership, which is a collaboration of 26 partnership organisations who work to deliver sustainable development through direct action, through advocacy and providing advice. The non-statutory 'North Devon Biosphere Reserve Strategy for Sustainable Development 2014 to 2024' (NDB undated) provides a context for stakeholders to deliver programmes and plans in support of the sustainable development of the Biosphere Reserve.

1.2.15 Within the North Devon Biosphere Reserve, non-statutory programmes and plans relevant to benthic ecology include:

- North Devon Marine Natural Capital Plan
- North Devon Marine Nature Recovery Plan 2022-2027

1.2.16 The extent to which the Proposed Development impacts on the North Devon Biosphere Reserve and its relevant programmes / plans has been considered in this benthic ecology chapter, and consultation has taken place with the North Devon Biosphere Reserve Partnership during preparation of the ES. **Table 1.5** presents a summary of the provisions set out in the North Devon Marine Natural Capital plan (North Devon Biosphere Reserve, 2020) relevant to this chapter.

Table 1.5: Summary of North Devon UNESCO Biosphere marine policies relevant to this chapter

Policy	Key provisions / Description	How and where considered in the ES
North Devon Marine Nature Recovery Plan 2022-2027		
North Devon Marine Nature Recovery Plan	*This Marine Nature Recovery Plan covers the biodiversity found in the coastal, estuarine and marine areas of the North Devon Biosphere Reserve and has been developed in order to deliver against relevant international, national and local policies and initiatives. The plan highlights habitats of importance which includes coastal and estuarine rocky intertidal habitats, coastal and estuarine sediment intertidal habitats, saltmarsh and saline reedbeds, subtidal rocky habitats, subtidal vegetated habitats, and transitional and coastal waters. Benthic species*	A range of species and habitats of conservation importance have been identified in **section 1.7** and are indicated in **Table 1.19**. Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10, 1.11,** and **1.12**.

Policy	Key provisions / Description	How and where considered in the ES
	of importance indicated include the Celtic sea slug, gold star coral, sunset cup coral and pink sea fan, with the plan recommending actions that need to be taken forward to support their recovery.	
Marine Natural Capital Plan		
Marine Natural Capital Plan PL07: *Support proposals that identify habitat extents outside Marine Protected Areas (MPAs) that enhance ecological connectivity and seek to increase extent and / or condition of these assets where it has been identified as 'at risk'.*	*Identifying habitat extents outside MPAs that enhance ecological connectivity would benefit site level management approaches to underpin flows of ecosystem benefits. PL07 supports ongoing research and monitoring of natural capital assets in North Devon to improve understanding of the flow of ecosystem services for enhancement of marine natural capital.*	The baseline benthic ecology characterisation of the Offshore Cable Corridor will contribute to the ongoing understanding of the wider biosphere area. A range of species and habitats of conservation importance have been identified in **section 1.7** and are indicated in **Table 1.19**. The applicant has agreed to share benthic characterisation data (collected as part of pre-construction surveys for the Proposed Development) with the North Devon Biosphere (see **Section 1.7** for benthic ecology baseline characterisation and Volume 3, Appendix 8.4 GEOxyz Environmental Report of the ES, for further description of data collated. Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10, 1.11,** and **1.12**.
Marine Natural Capital Plan PL08: *Set management priorities that will rapidly enable 'recovery' of estuarine and coastal intertidal habitats within MPAs, where this conservation objective exists.*	*In the North Devon Marine Natural Capital Plan area these habitats, particularly saltmarsh as well as shallow subtidal reefs and sediments, support multiple ecosystem benefits including food provision, sea defence, healthy climate, and, tourism and recreation. PL08 recognises the importance of these habitats and focuses management measures towards delivering multiple ecosystem service benefits.*	A range of species and habitats of conservation importance have been identified in **section 1.7** and are indicated in **Table 1.19**. Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10, 1.11,** and **1.12**. Intertidal habitats of MPAs have been considered where appropriate in this ES Chapter. A RIAA (document reference 7.16) and MCZ Assessment (document reference 7.15) have also been submitted alongside the ES.
Marine Natural Capital Plan PL09: *Support MPA management priorities that consider the wider ecological structures and processes that*	*Environmental net gain for natural capital may be achieved via MPA management though a more ambitious approach to marine biodiversity conservation. PL09 supports proposals that seek a reduction in pressure across the whole site instead of considering only the designated features, along with*	A range of species and habitats of conservation importance have been identified in **section 1.7** – across the entire Offshore Cable Corridor - and are indicated in **Table 1.19**. The Bristol Channel Approaches MPA (which is an SAC) has been considered in the assessment in relation to potential effects on Conservation Objective 3.

Policy	Key provisions / Description	How and where considered in the ES
have the potential for 'recovery' and 'renewal' beyond the delineated boundaries of features of conservation interest within an MPA.	*the identification of thresholds for sustainable use.*	MCZs and their features have also been considered in this ES Chapter. A RIAA (document reference 7.16) and MCZ Assessment (document reference 7.15) have also been submitted alongside the ES. Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10, 1.11,** and **1.12**.
Marine Natural Capital Plan PL10: *Support the implementation of management measures that reduce pressure across subtidal sediments*	*Deeper subtidal habitats provide multiple ecosystem service benefits including food provision and water quality. These habitat assets make up a significant proportion of the plan area but very large extents of these deeper offshore habitats are in an impacted condition, both within and outside MPAs, due to previous interactions with abrasive pressure from demersal fishing activities. PL10 recognises that management must consider improving the condition of this habitat.*	A range of species and habitats of conservation importance have been identified in **section 1.7** and are indicated in **Table 1.19**. Effects on benthic ecology receptors due to the Proposed Development have been assessed in **sections 1.10, 1.11,** and **1.12**. Commercial fisheries activities are described and assessed in Volume 3, Chapter 3: Commercial Fisheries of the ES.

1.3 Consultation and Engagement

Scoping

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

1.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 7 March 2024. Key issues raised during the scoping process specific to benthic ecology are listed in **Table 1.6**, together with details of how these issues have been addressed within the ES.

Table 1.6: Summary of Scoping Responses

Comment	How and where considered in the ES
Planning Inspectorate	
Several aspect chapters in the Scoping Report refer to fixed distance study areas with no explanation as	The study area is presented in **section 1.4** and **Figure 1.1**. The study area comprises the Offshore

Comment	How and where considered in the ES
to why these have been selected. The ES should ensure the study area for each aspect reflects the Proposed Development's ZoI and the impact assessment should be based on the ZoI from the Proposed Development with reference to potential effect pathways. Clear justification should be provided to support any distances applied.	Cable Corridor with a buffer area between 5 km and 15.2 km. This is a precautionary distance fully encompassing the zone of influence (ZoI) for suspended sediment dispersion (maximum distance of 15.2 km within Bideford Bay) which is the impact with the greatest ZoI (refer to Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES, and Section 1.4).
The Inspectorate acknowledges that data and knowledge regarding the baseline environment exists for the offshore area in which the Proposed Development would be located. The Inspectorate understands the benefits of utilising this information to supplement site-specific survey data but advises that suitable care should be taken to ensure that the information in the ES remains representative and fit for purpose. The Applicant should make effort to agree the suitability of information used for the assessments in the ES with relevant consultation bodies.	Data and information from desk-based review was used to supplement data from site-specific surveys when describing the baseline environment in the Scoping Report. These data were reviewed again to ensure suitability of the information to inform the assessment in the PEIR, with information updated in the PEIR where appropriate. It has also been reviewed for the ES to ensure that the most up to date information available is considered. Comments from regulators received in reply to statutory consultation under section 42 of the PA 2008have been considered when assessing suitability of available data for the ES (Table 1.7).
It is noted that the Scoping Report includes consideration of potential transboundary effects in relation to benthic ecology. The Inspectorate recommends that the ES should identify whether the Proposed Development has the potential for significant transboundary effects, and if so, what these are, and which EEA States would be affected. The Inspectorate will undertake a transboundary screening on behalf of the SoS in due course.	Transboundary impacts in relation to benthic ecology are considered in **section 1.14**.
The Inspectorate notes that no justification is presented in the Scoping Report for the proposal to scope direct habitat loss out during operation (repair) and decommissioning (in situ). It is also noted that the potential for a change in hydrodynamic regime from localised areas of scour is scoped into the assessment.	In this ES the assessment for the impact 'Temporary habitat loss/disturbance' considers any direct habitat loss during operation (repair) as a result of any de-burial and re-burial of cable failure points (**Table 1.21**, **section 1.11**). The assessment for the impact 'Long-term habitat loss/change' considers any direct habitat loss during decommissioning if the cable was left *in-situ* (**Table 1.21**, **section 1.12**). Long-term habitat loss change is also assessed for the operational phase in **section 1.11**. Effects of changes in hydrodynamic regime on benthic ecology receptors are assessed in **section 1.11**.
The Inspectorate considers that there is a possibility for localised scour due to the presence of the offshore cable and cable protection (if required), which could also result in direct habitat loss. This matter should be considered in the assessment, where likely significant effects could occur, or provide evidence demonstrating agreement with the relevant consultation bodies that significant effects are not likely to occur.	The assessment for the impact 'Change in hydrodynamic regime (scour & accretion)' considers the potential for localised scour due to the presence of the offshore cable and cable protection (if required) (**Table 1.21**, **section 1.11**).

Comment	How and where considered in the ES
The Inspectorate notes that no justification is presented in the Scoping Report for the proposal to scope physical habitat change during decommissioning (if the cable is removed) out and that paragraphs 4.12.11 to 4.12.14 of the Scoping Report provide limited information about the proposed approach to decommissioning if the cable is removed, beyond it being similar to installation. It is unclear whether the armour protection would be fully removed and any works that might be required to reinstate habitat affected during operation. The Inspectorate does not have sufficient evidence to exclude the possibility of likely significant effects and this matter should be scoped into the assessment, where likely significant effects could occur.	In this ES the assessment for the impact 'Temporary habitat loss/disturbance' considers any habitat loss during decommissioning if the cable is removed (**section 1.12**) which is primarily based on the assessment for the construction phase (**section 1.10**). The decommissioning project description has been updated in this ES, containing further detail compared to the Scoping Report and PEIR (refer to Volume 1, Chapter 3: Project Description of the ES). It is anticipated the effects of any decommissioning activities would be less than for the construction phase, with e.g. footprint of disturbance less than construction (as removal of e.g. a section of cable is anticipated to result in less disturbance than methods such as seabed clearance or trenching used to install it).
The Inspectorate notes that no justification is presented in the Scoping Report to scope out physical disturbance and displacement (disturbance of bottom sediments) and changes to water quality (resuspension of sediments and increased sediment loading) during operation (excluding operational repair) and decommissioning (if the cable is left in situ). However, it considers that a pathway for effect from these matters is unlikely to arise during operation and decommissioning from the presence of the offshore cable, the majority of which is predicted to be buried as described at paragraph 4.7.38 of the Scoping Report, and on the basis that there would be no physical works or significant vessel movements. The Inspectorate agrees that these matters can be scoped out of the assessment on that basis.	'Temporary habitat loss/disturbance' and 'Temporary increase in suspended sediments and sediment deposition' have been scoped out of assessment for operation (excluding operational repair) and decommissioning (if cable is left *in-situ*), (**Table 1.21**).
The Inspectorate notes that no justification is presented in the Scoping Report for the proposal to scope out changes to water quality (release of hazardous substances) during operation (excluding operational repair) and decommissioning (if the cable is left in situ). However, it considers that a pathway for effect from these matters is unlikely to arise during operation (excluding repair) and decommissioning (in situ) given the limited activities involved and the infrequent vessel movements along the offshore cable corridor, as described in Chapter 4 of the Scoping Report respectively. The Inspectorate agrees that these matters can be scoped out of the assessment on that basis.	'Changes to water quality (release of hazardous substances from sediments)' has been scoped out of assessment for operation (excluding operational repair) and decommissioning (if cable is left *in-situ*).
The Inspectorate agrees that the introduction and spread of INNS during operation (excluding operational repair) and decommissioning (if the cable is left in situ) can be scoped out of the ES on the basis that the Applicant has committed to embedded mitigation measures including the	'Introduction and spread of INNS' has been scoped out of assessment for operation (excluding operational repair), and decommissioning (if the cable is left *in-situ*).

Comment	How and where considered in the ES
production and implementation of a biosecurity plan with incorporation of biosecurity risk assessment during all phases of the Proposed Development (Table 4.8.2 of the Scoping Report). The Scoping Report also indicates that vessel movements during operation (excluding repair) would be minimal with a single vessel per year for the first five years, and five yearly thereafter (Paragraph 4.11.11).	Embedded mitigation measures including the production and implementation of an outline offshore biosecurity plan (document reference 7.19) with incorporation of biosecurity risk assessment are presented in Table 1.20. The proposed operational survey schedule is detailed in Volume 1, Chapter 3: Project Description of the ES.
An outline of the biosecurity plan and risk assessment should be submitted with the DCO application. It should describe how available best industry practice would be incorporated into the plan. The ES should also explain the proposed measures and how these are secured through DCO requirements (or other suitably robust methods). Effort should be made to agree such measures with relevant consultation bodies.	An outline offshore biosecurity plan is included as part of the application for development consent which describes how available industry best practice is incorporated into the plan (document reference 7.19). Embedded mitigation measures including the production and implementation of an outline offshore biosecurity plan (document reference 7.19) have been agreed with relevant consultation bodies and are presented in **Table 1.20**. The final offshore biosecurity plan will be finalised by the offshore contractor and is a requirement of the Final Offshore CEMP (an Outline Offshore CEMP is included as part of the application for development consent (document reference 7.9), with the Final Offshore CEMP to be produced post consent by the contractor).
The Scoping Report states that changes could occur from presence of rock berms, which may be required for cable protection at crossings or in isolated hard seabed areas during operation. The Inspectorate notes the predicted construction timetable and two offshore cable laying phases as described at Paragraphs 4.7.10 to 4.7.12 of the Scoping Report. It appears possible that rock berms would be in place for extended periods of construction activity in advance of the cable becoming operational and that mitigation may also be required during this period. The Inspectorate advises that the potential for change to the hydrodynamic regime due to the presence of cable protection should be assessed for the phases during which it is likely to give rise to significant effects and that the ES should describe any mitigation required and explain how this would be secured in the DCO.	Acknowledging that the separate bipoles / cable bundles may be installed in separate construction years, there is potential for hydrodynamic and scour effects to commence prior to completion of the 'construction phase'. However, consistent with the further PINS comment below (*The Inspectorate is content for the effect of the introduction of hard substrate to be considered during the operational phase and therefore agrees this matter can be scoped out of the construction stage assessment*) the impact 'Change in hydrodynamic regime (scour & accretion)' on benthic ecology receptors has been assessed for the operational phase but not the construction phase. Effects during the operation phase will effectively be worst case with all seabed rock protection and crossings in place.
The Inspectorate agrees that there is unlikely to be an effect pathway from change in hydrodynamic regime (scour and accretion) during operational repair and this matter can be scoped out of assessment.	'Change in hydrodynamic regime (scour & accretion)' has been scoped out of assessment for operation (repair) (**Table 1.21**).
The Inspectorate does not have sufficient evidence to exclude the possibility of likely significant effects from change in hydrodynamic regime (scour and accretion) during decommissioning (if the cable is	'Change in hydrodynamic regime (scour & accretion)' has been scoped in to assessment for

Comment	How and where considered in the ES
removed) and this matter should be scoped into the assessment, where likely significant effects could occur.	decommissioning (if the cable is removed) (**Table 1.21**).
The Inspectorate does not agree to scope out underwater noise and vibration during operation (including repair) and decommissioning (both options) as no supporting evidence has been provided in the Scoping Report. It is unclear whether underwater noise and vibration could be generated during these phases of the Proposed Development for example from vessel movements, cable repair and/ or reburial, and cable removal activity and whether there are noise and/ or vibration sensitive benthic receptors that could be affected by these works. The ES should include an assessment of underwater noise, where likely significant effects could occur, or provide evidence demonstrating agreement with the relevant consultation bodies that significant effects are not likely to occur.	For benthic ecology, underwater noise and vibration has only been assessed for the Horizontal Directional Drilling (HDD) aspects of construction with justification provided in **section 1.10**. The noise levels that would be generated by construction vessels, by cable laying equipment and during boulder clearance would be very low compared to e.g. much louder sources of noise such as pile driving (an impact which is not associated with the Proposed Development), and any effects on benthic invertebrates are anticipated to be minimal. NE and JNCC have not raised any concerns about underwater noise and vibration in relation to benthic ecology in either their Scoping opinion or in their meetings with the Applicant at PEIR stage.
The Inspectorate notes that no justification is presented in the Scoping Report for the proposal to scope out sediment heating and electromagnetic fields (EMFs) from the cable during construction and decommissioning (both options). However, the Inspectorate considers that a pathway for effect from these matters would only arise when the cable is operational and live, and as such significant effects are not likely to occur during construction and decommissioning. The Inspectorate agrees that these matters can be scoped out of the assessment.	Consideration of sediment heating and EMFs has been scoped out of assessment for construction and both decommissioning options (**Table 1.21**).
The CIEEM guidelines for Ecological Impact Assessment for Terrestrial, Freshwater and Coastal Environments (2018) was updated in April 2022 as version 1.2. The assessment should refer to the most recent iteration of the guidelines as relevant.	The updated CIEEM guidelines have been referred to within the ES but they are still referenced as 2018 (as specified in the 2022 update). This has been referenced as 'CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.2 – Updated April 2022)' within the reference list in **section 1.17**.
Whilst the Inspectorate agrees that suspended sediment carried in plumes is likely to be pathway resulting in the greater spatial extent, it is noted that no survey or modelling evidence has been presented in the Scoping Report to explain how the proposed 15km buffer relates to the potential extent of suspended sediment plumes and/ or whether there is potential for effects to extend beyond this including to designated sites with benthic features located outside of the 15km buffer. Section 8.9 of the Scoping Report proposes a 30km buffer for physical processes. The ES should clearly identify and justify the final study area applied to the assessment of effects on benthic ecology, based on the ZoI and considering relevant guidance.	The study area is presented in **section 1.4** and **Figure 1.1**. The study area comprises the Offshore Cable Corridor with a buffer area between 5 km and 15.2 km. This is a precautionary distance fully encompassing the ZoI for suspended sediment dispersion (maximum distance of 15.2 km within Bideford Bay) which is the impact with the greatest ZoI (refer to Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES, and Section 1.4 of this chapter).
Effort should be made to agree whether modelling is required to identify the ZoI, together with scope and	The methods for the semi-empirical approach used to estimate the ZoI for suspended sediment dispersion have been provided to Natural England

Comment	How and where considered in the ES
extent of any modelling, with relevant consultation bodies.	(NE) and the Marine Management organisation (MMO) for comment, with consultation comments included within Volume 3, Chapter 8: Physical Processes of the ES (methods and results are in Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES).
The Scoping Report describes site-specific benthic surveys that have been carried out to inform the baseline. In the absence of information on the rationale behind the approach to sampling and the area covered by the survey, it is difficult for the Inspectorate to understand if the baseline data is likely to be adequate. The ES should either demonstrate that the adequacy of the baseline data has been agreed through consultation with relevant consultation bodies (with supporting information eg meeting minutes) or present a detailed justification as to why it is considered adequate.	Site-specific subtidal benthic surveys were conducted by GEOxyz between August and October 2023 (Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). The survey design consisted of a total of 61 camera transects and 51 grab sample stations covering the length of the Offshore Cable Corridor. Sampling locations were informed by geophysical survey. Data was obtained for the distribution of seabed habitats and associated fauna within the survey area, including assessment of the presence or absence of potential habitats/species of conservation importance including Annex I habitats. Additionally, water profiling was also conducted at each target location. Reports outlining methods and survey results have been provided to NE, the MMO and JNCC for information ahead of PEIR consultation with responses highlighted in **Table 1.7**. An intertidal survey has been conducted to provide additional data for the intertidal environment in the vicinity of the HDD works to inform the assessment in the ES, the results of which are included in Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES.
In relation to site-specific survey data, the Applicant should ensure the baseline is adequately understood for the purposes of impact assessment and to inform preparation of the cable burial risk assessment, and development of any necessary mitigation measures thereafter.	See response to comment directly above. Site-specific survey data has been collected to inform the assessment and to inform preparation of the Outline Cable Burial Risk Assessment (CBRA) (Volume 1, Appendix 3.4 of the ES), and development of any necessary mitigation measures as included in **Table 1.20**.and in the Commitments Register (Volume 1, Appendix 3.1 of the ES).
Section 8.2 of the Scoping Report identifies several SACs and MCZs within the study area, but these are not referred to as receptors for consideration in the assessment in Table 8.2.5. For the avoidance of doubt, the potential for likely significant effects to designated MCZ and SAC, and relevant benthic ecology features, should be considered in the impact assessment.	Features of Special Areas of Conservation (SACs) and Marine Conservation Zones (MCZs) identified within the study area (**Table 1.18**) have been considered as key receptors for consideration within the assessment (**Table 1.19**). A RIAA has been submitted alongside the ES (document reference 7.16). An MCZ Assessment has been submitted alongside the ES (document reference 7.15), and an indication of potential effects on MCZ features is provided in

Comment	How and where considered in the ES
	this benthic ecology chapter (see **sections 1.10** and **1.11**).
The assessment should include reference to, and consideration of, the conservation objectives for the MCZ. The Applicant's attention is drawn to the comments of NE and the JNCC (Appendix 2 of this Scoping Opinion), which highlight the availability of further information about MCZ.	Benthic ecology features of MCZs within the ZoI of the Proposed Development are outlined in **Table 1.18**. An indication of potential effects on MCZ features is provided in the ES (see **sections 1.10** and **1.11**) and an MCZ Assessment has been submitted alongside the ES (document reference 7.15).
For the SACs, cross-reference can be made to information within a HRA Report(s) to avoid duplication.	The ES indicates that potential effects on SAC features are indicated in the RIAA accompanying the ES (document reference 7.16).
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. The ES should clearly describe any mitigation measures relied on to avoid significant effects on benthic receptors including SACs and MCZs and explain how the measures would be secured.	The impact 'Temporary habitat loss/disturbance' has been considered for installation of cable protection (**section 1.10**). For the assessment of effects of cable protection during operation the impact 'Long-term habitat loss/change' has been considered (**section 1.11)**. Mitigation measures to avoid significant effects on benthic ecology receptors are described in **Table 1.20** and included within the Commitments Register (Volume 1, Appendix 3.1 of the ES). Volume 3, Chapter 8: Physical Processes of the ES includes an assessment of secondary (localised) scour, building on recent modelled estimates of bed currents (refer to Volume 3, Appendix 8.1: Sediment Source Concentrations and Assessment of Disturbance of the ES).
The Inspectorate is content for the effect of the introduction of hard substrate to be considered during operational phase and therefore agrees this matter can be scoped out of the construction stage assessment. The ES should however consider the removal of subsequent hard substate in the decommissioning (removal) phase, where likely significant effects could occur, or provide evidence demonstrating agreement with the relevant consultation bodies that significant effects are not likely to occur.	The impacts 'Long-term habitat loss/change' and 'Change in hydrodynamic regime (scour & accretion)' associated with the introduction of hard substrata have been scoped out of the construction phase. However, they have been assessed for the operational phase in **section 1.11**. For this ES, a precautionary approach to decommissioning (removal) impacts has been adopted where it is assumed impacts will be equivalent to those associated with the construction phase (despite likely reduced magnitude of impact in many instances) (refer to Volume 1, Chapter 3: Project Description of the ES).
The impact assessment should be informed by plume modelling. The ES should clearly describe the modelling undertaken to inform the impact assessment and seek to agree the scope of the physical process modelling with relevant consultation bodies, such as JNCC, NE and the MMO.	A semi-empirical approach has been used to estimate the ZoI for suspended sediment dispersion (refer to Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). These methods have been presented to, and (a previous draft of) the Technical Note (ES Volume 3, Appendix 8.1) issued, to the MMO and Natural England. As further detailed in Volume 3, Chapter 8: Physical Processes of the ES, these consultation

Comment	How and where considered in the ES
	bodies have confirmed that they deem this semi-qualitative assessment (which are presented as a worst-case estimate of likely sediment transport distances), as an appropriate level of 'modelling' to inform the ES.
The ES should assess impacts from climate change, including extreme weather events over the construction and decommissioning periods, where significant effects are likely to occur and describe and secure any relevant mitigation measures.	The impacts of climate change have been considered within the future baseline conditions section (**section 1.7**).
The ES should set out the methodologies used to explain any departure from the proposed approach where professional judgement is applied. Outputs from other assessments should be clearly explained where these have been applied.	The impact assessment methodology is presented in **section 1.6**. Criteria for sensitivity and magnitude have been informed by previous assessments.
Where significance criteria are not explicitly defined within the guidance, the ES should clearly set out where deviation from guidance has occurred and professional judgement has been applied.	The impact assessment methodology is presented in **section 1.6**. Criteria for sensitivity and magnitude have been informed by previous assessments.
The Inspectorate agrees that likely significant effects arising from residues and emissions (eg dust, pollutants, light, noise, vibration) are to be assessed in the relevant aspect chapters of the ES and a standalone aspect chapter for residues and emissions is not required.	This benthic ecology chapter includes consideration of construction phase 'emissions' of noise and vibration and suspended sediments (**section 1.10**) and operational phase 'emissions' of EMF and sediment heating (**section 1.11**).
The Inspectorate notes that various aspect chapters in the Scoping Report do not clearly identify those impacts scoped-in to the assessment that include an assessment of major accidents and disasters. The Inspectorate advises that the ES ensures clarity on what has been considered within the technical assessments. The Inspectorate would expect an overarching section in the ES which explains how potential impacts have been identified and where in the ES the assessment of their effects is presented.	In terms of potential major accidents, this ES chapter includes consideration of 'Accidental pollution' (**sections 1.10**, **1.11** and **1.12**). An overarching section on major accidents and disasters is included within Volume 1, Chapter 3: Project Description of the ES.
The Scoping Report confirms that heat generated during the operation and maintenance of the Proposed Development (eg heat generated by offshore and onshore cables) will be considered within the relevant aspect chapters, including Benthic Ecology, Fish and Shellfish Ecology; and Commercial Fisheries. However, activities during construction and decommissioning of the Proposed Development are unlikely to generate significant levels of heat. The Inspectorate agrees that activities during construction and decommissioning are unlikely to result in significant environmental effects and can be scoped out of the assessment.	'Sediment heating' has been scoped in to the assessment of the operation and maintenance phase only (**section 1.11**).
The Scoping Report confirms that EMFs generated during the operation of the Proposed Development will be considered in the relevant aspect chapters, including benthic ecology, and would not be included in a standalone ES chapter in respect of heat and radiation. The Inspectorate is content with this approach.	EMF effects have been scoped in to the assessment of the operation and maintenance phase only (**section 1.11**).

<table>
<tr><th>Comment</th><th>How and where considered in the ES</th></tr>
<tr><td>Site-specific survey data: The Inspectorate advises that effort should be made to agree the scope and method of any future survey work with relevant consultation bodies, including the JNCC, NE and the Marine Management Organisation (MMO).</td><td>The Proposed Development benefits from extensive benthic survey data which is deemed sufficient to inform the ES (c.f. 'Site-Specific Surveys' section of this ES chapter).

Additional geophysical survey data may be collected as part of UXO identification and characterisation surveys; the scope of these surveys would be agreed with the MMO (and other relevant bodies). Any such surveys would be undertaken prior to construction and under separate marine licence (approach confirmed by MMO consultation discussions); c.f. Volume 3, Chapter 4: Marine Mammals & Turtles of the ES.

Similarly, any additional geophysical surveys required for additional characterisation of unknown archaeological features (as identified by the Wessex Archaeology review of existing data), would be designed in consultation with statutory bodies, including Historic England (c.f. Volume 3, Appendix 7.5: Outline Offshore Archaeological Written Scheme of Investigation of the ES).</td></tr>
<tr><td colspan="2">Joint Nature Conservation Committee (JNCC)</td></tr>
<tr><td>We note that the project passes through the following sites designated for nature conservation:
• East of Haig Fras Marine Conservation Zone (MCZ);
• South-West Approaches to Bristol Channel MCZ;
• Lundy Sand Special Area of Conservation (SAC);
• Lundy MCZ;
• Bristol Channel Approaches SAC;
• North West of Lundy MCZ; and
• Bideford to Foreland Point MCZ.
The East of Haig Fras MCZ is an offshore site and so JNCC is the responsible agency for this site. The South West Approaches to the Bristol Channel MCZ and Bristol Channel Approaches SAC are jointly managed sites between Natural England, Natural Resources Wales (in the case of Bristol Channel Approaches SAC) and JNCC. JNCC defer to Natural England for comments on the remaining sites as they are the responsible agency.</td><td>Designated sites with benthic ecology features which overlap with the Benthic Ecology study area are presented in Table 1.18 and are:
• Taw-Torridge Estuary SSSI;
• Lundy SAC;
• Bideford to Foreland Point MCZ;
• South West Approaches to Bristol Channel MCZ; and
• East of Haig Fras MCZ

The only feature of Lundy MCZ is spiny lobster which is mentioned in Table 1.18, but a footnote has been added to indicate it is covered by the Fish and Shellfish ES chapter (Table 1.18).</td></tr>
<tr><td>Whilst reviewing the Scoping Report we found some of the figures in chapters difficult to understand as the text was too small. For example, the legend on Figure 8.2.3 cannot be read as the text is too small.</td><td>Noted. Figures have been provided separately to the main document for the ES (see Volume 3, Figures of the ES) which means they can be more readily enlarged making text easier to read.</td></tr>
<tr><td>We note that the Applicant has allowed for a 500m corridor within which they aim to microroute the cable following interpretation of geophysical and geotechnical survey results. We would encourage the Applicant to consider surveying and potentially micro-routing outside of this 500m corridor if sensitive habitat is found to cover the width of this 500m corridor. In some situations, the habitat extent</td><td>The potential presence of sensitive habitats including potential Annex I geogenic reefs (i.e. bedrock reefs and stony reef) and biogenic reef (Sabellaria spinulosa reef) was determined across the proposed cable route based on outputs of geophysical surveys and DDV surveys. Results found that where these habitats were identified, they did not span the 500 m width of the Offshore Cable</td></tr>
</table>

Comment	How and where considered in the ES
may only extend to just outside the cable corridor and so micro-routing just outside of the corridor could be plausible.	Corridor. Therefore, it is anticipated that micro-routing around these sensitive habitats will be possible within the cable corridor.
JNCC agree with the Applicant using CIEEM Guidelines for Ecological Impact Assessment for Terrestrial, Freshwater and Coastal Environments (2018) for the benthic ecology assessment. We would also recommend that the Applicant uses 'Nature conservation considerations and environmental best practice for subsea cables for English inshore and UK offshore waters' (Natural England and JNCC, 2022).	The updated CIEEM (2018) guidelines have been referred to within the ES. This has been referenced as 'CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.2 – Updated April 2022)' within the reference list in **section 1.17**. The guidance 'Nature conservation considerations and environmental best practice for subsea cables for English inshore and UK offshore waters' (Natural England and JNCC, 2022) has been used to inform the assessment of potential impacts.
JNCC agrees with the proposed study area for benthic ecology being determined based on the pathway for effect that is likely to have the greatest spatial extent, which will be suspended sediment carried in plumes as a result of cable burial activities. We also agree with this being based on physical processes understanding and would recommend sediment plume modelling be undertaken as a basis for the study area taken forward in the assessment.	The study area is presented in **section 1.4** and **Figure 1.1**. A study area of up to 15.2 km has been used for the cable route. This is a precautionary distance fully encompassing the ZoI for suspended sediment dispersion (maximum distance of 3.9 km along the majority of the cable route and 15.2 km at Bideford Bay) which is the impact with the greatest ZoI (refer to Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES, and Section 1.4 of this chapter). The methods for the semi-empirical approach used to estimate the ZoI for suspended sediment dispersion have been provided to NE, the MMO and JNCC for comment (methods and results are in **Volume 3, Appendix 8.1: Sediment Dispersion Technical Note**). These consultation bodies have confirmed that they deem this semi-qualitative assessment (which are presented as a worst-case estimate of likely sediment transport distances), as an appropriate level of 'modelling' to inform the ES.
We note that the applicant has not included the Cefas OneBenthic Baseline Tool within the desk-based data sources to be used in the assessment, but this source is used to describe the benthic baseline within the chapter. We would recommend the Applicant includes all desk-based data sources to be used to inform the assessment be included here.	The Cefas OneBenthic Baseline Tool has been used to inform the baseline in **section 1.7** and results from the OneBenthic Baseline Tool are presented in **Table 1.17**. The OneBenthic Tool has been referenced as a data source in **Table 1.10** of this ES Chapter.
JNCC are grateful for this early information provided by site-specific surveys of the cable corridor. We would like to highlight that sampling effort should be thorough enough so as to adequately characterise the benthic environment and understand all potential impact pathways that may present themselves throughout the whole cable corridor.	Site-specific subtidal benthic surveys were conducted by GEOxyz between August and October 2023 (Volume 3, Appendix 8.4: GEOxyz Environmental Report). The survey design consisted of a total of 61 camera transects and 51 grab sample stations covering the length of the Offshore Cable Corridor. Sampling locations were informed by geophysical survey. Data was obtained for the distribution of seabed habitats and associated fauna within the survey area, including assessment of the

Comment	How and where considered in the ES
	presence or absence of potential habitats/species of conservation importance including Annex I habitats. Additionally, water profiling was also conducted at each target location. Reports outlining methods and survey results have been provided to NE and JNCC for information with any responses highlighted in **Table 1.7**. An intertidal survey has been conducted to provide additional data for the intertidal environment in the vicinity of the HDD works to inform the assessment in the ES, the results of which are included in Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES.
JNCC agrees with the designated sites for benthic features that have been scoped into the assessment. We defer to Natural England in regard to comments on Lundy Sand Special Area of Conservation (SAC), Braunton Burrows SAC, Hartland Point to Tintagel Marine Conservation Zone (MCZ) as they are these sites' responsible agency. For the East of Haig Fras MCZ, JNCC is the responsible agency for this site and the South West Approaches to the Bristol Channel MCZ is jointly managed by JNCC and Natural England. We have therefore focused our comments on these two sites. The applicant has highlighted the designated features for these sites which are benthic species and habitats. We would recommend that the Applicant reviews the site information and Conservation Objectives available on JNCC's website in order to assess the impact the project might have on these sites. Whilst the cable corridor does not directly cross either of these sites there is potential for activities to affect designated features through impact pathways such as sediment plumes caused during construction and operation and maintenance. JNCC would therefore expect these impacts to be assessed during the subsequent EIA stages.	Noted. Consideration of protected sites for assessment for benthic ecology has been based on a distance between 5 km and 15.2 km, which is a precautionary distance fully encompassing the ZoI for suspended sediment dispersion which is the impact with the greatest ZoI (refer to Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). A RIAA has been submitted alongside the ES (document reference 7.16). An MCZ Assessment has been submitted alongside the ES (7.15).
JNCC agrees with the applicant's proposed approach of determining the full extent of the areas showing characteristics of Annex I reefs during the subsequent EIA process by undertaking further assessments. We wish to clarify if these assessments at the EIA stage will involve further sampling of the area to determine the extent of these habitats as this may provide options for micro-routing around the habitat. If so, we would recommend survey effort is not restricted to the cable corridor as it may be that the habitat extent does not extend far outside of the corridor boundaries and could present opportunities for cable	The potential presence of sensitive habitats including potential Annex I geogenic reefs (i.e. bedrock reefs and stony reef) and biogenic reef (*Sabellaria spinulosa* reef) was determined across the proposed cable route based on outputs of geophysical surveys and DDV surveys. Results found that where these habitats were identified, they did not span the 500 m width of the Offshore Cable Corridor. Therefore, it is anticipated that micro-routing around these sensitive habitats will be possible within the Offshore Cable Corridor.

Comment	How and where considered in the ES
micro-routing and reduced rock dump for cable protection.	It is considered that data available are sufficient to inform micro-routing.
JNCC agree with the applicant scoping all benthic impacts listed in Table 8.2.5 into the assessment and acknowledge that effects related to UXO clearance works will be covered in a separate licence application if necessary. In regard to the impact 'direct habitat loss', if the cable is buried then we agree that direct habitat loss will not occur during the operational phase of work. However, if the cable cannot be buried and cable protection measures are needed then permanent direct habitat loss will still occur during the operational phase. If the cable cannot be buried, cable protection material would be present and will permanently reduce the area of natural habitat that is available for colonisation.	The effect of 'Long term habitat loss/change' has been assessed for the operational phase in **section 1.11**. This represents a worst case scenario with all cable protection measures in place and any effects during construction would be reduced in comparison.
JNCC agrees with the applicant's proposed approach to assessing the impact of works on benthic ecology. We would recommend that the applicant uses the Marine Evidence based Sensitivity Assessment (MarESA) on the Marine Life Information Network website to help with understanding of the sensitivity of receptors identified during desk-based reviews and site-specific surveys to the impact pathways identified in Table 8.2.5.	The assessment in **sections 1.10** and **1.11** has used the MarESA on the Marine Life Information Network website to identify the sensitivity of key receptors to various impacts (pressures).
The applicant includes mitigation measures as one of the iterative steps involved in the assessment approach. We would recommend the applicant applies the mitigation hierarchy to their assessment approach (avoid, minimise, rectify, reduce, offset). For example, JNCC would recommend micro-routing a cable around Annex I stony habitat in the first instance in order to avoid additional rock dump and would expect survey evidence as justification as to why this isn't being proposed before any measures to offset significant impacts are considered.	Mitigation measures are presented in **Table 1.20** and the Commitments Register (Volume 1, Appendix 3.1 of the ES), and the mitigation hierarchy has been applied to the assessment approach. Where Annex I habitats are present the first option to be considered will be micro-routing of the cable.
Natural England	
Natural England would like to sign post the applicant to our joint advice with JNCC on subsea cable projects for high level advice for environmental considerations that are essential for cable operations across English inshore waters and UK offshore waters: Environmental considerations for offshore wind and cable projects - Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK offshore waters, Sept 22.pdf - All Documents (sharepoint.com)	This guidance has been used to inform the assessment of potential impacts.
The development site is within or may impact on the following Habitats/internationally designated nature conservation sites: Marine sites:	Of these sites listed, the only site with benthic ecology features within the Benthic Ecology study area is Lundy SAC. Braunton Burrows is outside of the study area.

Comment	How and where considered in the ES
• Bristol Channel Approaches Special Area of Conservation (SAC) • Lundy SAC • Isles of Scilly Complex SAC • Severn Estuary SAC/Ramsar Terrestrial sites: • Braunton Burrows SAC Based on the information provided, Natural England's advice is that the proposed cable route is unlikely to have a significant effect on terrestrial European sites and can therefore be screened out from requiring further assessment. (Discretionary Advice Service 17671-358612 dated 03/08/2021).	Conservation objective 3 for the Bristol Channel Approaches SAC (i.e. 'The condition of supporting habitats and processes, and the availability of prey is maintained') is considered in **section 1.10** (and the RIAA that accompanies the ES – document reference 7.16). The Annex I habitat which is the primary reason for site selection for Lundy SAC is 'Reefs' (1170) Annex I habitats present as qualifying features, but not a primary reason for site selection are: 'Sandbanks which are slightly covered by sea water all of the time' (1110), and 'Submerged or partly submerged sea caves' (833). Potential effects on Lundy SAC are covered in **section 1.10** and RIAA (document reference 7.16) submitted with the ES.
The development site is within or may impact on the following Sites of Special Scientific Interest: • Mermaid's Pool to Rowden Gut Site of Special Scientific Interest (SSSI) • Taw-Torridge Estuary SSSI • Lundy SSSI The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSI and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects.	The Taw-Torridge Estuary SSSI has been included as it has some intertidal and subtidal benthic habitat features. The Lundy SSSI encompasses terrestrial areas and the intertidal zone only, so has not been included in the assessment for benthic ecology. Mermaid's Pool to Rowden Gut SSSI is designated for its geological interest. Therefore, it has not been included in the assessment for benthic ecology.
You will need to consider Marine Conservation Zones (MCZs) where appropriate. The ES should include a full assessment of the direct and indirect effects of the development on the site and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects. The proposal may affect the following Marine Conservation Zones: • Bideford to Foreland Point MCZ • South West Approaches to Bristol Channel MCZ • East of Haig Fras MCZ • Lundy MCZ • Hartland Point to Tintagel MCZ • North West of Lundy MCZ • Morte Platform MCZ	The MCZs considered have been screened in based on the modelled maximum distance for dispersal of suspended sediments due to the works (using semi-empirical methods). Based on this distance only three MCZs have been considered in the assessment: - Bideford to Foreland Point MCZ - South West Approaches to Bristol Channel MCZ - East of Haig Fras MCZ Potential effects on these MCZs are covered in **section 1.10**, **1.11** and **1.12** and an MCZ Assessment submitted alongside the ES (document reference 7.15).
Cable protection within marine protected areas should be avoided and where that is possible every effort should be made to mitigate the impacts. In order to achieve this, we advise that a cable burial risk assessment is undertaken as part of the application process informed by comprehensive	A CBRA has been provided (refer to Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES). Burial will be the preferred option for the cable protection, and only when full target burial depth is not possible will additional protection be installed.

Comment	How and where considered in the ES
geotechnical and geophysical surveys. If cable protection is required options that have the greatest success of removal with least impact to interest features should be taken forward. A site integrity plan could then be used to determine the risk to the conservation objectives for the site and determine the requirements for any compensation measures.	It should be noted that the cable route will not pass through any protected sites other than the Bristol Channel Approaches SAC which is only designated for Harbour Porpoise. Therefore, direct loss of habitat is not an impact for any designated sites with benthic habitat features.
Please note that impacts from secondary scouring around cable protection should also be factored into both marine processes and benthic assessment.	The impact 'Changes in hydrodynamic regime (scour & accretion)' has been scoped in to the assessment for the operation and maintenance phase (**section 1.11**). Scour has currently been assessed in a qualitative way indicating that it is anticipated to be localised around any cable protection structures. The MarESA pressure that has been used for the 'Change in hydrodynamic regime (scour and accretion)' assessment is 'Water flow (tidal current) changes (local)' as there is no MarESA pressure for scour as such. Volume 3, Chapter 8: Physical Processes of the ES includes an assessment of secondary (localised) scour, building on updated modelled estimates of bed currents (refer to Volume 3, Appendix 8.1: Sediment Source Concentrations and Assessment of Disturbance of the ES).
For priority habitats within the cable corridor, Natural England advises that the mitigation hierarchy is used. Avoidance techniques can include micro-routing the cable around Annex I habitats that fall within the cable corridor. Where the cable corridor is too narrow to allow micro-routing around priority habitats, micro-routing outside of the cable corridor may need to be used to avoid Annex I habitats. If this is the case for the stony reef habitat as shown on slide 16 of the meeting between Natural England and Xlinks 22/02/2024, Natural England would like to see the habitat mapping surveys for the area outside of this section of the cable corridor, to understand the viability of cable routing outside of the cable corridor.	The potential presence of sensitive habitats including potential Annex I geogenic reefs (i.e. bedrock reefs and stony reef) and biogenic reef (*Sabellaria spinulosa* reef) was determined across the proposed cable route based on outputs of geophysical surveys and DDV surveys. Results found that where these habitats were identified, they did not span the 500 m width of the Offshore Cable Corridor. Therefore, it is anticipated that micro-routing around these sensitive habitats will be possible within the Offshore Cable Corridor.

Preliminary Environmental Information Report

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

1.3.4 A summary of the key items raised specific to benthic ecology is presented in **Table 1.7,** together with how these issues have been considered in the production of this ES chapter.

Further Engagement

1.3.5 Throughout the EIA process, consultation and engagement (in addition to scoping and section 42 consultation) with interested parties specific to benthic ecology has been undertaken.

1.3.6 A summary of the key items raised specific to benthic ecology is presented in **Table 1.7,** together with how these issues have been considered in the production of this ES chapter.

Table 1.7: Summary of consultation relevant to this chapter

Date	Consultee and type of response	Issues raised	How and where considered in the ES
January 2024	JNCC consultation meeting	This was a meeting to introduce the offshore aspects of the Proposed Development to JNCC. JNCC indicated that the proximity of the Offshore Cable Corridor to the South-West approaches to Bristol Channel MCZ was to be considered in terms of potential effects on the MCZ. It was seen as a positive that the cable route did not run through the site. It was suggested the key information required would be the potential distance that suspended sediments released into suspension during the works could be transported beyond the MCZ boundary and the effects of any subsequent smothering. It was suggested that where Annex I stony or bedrock reef was present the cable should be micro-routed to avoid them, and the boulder plough should not be used in those habitats. Key considerations for JNCC were associated with the requirements for any cable protection measures and long-term habitat change. It was clarified that the term habitat creation should be avoided in relation to the use of cable protection measures, and habitat change should be used instead. There was discussion around linking the use of rock for cable protection with changes to habitat, so determining where rock would be used and selecting options most appropriate to the habitat in which the cable protection would be installed.	The proposed cable route has avoided interaction with protected sites as far as possible, and the Offshore Cable Corridor avoids all protected sites with benthic features (**section 1.7**). Annex I habitat (outside protected sites) will be avoided via micro-routing of the Offshore Cable Corridor where possible (**section 1.8**). Where Annex I habitats are present these do not extend across the full width of the Offshore Cable Corridor, thus allowing microrouting avoidance (dependent on burial conditions). Cable protection (rock placement) would be kept level with the seabed where possible, and if above the seabed they would be kept to a maximum of c. 1 m above seabed level and c. 1.4 m at crossings (**section 1.8)** as outlined in the Commitments Register (Volume 1, Appendix 1.3 of the ES) and secured via design parameters set out in the Outline Offshore CEMP (document ref. 7.9). Specific options for cable protection are considered in more detail in Volume 1, Chapter 3: Project Description of the ES.
January 2024	Environment Agency	Introduction to Proposed Development, non-technical discussion	Not applicable

Date	Consultee and type of response	Issues raised	How and where considered in the ES
	consultation meeting		
February 2024	Natural England consultation meeting	This was a meeting to introduce the offshore aspects of the Proposed Development to NE, with focus on areas within the 12 nm limit. It was confirmed to NE that the suitability for undertaking HDD under the intertidal zone was confirmed on the basis of a feasibility report commissioned for the Proposed Development to confirm intended approach (LMR, 2023) which is directly informed by previous HDD boreholes and ground investigations at the same broad location (when undertaking the Cornborough Sewage Treatment Scheme outfall HDD). Thus there will be no interaction with the intertidal zone. NE confirmed that although there was slightly overlap of the 12 nm boundary with the South-West approaches to Bristol Channel MCZ, consideration of the potential effects on this MCZ would be the responsibility of JNCC. Potential presence of stony and bedrock reef in some areas was discussed. It was indicated the preference would be to micro-route the cable around these areas. It was discussed that guidance in Irving (2009) and Golding *et al*. (2020) would be used to determine if areas of stony reef constituted Annex I habitat.	Details for HDD are provided in **section 1.9** and in Volume 1, Chapter 3: Project Description of the ES. Potential effects of vibration from the HDD on benthic invertebrates is consider in **section 1.10** (Underwater noise and vibration). Potential effects of break out are assessed in **section 1.10** (Accidental pollution). Potential presence of Annex I reef habitat was determined via use of best practice guidance including Irving (2009) and Golding *et al*. (2020), (see Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). Any areas of Annex I habitat (outside protected sites) will be avoided via micro-routing of the Offshore Cable Corridor as far as possible (**section 1.8**).
March 2024	Natural England consultation meeting	Discussion of Natural England Scoping Opinion responses – as per responses in **Table 1.6**. Following issue of sediment dispersion Technical Note ahead of meeting (presented within the PEIR as Volume 3, Appendix 8.1 High Level Assessment of Sediment	Discussions confirmed approach to address Scoping Opinion responses – as per **Table 1.6**. Sediment dispersion technical note (final version incorporating methods reviewed and approved by NE and MMO) presented as Volume 3, Appendix 8.1 of the ES.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		Dispersion), the methods were presented and discussed. Natural England confirmed review by NE Physical Processes experts and acceptance of methods.	
April 2024	JNCC meeting – Scoping Opinion and methods discussions	Discussed all JNCC scoping opinion responses. JNCC welcomed the presentation of the sediment dispersion calculation methods which underpin and justify the benthic ecology study area. JNCC confirmed that any impact assessment on the Bristol Channel Approaches SAC should include consideration of conservation objective 3.	The 'study area' discussions within **section 1.4** of this ES chapter provide justification for the ZoI and the Benthic Ecology study area. Conservation objective 3 for the Bristol Channel Approaches SAC (i.e. 'The condition of supporting habitats and processes, and the availability of prey is maintained') is considered in **section 1.10** (and the RIAA that accompanies the ES (document reference 7.16).
May 2024	Land Interests - Miranda Cox (Cat 3)	Raised concern that the operation of the offshore part of the Proposed Development will cause damage to marine creatures from electric and magnetic currents coming from cables.	The effect of 'Electromagnetic field (EMF) effects' has been assessed for the operational phase in **section 1.11**.
		Concern over the effects of electric and magnet currents on seabeds.	The effect of 'Electromagnetic field (EMF) effects' has been assessed for the operational phase in **section 1.11**.
June 2024	JNCC, section 42 response	JNCC agree with the screening criteria methodology used for benthic features. No offshore benthic sites were identified as part of this stage 1 screening assessment.	Noted. A RIAA has been submitted alongside this ES (document reference 7.16).
July 2024	MMO, 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 sediment, the material used to provide cable protection should be in keeping and typical of the surrounding habitat.	As detailed in Volume 1, Chapter 3: Project Description of the ES, 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 DCO consent. It is unlikely to be feasible to deploy variable 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.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		The MMO welcomes the commitment to micrositing around Annex I habitat within the Offshore Cable Corridor.	Noted. The potential presence of sensitive habitats including potential Annex I geogenic reefs (i.e. bedrock reefs and stony reef) and biogenic reef (*Sabellaria spinulosa* reef) was determined across the proposed cable route based on outputs of geophysical surveys and DDV surveys (see Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). Results found that where these habitats were identified, they did not span the 500 m width of the Offshore Cable Corridor. Therefore, it is anticipated that micro-routing around these sensitive habitats will be possible within the Offshore Cable Corridor, which is included as part of the Commitments Register for the Proposed Development (Volume 1, Appendix 3.1 of the ES). It is considered that data available are sufficient to inform micro-routing.
		The MMO defers to the relevant Statutory Nature Conservation Bodies ("SNCBs") regarding the potential impacts of the proposed development on the conservation features of designated protected areas.	Noted. No response required.
July 2024	Natural England, section 42 responses	Natural England advises Mitigation hierarchy should always be followed; Avoid, Reduce, Mitigate.	Avoidance of protected habitats has been the first mitigation step taken during the Offshore Cable Corridor route selection process i.e. adhering to the Mitigation hierarchy. The Offshore Cable Corridor avoids MPAs where possible. The only MPA that the Offshore Cable Corridor passes through is the Bristol Channel Approaches SAC, which is unavoidable for any approach to the North Devon coast (or the wider South West). Existing asset Crossing ID84 is situated within the Bristol Channel Approaches SAC. All other crossings are located outside of MPAs.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
			Consideration has been given to applying approaches to the Proposed Development to reduce effects as far as possible and apply mitigation measures as appropriate (**Table 1.20**). Potential effects on the Bristol Channel Approaches SAC, which is designated for Harbour Porpoise, have been assessed as part of the ES and the RIAA (document reference 7.16). Effects on habitats, and consideration of recoverability forms part of this ES chapter (**section 1.6**).
		From the project description it appears rock protection may be required for up to 150 km of cable route. Although it appears from the project description that any associated rock protection would not overlap with any benthic protected features, given the large extent of potential impacts Natural England advises mitigation measures are applied to the Proposed Development.	As outlined in the Commitments Register (Volume 1, Appendix 3.1 of the ES), the Proposed Development is committed to attempt cable re-burial as a first option in suitable habitats before consideration of use of external cable protection to reduce the amount of external cable protection used (secured via design parameters set out in the Outline Offshore CEMP(document ref. 7.9). This is consistent with Natural England's environmental best practice guidance (Natural England, 2022). An outline CBRA has been undertaken (Volume 1, Appendix 3.4of the ES) and details of this assessment, including a spatial analysis of possible installation methods, including those in proximity to protected sites is presented within this ES (see **sections 1.10**, **1.11** and Volume 3, Figures 1.14 to 1.19 of the ES). Final micro-routing, included as part of the Commitments Register (Volume 1, Appendix 3.1 of the ES), will allow identification of the most optimum route which will involve minimising rock placement where possible - whilst also working to avoid sensitive habitats, archaeological exclusion zones etc. Given the large spatial extent of potential rock protection required, rock bags are impractical, with loose rock placement the intended method. Deployment of rock protection is

Date	Consultee and type of response	Issues raised	How and where considered in the ES
			consistent with other recently consented and proposed large scale cable lay projects in the Celtic Sea (including the Celtic Interconnector project and the White Cross Offshore Wind Farm project which are considered as part of the Cumulative Effects Assessment (CEA) in **Section 1.13**). UXO authorisations will be undertaken under separate marine licence application(s), as per the MMO preferred approach (as confirmed e.g in their Scoping response).
		Natural England notes that there is no cable burial risk assessment provided in this chapter, nor a map showing where cable protection is required.	The outline CBRA is presented as part of the ES (Volume 1, Appendix 3.4). A series of CBRA related maps and associated potential habitat disturbance calculations (interaction between different construction methods and habitats) are also presented within the ES (Volume 3, Figures 1.14 to 1.19; Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). Note, the precise tools used at any one location cannot be guaranteed until installation conditions are encountered, however the risk assessments provide a good indication of the likely tools to be used. The maps include indicative (and worst case) rock placement locations, including presentation relative to benthic habitats and designated sites (Volume 3, Figure 1.19 of the ES).
		Natural England agrees with the principles of the method used for assigning significance, sensitivity and magnitude of impact. However, it is not clear whether all relevant pathways of effect to MPAs have been considered. Para 1.4.24 acknowledges the limitations of the current assessment in the absence of more detailed seabed preparation requirements, but it is not clear from the information provided whether, due to the proximity of the cable corridor, seabed preparation/boulder clearance could be required within the boundaries of the South West Approaches to Bristol Channel MCZ	Within the stretch of the cable corridor that runs directly adjacent to the South West Approaches to Bristol Channel MCZ, the outline CBRA has indicated that the seabed in this area is composed of low density boulders and as such only minimal boulder clearance is anticipated to be required in these areas (refer to Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES). As the cable corridor does not cross into the MCZ itself and any boulder clearance adjacent to the MCZ would be limited in extent (and wholly contained within the Offshore Cable Corridor), there is not considered to be any risk of an impact pathway to the South West Approaches to Bristol Channel MCZ from boulder clearance activities.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		Natural England advises that it is not clear whether secondary impacts to MPAs, such as smothering, have been appropriately characterised and considered. This is particularly relevant for the reef features with the East of Haig Fras MCZ, which are more sensitive to sediment deposition. This pressures also needs to be included in the MCZ assessment.	Potential for smothering of habitats/species has been considered in the ES (**sections 1.10** and **1.11**), RIAA (document reference 7.16) and MCZ Assessment (document reference 7.15). This has taken into account the outputs of final sediment transport studies (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES) and MarESA sensitivity where appropriate.
		Natural England advises that until we fully understand what the likely impacts within MCZs will be, we are unable to advise on the requirements for future monitoring.	Noted. An MCZ Assessment report has been issued to NE for comment. A final MCZ Assessment forms part of the application for DCO (document reference 7.15). The MCZ Assessment concluded that the Proposed Development will not hinder the achievement of the objectives for the features considered within MCZs, and as such no future monitoring is required.
		Natural England agrees with UXO clearance being scoped out in terms of benthic impacts, so long as all clearance activities remain outside of MPA boundaries and an appropriate buffer is applied for SOCI within MPAs	The UXO licensing is separate to the ES and the application for DCO.
		Natural England welcomes the proposed biotope mapping around the landfall area but would advise surveys are amended to allow for wider considerations.	A landfall area survey has been conducted focussing on the intertidal zone (refer to Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES). There will be no ancillary activity (vehicle activity, storage etc.) within the intertidal zone. As Outlined in Volume 1, Chapter 3: Project Description of the ES) the HDD will be physically separated from the intertidal zone (HDD boreholes will be c.20 m below seabed level) and the (marine) exit points will be approximately 500 to 1800 m offshore. There will not be any works or storage of materials between the exit points and the foreshore. The intertidal habitats have been surveyed in case of potential risk of a bentonite breakout in the intertidal zone. Due to rapid dilution of bentonite during any breakout in subtidal areas, or at the exit point breach locations, potential effects are anticipated to be minimal and available information for subtidal habitats is

Date	Consultee and type of response	Issues raised	How and where considered in the ES
			considered to be sufficient to inform assessment (**section 1.10**).
		Natural England notes that where possible out of service cables will be cut prior to cable installation, which is Natural England's preference to prevent the need for mandatory external cable protection at crossings. There are 27 out of service crossings [updated from the 28 presented at PEIR] and 21 active cables, therefore worst-case scenario is 48 cables crossings with potentially 3,500 m^2 per crossing (171,500 m^2).	As noted at PEIR stage, a short section of Out-Of-Service (OOS) cables will be cut and removed where possible, which is consistent with Natural England's preference i.e. prevents the need for mandatory external cable protection at these OOS crossings. Liaison with the asset owners for the OOS cables (there are x27 OOS cable crossings confirmed at ES stage) is underway to finalise agreements for cable removal. As a worst case, 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). Should any OOS cable crossings be required, this will be confirmed to the MMO (and Natural England) post consent, prior to construction (as secured by the Deemed Marine Licence, at Schedule 14 to the draft DCO). For clarity there are x20 active or planned cables that require crossing protection - 18 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.) Grand total asset crossing protections structures (across both bipoles) = 50 (worst case). Precautionary dimensions for these crossings were presented at PEIR stage (3,500 m^2 per crossing). Crossing design considerations at ES stage allows a crossing approach length of 250 m either side of an existing asset, which is considered a worst case (maximum). Therefore the crossing footprint presented at ES stage is (500 m length x 7 m width) 3,500 m^2 per crossing. This is considered a precautionary/worst case overall area estimate

Date	Consultee and type of response	Issues raised	How and where considered in the ES
			(recognising that width may extend out to c.9.5 m width in the immediate vicinity of the asset being crossed). The total crossing footprint is assumed to be (3,500 x 50) 171,500 m^2 (the same as at PEIR stage). The ES presents the location of planned and OOS crossings, including a visual comparison against habitat biotopes (see e.g. Volume 1 Figures 3.10 to 3.16 of the ES. A further quantitative assessment of indicative habitat disturbance (to biotope level) is provided across all planned crossings (see e.g. Volume 3 Figures 1.14 to 1.19 of the ES).
		Natural England advises that consideration is needed in relation to potential habitat changes/loss from cable installation and placement of cable protection on supporting habitats for Marine Mammals and Annex I birds.	The role of benthic habitats as supporting habitats for marine mammals and Annex I birds is considered in more detail in Volume 3, Chapter 4: Marine Mammals & Turtles and Volume 3, Chapter 9: Offshore Ornithology of the ES. Conservation Objective 3 for the Bristol Channel Approaches SAC which states '*The condition of supporting habitats and processes, and the availability of prey for harbour porpoise is maintained'* has been considered in the RIAA (document reference 7.16) and is included in this Benthic Ecology ES chapter and Volume 3, Chapter 4: Marine Mammals & Turtles of the ES.
		"Rock protection over in-service cable crossings equating to a maximum rock protection footprint of 175,000 m^2" from Table 1.19. Until a map showing where these cable crossings are and how many are within the Bristol Channel Approaches SAC, Natural England advises physical change to another seabed/sediment type and reduction in prey availability remain scoped into the HRA for now.	The ES presents figures of the in-service cable crossing locations (including relative to protected sites) (Volume 3, Figure 1.14 of the ES).
		Natural England highlights that the best case is that the cable remains buried and that no external cable protection is required. In a mobile environment, reaching the non-mobile	The outline CBRA is presented as part of the ES (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment). A series of CBRA related maps and associated potential habitat

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		reference level using pre sweeping or sandwave levelling methods is likely to facilitate the burial activity. However, the impact of sandwave clearance needs to be assessed. There is no map showing areas of sandwave levelling.	disturbance calculations (interaction between different construction methods and habitats) are also presented within the ES (Volume 3, Figures 1.14 to 1.19; Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). Note, the precise tools used at any one location cannot be guaranteed until installation conditions are encountered, however the risk assessments provide a good indication of the likely tools to be used. Note, review of the CBRA now confirms (at ES stage) that there are no large sandwaves in UK waters that require pre-sweeping / sandwave levelling; sandwaves are small enough to enable e.g. conventional jetting to bury below the non-mobile reference layer.
		Natural England request further information on seabed preparation works.	The outline CBRA is presented as part of the ES (Volume 1, Appendix 3.4 of the ES). A series of CBRA related maps and associated potential habitat disturbance calculations (interaction between different construction methods and habitats) are also presented within the ES (Volume 3, Figures 1.14 to 1.19; Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). It is currently envisaged that the pre-lay grapnel run will extend along the whole route apart from at the live crossings (ES includes maps of in-service crossing locations, see Volume 3, Figure 1.14 of the ES). The only exception will be if the cable is installed by pre-cut trenching by plough when pre-lay grapnel run would not be required, but this level of detail is currently not known. For ES purposes, the pre-lay grapnel run does not represent the maximum disturbance construction activity as the total width of the grapnel is c.1 m i.e. less than e.g. the trenching remotely operated vehicle (ROV) (see **Table 1.21** for maximum design scenario considered for the assessment).
		Natural England notes that further information is required on boulder clearance.	The outline CBRA is presented as part of the ES (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment). A series of CBRA related maps and associated potential habitat disturbance calculations (interaction between different construction methods and habitats) are also presented within the ES (Volume 3, Figures 1.14 to 1.19; Volume 3, Appendix

Date	Consultee and type of response	Issues raised	How and where considered in the ES
			1.2: Benthic Habitat Disturbance Calculations of the ES). Boulder density maps are presented which are indicative of the boulder clearance locations. Boulder clearance is likely to be undertaken by a combination of boulder grab in areas of low boulder density or by boulder clearance plough in areas of high boulder density. The use of the 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.
		Natural England notes that bedform is mentioned to be across much of the survey area. In Volume 3, Appendix 8.4 GEOxyz Environmental Report, Section 4.2 discusses Seabed Features identified using reconnaissance survey data coupled with BGS information. Figures 5-8 in this report present ten 'representative' sections of the route showing interpreted seabed features along the UK route survey area. It also states that the 'full interpreted seabed features will be described and displayed within the 'Draft Geophysical Survey Interpretation Report'.	Noted. The presence of seabed features has been considered in the assessment (**sections 1.10 and 1.11**). Volume 3, Appendix 8.4 GEOxyz Environmental Report of the ES presents an overview description of seabed features. For information, the geophysical data are also further interrogated as part of the archaeological studies (e.g. Volume 3 Appendix 7.5 Outline Offshore Archaeological Written Scheme of Investigation and Volume 3, Appendix 7.2 Archaeological assessment of geophysical data of the ES present a detailed interpretation of geophysical data).
		Natural England advises that although the South West Approaches to Bristol Channel MCZ will not be directly intersected, the close proximity of the cable corridor to this designation is a concern. The overarching conservation objectives for the site is for its designated feature either to remain in or reach favourable condition. Cable routes can change significantly throughout the planning process, so it is important that the surveyed cable corridor is sufficiently wide enough to cover any potential changes in routing as well as allowing for micro-siting where required. 1km is generally acceptable, however 500m has been considered for the majority of the cable corridor with 2 x 2 bundled cables and corresponding trenches with 50-100m spacing	An MCZ Assessment has been submitted alongside the ES (document reference 7.15). One of the protected features of the Bideford and Foreland Point MCZ (Pink sea-fan), two of the protected features for the South West Approaches to Bristol Channel MCZ (Subtidal coarse sediment and Subtidal sand) and two features of the East of Haig Fras MCZ (Sea-pen and burrowing megafauna communities; and Fan mussel *Atrina fragilis*) were screened in to further assessment for the impacts 'changes in suspended solids' and 'smothering and siltation rate changes'. Stage I assessment concluded that effects of 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)' on subtidal coarse sediment were anticipated to be insignificant. A key basis for this conclusion was the outputs of the sediment transport modelling (Volume 3, Chapter 8: Physical Processes; Volume 3, Appendix 8.1: Sediment Dispersion

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		distance, this doesn't leave much space for necessary changes and micro-siting.	Technical Note of the ES) which indicated dispersal of sediment is anticipated to be very limited along the section of the offshore cable corridor adjacent to the South West Approaches to Bristol Channel MCZ. The note confirms that even worst case peak spring currents would be insufficient to maintain sediments in suspension and thus sediment dispersal is expected to be limited to tens of metres i.e. immediate settling of disturbed sediments. Proposed Development activities would be temporary and transient, and any sediment released into the water column will be rapidly dispersed in the water column likely rapidly reaching background levels at or before reaching the MCZ. In addition, MarLIN MarESA sensitivity assessments for different circalittoral coarse sediments (the Habitat of Conservation Importance (HOCI) considered within the MCZ Assessment (document reference 7.15) and in **Sections 1.10** and **1.11**), range from 'not sensitive' to 'medium' sensitivity to changes in suspended sediments and smothering and siltation rate changes (e.g. Section 1.10). However, the majority of HOCI are 'not sensitive' to changes in suspended sediments and smothering and siltation rate changes, or are indicated as having 'low sensitivity to these impacts. It can be confirmed that both bedrock reef and stony reef were not identified within the Offshore Cable Corridor adjacent to the South West Approaches to Bristol Channel MCZ (Volume 3, Figures 1.12 and 1.13 of the ES). Therefore, there is not anticipated to be a requirement for microrouting around Annex I habitats in the vicinity of the South West Approaches to Bristol Channel MCZ.
		Natural England highlights that it is unclear whether grabs were completed in each broad level biotope found along the cable corridor.	See response provided for this item below for the August 2024 meeting.
		Natural England largely agrees with the conclusions made considering benthic features. However, Natural England request clarification in some areas in the form of further	This introductory/general comment is noted. The results of the project-specific intertidal survey are presented within this benthic ecology ES chapter (**section 1.7**) and are referred to as required within the assessment (**sections 1.10**, **1.11** and

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		assessments/plans, figures and adjustments to the classification of some impacts.	**1.12**). The updated results of the RIAA (document reference 7.16 and the final MCZ Assessment (document reference 7.15) are also reflected in the benthic ecology ES chapter.
August 2024	Natural England, section 42 responses	Natural England advises Mitigation hierarchy should always be followed; Avoid, Reduce, Mitigate (this item is also indicated above for the July 2024 meeting).	See response provided above for this item for the July 2024 meeting.
		Natural England raised suggestions of mitigation for burial. Adopt reburial hierarchy with cable protection as last resort; undertake CBRA; minimise footprint; use rock bags for easier removal (this item is also indicated above for the July 2024 meeting).	See responses provided above for this item for the July 2024 meeting.
		Natural England indicated it was not clear whether seabed preparation/boulder clearance could be required within the boundaries of the South West Approaches to Bristol Channel MCZ (this item is also indicated above for the July 2024 meeting).	See responses provided above for this item for the July 2024 meeting.
		It was not clear to Natural England whether smothering has been considered appropriately (this item is also indicated above for the July 2024 meeting).	See responses provided above for this item for the July 2024 meeting.
		For bentonite breakout, Natural England would like clarification a management plan will be in place.	An Outline Bentonite Breakout Plan (document reference 7.20), which sets out the framework and principles to mitigate any breakout, will be submitted with the application for development consent and is included within the Commitments Register (Volume 1, Appendix 3.1 of the ES),. The plan will be finalised by the ultimate HDD contractor post consent.
		It was suggested by Natural England that survey should encompass sublittoral, littoral and supralittoral to encompass all ancillary activity (vehicle activity, storage etc.), (this item is also indicated above for the July 2024 meeting).	See responses provided above for this item for the July 2024 meeting.
		Natural England raised potential habitat changes/loss from cable installation and placement of cable protection on supporting habitats for Marine Mammals and Annex I birds (this item is also indicated above for the July 2024 meeting).	See responses provided above for this item for the July 2024 meeting.

Date	Consultee and type of response	Issues raised	How and where considered in the ES
		Natural England highlighted that it was unclear whether grabs were completed in each broad level biotope found along the cable corridor (this item is also indicated above for the July 2024 meeting).	Further information to indicate which habitat types were not covered by grabs were presented to NE (12/08/24). Seven habitat types which intersect with the Offshore Cable Corridor are not covered by the grab samples (habitats listed below). However, the area of these habitat types is small in relation to the area of the Offshore Cable Corridor (see list of habitats below which were not covered by the grab sampling). Additionally, five of the seven habitats are rocky habitats and grabs are not suitable for sampling these rocky habitats. NE agreed that the rocky habitats could not be sampled by grab and that the areas of other habitats not sampled were extremely small percentages of these habitat types in the Offshore Cable Corridor, so the data collected was suitable for site characterisation to effectively inform the assessment. **Hard substrate habitats** A4.27: Faunal communities on deep moderate energy circalittoral rock (4.46 ha) - 0.02% of the Offshore Cable Corridor A4.2: Atlantic and Mediterranean moderate energy circalittoral rock (9.02 ha) - 0.04% of the Offshore Cable Corridor A3.1: Atlantic and Mediterranean high energy infralittoral rock (5.63 ha) - 0.02% of the Offshore Cable Corridor A4.1: Atlantic and Mediterranean high energy circalittoral rock (0.27 ha) - 0.001% of the Offshore Cable Corridor A4.33: Faunal communities on deep low energy circalittoral rock (0.30 ha) - 0.001% of the Offshore Cable Corridor **Mixed and soft substrate habitats** A5.45: Deep circalittoral mixed sediments (341.68 ha) - 1.68% of the Offshore Cable Corridor A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand (13.36 ha) - 0.07% of the Offshore Cable Corridor

Date	Consultee and type of response	Issues raised	How and where considered in the ES

1.4 Study Area

1.4.1 The Benthic Ecology study area comprises the Offshore Cable Corridor with a buffer area of between 5 km and 15.2 km either side (Volume 3, Figure 1.1 of the ES) and covers a total area of 4,074.82 km^2.

1.4.2 The extent of the study area was informed by consideration of the extent of the potential effect with the greatest ZoI for benthic ecology which was the distribution of disturbed sediment during construction works. Initial high-level assessment of sediment transport, considering currents alone, indicated that the distribution of resuspended sediment was anticipated to be 0.1 to 3.9 km from the Offshore Cable Corridor depending on location (Volume 3, Chapter 8: Physical Processes; Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). The only locations along the cable route where sediment was found to not fall out of suspension in the immediate vicinity of the cable route were between Stations 61 and 56 (from just beyond the intertidal zone moving approximately 8 km seawards) and between Station 19 to 09 (towards the end of the cable route in UK waters) (see Volume 3, Figure 1.7 of the ES for indication of station locations).

1.4.3 Further assessment of sediment transport (taking into account of the influence of waves and sediment resuspension) has since been conducted and has indicated that the distribution of resuspended sediment is anticipated to be up to 15.2 km at these specific locations only (Volume 3, Chapter 8: Physical Processes; Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). Consequently, the final approach which has been taken in carrying out the EIA (adding a 15.2 km buffer at locations where sediment was found to not fall out of suspension and adding a 5 km buffer to the remainder of the Offshore Cable Corridor), is considered extremely precautionary. It is anticipated that this study area will allow for robust characterisation of the benthic habitats and species within the ZoI for the construction, operation and maintenance and decommissioning phases of the Proposed Development.

1.5 Scope of the Assessment

1.5.1 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 1.6** and **Table 1.7**.

1.5.2 Taking into account the scoping and consultation process, **Table 1.8** summarises the impacts considered as part of this assessment.

Table 1.8: Impacts considered within this assessment

Activity	Impacts scoped into the assessment
Construction Phase	
Seabed preparation, route clearance, cable laying, HDD and burial activities	Temporary habitat loss/disturbance
	Temporary increase in suspended sediments and sediment deposition
	Changes to water quality (release of hazardous substances from sediments)
	Introduction and spread of invasive non-native species (INNS)
	Underwater noise and vibration
	Accidental pollution
Operation and Maintenance	

Activity	Impacts scoped into the assessment
Cable operation and presence of rock protection	Change in hydrodynamic regime (scour and accretion)
	Sediment heating
	Electromagnetic field (EMF) effects
	Long-term habitat loss/change
Cable repairs	Temporary habitat loss/disturbance
	Temporary increase in suspended sediments and sediment deposition
	Changes to water quality (release of hazardous substances from sediments)
	Introduction and spread of INNS
	Accidental pollution
Decommissioning Phase	
Cable left *in-situ*	Introduction of invasive non-native species
	Long-term habitat loss/change
	Accidental pollution
Decommissioning removal activities	Temporary habitat loss/disturbance
	Temporary increase in suspended sediments and sediment deposition
	Changes to water quality (release of hazardous substances from sediments)
	Introduction and spread of INNS
	Change in hydrodynamic regime (scour and accretion)
	Accidental pollution

1.5.3 Impacts that are not likely to result in significant effects have been scoped out of the assessment. A summary of the impacts scoped out, together with justification for scoping them out and whether the approach has been agreed with key stakeholders through either the Scoping Opinion or consultation, is presented in **Table 1.9**.

Table 1.9: Issues scoped out of the assessment

Impact	Justification
Construction Phase	
Change in hydrodynamic regime (scour & accretion)	Effects related to change in hydrodynamic regime (scour & accretion) for benthic ecology receptors are considered for the operational and maintenance phase of the Proposed Development only.
Sediment heating	Effects related to sediment heating for benthic ecology receptors are not anticipated to take place during the construction phase of the Proposed Development.
EMF effects	Effects related to EMF effects for benthic ecology receptors are not anticipated to take place during the construction phase of the Proposed Development.
Long-term habitat loss	Effects related to long-term habitat loss for benthic ecology receptors are considered for the operational and maintenance phase of the Proposed Development only.
UXO clearance	Effects related to any potential UXO clearance works have been excluded, and if required would be subject to separate licence application(s) as recommended by the MMO.
Operational and Maintenance Phase	

Impact	Justification
Underwater noise and vibration	Effects related to underwater noise and vibration for benthic ecology receptors are not anticipated to take place during the operational and maintenance phase of the Proposed Development.
Decommissioning Phase	
Underwater noise and vibration	Effects related to underwater noise and vibration for benthic ecology receptors are not anticipated to take place during the decommissioning phase of the Proposed Development.
Sediment heating	Effects related to sediment heating for benthic ecology receptors are not anticipated to take place during the decommissioning phase of the Proposed Development.
EMF effects	Effects related to EMF effects for benthic ecology receptors are not anticipated to take place during the decommissioning phase of the Proposed Development.

1.6 Methodology

Relevant Guidance

1.6.1 The benthic ecology assessment has been conducted with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for Ecological Impact Assessment for Terrestrial, Freshwater and Coastal Environments (2018).

1.6.2 Marine Evidence-based Sensitivity Assessment (MarESA) information hosted by the Marine Life Information Network (MarLIN) was consulted to determine sensitivity of different benthic habitats to a range of anthropogenic pressures.

Methodology for Baseline Studies

Desk Studies

1.6.3 A desk-based assessment has been conducted for benthic ecology receptors using a range of existing ecological data (**Table 1.10**).

1.6.4 As an example, the DEFRA Magic Map site was used to identify designated sites with benthic ecology qualifying features in the vicinity of the Proposed Development.

Table 1.10: Summary of desk study sources used

Title	Source	Year	Author
Marine environments across Great Britain	DEFRA Magic Map	2024	DEFRA
Benthic habitat classification mapping	European Marine Observation and Data Network (EMODnet)	2023	European Commission
Occurrence data for benthic species (excluding entries not licenced for commercial use)	National Biodiversity Network (NBN) Atlas	2024	NBN
OneBenthic portal	Cefas	2023	Cefas

1.6.5 The desk-based study information was supplemented by project-specific surveys which are outlined in the following section and have provided the main source of site-specific information relating to benthic species and habitats to inform the impact assessment.

Site-Specific Surveys

1.6.6 Site-specific surveys have been conducted to obtain data for benthic habitats and species with a brief summary provided in **Table 1.11**, and the survey methods and results detailed in Volume 3, Appendix 8.4: GEOxyz Environmental report and Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES. A summary of baseline data obtained from the surveys is provided in **section 1.7**.

Table 1.11: Site-specific surveys – Benthic Ecology

Surveys	Summary
Geophysical surveys	Geophysical surveys included acquisition of seabed data using a multibeam echosounder (MBES), side scan sonar (SSS), magnetometer and Sub-bottom Profiler (SBP) Shallow and Deep SBP Dura Spark 400 for seismic data. The SSS and bathymetry from the MBES were interpreted to inform the survey plan for Drop Down Video (DDV) and grab surveys.
Subtidal DDV surveys	Seabed video footage was acquired to ground-truth all grab locations, features of interest and to facilitate a habitat assessment. A total of 61 camera transects were acquired across the survey area using a STR Seabug system mounted on a camera sled or a Freshwater Lens system.
Subtidal Grab surveys	51 grab stations were surveyed along the UK section of the Offshore Cable Corridor (with samples successfully collected at 48 of the stations). The majority of stations were sampled with a Double Van Veen (DVV) grab (2 x 0.1 m^2) with stations with coarser sediments sampled with a 0.01 m^2 mini-Hamon grab. Samples were acquired to provide data on physico-chemistry and macrofauna at sampling stations. Water sampling using a multi-parameter Conductivity Temperature Depth (CTD) sensor was conducted at every third station in the deeper offshore sections of the cable route, increasing to every station in water depths of less than 50 m.
Intertidal Phase I Rocky Shore survey	Phase I biotope mapping has been conducted at the landfall in the area the HDD will be conducted. The survey was conducted using standard approaches as set out in Wyn *et al.* (2006); Davies *et al.* (2001); and JNCC (2004).

Impact Assessment Methodology

Overview

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

1.6.8 The assessment approach will be based on the conceptual 'source-pathway-receptor' model. This model identifies likely environmental effects resulting from the construction, operation, maintenance and decommissioning of the Proposed Development. This process provides an easy to follow assessment route between effect sources and potentially sensitive receptors ensuring a transparent impact assessment. The parameters of this model are defined as follows:

- source: the origin of a potential effect (noting that one source may have several impact pathways and associated receptors); e.g. a construction activity;
- pathway: the link or interaction 'pathway' by which the effect of the activity could influence a receptor; and
- receptor: the element of the receiving environment that is affected.

1.6.9 Iterative steps involved in the assessment approach included:

- determination of potential interactions between the Proposed Development and ecological receptors (for construction and operation and maintenance phases;
- definition of benthic ecology environment within the influence of the Proposed Development;
- assessment of the sensitivity of benthic ecological receptors;
- assessment of the magnitude of impact;
- assessment of the significance of effects;
- proposal of mitigation measures to avoid, reduce, mitigate, or where these are not possible, to offset, any adverse significant effects;
- assessment of the residual effects after any mitigation measures have been considered; and
- assessment of cumulative effects.

1.6.10 In some instances, the Proposed Development will retain flexibility in terms of the options for methods and approaches to be applied during the construction phase. Where this is the case, for each combination of effect and receptor, the assessment will be based on the Maximum Design Scenario (MDS) for the specific assessment (as outlined in **Section 1.9**).

Receptor Sensitivity/Value

1.6.11 The criteria for defining value in this chapter are outlined in **Table 1.12**. To incorporate value into the assessment it has been included as part of the sensitivity criteria outlined in **Table 1.13**. It should be noted, however, that conservation value and high sensitivity are not necessarily linked for a particular effect. For example, a receptor could be of international or national importance (e.g. an interest feature of a protected site) but have a low or negligible physical/ecological sensitivity to an impact and vice versa. Consequently, when determining the sensitivity level taken forward to assessment this has taken into account habitat and species-specific considerations and professional judgement.

Table 1.12: Value criteria

Value	Definition
International	• An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site etc.) or an area which the country agency has determined meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified. • Internationally significant and viable areas of a habitat type listed in Annex I of the EC Habitats Directive (implemented in the UK via the Habitats Regulations) which are qualifying interests of an SAC in the study area. • Globally threatened species (i.e. Critically endangered or endangered on the International Union for Conservation of Nature (IUCN) Red list) or species listed on Annex 1 of the Berne Convention. • Regularly occurring populations of internationally important species that are rare or threatened in the UK or of uncertain conservation status. • A regularly occurring, nationally significant population/number of any internationally important species. • Habitat/species are highly regarded for their important biodiversity, social/community value and / or economic value.
National	• A nationally designated site (SSSI, NNR, MNR, MCZ) or a discrete area, which the country conservation agency has determined meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. • Annex I habitat that is not a qualifying interest of an SAC in the study area. • Regularly occurring, globally threatened species (i.e. Vulnerable or lower on IUCN Red list) or species listed on Annex 1 of the Berne Convention. • S41 species/habitats list of Natural Environment and Rural Communities (NERC) Act (Previously UK Biodiversity Action Plan (UKBAP) habitats/species) – whether National or Regional importance requires consideration of the species/habitat being considered, its abundance/extent within the Proposed Development area, and its abundance/extent in the wider area. • Habitat/species possess important biodiversity, social/community value and / or economic value.
Regional	• S41 species/habitats list of NERC Act (Previously UKBAP habitats/species) – whether National or Regional importance requires consideration of the species/habitat being considered, its abundance/extent within the Proposed Development area, and its abundance/extent in the wider area. • WFD biological element. • Any regularly occurring significant population that is listed in a Local Red Data Book. • Significant populations of a regionally/county important species. • Habitat/species possess moderate biodiversity, social / community value and / or economic value.
Local	• Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile. • District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/Borough ecological criteria (District sites, where they exist, will often have been identified in local plans). • Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource. • Species are abundant, common or widely distributed. • Habitat/species possess low biodiversity, social/community value and / or economic value.

1.6.12 The criteria for defining sensitivity in this chapter are outlined in **Table 1.13** below. Sensitivity has been considered as required when assessing effects, and information relating to sensitivity of receptors to impacts has been clearly indicated in the assessment narrative where appropriate.

Table 1.13: Sensitivity criteria for benthic ecology receptors

Sensitivity	Definition
Very High	**Vulnerability**: The receptor cannot avoid, adapt or tolerate the impact. **Recoverability**: The effect on the receptor is anticipated to be permanent. **Value**: The receptor is of international value.
High	**Vulnerability**: The receptor cannot or has very low capacity to avoid, adapt or tolerate the impact. **Recoverability**: Partial recovery is only likely to occur after about 10 years and full recovery may take over 25 years. **Value**: The receptor is of international or national value.
Medium	**Vulnerability**: The receptor has limited capacity to avoid, adapt or tolerate the impact. **Recoverability**: Only partial recovery is likely within 5 years and full recovery is likely to take up to 10 years. **Value**: The receptor is of national or regional value.
Low	**Vulnerability**: The receptor has a reasonable capacity to avoid, adapt or tolerate the impact. **Recoverability**: Full recovery will occur but will take many months (or more likely years) but should be complete within about five years. **Value**: The receptor is of regional or local value.
Negligible	**Vulnerability**: The receptor has a high capacity to avoid, adapt or tolerate the impact. **Recoverability**: The receptor is anticipated to recover immediately (seconds to days). **Value**: The receptor is of regional or local value.

Magnitude of Impact

1.6.13 The criteria for defining magnitude in this chapter are outlined in **Table 1.14**. Magnitude of impact has been assessed taking into account property/aspect/features designed into the Proposed Development to avoid or minimise environmental effects (i.e. embedded mitigation). Where an impact could reasonably be assigned to more than one level of magnitude, professional judgement has been used to determine which level is applicable.

Table 1.14: Impact magnitude criteria

Magnitude of impact	Definition
High	**Extent**: Impact across the near-field and far-field areas beyond the study area. **Duration**: The impact is anticipated to be permanent or long-term (>5 years). **Frequency**: The impact will occur constantly throughout the relevant project phase.
Medium	**Extent**: Impact across the near-field (0 to 2 km from Offshore Cable Corridor) and far-field areas (2 to 5 km from Offshore Cable Corridor), but not beyond the study area.

Magnitude of impact	Definition
	Duration: The impact is anticipated to be medium term (1-5 years) or long-term (>5 years). **Frequency**: The impact will occur constantly throughout a relevant project phase.
Low	**Extent**: Impact mainly in the near-field (0 to 2 km from Offshore Cable Corridor). **Duration**: The impact is anticipated to be short term (<1 year). **Frequency**: The impact will occur frequently throughout a relevant project phase.
Negligible	**Extent**: Impact immediately adjacent to the source. **Duration**: The impact is anticipated to be momentary (seconds to minutes) to brief (lasting less than one day). **Frequency**: The impact will occur once or infrequently throughout a relevant project phase.
No change	Impact is expected to result in no change.

Significance of Effect

1.6.14 The significance of the effect upon benthic ecology has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in **Table 1.15**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

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

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

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

Table 1.15: Assessment Matrix

Sensitivity of Receptor	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No Change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No Change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No Change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No Change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No Change	Minor	Moderate or Major	Major	Major

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

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

- **Major**: These effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- **Moderate**: These effects have the potential to be important and may influence the key decision-making process.
- **Minor**: These effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process.
- **Negligible**: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
- **No change**: No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Assumptions and Limitations of the Assessment

1.6.20 The assessment is based on the Project Design (e.g. methods for construction, operation, and decommissioning) as set out in Volume 1, Chapter 3 of this ES. In some cases, the information provided is high level; numerous details will be finalised by the final construction contractor. Seabed preparation and burial specifics will only be known at the time of construction, thus a degree of flexibility is inherent in a scheme of this type, however the assessment envelopes all potential benthic impact considerations. The outline CBRA (Volume 1, Appendix 3.4 of this ES) provides indicative assessment of burial and protection risk and interpretation of these data in the context of local habitats is provided in this chapter. Further uncertainty remains at this stage regarding the options to be taken at decommissioning (leaving *in-situ* or removal). As above, where uncertainty exists, a precautionary MDS approach to the assessment has been undertaken presenting a worst-case scenario, with various associated parameters clearly laid out in **Table 1.21**.

1.6.21 Detailed project-specific surveys were conducted within the intertidal and subtidal zone to inform the assessments. These provided key data in relation to the species and habitats present, and any species and habitats of conservation importance. Based on the number of stations sampled, the best practice sampling methodologies and the approach taken to data analysis, it is considered that these data are sufficiently robust to inform the assessments within this chapter.

1.7 Baseline Environment

Desk Study

1.7.1 Information on benthic ecology within the study area was collected through a detailed review of existing studies and datasets. These are summarised in **Table 1.10**.

1.7.2 The EUSeaMap (2023) habitat types (Marine Strategy Framework Directive (MSFD) benthic broad habitats) mapped by EMODnet indicate the subtidal habitat is likely to be 'Circalittoral sand' up to 18 km from the landfall (Volume 3, Figure 1.2 of the ES)**.** Beyond this point the EMODnet data indicate subtidal habitats may include:

- Circalittoral coarse sediment;
- Circalittoral rock and biogenic reef;
- Offshore circalittoral coarse sediment;
- Offshore circalittoral mixed sediment;
- Offshore circalittoral sand; and
- Offshore circalittoral mud.

1.7.3 Records from the NBN Atlas from within the study area collected between 2013 and 2023 indicated a total of 1,643 individuals across 469 taxa within the study area (which includes intertidal and subtidal species) (NBN Trust, 2023). Records indicated a faunal community rich in molluscs and arthropods, with three arthropods and five mollusc taxa within the top 10 recorded species (**Table 1.16**).

Table 1.16: Top 10 Benthic Species by number (n), from NBN Atlas Species Occurrence Data

Taxa	Taxonomic Group	Count, n
Chaetognatha	Chaetognatha	35
Trivia monacha	Mollusca	31
Doris pseudoargus	Mollusca	30
Cancer pagarus	Arthropoda	29
Goniodoris nodosa	Mollusca	27
Echinodermata	Echinodermata	26
Necora puber	Arthropoda	23
Berthella plumula	Mollusca	22
Trivia arctica	Mollusca	22
Decapoda	Arthropoda	21

1.7.4 The OneBenthic portal from Cefas provides predictive maps of subtidal assemblages based on random forest modelling of point source data. OneBenthic indicated that faunal cluster groups (biotopes) were mainly characterised by cluster group D2c for the first 15 km of the cable route (OneBenthic, 2023; **Table 1.17**). There is a section of C1b between the ~15-25 km section and then the remainder of the route is mainly indicated as being represented by D2a, apart from the section from ~210km to 300 km which was characterised as D2b. Other cluster groups within the Benthic Ecology study area are listed in **Table 1.17** and indicated in Volume 3, Figure 1.3 of the ES.

Table 1.17: Characterising Taxa for Faunal Cluster Groups Identified Within the Benthic Subtidal and Intertidal Study Area and Surrounding area (Cooper and Barry, 2017). (A) = Amphipod crustacean, (AT) = Ascidian tunicate, (B) =

Bryozoan, (BC) = Barnacle crustacean, (BM) = Bivalve mollusc, (DC) = Decapod crustacean, (E) = Echinoderm, (NE) = Nematoda, (P) = Polychaete

Cluster	Taxa
A2a	*Sabellariidae* (P)
A2b	*Sabellariidae* (P), *Serpulidae* (P), *Syllidae* (P), *Terebellidae* (P), *Spionidae* (P), *Capitellidae* (P), *Polynoidae* (P), *Styelidae* (AT), *Lumbrineridae* (P), *Porcellanidae* (DC), *Amphiuridae* (E), *Cirratulidae* (P), *Verrucidae* (BC)
B1b	*Spionidae* (P), *Serpulidae* (P), *Syllidae* (P), *Galatheidae* (DC), *Glyceridae* (P), *Terebellidae* (P), *Phyllodocidae* (P), *Amphiuridae* (E), *Polynoidae* (P), *Capitellidae* (P), *Nemertea* (NE), *Scalibregmatidae* (P), *Fibulariiidae* (E), *Eunicidae* (P), *Lumbrineridae* (P), *Cirratulidae* (P)
C1a	*Spionidae* (P), *Terebellidae* (P), *Serpulidae* (P), *Syllidae* (P), *Capitellidae* (P), *Lumbrineridae* (P), *Sabellariidae* (P), *Nemertea* (NE), *Polynoidae* (P), *Phyllodocidae* (P), *Glyceridae* (P), *Maldanidae* (P)
C1b	*Spionidae* (P), *Capitellidae* (P), *Terebellidae* (P), *Lumbrineridae* (P), *Ampeliscidae* (A), *Nemertea* (NE), *Cirratulidae* (P), *Semelidae* (BM), *Ampharetidae* (P), *Phyllodocidae* (P), *Pholoidae* (P)
D2a	*Spionidae* (P), *Glyceridae* (P), *Nemertea* (NE), *Terebellidae* (P), *Capitellidae* (P), *Fibulariidae* (E), *Syllidae* (P), *Phyllodocidae* (P), *Cirratulidae* (P), *Opheliidae* (P), *Lumbrineridae* (P), *Goniadidae* (P), *Polynoidae* (P), *Nephtyidae* (P), *Dorvilleidae* (P)
D2b	*Oweniidae* (P), *Spionidae* (P), *Amphiuridae* (E), *Capitellidae* (P), *Ampharetidae* (P), *thyasiridae* (BM), *lumbrineridae* (P), *Nemertea* (NE), *Nephytidae* (P), *Cirraatulidae* (P)
D2c	*Nephytidae* (P), *Spionidae* (P), *Opheliidae* (P), *Glyceridae* (P), *Bathyporeiidae* (A), *Nemertea* (NE), *Terebellidae* (P), *Orbiniidae* (P), *Electridae* (B), *Urothoidae* (A), *Semelidae* (BM), *Capitellidae* (P) *Ophiuridae* (E), *Cirratulidae* (P), *Mysidae* (DC), *Mactridae* (BM), *Phyllodocidae* (P), *Magelonidae* (P), *Lumbrineridae* (P), *Tellinidae* (BM)
D2d	*Bathyporeiidae* (A), *Spionidae* (P), *Magelonidae* (P), *Nephytidae* (P), *Tellinidae* (BM), *Cirratulidae* (P), *Semelidae* (BM), *Nemertea* (NE)

Designated sites

1.7.5 There are several SSSIs, SACs and MCZs in the vicinity of the Offshore Cable Corridor, but the majority are outside the Benthic Ecology study area (Volume 3, Figure 1.4 of the ES).

1.7.6 All designated sites within the study area with benthic ecology qualifying interest features that could be affected by the construction, operation and maintenance, and decommissioning phases of the Proposed Development are set out in **Table 1.18**.

Table 1.18: Designated sites and relevant qualifying interests

Designated Site	Distance to the Proposed Development (nearest point)	Relevant Qualifying Interest
Sites of Special Scientific Interest		
Taw-Torridge Estuary SSSI	5 km	It is designated for its populations of overwintering and migratory populations of wading birds and its wide tidal range and intertidal habitats, with large areas of mudflats and sandbanks. Together with beaches and saltmarsh, these provide a rich and varied source of food for many birds and animals.
Special Areas of Conservation		
Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC	0 km (Offshore Cable Corridor traverses the site)	Although the only feature of this site is harbour porpoise, conservation objective 3 for the Bristol Channel Approaches SAC states 'The condition of supporting habitats and processes, and the availability of prey is maintained'
Lundy SAC	3.5 km	The primary reason for site selection is the Annex I habitat 'Reefs' (1170) Annex I habitats present as qualifying features, but not a primary reason for site selection are: 'Sandbanks which are slightly covered by sea water all of the time' (1110), and 'Submerged or partly submerged sea caves' (833)
Marine Conservation Zones		
South West Approaches to Bristol Channel MCZ	c.0 km (immediately adjacent however the Offshore Cable Corridor does not cross into the site)	Features of Conservation Interest (FOCI): • Subtidal coarse sediment; • Subtidal sand.
Bideford to Foreland Point MCZ	0.5 km	Features of Conservation Interest (FOCI): • Honeycomb worm, *Sabellaria alveolata* reefs; • Intertidal under boulder communities; • Fragile sponge and anthozoan communities on subtidal rocky habitats; • Pink sea fan, *Eunicella verrucosa*; • Spiny lobster, *Palinurus elephas*[1]; • Low energy intertidal rock; • Moderate energy intertidal rock; • High energy intertidal rock; • Intertidal coarse sediment; • Intertidal mixed sediments; • Intertidal sand and muddy sand; • Littoral chalk communities; • Low energy infralittoral rock. • Moderate energy infralittoral rock; • High energy infralittoral rock;

[1] This feature (relevant to Bideford and Foreland Point MCZ and Lundy MCZ) is covered by the Fish and Shellfish chapter.

Designated Site	Distance to the Proposed Development (nearest point)	Relevant Qualifying Interest
		• Moderate energy circalittoral rock; • High energy circalittoral rock; • Subtidal coarse sediment; • Subtidal mixed sediments; • Subtidal sand.
East of Haig Fras MCZ	0.65 km	Features of Conservation Interest (FOCI): • Sea-pen and burrowing megafauna communities; • Fan mussel, *Atrina fragilis*; • High energy circalittoral rock; • Moderate energy circalittoral rock; • Subtidal coarse sediment / subtidal mixed sediments mosaic; • Subtidal sand; • Subtidal mud.
Lundy MCZ	3.5 km	Features of Conservation Interest (FOCI): • Spiny lobster (Palinurus elephas)[1]

Site-Specific Surveys

Intertidal Benthic Survey

1.7.7 The Bideford to Foreland Point Marine Conservation Zone (MCZ) is located 500 m to the north of the landfall site and an intertidal survey of this MCZ was conducted in 2013 (Natural England, 2014). In 2013, the area closest to the proposed landfall location was comprised of a band of '*Fucus spiralis* on full salinity sheltered upper eulittoral rock' (EUNIS: MA123C1 / JNCC: LR.LLR.F.Fspi.FS) along the upper shore, whilst the mid and lower shore was dominated by '*Fucus vesiculosus* on full salinity moderately exposed to sheltered mid eulittoral rock' (EUNIS: MA123D1 / JNCC: LR.LLR.F.Fves.FS), and *Chthamalus spp*. on exposed eulittoral rock (EUNIS: MA1222 / JNCC: LR.HLR.MusB.Cht).

1.7.8 An intertidal survey specific to the Proposed Development was conducted in June 2024 to determine biotope composition, biotope distribution, extent of sub-features and notable biotopes within the proposed intertidal portion of the Offshore Cable Corridor (at the proposed landfall location). The survey aimed to determine the distribution and extent of habitats at the proposed landfall location, with quadrats used to provide quantitative assessments of species composition at sampling stations to help refine biotopes (see Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES, for more details).

1.7.9 As per the findings of the intertidal survey, the uppermost section of the littoral zone was comprised of a band of mobile cobbles and pebbles with no visible fauna or flora and was assigned to the habitat 'Barren littoral shingle' (EUNIS: MA3211 / JNCC: LS.LCS.Sh.BarSh). Within this habitat was a thin strandline, formed of decomposing macroalgae, wood and occasional anthropogenic debris which was assigned to the habitat 'Strandline communities on Atlantic littoral sand' (EUNIS: MA521 / JNCC: LS.LSa.St), (see Volume 3, Figure 1.5: Results of the intertidal survey of the ES). Beyond this was a band of spiral wrack *Fucus spiralis* and barnacles (*Chthamalus* spp.) along most of the length of the survey area which was assigned to '*Fucus spiralis* on exposed to moderately exposed upper eulittoral rock' (EUNIS: MA1242 / JNCC: LR.MLR.BF.FspiB), (see Volume 3, Figure 1.5 of the ES). This band also included areas dominated by *Ulva intestinalis*, sparse fronds of *F. spiralis* and egg wrack *Ascophyllum nodosum* along with low numbers of the flat top shell *Steromphala umbilicalis* comprising the habitat '*Ulva* spp. on freshwater-influenced and/or unstable upper eulittoral rock' (EUNIS: MA123G / JNCC: LR.FLR.Eph.Ulv), (see Volume 3, Figure 1.5 of the ES).

1.7.10 The mid shore alternated between a canopy of bladderwrack *Fucus vesiculosus*, and expanses of rock dominated by barnacles (mostly *Chthamalus* spp. with a few *Semibalanus balanoides* and sporadic individuals of *Austrominius modestus*) with only sparse algal cover. This habitat was assigned to '*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock' (EUNIS: MA1243 / JNCC: LR.MLR.BF.FvesB), (see Volume 3, Figure 1.5 of the ES). Areas of barnacle-dominated bedrock had sparse other flora or fauna present, with sparse *F. vesiculosus* fronds, *P. vulgata* and *Littorina littorea* in crevices or pools amongst the bedrock. This habitat was assigned to '*Chthamalus* spp. on exposed eulittoral rock' (EUNIS: MA1222 / JNCC: LR.HLR.MusB.Cht), (see Volume 3, Figure 1.5 of the ES).

1.7.11 The southern extent of the intertidal survey area on the mid shore was dominated by the egg wrack *A. nodosum* with epiphytic *Vertebrata lanosa* and was assigned to the habitat '*Ascophyllum nodosum* on full salinity mid eulittoral rock' (EUNIS: MA123E1 / JNCC: LR.LLR.F.Asc.FS), (see Volume 3, Figure 1.5 of the ES). On the mid shore at the northern end of the survey area, elevated strata of vertical bedrock were dominated by the barnacles *Chthamalus* spp., with some *Semibalanus balanoides*, sporadic individuals of *Austrominius modestus* and the lichen *Lichina pygmaea* was present, this habitat was allocated to '*Chthamalus* spp. and *Lichina pygmaea* on steep exposed upper eulittoral rock' (EUNIS: MA12222 / JNCC: LR.HLR.MusB.Cht.Lpyg), (see Volume 3, Figure 1.5 of the ES).

1.7.12 Scattered rockpools were present within the survey area. Most of the smaller shallow pools were covered with encrusting coralline algae and included red algal species such as *Chondrus crispus*, *Corallina officinalis*, *Hildenbrandia rubra*, the brown alga *Ectocarpus* spp. and the gastropods *L. littorea*, *P. vulgata* and *S. umbilicalis* representing the habitat 'Coralline crust-dominated shallow eulittoral rockpools' (EUNIS: MA1262 / JNCC: LR.FLR.Rkp.Cor), (see Volume 3, Figure 1.5 of the ES). Larger upper shore pools were distinguished by an abundance of the brown algal species *Bifurcaria bifurcata* and were assigned to the habitat '*Bifurcaria bifurcata* in shallow eulittoral rockpools' (EUNIS: MA12623 / JNCC: LR.FLR.Rkp.Cor.Bif), (see Volume 3, Figure 1.5 of the ES). Larger, deeper rock pools on the mid-shore were dominated by a canopy of the invasive wireweed *Sargassum muticum* and were assigned to the habitat '*Sargassum muticum* in eulittoral rockpools' (EUNIS: MA12631 / JNCC: LR.FLR.Rkp.Fk.Sar), (see Volume 3, Figure 1.5 of the ES).

1.7.13 From the mid to lower shore *F. vesiculosus* transitioned to the serrated wrack *F. serratus* forming a dominant canopy. Beneath the canopy were red algae including *C. officinalis*, *Osmundea pinnatifida*, *Chondrus crispus*, *Mastocarpus stellatus*, *Lomentaria articulata* and the green alga *Cladophora rupestris*, and this habitat was assigned to '*Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock' (EUNIS: MA12441 / JNCC: LR.MLR.BF.Fser.R), (see Volume 3, Figure 1.5 of the ES). From the mid shore down to the sublittoral fringe were extensive veneers formed by the tubes of the honeycomb worm *S. alveolata* covering more than half of the survey area representing the habitat '*Sabellaria alveolata* reefs on sand-abraded eulittoral rock' (EUNIS: MA2261 / JNCC: LS.LBR.Sab.Salv), (see Volume 3, Figure 1.5 of the ES).

1.7.14 The only species of conservation importance recorded was the dog whelk *Nucella lapillus* which was observed on the lower shore within the habitat '*Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock' (EUNIS: MA12441 / LR.MLR.BF.Fser.R), (see Volume 3, Figure 1.5 of the ES). *N. lapillus* is on the OSPAR list of threatened and/or declining species and habitats for regions II, III (the Proposed Development is in this region) and IV (OSPAR, 2009). However, the dog whelk is a common species in the British Isles and is not protected under any other piece of legislation.

1.7.15 Tubes of the honeycomb worm *S. alveolata* were also observed during the survey. These tubes can form topographically complex biogenic reefs, which are protected under Annex I of the EC Habitats Directive. However, the tubes within the survey area comprised veneers on the rock of less than 2 cm in height rather than elevated reef structures and are therefore not considered to represent Annex I habitat.

1.7.16 Two non-native species were identified during the survey: Japanese wireweed *S. muticum* and the modest barnacle *A. modestus*. Of these, *S. muticum* is listed in schedule 9 of the Wildlife and Countryside Act (1981 as amended) - Schedule 9 lists non-native species that are already established in the wild, which continue to pose a conservation threat to native biodiversity and habitats, so that further releases should be regulated.

1.7.17 The foreshore location at the landfall is backed by cliffs. Notably HDD will be deployed to allow the cables to be installed beneath the intertidal zone, consequently there are no works planned in the intertidal zone. The HDD will be physically separated from the intertidal zone (HDD boreholes will be c.20 m below seabed level) with the only pathways for impact (**Section 1.10**) considered to be escape of drill fluids via accidental 'frack out' and increase in suspended sediments and sediment deposition.

Subtidal Benthic Ecology

1.7.18 Extensive project-specific benthic characterisation surveys have been conducted of the subtidal environment from the landfall to the UK EEZ boundary. These have included subtidal grab surveys using a Double Van Veen grab and a mini-Hamon grab, water quality sampling and Drop Down Video surveys (**Table 1.11**), (see Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES, for more details).

Sediment type along the Offshore Cable Corridor

1.7.19 Particle size interpretation of sediments was based on the analytical results of surface sediments acquired at sampling stations along the survey cable route. A detailed analysis of sediment distribution along the Offshore Cable Corridor is provided in Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES.

1.7.20 Grab samples were represented by eight British Geological Survey (BGS) modified folk classifications (Volume 3, Figure 1.6 of the ES). Results indicate that sediments were primarily characterised by sand within the nearshore section of the Offshore Cable Corridor (i.e. 0 – 15 km), shifting to gravelly sand up to 50 km along the Offshore Cable Corridor (Volume 3, Figure 1.6 of the ES). Between 50 and 200 km along the Offshore Cable Corridor, sediment was primarily slightly gravelly sand and gravelly sand with some instances of sand and sandy gravel sediments (Volume 3, Figure 1.6 of the ES). From approximately 200 to 250 km, the Offshore Cable Corridor consisted of a range of sediment types including slightly gravelly sand, gravelly muddy sand, gravelly mud, and sand. Between 250 and 300 km, sediments were primarily characterised by muddy sand and slightly gravelly muddy sand. The final section of the Offshore Cable Corridor (300 to 370 km) was characterised by gravelly sand, gravelly muddy sand, and slightly gravelly sand and slightly gravelly muddy sand (Volume 3, Figure 1.6 of the ES).

Habitat assignment at grab/DDV stations

1.7.21 A habitat assessment survey was carried out along the UK section of the proposed Offshore Cable Corridor (Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). Seabed habitats were identified primarily using a combination of benthic grab data and Particle Size Analysis (PSA) data from 48 stations (there were 51 target stations). Benthic grab data and PSA could not be collected at three stations during the survey due to repeated failed attempts and the presence of large cobbles and boulders. However, additional video assessment ground-truthing from a number of stations and geophysical data for the cable route was available to supplement any unsuccessful grab stations.

1.7.22 Biotope classifications within the Offshore Cable Corridor were as follows:

- Close to the coast (0 to 6 km along the Offshore Cable Corridor), stations were assigned the EUNIS habitat '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (EUNIS: MC5215 / JNCC: SS.SSa.CMuSa.AalbNuc) (Volume 3, Figure 1.7 of the ES).
- From approximately 6 to 15 km along the Offshore Cable Corridor, the predominant recorded habitat was 'Sparse fauna in Atlantic infralittoral mobile clean sand' (EUNIS: MB5231 / JNCC: SS.SSa.IFiSa.IMoSa) (Volume 3, Figure 1.7 of the ES).
- From approximately 15 to 40 km along the Offshore Cable Corridor there was a station which was assigned the habitat *'Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (EUNIS: MC2211 / JNCC: SS.SBR.PoR.SspiMx), and there was another station allocated this biotope between 115 to 125 km (Volume 3, Figure 1.7 of the ES). However, there was no evidence of *Sabellaria* reef along the Offshore Cable Corridor.
- From approximately 40 to 115 km, the predominant recorded habitat was *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (EUNIS: MC5211 / JNCC: SS.SSa.CFiSa.EpusOborApri) (Volume 3, Figure 1.7 of the ES).
- From approximately 125 to 205 km, the predominant recorded habitat was '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (EUNIS: MC3213 / JNCC: SS.SCS.CCS.Pkef) (Volume 3, Figure 1.7 of the ES).
- For the remainder of the Offshore Cable Corridor, approximately 205 to 370 km, the predominant recorded habitats were *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (EUNIS: MC5211 / JNCC: SS.SSa.CFiSa.EpusOborApri) and 'Polychaete-rich deep Venus

community in offshore circalittoral mixed sediment' (EUNIS: MD4211 / JNCC: SS.SMx.OMx.PoVen) (Volume 3, Figure 1.7 of the ES).

1.7.23 The survey found that Annelida (segmented worms) was the most abundant taxonomic group across the grab stations. One of the most abundant species was the echinoderm *Echinocyamus pusillus*, which was found at 85 of the 96 grab sample replicates taken for macrofaunal analysis (noting that two replicates were analysed for each benthic station and grab samples could not be collected at three of the 51 target grab stations). Other frequently occurring and abundant species included the polychaetes *Magelona minuta* (recorded at 18 grab stations) and *Ampharete falcata* (recorded at 23 grab stations).

1.7.24 Four species of conservation interest were recorded with the species *Apherusa ovalipes, Harpinia laevis, Eriopisa elongata*, and *Thia scutellata* being currently listed as 'Nationally Scarce' by the Joint Nature Conservation Committee (JNCC).

1.7.25 The only non-native species identified during the survey was the polychaete *Goniadella gracilis*.

Habitat Assignment across the Offshore Cable Corridor

1.7.26 In addition to the station-specific habitat information, European Nature Information System (EUNIS) Level 4 (and where appropriate EUNIS Level 5) habitat mapping has been performed for the entire Offshore Cable Corridor based on consideration of geophysical survey outputs and the results of the benthic grab and underwater video ground-truthing surveys (See Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES, for further information) (Volume 3, Figure 1.8 to Figure 1.11 of the ES).

1.7.27 The predominant habitat from 0 to 100 km of the Offshore Cable Corridor was 'Atlantic offshore circalittoral sand' (EUNIS level 4 code: MD32) (Volume 3, Figure 1.8 of the ES). The predominant habitat nearest to the landfall was 'Atlantic infralittoral sand' (EUNIS level 4 code: MB52). Three EUNIS level 5 code habitats were mapped from 0 to 100 km, 'infralittoral mobile clean sand with sparse fauna' (EUNIS level 5 code: A5.231), '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (EUNIS level 5 code: A5.611), and 'sparse sponges, *Nemertesia spp*. and *Alyconidium diaphanum* on circalittoral mixed substrata' (EUNIS level 5 code: A4.135).

1.7.28 The predominant habitat from 100 to 200 km was 'Atlantic offshore circalittoral coarse sediment' (EUNIS level 4 code: MD32) (Volume 3, Figure 1.9 of the ES). No EUNIS level 5 code habitats were mapped from 100 to 200 km for the full Offshore Cable Corridor mapping.

1.7.29 The predominant habitat from 200 to 300 km was 'polychaete-rich deep venus community in offshore circalittoral mixed sediment' (EUNIS level 5 code: MD4211) (Volume 3, Figure 1.10 of the ES). There were also extensive areas of 'Atlantic offshore circalittoral coarse sediment' (EUNIS level 4 code: MD32), and 'Atlantic offshore circalittoral sand' (EUNIS level 4 code: MD32) (Volume 3, Figure 1.10 of the ES).

1.7.30 The predominant habitats from 300 to 370 km were 'Atlantic offshore circallitoral sediment' (EUNIS level 4 code: MD32), and 'Atlantic offshore circalittoral sand' (EUNIS level 4 code: MD32) (Volume 3, Figure 1.11 of the ES). There was also areas of 'polychaete-rich deep venus community in offshore circalittoral mixed sediment' (EUNIS level 5 code: MD4211) (Volume 3, Figure 1.11 of the ES).

Bedrock reef and stony reef

1.7.31 Bedrock and stony reef areas can be characteristic of the Annex I habitat 'Reef' under the EC Habitats Directive (code 1170).

1.7.32 An area of outcropping bedrock was evident from the video and stills data at Station 14. Bedrock was observed rising out from the silty sand seabed, forming distinctive outcrops that were often colonised by numerous species including hydrozoans, bryozoans, encrusting sponges and cup corals. From the images reviewed, this habitat also supported mobile fauna, such as several species of fish and crustaceans. A similar habitat was observed closer inshore from Stations 47 to 50, with Station 50 having more resemblance to stony reef than bedrock formations (Volume 3, Figure 1.12 of the ES).

1.7.33 Consequently, the underwater video surveys identified areas of exposed bedrock that may be classified as Annex I 'Reef' habitat (referred to hereon as 'bedrock reef') at Stations 14, 47, 48 and 49. There were 142 recorded observations (stills) of 'Annex I bedrock reef with low biodiversity' across the four stations. There were only five stills of 'Annex I bedrock reef with high biodiversity' (one at Station 47 and four at Station 49), (Volume 3, Figure 1.12 of the ES).

1.7.34 There were also 49 recorded observations of 'bedrock reef partially covered' at Stations 48 and 49, however, this was not considered to be representative of Annex I habitat. Further details indicating the considerations when determining which areas were bedrock reef and why the 'bedrock reef partially covered' was not considered to be Annex I habitat listed under the EC Habitats Directive are provided in Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES.

1.7.35 Close to the Isles of Scilly and the East of Haig Fras MCZ, the sediment was rippled gravelly coarse sand with cobbles and boulders. An abundance of cobbles and boulders were observed in an area of silty sandy gravel with shell debris at Station 19. The cobbles and boulders were often colonised by *Hymedesmiidae, Caryophyllia sp.* and *Amphilectus fucorum*, with numerous hydroids and bryozoans protruding from the coarse seabed. These areas of cobble and boulders can be classed as Annex I 'Reef' habitat (referred to hereon as 'stony reef') dependent on consideration of a range of criteria for the degree of reefiness which includes extent, degree of colonisation, species observed within these areas and the distinctiveness from the surrounding seabed (Irving 2009; Golding *et al*., 2020). Detail relating to how these considerations and criteria were applied to determine classifications of the different sections of potential stony reef along the Offshore Cable Corridor is provided in Volume 3: Appendix 8.4: GEOxyz Environmental Report of the ES.

1.7.36 Stony reef was identified at Stations 19, 45 and 50. There were 20 recorded observations of 'Low stony reef' across stations, there was only one instance (one still) of 'Medium stony reef' which was at Station 50 (Volume 3, Figure 1.13 of the ES).

1.7.37 Medium stony reef is considered to represent Annex I habitat.

1.7.38 In line with the Irving (2009) stony reef guidance, areas of 'Low reef', however, are unlikely to be classified as Annex I habitat without strong justification. Accordingly, the aforementioned areas of 'Low reef' were further evaluated to determine whether such justification was warranted by assessing whether they met the reef biotope/species characteristics outlined in Golding *et al*. (2020).

1.7.39 The transects where initial Annex I stony reef assessment were conducted and exhibited overall 'Low reef' (structure vs epifaunal coverage vs. extent) were further investigated to establish whether hard substrate areas still corresponded to reef-like structures based on the epifauna present. This involved the assignment of 'reef biotopes', the identification of key species and the richness of 'reef species' according to the criteria outlined in Golding *et al*. (2020).

1.7.40 It was found that at Stations 19 and 45 the areas warranted 'no strong justification for Annex I status' (Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). The transect at Station 50 had the highest abundance of epifauna with six key reef species (including *Pentapora foliacea*, *Alcyonium digitatum* and *Abietinaria abietina*) and four desirable reef species (including *Caryophyllia smithii*, *Halecium halecinum* and *Antedon bifida*), resulting in the delineation of 'Low Resemblance Reef with a strong justification to warrant Annex I status' for this transect. When overlaid on the delineated seabed features, Station 50 is situated within a large area designated as 'Pebbley Cobbley Sandy Gravel' where stony reef features can be considered supportive of diverse epifaunal communities with the potential to warrant Annex I status (Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES).

Other notable habitats

1.7.41 Sponges were evident across the DDV survey area, primarily associated with areas of cobbles/boulders along the route. To assess the potential occurrence of the 'deep-sea sponge aggregations' OSPAR habitat, the Norwegian Oil and Gas Association (NOROG) assessment method was applied (NOROG, 2019). Most stills assessed contained no evidence of sponges and were assigned the 'No Sponge' category and a total of 17 patches were categorised into 'Category 1' with a sponge density of less than 0.5 m^2. Consequently, it is considered that the 'deep-sea sponge aggregations' habitat (which is listed as threatened and/or declining by OSPAR) is not present in the surveyed area (Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES).

Future Baseline Conditions

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

1.7.43 The EIA process considers the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in Volume 1, Chapter 5: EIA Methodology, of the ES.

1.7.44 Cable laying in UK waters will be undertaken in several campaigns. As outlined in Volume 1, Chapter 3: Project Description of the ES, pre-lay works may commence in early 2027, with cable lay campaigns then starting later in 2027 (provisional schedule indicates Q3 2027 start) and completed in 2028 for Bipole 1. Pre-lay for Bipole 2 would be in 2029, with lay of all Bipole 2 anticipated to be in 2030. Existing data are considered appropriate to characterise the benthic ecology baseline for the Proposed Development provisional construction period (2027-2030 if the application for development consent is granted).

1.7.45 A consideration of climate change is required for consideration of the longer (c.50 years after commissioning) operational phase, and subsequent decommissioning phase of the Proposed Development. The baseline environment will exhibit some degree of natural change over time, even if the Proposed Development was not to proceed. A key consideration in assessing the future baseline conditions is the influence of climate change on benthic communities.

1.7.46 There are numerous models covering the UK which simulate possible climate change scenarios and the UKCP18 (Defra 2019) Climate Projections indicate there could be increases in mean summer temperatures in the longer term and milder winters (influencing sea water temperature), changes in rainfall distribution and seasonality, more extremes of weather and sea level rise (Defra 2019). Rising sea temperatures, ocean acidification, ocean deoxygenation and rising sea levels have been identified as key stressors that are affecting marine communities and reducing ecosystem resilience (European Environmental Agency, 2023).

1.7.47 The long-term baseline conditions for benthic ecology are considered to be relatively stable within deeper, offshore waters. The existing environment is influenced by the physical processes which exist within the Celtic Sea, including waves and tidal currents driving sediment transport and seabed morphology characteristics (refer to Volume 3, Chapter 8: Physical Processes of the ES). Long-term established patterns may be affected by climate change driven sea-level rise, however this will have a reduced impact offshore compared to along the coastline. Key threats of climate change include sea-level rise and potential for increased wave action which may cause erosion and coastal squeeze, noting that these will predominantly affect coastal habitats.

1.7.48 Warming sea temperatures and ocean acidification are likely to result in changes to the composition and geographical distribution of benthic communities, with a general north westerly shift (Hiddink *et al*., 2015) in the latitudinal ranges of many species.

1.7.49 Anthropogenic pressures that currently exist across the study area such as commercial fishing, particularly using bottom towed gear, have the potential to influence future change in the existing benthic environment (refer to Volume 3, Chapter 3: Commercial Fisheries of the ES).

Key Receptors

1.7.50 **Table 1.19** identifies the receptors taken forward into the assessment.

Table 1.19: Key receptors taken forward to assessment and conservation value

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Annex I habitats					
Bedrock reef	Considered at reef habitat level as opposed to constituent biotope level.	Not a feature of any SACs potentially affected by the Proposed Development	Annex I habitat (EC Habitats Directive)	Subtidal survey recorded very small isolated areas of Annex I Bedrock Reef with high biodiversity bedrock reef in a small number of stills at two stations, and bedrock reef with low biodiversity was recorded in numerous stills across four stations locations within the Offshore Cable Corridor. High and low biodiversity bedrock reef is considered to represent Annex I habitat (see Volume 3, Figure 1.12 of the ES).	**National** (listed as National as not a qualifying feature of an SAC in the study area)
Stony reef	Considered at reef habitat level as opposed to constituent biotope level.	Not a feature of any SACs potentially affected by the Proposed Development	Annex I habitat (EC Habitats Directive)	Subtidal survey recorded Annex I Medium stony reef at one discrete location at Station 50 within the Offshore Cable Corridor. Low reef habitat at Station 50 was considered to have a strong justification to warrant Annex I status (see Volume 3, Figure 1.13 of the ES).	**National** (listed as National as not a qualifying feature of an SAC in the study area)
Granite and slate reef system	Considered at reef habitat level as opposed to constituent biotope level.	A primary reason for site selection for Lundy SAC which is within the Benthic Ecology study area.	Annex I habitat (EC Habitats Directive)	SAC boundary is 3.5 km from the Offshore Cable Corridor	**International** (qualifying feature of SAC in the study area)

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Sandbanks which are slightly covered by sea water all of the time	Considered at sandbank habitat level as opposed to constituent biotope level.	A qualifying feature of the Lundy SAC which is within the Benthic Ecology study area, but not a primary reason for site selection	Annex I habitat (EC Habitats Directive)	SAC boundary is 3.5 km from the Offshore Cable Corridor	**International** (qualifying feature of SAC in the study area)
Submerged or partly submerged sea caves	Considered at habitat level as opposed to constituent biotope level.	A qualifying feature of the Lundy SAC which is within the Benthic Ecology study area, but not a primary reason for site selection	Annex I habitat (EC Habitats Directive)	SAC boundary is 3.5 km from the Offshore Cable Corridor	**International** (qualifying feature of SAC in the study area)
Intertidal Habitats					
Littoral rock habitats	*Chthamalus* spp. on exposed eulittoral rock (MA1222) *Chthamalus* spp. and *Lichina pygmaea* on steep exposed upper eulittoral rock (MA12222) *Ulva* spp. on freshwater-influenced and/or unstable upper eulittoral rock (MA123G) *Fucus spiralis* on exposed to moderately exposed upper eulittoral rock (MA1242) *Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock (MA1243)	Not a feature of any SACs potentially affected by the Proposed Development	Not a habitat of conservation interest	Widespread throughout the intertidal survey area (see Volume 3, Figure 1.5 of the ES)	**Local** (c.f. Table 1.12; taking into account the low biodiversity, social/community value and / or economic value of this habitat)

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
	Fucus serratus and red seaweeds on moderately exposed lower eulittoral rock (MA12441) Coralline crust-dominated shallow eulittoral rockpools (MA1262) *Ascophyllum nodosum* on full salinity mid eulittoral rock (MA123E1) *Bifurcaria bifurcata* in shallow eulittoral rockpools (MA12623) *Sargassum muticum* in eulittoral rockpools (MA12631)				
Littoral coarse sediment habitats	Barren littoral shingle (MA3211)	Not a feature of any SACs potentially affected by the Proposed Development	Not a habitat of conservation interest	Widespread throughout the uppermost section of the littoral zone within the intertidal survey area (see Volume 3, Figure 1.5 of the ES)	**Local** (c.f. Table 1.12; taking into account the low biodiversity, social/community value and / or economic value of this habitat)
Littoral sand habitats	Strandline (MA521)	Not a feature of any SACs potentially affected by the Proposed Development	Not a habitat of conservation interest	Thin band located throughout the uppermost section of the littoral zone within the intertidal survey area (see Volume 3, Figure 1.5 of the ES)	**Local** (c.f. Table 1.12; taking into account the low biodiversity, social/community value and / or economic value of this habitat)
Habitats of Principal Importance					

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Subtidal sand sediment habitats	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231) *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214) *Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Not a feature of any SACs potentially affected by the Proposed Development	Section 41 NERC Act Habitat of Principal Importance (2006), (Subtidal Sands and Gravels)	Widespread throughout Offshore Cable Corridor (see Volume 3, Figure 1.8 to 1.11 of the ES)	**Regional** (taking into account extent of this Habitat of Principal Importance in the region)
Subtidal coarse sediment habitats	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	Not a feature of any SACs potentially affected by the Proposed Development	Section 41 NERC Act Habitat of Principal Importance (2006), (Subtidal Sands and Gravels)	Widespread throughout Offshore Cable Corridor (see Volume 3, Figure 1.8 to 1.11 of the ES)	**Regional** (taking into account extent of this Habitat of Principal Importance in the region)
Subtidal mixed sediment habitats	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211) Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Not a feature of any SACs potentially affected by the Proposed Development	Section 41 NERC Act Habitat of Principal Importance (2006), (Subtidal Sands and Gravels)	Widespread throughout Offshore Cable Corridor (see Volume 3, Figure 1.8 to 1.11 of the ES)	**Regional** (taking into account extent of this Habitat of Principal Importance in the region)

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Sabellaria habitat (not reef)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) *Sabellaria alveolata* reefs on sand-abraded eulittoral rock (MA2261)	Not a feature of any SACs potentially affected by the Proposed Development	Section 41 NERC Act Habitat of Principal Importance (2006), (Subtidal Sands and Gravels)	Subtidal survey recorded representative biotope at two discrete locations within the Offshore Cable Corridor (see Volume 3, Figure 1.8 of the ES)	**Regional** (taking into account extent of this Habitat of Principal Importance in the region)
Features of MCZs					
Subtidal sand[2]	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the South West Approaches to Bristol Channel MCZ; Bideford to Foreland Point MCZ; East of Haig Fras MCZ and Hartland Point to Tintagel MCZ	South West Approaches to Bristol Channel MCZ, Bideford to Foreland Point MCZ, East of Haig Fras MCZ and Hartland Point to Tintagel MCZ overlap with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Subtidal coarse sediment	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the South West	South West Approaches to Bristol Channel MCZ, Bideford	**National**

[2] It should be noted that although these specific MCZ habitat features have been listed here, some of them are also covered by the first part of the table but not in the context of being an MCZ feature.

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
			Approaches to Bristol Channel MCZ; Bideford to Foreland Point MCZ; the East of Haig Fras MCZ and Hartland Point to Tintagel MCZ (as part of subtidal coarse sediment / subtidal mixed sediments mosaic)	to Foreland Point MCZ, East of Haig Fras MCZ and Hartland Point to Tintagel MCZ overlap with the Benthic Ecology study area	(listed as a feature of the indicated MCZs)
Subtidal mixed sediment	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ; and East of Haig Fras MCZ (as part of subtidal coarse sediment / subtidal mixed sediments mosaic)	Bideford to Foreland Point MCZ and East of Haig Fras MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Subtidal mud	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the East of Haig Fras MCZ	East of Haig Fras MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the East of Haig Fras MCZ)
Sea-pen and burrowing megafauna communities	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the East of Haig Fras MCZ	East of Haig Fras MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the East of Haig Fras MCZ)
Fan mussel *Atrina fragilis*	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the East of Haig Fras MCZ	East of Haig Fras MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the East of Haig Fras MCZ)
High energy circalittoral rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ,	Bideford to Foreland Point MCZ, East of Haig Fras MCZ and Hartland Point to Tintagel	**National**

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
			East of Haig Fras MCZ and Hartland Point to Tintagel MCZ	MCZ overlaps with the Benthic Ecology study area	(listed as a feature of the indicated MCZs)
Moderate energy circalittoral rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ, East of Haig Fras MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ, East of Haig Fras MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Honeycomb worm, *Sabellaria alveolata* reefs	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Intertidal under boulder communities	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ	Bideford to Foreland Point MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the Bideford to Foreland Point MCZ)
Fragile sponge and anthozoan communities on subtidal rocky habitats	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Pink sea fan, *Eunicella verrucosa*	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Low energy intertidal rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Moderate energy intertidal rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated)
High energy intertidal rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Intertidal coarse sediment	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Intertidal mixed sediments	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ	Bideford to Foreland Point MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the Bideford to Foreland Point MCZ)
Intertidal sand and muddy sand	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Littoral chalk communities	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ	Bideford to Foreland Point MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the Bideford to Foreland Point MCZ)
Low energy infralittoral rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ	Bideford to Foreland Point MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the Bideford to Foreland Point MCZ)

Receptor	Representative biotope recorded within the Benthic Ecology study area	Designation status	Conservation Interest	Distribution within the Benthic Ecology study area	Value and Justification
Moderate energy infralittoral rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated in MCZs)
High energy infralittoral rock	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ	Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)
Coastal saltmarshes and saline reedbeds	Not applicable as no surveys were conducted within the MCZ	MCZ	Protected feature within the Hartland Point to Tintagel MCZ	Hartland Point to Tintagel MCZ overlaps with the Benthic Ecology study area	**National** (listed as a feature of the indicated MCZs)

1.8 Mitigation Measures Adopted as Part of the Proposed Development

1.8.1 For the purposes of the EIA process, the term *'measures adopted as part of the Proposed Development'* is used to include the following types of mitigation measures (adapted from IEMA, 2016). These measures are set out in Volume 1, Appendix 3.1: Commitments Register of the ES.

- Embedded mitigation. This includes the following.
  - Primary (inherent) mitigation - measures included as part of the Proposed Development design. IEMA describes these as '*modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'*. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and/or marine licences. For example, a reduction in footprint or height.
  - Tertiary (inexorable) mitigation. IEMA describes these as '*actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects*'. 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 (EMP).

1.8.2 In addition, where relevant, measures have been identified that may result in enhancement of environmental conditions. Such measures are clearly identified within Volume 1, Appendix 3.1: Mitigation Schedule of the ES. The measures relevant to this chapter are summarised in **Table 1.20**.

1.8.3 Embedded measures that will form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the assessment presented in **sections 1.10**, **1.11** and **1.12** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures to which the Applicant is committed are taken into account in the assessment of effects.

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

Table 1.20: Mitigation measures adopted as part of the Proposed Development

Commitment Number	Measure Adopted	How the Measure Will be Secured
Embedded Measures		
OFF01	Cables will be buried (where possible) up to a maximum of approximately 1.6 m below the seabed, as informed by detailed 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).
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).	Design parameters set out in the Outline Offshore CEMP (document ref. 7.9).
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).
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. 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 Offshore CEMP is a requirement of the Deemed Marine Licence.
OFF06	An Offshore Biosecurity Plan will be implemented, 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 Offshore CEMP (outline provided at application stage, as document ref. 7.9).
OFF07	A Marine Pollution Contingency Plan (MPCP) will form part of the final Offshore CEMP and will include measures to minimise 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).
OFF08	For compliance with the requirements of MARPOL, all Project 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).

Commitment Number	Measure Adopted	How the Measure Will be Secured
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 Offshore CEMP (outline provided at application stage, as document ref. 7.9)
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).
OFF34	All potential sediment disturbance activities in Bideford Bay to avoid peak spring tides and significant wave activity, to limit any potential for sediment mobilisation. These activities would include the excavation / sediment clearance at the x4 (no) HDD exit pits and trenching works.	Requirement of the Outline Offshore CEMP (document ref. 7.9).
Secondary (Further) Measures		
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 reef habitats.	Set out as 'Further Commitments' in the Outline Offshore CEMP (document ref. 7.9).
Enhancement Measures		
N/A		

1.9 Key Parameters for Assessment

Maximum Design Scenario

1.9.1 The MDS identified in **Table 1.21** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the information provided in Volume 1, Chapter 3: Project Description of the ES. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (PDE) (e.g. different cable installation method), to that assessed here be taken forward in the final design. Therefore, this comprises a conservative assessment of a worst case scenario, with commentary.

Table 1.21: Maximum design scenario considered for the assessment of impacts

<table>
<tr><th rowspan="2">Impact</th><th colspan="5">Phase[1]</th><th rowspan="2">Maximum Design Scenario</th><th rowspan="2">Commentary</th></tr>
<tr><th>C</th><th>Op</th><th>Op repair</th><th>D In-situ</th><th>D removal</th></tr>
<tr><td>Temporary habitat loss/disturbance</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td><td>Yes</td><td>Construction phase
Temporary habitat loss / disturbance as a result of construction phase activities, including boulder clearance, pre-lay ploughing and seabed debris removal:
• 7,400,000 m² precautionary footprint for use of seabed surface plough and / or Mass Flow Excavation. Precautionary estimate assuming clearance along 50% of Offshore Cable Corridor (20 [width] x 370,000 [length] x 2 [number] x 50%). Seabed surface plough with swath width of 10-20 m wide.
• 6,000,000 m² for boulder clearance, pre-lay plough with swath width of 10-15 m assumed across approximately 200 km of the cable route (15 [width] x 200,000 [length] x 2 [number]). See Outline CBRA (Volume 1, Appendix 3.4of the ES), benthic habitat disturbance figure showing boulder density (Volume 3, Figure 1.15 of the ES) and associated potential habitat disturbance (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).
• 740,000 m² for max (precautionary) seabed debris removal, pre-lay grapnel run with 1 m width and at maximum penetration depth of 1 m (1 [width] x 370,000 [length] x 2 [number]).
• 11,100,000 m² for max (precautionary) pre-lay trench ploughing with disturbance width of 15 m (15 [width] x 370,000 [length] x 2 [number].
• 440,000 m² for max (precautionary) build up of sediment either side of cables along 220 km of buried cable with a maximum width of 0.5 m either side of cable (1 [width] x 220,000 [length] x 2 [number]).</td><td>Maximum effect of temporary habitat loss / disturbance will occur as result of the maximum area of seabed disturbed. Temporary habitat loss / disturbance does not factor in in-service cables which would be covered in rock protection and therefore has been factored into long term habitat loss/change.</td></tr>
</table>

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						Habitat loss as a result of cable burial: • Burial techniques including trench ploughing, trench jetting or mechanical trench excavation. See outline CBRA (Volume 1, Appendix 3.4of the ES), benthic habitat disturbance figures showing burial risk (Volume 3, Figures 1.14 to 1.19 of the ES) and associated potential habitat disturbance areas (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). • Mechanical trenching, ROV on seabed with footprint up to 126 m^2 (10 m width and 12.6 m length). • For water jetting ROV, seabed footprint of up to 55.2 m^2 (6 m width and 9.2 m length). • Cable spacing 50 – 180 m between the two bipoles (up to 250 m in places e.g. areas of high shipping density). • Trench width of 0.5 to 1.5 m (max); target width 1 m (less where seabed conditions allow). • Cable burial across entire length, with estimated up to 150 km of route requiring potential additional rock protection (i.e. 300 km in total for the two cable bundles). • Additional rock placement needed at crossing of up to 25 cables (20 in-service and up to 5 crossings of out-of-service cables). • 27 out-of-service cable crossings (cutting and removal of existing cables assumed to be within the maximum construction disturbance footprints above) – up to 5 of these out of service cables may be retained (see crossings above). See Outline CBRA (Volume 1, Appendix 3.4 of the ES), habitat disturbance figure showing cable crossings (Volume 3, Figure 1.14 of the ES) and associated potential habitat disturbance areas	

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						(Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). Habitat loss as a result of the use of jack-up vessels at the HDD • Maximum of two jack-up vessels required (assumed to be less than the associated sediment removal area below). Habitat loss as a result of excavations at HDD exit pits, if required: • Localised excavations using back-hoe dredger (long arm barge mounted excavator) or Mass Flow Excavation. Sediment will be cleared from an area of approximately 15 m x 15 m around the (x4) exit points. No sediment removal offsite outside the Offshore Cable Corridor. **Operational phase repair activities** • De-burial and re-burial of cable failure points across two 370 km bundled cables. (Infrequent, isolated repair activities). **Decommissioning phase (removal)** • Cables would be removed.	
Temporary increase in suspended sediments and sediment deposition	Yes	No	Yes	No	Yes	**Construction phase** Temporary seabed disturbance as a result of construction phase activities, including boulder clearance, pre-lay ploughing and seabed debris removal: • 7,400,000 m^2 precautionary footprint for use of seabed surface plough and / or Mass Flow Excavation. Precautionary estimate assuming clearance along 50%	Maximum effect of increased suspended sediments and sediment deposition will occur as result of the maximum area and volume of seabed disturbed.

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						of Offshore Cable Corridor (20 [width] x 370,000 [length] x 2 [number] x 50%). Seabed surface plough with swath width of 10-20 m wide. • 6,000,000 m^2 for boulder clearance, pre-lay plough with swath width of 10-15 m assumed across approximately 200 km of the cable route (15 [width] x 200,000 [length] x 2 [number]). See Outline CBRA (Volume 1, Appendix 3.4 of the ES), benthic habitat disturbance figure showing boulder density (Volume 3, Figure 1.15 of the ES) and associated potential habitat disturbance (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES**)**. • 740,000 m^2 for max (precautionary) seabed debris removal, pre-lay grapnel run with 1 m width and at maximum penetration depth of 1 m (1 [width] x 370,000 [length] x 2 [number]). • 11,100,000 m^2 for max (precautionary) pre-lay trench ploughing with disturbance width of 15 m (15 [width] x 370,000 [length] x 2 [number]. Seabed disturbance as a result of cable burial: • Burial techniques including trench ploughing, trench jetting or mechanical trench excavation. See Outline CBRA (Volume 1, Appendix 3.4 of the ES), benthic habitat disturbance figures showing burial risk (Volume 3, Figures 1.14 to 1.19 of the ES) and associated potential habitat disturbance areas (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). • Mechanical trenching, ROV on seabed with footprint up to 126 m^2 (10 m width and 12.6 m length). • For water jetting ROV, seabed footprint of up to 55.2 m^2 (6 m width and 9.2 m length).	

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• Cable spacing 50 – 180 m between the two bipoles (up to 250 m in places e.g. areas of high shipping density). • Trench width of 0.5 to 1.5 m (max); target width 1 m (less where seabed conditions allow). • Cable burial across entire length, with estimated up to 150 km of route requiring potential additional rock protection (i.e. 300 km in total for the two cable bundles). • Additional rock placement needed at crossing of up to 25 cables (20 in-service and up to 5 crossings of out-of-service cables. Increase in suspended sediments as a result of disturbance at out of service and in-service cables and associated rock protection: • Additional rock placement needed at crossing of up to 25 cables (20 in-service and up to 5 crossings of out-of-service cables). • 27 out-of-service cable crossings (cutting and removal of existing cables assumed to be within the maximum construction disturbance footprints above) – up to 5 of these out of service cables may be retained (see crossings above). See Outline CBRA (Volume 1, Appendix 3.4 of the ES), habitat disturbance figure showing cable crossings (Volume 3, Figure 1.14 of the ES) and associated potential habitat disturbance areas (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). Seabed disturbance as a result of the use of jack-up vessels at the HDD:	

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• Maximum of two jack-up vessels required (assumed to be less than the associated sediment removal area below). Habitat loss as a result of excavations at HDD exit pits, if required: • Localised excavations using 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 (x4) exit points. No sediment removal offsite. **Operation phase repair activities** • De-burial and re-burial of cable failure points across two 370 km bundled cables. (Infrequent, isolated repair activities.) **Decommissioning phase (removal)** • Cable would be removed.	
Changes to water quality (release of hazardous substances from sediments)	Yes	No	Yes	No	Yes	**Construction phase** • As per Temporary increase in suspended sediments and sediment deposition. **Operation phase repair activities** • As per Temporary increase in suspended sediments and sediment deposition. **Decommissioning phase (removal)** • As per Temporary increase in suspended sediments and sediment deposition.	Maximum effects of changes to water quality as a result of resuspension of suspended sediments will results from the maximum amount of disturbance and chemical composition of the sediment.
Introduction and spread of INNS	Yes	No	Yes	Yes	Yes	**Construction phase** • Where equipment or structures are introduced to the water column there is risk of introduction and spread of INNS. Consequently, those activities outlined in the above sections of the table apply.	The most likely pathway for INNS is via vessel activities, therefore the maximum number of vessels will represent the maximum risk of introduction of INNS.

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• Up to 20 Guard vessels stationed every 10 nautical miles (nm) (vessels only deployed during periods of unprotected cable – thus 20 would be highly unlikely). • 2 Rock placement vessels. • 1 CLV (two brief periods during changeovers). • Up to 5 Trenching vessels. • 2 Pre-installation vessels. • Max 2 jack up / multi-cat vessels. **Operation phase repair activities** • 1 Survey vessel equipped with ROV, MBES, SSS and magnetometer. **Decommissioning phase (*in-situ*)** • Cables left *in-situ*: Vessels assumed to be less than construction. **Decommissioning phase (removal)** • Cables removed: Assumed to be similar in nature to that of construction (which is deemed a precautionary worst case assumption).	
Underwater noise & vibration	Yes	No	No	No	No	**Construction phase** • Only vibration from HDD has been considered for benthic invertebrates. There will be four borehole drills, and four exit points.	Vibration in sediments due to HDD has the potential to affect benthic invertebrates.
Change in hydrodynamic regime (scour & accretion)	No	Yes	No	No	Yes	**Operational phase** 625,000 m^2 of long term habitat loss /change as a result of: • Cable burial across entire length, with estimated up to 150 km of route requiring potential additional rock protection (i.e. 300 km in total for the two cable bundles).	The maximum change in hydrodynamic regime will result from the maximum area and height of rock protection.

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• Additional rock protection across cables equating to an estimated maximum rock protection footprint of 450,000 m^2 (225,000 m^2 per cable bundle). • Rock protection assumed 1.5 m wide (7 m wide at crossings). Rock protection over cable crossings equating to a maximum rock protection footprint of 175,000 m^2: • 20 in service cable crossings and up to 5 out of service cable crossings. • Maximum rock protection footprint of 3,500 m^2 per crossing (7 m wide and 500 m long). • 2 cable bundles. **Decommissioning phase (removal)** • Potential impact if cable was removed – adopting similar MDS assumptions to construction phase above (noting this is a precautionary worst case).	
Sediment heating	No	Yes	No	No	No	**Operational phase** • 4 x 525 kV HVDC cables (175 mm in diameter) with a length of 370 km. • Target burial depth of 1.5 m (average minimum depth of 0.8 m).	The maximum heat change will result from the maximum cable voltage. Maximum extent of heat change will result from the maximum length of the cable bundles.
Electromagnetic field (EMF) effects	No	Yes	No	No	No	**Operational phase** • 4 x 525 kV HVDC cables (175 mm in diameter) with a length of 370 km. • Cable burial across entire length, with estimated up to 150 km of route requiring potential additional rock protection.	The operation of the cable could result in the generation of EMFs which could affect benthic invertebrates. Maximum EMF values emitted from cable and extent of the EMFs will vary in relation to a number of aspects including the maximum cable voltage, distance from the seafloor and length of the cable.

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• Target burial depth of 1.5 m (average minimum depth of 0.8 m).	
Long-term habitat loss/change	No	Yes	No	Yes	No	**Operational phase** 625,000 m^2 of long term habitat loss /change as a result of: • Cable burial across entire length, with estimated up to 150 km of route requiring potential additional rock protection (i.e. 300 km in total for the two cable bundles). • Additional rock protection across cables equating to an estimated maximum rock protection footprint of 450,000 m^2 (225,000 m^2 per cable bundle). See Outline CBRA (Volume 1, Appendix 3.4 of the ES), habitat disturbance figure showing indicative rock placement (Volume 3, Figure 1.19 of the ES) and associated potential habitat disturbance (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). • Rock protection assumed 1.5 m wide. Rock protection over in-service cable crossings equating to a maximum rock protection footprint of 175,000 m^2: • 20 in service cable crossings and up to 5 out of service cable crossings. • Maximum rock protection footprint of 3,500 m^2 per crossing (7 m wide and 500 m long). • 2 cable bundles. • See Outline CBRA (Volume 1, Appendix 3.4 of the ES), habitat disturbance figure showing cable crossings (Volume 3, Figure 1.14 of the ES) and associated potential habitat disturbance (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). **Decommissioning phase (*in-situ*)**	Maximum effect of long-term habitat loss will occur as a result of the maximum area of seabed covered by cable protection and cable crossings protection (i.e., rock berms).

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						• See 'operational phase' for 'long-term habitat loss/change' above for potential impact if cable was left *in-situ*	
Accidental pollution	Yes	No	Yes	Yes	Yes	**Construction phase** • See 'Temporary habitat loss/disturbance' for general construction information. • See 'Introduction and spread of INNS' for vessel information. • Potential accidental release of bentonite during HDD. **Operation phase repair activities** The number of vessels required during the operational phase is not clear (on account of unknown repair frequency), however, as a minimum there would be: • One survey vessel to undertake routine post installation inspection surveys 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 through the remainder of the operational phase, is likely to be conducted on a five-year basis. - If an issue is found, it will be flagged for further investigation, and mobilisation of repair as appropriate. • Vessels to support unplanned maintenance and repair, as needed.	There is a risk of chemicals being accidentally released from sources including vessels/vehicles and equipment/machinery. The greatest likelihood of accidental pollution will result from the maximum number of vessels on site at any one time. The MDS also considers the release of bentonite from HDD.

Impact	Phase[1]					Maximum Design Scenario	Commentary
	C	Op	Op repair	D *In-situ*	D removal		
						Decommissioning phase (*in-situ*) • Cables left *in-situ*: Vessels will be required to secure cables (vessels assumed to be less than construction).	
						Decommissioning phase (removal) • Cables removed: Assumed to be similar in nature to that of construction.	

[1] C=Construction phase, Op=Operational phase, Op_{repair}=Operational phase repair activities, $D_{\textit{In-situ}}$=Decommissioning phase assuming cable de-energised and left *In-Situ*, $D_{removal}$=Decommissioning phase assuming cable removed.

1.10 Assessment of Construction Effects

Introduction

1.10.1 The impacts of the construction of the Proposed Development have been assessed. The impacts arising from the construction phase of the Proposed Development are listed in **Table 1.21**, along with the MDS against which each impact has been assessed.

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

1.10.3 The Offshore Cable Corridor runs immediately adjacent to the South West Approaches to Bristol Channel MCZ for about 50 km. The Offshore Cable Corridor also runs adjacent to a corner of the East of Haig Fras MCZ and part of the nearshore section is in the vicinity of the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ. An MCZ Assessment (document reference 7.15) has been conducted and will be submitted with the EIA application providing a full assessment of potential effects on the South West Approaches to Bristol Channel MCZ, East of Haig Fras MCZ, Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ. The only impacts which are considered to have the potential to have any effects on the MCZs are: temporary increase in suspended sediments and sediment deposition; changes to water quality (release of hazardous substances from sediments); introduction of INNS; and accidental pollution. Consequently, for these impacts additional information is provided for MCZ Features of Conservation Interest (FOCI) as appropriate, and an assessment is provided here of whether there is a risk of conservation objectives for MCZs being hindered.

Temporary habitat loss/disturbance

1.10.4 Temporary habitat loss / disturbance within the Offshore Cable Corridor may occur during the construction phase as a result of a range of activities. This includes associated seabed preparation (including boulder clearance, pre-lay ploughing and seabed debris removal), and cable burial activities. Temporary habitat loss will also occur due to the use of construction vessels including jack-up vessels during HDD operations. Where habitats are subsequently covered with infrastructure (e.g. rock berm for cable protection and cable crossings) habitat loss/change is considered long-term and has therefore been assessed as an operational impact in **section 1.11** of this Chapter and is not considered further here.

Sensitivity of the Receptor

1.10.5 The sensitivity of the receptors identified in the Benthic Ecology study area have been assessed in relation to the following MarESA pressures relevant to temporary habitat loss/disturbance:

- Habitat structure changes – removal of substratum (extraction).
- Abrasion / disturbance of the surface of the substratum or seabed.
- Penetration or disturbance of the substratum subsurface.

- Smothering and siltation rate changes (heavy i.e. 5 to 30 cm deposition).

1.10.6 The sensitivity of representative biotopes to temporary habitat loss/disturbance pressures are summarised in **Table 1.22**.

1.10.7 The boundaries of all SACs and MCZs with listed benthic features within the Benthic Ecology study area are located beyond the Cable Corridor (Volume 3, Figure 1.4 of the ES). Consequently, there is no potential for interaction between benthic habitat/species features of these SACs and MCZs (**Table 1.18**) and the activities associated with temporary habitat loss/disturbance (this is noting that 'Temporary increase in suspended sediments and sediment deposition' has been considered as a separate impact). Therefore, these receptors have not been considered in this 'Temporary habitat loss/disturbance' assessment section.

1.10.8 Similarly, there is no potential for interaction between activities associated with temporary habitat loss and intertidal benthic receptors due to the installation of cables at the landfall via HDD. Therefore, these receptors have not been assessed.

1.10.9 There will be micro-routing of the cable to avoid potential impacts on Annex I bedrock and stony reef habitats.

1.10.10 The MarESA assessment indicated that subtidal biotopes recorded during surveys have a medium sensitivity to 'habitat structure changes – removal of substratum (extraction)' (**Table 1.22**). Construction activities such as pre-lay ploughing will result in the redistribution of sediment within the footprint of the Offshore Cable Corridor (along the line of the cable installation) and the subsequent removal of characterising species within the upper layers of sediment. However, it is anticipated that representative biotopes may recover following cable burial. For instance, characterising species of the biotope '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214), may take up to two years to re-establish (Tillin *et al*., 2023). Hill *et al*. (2011) reviewed the recoverability of seabed sediments following marine aggregate extraction, with rapid recovery (approximately 8 months) was reported in areas with high levels of sediment mobility. Consequently, these receptors will have a limited capacity to avoid adapt to or tolerate the impact with partial recovery anticipated within 5 years and full recovery within 10 years. Benthic receptors are also considered to be of Regional value. These receptors are therefore assessed as having **medium** sensitivity to 'habitat structure changes – removal of substratum (extraction)'.

1.10.11 The MarESA assessment indicated that a number of recorded subtidal biotopes including 'Sparse fauna in Atlantic infralittoral mobile clean sand' (MB5231), '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213), '*Echinocyamus pusillus*, *Ophelia borealis*, *Abra prismatica* in circalittoral fine sand' (MC5211), 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) and '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214) had a low sensitivity to 'abrasion / disturbance of the surface of the substratum or seabed' and 'penetration or disturbance of the substratum surface' (**Table 1.22**). Associated species of the biotope 'Sparse fauna in Atlantic infralittoral mobile clean sand' (MB5231) such as the white catworm *Nephtys cirrosa*, amphipods and isopods are generally present in low abundance and are adapted to frequent sediment disturbance (Elliot *et al.* 1998). For the biotopes '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211), '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214) and 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211), abrasion is likely to damage epifauna and flora and may damage a proportion of the characterising species (Tillin & Watson, 2024a; Tillin *et al*., 2023; Tillin & Watson, 2023). However, opportunistic species are likely to rapidly recruit to damaged areas and some damaged characterising species may recover or recolonise (Tillin & Watson, 2023). Consequently, these receptors will have a limited capacity to avoid adapt to or tolerate the impact. However, full recovery may occur within 5 years. These benthic receptors are also considered to be of Regional value. These receptors are therefore assessed as having **low** sensitivity to 'abrasion / disturbance of the surface of the substratum or seabed' and 'penetration or disturbance of the substratum surface'.

1.10.12 Other representative biotopes including '*Sparse sponges, Nemertesia* spp*., and Alcyonidium diaphanum on Atlantic circalittoral mixed substrata*' (MC1217), '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) and '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212) have a medium sensitivity to 'abrasion / disturbance of the surface of the substratum or seabed' and 'penetration or disturbance of the substratum surface' (**Table 1.22**). Characterising sponges, hydroids and bryozoans will likely suffer damage and mortality following abrasion and penetration of the substratum surface (Readman *et al*., 2023). However, species such as *Nemertesia* spp. may show signs of resistance to abrasion and benthic larvae could rapidly colonise disturbed areas (Bradshaw *et al*., 2002). Similarly, if *S. spinulosa* was directly exposed to physical abrasion and penetration, there could be damage and mortality, but recovery may occur (within 2 years) if individuals are not completely removed (Tillin *et al*., 2023). Consequently, these receptors will have a very low capacity to avoid adapt to or tolerate the impact. However, partial recovery may occur within 5 years. These benthic receptors are also considered to be of Regional value. These receptors are therefore assessed as having **medium** sensitivity to 'abrasion / disturbance of the surface of the substratum or seabed' and 'penetration or disturbance of the substratum surface'.

1.10.13 The impact 'Smothering and siltation rate changes (heavy)' was included as sediment displaced from the cable trench is anticipated to be deposited along the trench at a depth greater than 5 cm, so a very localised area of sediment adjacent to the trench would be exposed to this impact. Heavy smothering is likely to result in the mortality of some characterising species of the biotope 'Atlantic infralittoral mobile clean sand' (MB5231). However, some polychaete species may escape up to 90 cm of burial (Speybroek *et al*., 2007). Additionally, Lewis *et al*., (2012), found that recovery of original abundances appear to occur within one year in response to burial. Consequently, these receptors will have a limited capacity to avoid adapt to or tolerate the impact. However, full recovery may occur within 5 years. These benthic receptors are also considered to be of Regional value. These receptors are therefore assessed as having **low** sensitivity to 'Smothering and siltation rate changes (heavy)'.

1.10.14 Other representative biotopes including '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211), '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214), '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212), 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) and '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) have a medium sensitivity to smothering and siltation rate changes (heavy). For the characterising species for these biotopes, heavy smothering is likely to result in a significant burden, resulting in mortality (De-Bastos, 2023). In the case of *S. spinulosa*, no direct evidence is available for the length of time the species can survive. However, in areas of high water flow, dispersion of fine sediments may be rapid and this will mitigate the magnitude of this pressure by reducing the time exposed (Tillin *et al*., 2023). Consequently, these receptors will have a very low capacity to avoid adapt to or tolerate the impact. However, partial recovery may occur within 5 years and full recovery within 10 years. These benthic receptors are also considered to be of Regional value. These receptors are therefore assessed as having **medium** sensitivity to 'Smothering and siltation rate changes (heavy).

Table 1.22: Sensitivity of benthic receptors to temporary habitat loss/disturbance

Habitats	Representative biotopes	MarESA Assessment			
		Habitat structure changes – removal of substratum (extraction)	Abrasion / disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)
Annex I Habitats					
Bedrock reef [3]	Not applicable	Not Applicable	Medium Sensitivity	Not Applicable	Medium Sensitivity
Stony reef	Not applicable	Medium	Medium	Medium	Medium
Subtidal sand sediment habitats					
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	Medium Sensitivity (based on No resistance and High resilience)	Low Sensitivity (based on Low resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Low resistance and High resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	Medium Sensitivity (based on No resistance and Medium resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Medium Sensitivity (based on No resistance and Very Low resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)

[3] Note that MarESA does not provide assessments for these impacts for Bedrock reef and Stony reef, and Medium has been indicated as an indicative level of sensitivity to the impacts based on professional judgement.

Habitats	Representative biotopes	MarESA Assessment			
		Habitat structure changes – removal of substratum (extraction)	Abrasion / disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)
Subtidal coarse sediment habitats					
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	Medium Sensitivity (based on No resistance and Medium resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)	No Evidence
Subtidal mixed sediment habitats					
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	Medium Sensitivity (based on No resistance and Medium resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)	Medium Sensitivity (based on Medium resistance and Medium resilience)
Atlantic circalittoral rock (MC12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Medium Sensitivity (based on No resistance and Medium resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)	Low Sensitivity (based on Medium resistance and High resilience)
***Sabellaria* habitats**					
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	Medium Sensitivity (based on No resistance and Medium resilience)	Medium Sensitivity (based on Low resistance and Medium resilience)	Medium Sensitivity (based on No resistance and Medium resilience)	Medium Sensitivity (based on No resistance and Medium resilience)

Magnitude of Impact

1.10.15 The MDS presents the maximum extent of temporary habitat loss / disturbance associated with surface plough: 7,400,000 m^2, boulder clearance and / or pre-lay surface ploughing: 6,000,000 m^2, seabed debris: 740,000 m^2, and as a result of cable trenching activities: 11,100,000 m^2. It should be noted however that these seabed area disturbance estimates are high on a precautionary basis, with associated precautionary assumptions associated. For instance, a portion of cable burial will occur within the same area previously disturbed by seabed preparation activities, and as such at least part of the MDS for cable burial would be repeat disturbance as opposed to disturbance of a new area.

1.10.16 The impact will directly affect receptors through the temporary loss of benthic habitats and will be intermittent throughout the construction phase of the Proposed Development, taking place during several months over approximately three years per cable bundle. A precautionary estimate of total temporary habitat loss / disturbance area (25,240,000 m^2) is estimated by adding all the maximum areas above. This estimated area discounts the fact that the footprint of these activities will clearly overlap, thus the total area of disturbance could reasonably be expected to be far less in reality. Notwithstanding the precautionary estimate of total disturbance area, this still represents only a small proportion of the habitats present across the Benthic Ecology study area (4,074.82 km^2) and will be restricted to the footprint of the Offshore Cable Corridor. This equates to approximately 0.61% of temporary habitat loss within the Benthic Ecology study area.

1.10.17 The ES presents the outline CBRA (Volume 1, Appendix 3.4: Outline Cable Burial Risk Assessment of the ES) which interprets the risk (i.e. likelihood) associated with different construction burial methods versus individual habitat types including ploughing, jetting and mechanical cutting.

1.10.18 At this stage, burial methods at specific locations is estimated based on the outline CBRA. The final burial methods will depend on the specific conditions encountered at time of construction. The likely construction methods (e.g. use of mechanical trenching or jetting) are interpreted from the risk of deployment (risk to successful deployment) associated with the different methods (see Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations, and Volume 3, Figures 1.14 to 1.19 of the ES for further details).

1.10.19 Where there is a low risk associated with using a jetting burial technique, it is estimated that there would be approximately 27.6 ha of habitat disturbance across the Offshore Cable Corridor (which equates to approximately 0.1% of habitats across the Offshore Cable Corridor), (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.10.20 Where there is a low risk associated with using a ploughing burial technique, it is estimated that there would be approximately 92.8 ha of habitat disturbance across the Offshore Cable Corridor (which equates to approximately 0.4% of habitats across the Offshore Cable Corridor), (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.10.21 Where there is a low risk associated with using a mechanical cutting technique, it is estimated that there would be approximately 603 ha of habitat disturbance (approximately 2.6% of habitats across the Offshore Cable Corridor), (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.10.22 Regarding boulder clearance, at locations along the Offshore Cable Corridor where there is anticipated to be high density of boulders (Volume 3, Figure 1.15 of the ES), approximately 116.7 ha of habitats could be impacted, which is approximately 0.5% of habitats across the entire Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). At locations where there is anticipated to be isolated boulders (Volume 3, Figure 1.15 of the ES), approximately 519.1 ha of habitats could be impacted, which is approximately 2.2% of habitats across the entire Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). At locations where there is anticipated to be low density of boulders (Volume 3, Figure 1.15 of the ES), approximately 933.4 ha of habitats could be impacted, which equates to approximately 4% of habitats across the entire Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.10.23 The MDS also factors in a maximum of 27 out of service cable crossings requiring removal and the presence of two jack-up vessels for HDD operations. The seabed area disturbed as a result of these activities is expected to be small when compared to the MDS for all other activities. Jack-up footprints could result in compression of seabed sediments beneath spud cans or tubular legs, however post-construction monitoring at windfarms has demonstrated that depressions associated with jack-up operations quickly infill (e.g. BoWind, 2008 - Barrow OWF). The jack-up vessels will be deployed in Bideford Bay which is considered the most active portion of the entire Offshore Cable Corridor in terms of sediment reworking, thus depressions would be expected to fill rapidly.

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

1.10.25 In relation to conservation objective 3 for the Bristol Channel Approaches SAC which relates to supporting habitats for harbour porpoise, the area of habitat potentially affected by this impact is extremely small in relation to the availability of similar habitats in the SAC and magnitude and significance of any indirect effect on harbour porpoise is considered to be negligible.

Significance of the Effect

1.10.26 The sensitivity of receptors is assessed to be **low** to **medium**, and the magnitude of the impact is considered to be **low**. Overall, it is considered that the effect will be of **minor** adverse significance, which is not significant in EIA terms.

1.10.27 The effect in relation to conservation objective 3 for the Bristol Channel Approaches SAC is considered in the RIAA (documents reference 7.16) which is issued alongside this ES.

Further Mitigation

1.10.28 The effect of 'Temporary habitat loss/disturbance' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.10.29 No significant effects have been identified and no future monitoring is proposed.

Temporary increase in suspended sediments and sediment deposition

1.10.30 Increases in suspended sediment concentrations (SSC) and associated deposition will occur during the construction phase as a result of a range of sediment disturbing activities, including boulder clearance and cable burial. Increased SSC and deposition of disturbed sediments can have impacts on benthic species; it can lead to greater levels of abrasion of animals, there is the potential for clogging up of organs, disrupting the normal functioning of breathing and filter feeding apparatus making respiration and feeding difficult.

Sensitivity of receptor

1.10.31 The sensitivity of the receptors identified in the Benthic Ecology study area have been assessed in relation to the following MarESA pressures relevant to temporary habitat loss/disturbance:

- Changes in suspended solids (water clarity).
- Smothering and siltation rate changes (light i.e. <5 cm deposition).

1.10.32 The sensitivity of representative biotopes to temporary increases in suspended sediments and sediment deposition pressures are summarised in **Table 1.23**.

1.10.33 As indicated below, the MarESA assessment indicated that the sensitivity of littoral rock habitats ranged from not sensitive to medium sensitivity to both 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', (**Table 1.23**).

1.10.34 For the biotopes '*Chthamalus* spp. on exposed eulittoral rock' (MA1222) and '*Chthamalus* spp. and Lichina pygmaea on steep exposed upper eulittoral rock' (MA12222), sensitivity to 'changes in suspended solids (water clarity)' is not sensitive and sensitivity to 'smothering and siltation rate changes (light)' is medium (Tillin & Watson, 2024a; Tillin & Watson, 2024b). Barnacles which characterise these biotopes would be found permanently attached to hard substrata and would therefore have no ability to escape smothering and burial could potentially prevent feeding and respiration, however, direct evidence of effects of smothering on barnacles is sparse (Tillin & Watson, 2024b).

1.10.35 For the biotope '*Ulva* spp. on freshwater-influenced and/or unstable upper eulittoral rock' (MA123G) sensitivity to 'changes in suspended solids (water clarity)' is not sensitive and sensitivity to 'smothering and siltation rate changes (light)' is low (Tillin & Budd, 2015). An increase in suspended solids and smothering may result in some sub-lethal abrasion of *Ulva* spp, but this will be compensated by the high growth rates that *Ulva* spp. exhibits (Tillin & Budd, 2015).

1.10.36 For the biotopes '*Fucus spiralis* on exposed to moderately exposed upper eulittoral rock' (MA1242) and '*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock' (MA1243) sensitivity to 'changes in suspended solids (water clarity)' is medium ((Perry & d'Avack, 2015; Perry, 2015). This is partly because increased turbidity can reduce potential for photosynthesis when immersed, although algae on the mid and upper shore spend a lot of time emersed when photosynthesis could occur. It also takes into consideration characterising filter feeding organisms such as *S. balanoides*, which could have their feeding apparatus clogged with suspended particles leading to a reduction in total ingestion and reduced scope for growth (Perry & d'Avack, 2015). For '*Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock' (MA12441), sensitivity to 'changes in suspended solids (water clarity)' is low (d'Avack andTyler-Walters, 2015) and this biotope is likely to be subject to naturally resuspended sediment on each tide. In terms or potential effects of 'smothering and siltation rate changes (light)', sensitivity of '*Fucus spiralis* on exposed to moderately exposed upper eulittoral rock' (MA1242) and '*Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock' (MA12441)' is low (Perry & d'Avack, 2015; d'Avack andTyler-Walters, 2015). For '*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock' (MA1243) is it indicated to be medium, mainly taking into consideration the length of time it could take deposited sediment to be resuspended as this biotope is usually subject to moderately exposed to exposed conditions (Perry, 2015). Once conditions return to baseline levels, characterising macroalgae are likely to rapidly regain photosynthesising capabilities as well as growth rate and associated communities will also recover (Perry & d'Avack, 2015; Perry, 2015).

1.10.37 The biotopes 'Coralline crust-dominated shallow eulittoral rockpools' (MA1262) and '*Sargassum muticum* in eulittoral rockpools' (MA12631) are indicated to be not sensitive to 'changes in suspended solids (water clarity)' and have medium sensitivity to 'smothering and siltation rate changes (light)' (Tillin & Budd, 2016a; Tillin & Budd, 2016b). Deposition of 5 cm of fine material in a single incident is unlikely to result in significant mortality before sediments are removed by current and wave action. Burial will lower survival and germination rates of algal spores and may lead to some mortality of spores and early stages of foliose red algae. Adults are more resistant but will experience a short-term decrease in growth and photosynthetic rates (Tillin & Budd, 2016a; Tillin & Budd, 2016b).

1.10.38 The biotope '*Ascophyllum nodosum* on full salinity mid eulittoral rock' (MA123E1) is not sensitive to 'changes in suspended solids (water clarity)' and has medium sensitivity to 'smothering and siltation rate changes (light)'. *A. nodosum* is sediment intolerant and smothering may persist over a number of tides before sediment is removed which could cause some damage to characterising and associated species (Perry & Hill, 2020).

1.10.39 The biotope '*Bifurcaria bifurcata* in shallow eulittoral rockpools (MA12623)' has medium sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light). An increase in suspended solids is considered likely to negatively impact *B. bifurcata* which is sensitive to changes in water quality and changes in turbidity (Tillin & Budd, 2016c). Sediments deposited in rockpools may be removed rapidly in wave exposed environments, however, limpets could be sensitive to smothering (Tillin & Budd, 2016c).

1.10.40 Consequently, littoral rock habitat receptors are generally considered to be adaptable to the changing environment, with high recoverability and tolerance and are of Regional value. The receptor is therefore assessed as having **low** to **medium** sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)'.

1.10.41 The MarESA assessment indicated that the littoral coarse sediment and littoral sand habitats recorded during the intertidal survey (the habitats 'Barren littoral shingle' (MA3211) and 'Talitrids on the upper shore and strand-line' (MA521)) are not sensitive to both 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', (**Table 1.23**), (Tillin & Budd, 2004; Tillin *et* al., 2019).

1.10.42 The MarESA assessment indicated that the sensitivity of subtidal sand biotopes recorded during the subtidal survey ranged from not sensitive to low sensitivity to both 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', as indicated below (**Table 1.23**), (Tillin *et al*., 2023).

1.10.43 For the biotopes '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211) and '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214), these species are predicted to be tolerant of short-term increases in turbidity following sediment mobilisation by storms and other events and sensitivity is low to both potential impacts (Tillin & Watson, 2024c; Tillin *et al*., 2023).

1.10.44 The biotope '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212) is not sensitive to 'changes in suspended solids (water clarity)', and has low sensitivity to 'smothering and siltation rate changes (light)' (De-Bastos, 2023).

1.10.45 Consequently, subtidal sand biotope receptors are generally considered to be adaptable to the changing environment, with high recoverability and tolerance and are of Regional value. The receptor is therefore assessed as having **low** sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)'.

1.10.46 The MarESA assessment indicated that the subtidal coarse sediment habitat '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213) is not sensitive to 'changes in suspended solids (water clarity) and no evidence is available for 'smothering and siltation rate changes (light)' (**Table 1.23**), (Tillin & Watson, 2023).

1.10.47 The MarESA assessment indicated that the sensitivity of the subtidal mixed sediments habitat ranged from not sensitive to low sensitivity for 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', (**Table 1.23**). For characterising venerid bivalves of 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) these bivalves are predicted to be tolerant of short-term increases of SSC following sediment mobilisation (Tillin & Watson, 2023). Similarly, shallow burying bivalve suspension feeders are typically able to escape smothering of 10-50 cm of their native sediment and relocate to their preferred depth by burrowing (Maurer, 1986). Overall sensitivity of this biotope to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light) is low (Tillin & Watson, 2023).

1.10.48 For the biotope 'Sparse sponges*, Nemertesia* spp*.,* and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata' (MC1217) many bryozoans and encrusting sponges are able to survive in highly sedimented conditions and the sensitivity of this biotope to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)' is not sensitive (Readman *et al*., 2023).

1.10.49 The MarESA assessment indicates that '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) is not sensitive to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)' (**Table 1.23**), (Tillin *et* al., 2023). *S. spinulosa* relies on a supply of suspended solids and organic matter to filter feed and build protective tubes and so can tolerate a broad range of SSC (Davies *et al*., 2009; Tillin, 2010). *S. spinulosa* may be sensitive to some smothering events (Hendrick *et al*., 2011), however, Last *et al*., (2011) found that *S. spinulosa* can survive short-term (32 days), periodic sand burial of up to 7 cm.

1.10.50 Habitat features of the Lundy SAC are indicated in **Table 1.18**. Sediment dispersion calculations i.e. maximum potential sediment mobilisation distances and direction at each of the sediment grab locations (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES) confirms no pathway for sediment dispersion to reach Lundy SAC. As a result, there will be no potential effect on benthic habitat features of the Lundy SAC.

1.10.51 Habitat features of the Taw-Torridge Estuary SSSI are indicated in **Table 1.18**. The SSSI is located within the maximum sediment dispersal distance across all sites which was calculated to be 15.2 km within Bideford Bay (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). However, the mudflats and sandbanks in the SSSI are subject to considerable variations in suspended sediment concentrations on a daily basis across the tidal cycle. The sediment plume from the Proposed Development would reach the Taw-Torridge Estuary SSSI on peak spring tides, but not on mean neap tides. Consequently, the impact would be short term and intermittent. Although the extent of the sediment plume is indicated to reach the Taw-Torridge Estuary SSSI on peak spring tides, suspended sediment concentrations would rapidly decrease with increased distance from source and the concentrations reaching the Taw-Torridge Estuary SSSI are anticipated to be minimal (approximating background). Sediment that is released from cable trenching activities in Bideford Bay is estimated to be deposited with a thickness of up to <1.5 mm depending on the timing of the trenching activities within the tidal cycle and subsequent distance of transport in suspension, and any deposited sediment would be repeatedly resuspended (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). This is far below the 5 mm threshold of 'light' smothering used for MarESA and is anticipated to be well within natural variations in sediment deposition regularly experienced in the SSSI. Overall, any effects of changes in suspended sediment levels due to the Proposed Development on benthic habitats/species in the SSSI are considered to be **negligible**.

1.10.52 Habitat FOCI of the South West Approaches to Bristol Channel MCZ are 'Subtidal coarse sediment' and 'Subtidal sand'. They are considered to be of National value as a FOCI of the MCZ but as indicated above, these habitat types have **low** sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', (**Table 1.23**).

1.10.53 Many of the Habitat FOCI of the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ are intertidal (**Table 1.18**), and as HDD will be deployed to route the cable under the intertidal zone, dispersal of sediments to the intertidal zone is considered to be minimal and intertidal habitats are not considered further here (c.f. the 'Accidental Pollution' section of this chapter (from **paragraph 1.10.127**) for consideration of accidental 'frack out'). As indicated above, the subtidal mixed sediment, coarse sediment and sand habitats are not sensitive or have low sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)' (**Table 1.23**). The circalittoral rock biotopes are generally not sensitive to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)'. The infralittoral rock biotopes have a range of sensitivities from low to medium sensitivity for 'changes in suspended solids (water clarity)' and not sensitive to medium sensitivity for 'smothering and siltation rate changes (light)' (**Table 1.23**). Representative biotopes for fragile sponge and anthozoan communities on subtidal rocky habitats are generally not sensitive for both of these impacts, which is also the case for pink sea fan (**Table 1.23**). Coastal saltmarshes and saline reedbed biotopes which are only a feature of the Hartland Point to Tintagel MCZ have a low sensitivity to 'smothering and siltation rate changes (light)' and medium sensitivity to 'changes in suspended solids (water clarity)'.

1.10.54 The East of Haig Fras MCZ is designated due to the FOCI: Subtidal coarse sediment / subtidal mixed sediment mosaic; subtidal sand; subtidal mud; high energy circalittoral rock; moderate energy circalittoral rock; sea-pen and burrowing megafauna communities; and fan mussel *Atrina fragilis.* As indicated above, the subtidal mixed sediment, coarse sediment and sand habitats are not sensitive or have low sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)' (**Table 1.23**). According to MarESA, 'sea-pen and burrowing megafauna communities', 'high energy circalittoral rock' representative biotopes and 'moderate energy circalittoral rock' biotopes are generally not sensitive to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)'. Fan mussel *Atrina fragilis*, however, is considered to have medium sensitivity to changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)', (**Table 1.23**). All of the MCZ FOCI are considered to be of National value.

Table 1.23: Sensitivity of benthic receptors to temporary increase in suspended sediments and sediment deposition

Habitats	Representative biotopes	MarESA Assessment	
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)
Annex I Habitats			
Bedrock reef	Not applicable	Not Applicable	Medium Sensitivity (not MarESA)
Stony reef	Not applicable	Medium (not MarESA)	Medium (not MarESA)
Littoral rock habitats			
Atlantic littoral rock (MA12)	*Chthamalus* spp. on exposed eulittoral rock (MA1222) *Chthamalus* spp. and *Lichina pygmaea* on steep exposed upper eulittoral rock (MA12222) *Ulva* spp. on freshwater-influenced and/or unstable upper eulittoral rock (MA123G) *Fucus spiralis* on exposed to moderately exposed upper eulittoral rock (MA1242) *Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock (MA1243) *Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock (MA12441) Coralline crust-dominated shallow eulittoral rockpools (MA1262) Coralline crust-dominated shallow eulittoral rockpools (MA1262)	Not Sensitive to Medium Sensitivity (variable resistance and resilience for representative biotopes)	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)

Habitats	Representative biotopes	MarESA Assessment	
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)
	Sargassum muticum in eulittoral rockpools (MA12631) *Ascophyllum nodosum* on full salinity mid eulittoral rock (MA123E1) *Bifurcaria bifurcata* in shallow eulittoral rockpools (MA12623)		
Littoral coarse sediment habitats			
Atlantic littoral coarse sediment (MA32)	Barren littoral shingle (MA3211)	Not Sensitive (based on High resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
Littoral sand habitats			
Atlantic littoral sand (MA52)	Strandline (MA521)	Not Sensitive (based on High resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
Subtidal sand sediment habitats			
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	Low Sensitivity (based on Medium resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Not Sensitive (based on High resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)
Subtidal coarse sediment habitats			
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	Not Sensitive (based on High resistance and High resilience)	No Evidence[4] (it is noted that this habitat was recorded along a section of the Offshore Cable Corridor where any sediment transport away from the Offshore Cable Corridor would be minimal (limited to tens of

[4] No direct evidence relating to the impacts of smothering and siltation rate changes (light) on '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213).

Habitats	Representative biotopes	MarESA Assessment	
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)
			metres i.e. immediate settling of disturbed sediments) based on consideration of current speed and sediment grain size).
Subtidal mixed sediment habitats			
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)
Atlantic circalittoral rock (MC12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Not Sensitive (based on High resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
Sabellaria habitat			
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	Not Sensitive (based on High resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
MCZ FOCI			
Subtidal coarse sediment	Representative biotope indicated above	Not Sensitive (based on High resistance and High resilience)	No evidence[5] (it is noted that this habitat was recorded along a section of the Offshore Cable Corridor where any sediment transport away from the Offshore Cable Corridor would be minimal (limited to tens of metres i.e. immediate settling of disturbed sediments) based on consideration of current speed and sediment grain size).
Subtidal sand	Representative biotopes indicated above	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)
Subtidal mixed sediment	Representative biotopes indicated above	Low Sensitivity (based on Medium resistance and High resilience)	Low Sensitivity (based on Medium resistance and High resilience)

[5] No direct evidence relating to the impacts of smothering and siltation rate changes (light) on Subtidal coarse sediment based on consideration of the representative biotope *'Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213).

Habitats	Representative biotopes	MarESA Assessment	
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)
Subtidal mud	Range of representative biotopes considered	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)
High energy circalittoral rock	Range of representative biotopes considered	Not Sensitive (based on High resistance and High resilience)	Generally Not Sensitive (based on High resistance and High resilience), some representative biotopes with Low to Medium sensitivity
Moderate energy circalittoral rock	Range of representative biotopes considered	Not Sensitive (based on High resistance and High resilience)	Generally Not Sensitive (based on High resistance and High resilience), some representative biotopes with Low to Medium sensitivity
High energy infralittoral rock	Range of representative biotopes considered	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)	Not sensitive to Medium Sensitivity (variable resistance and resilience for representative biotopes)
Moderate energy infralittoral rock	Range of representative biotopes considered	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)	Not sensitive to Medium Sensitivity (variable resistance and resilience for representative biotopes)
Low energy infralittoral rock	Range of representative biotopes considered	Low to Medium Sensitivity (variable resistance and resilience for representative biotopes)	Not sensitive to Medium Sensitivity (variable resistance and resilience for representative biotopes)
Fragile sponge and anthozoan communities on subtidal rocky habitats	Range of representative biotopes considered	Not sensitive (based on High resistance and High resilience)	Generally, not sensitive (based on High resistance and High resilience) some Low (based on Medium resistance and High resilience)
Pink sea fan	Not applicable	Not sensitive (based on High resistance and High resilience)	Not sensitive (based on High resistance and High resilience)
Sea-pen and burrowing megafauna communities	Limited number of representative biotopes, information provided based on 'seapens and burrowing megafauna in Atlantic circalittoral fine mud' (MC6216)	Not Sensitive (based on High resistance and High resilience)	Not Sensitive (based on High resistance and High resilience)
Fan mussel *Atrina fragilis*	Not applicable	Medium Sensitivity (based on Medium	Medium Sensitivity (based on Medium resistance and Low resilience)

Habitats	Representative biotopes	MarESA Assessment	
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)
		resistance and Low resilience)	
Coastal saltmarshes and saline reedbeds	Range of representative biotopes considered	Low Sensitivity (variable resistance and resilience for representative biotopes)	Medium Sensitivity (variable resistance and resilience for representative biotopes)

Magnitude of impact

1.10.55 During construction a range of activities will disturb the seabed resulting in increased levels of SSC and associated increases in sediment deposition. The MDS assumes a range of seabed preparation activities including boulder clearance, seabed debris removal and pre-lay trenching. Also included within the MDS is the disturbance of sediments as a result of cable trenching (where bed conditions allow trenching/ excavation of the seabed to a target depth of 1.5 m will be undertaken) and HDD (localised 15 m x 15 m clearance at exit pits and use of jack-up vessels).

1.10.56 The distance over which there would be elevated SSC levels and the duration of increased SSC will depend upon factors such as particle size and water movement within the area (current and wave energy). For example, coarser sand and gravels would settle rapidly and therefore any increases in SSC would be relatively small in extent, while finer sediments will tend to remain in suspension longer and as such any increases in SSC would extend over a greater distance.

1.10.57 BERR (2008) reviewed a number of case studies that had modelled or monitored suspended sediment release and deposition during the construction of Offshore Wind Farms (OWF). They concluded that SSC and associated deposition resulting from cable burial operations were short term and localised, with the majority of sediment deposition falling immediately to the seabed. For example, for Norfolk OWF, coarse sediments were modelled to be deposited at a maximum distance of 200 m away from source, with 90% of SSC being deposited within 20 m. Modelling for Sheringham Shoal OWF for sandy gravel with low fines, found SSC would drop to less than 1 mg/l above baseline levels within a single ebb or flood tidal excursion (9 km in extent).

1.10.58 BERR (2008) also reviewed the SSC associated with various cable laying methods at Nysted OWF (Seacon, 2005 as referenced in BERR, 2008). They found 200 m away from the source, maximum SSC levels would be 75 mg/l for trenching, 35 mg/l for backfilling and 18 mg/l for jetting.

1.10.59 An assessment of potential sediment transport and sediment deposition has been undertaken to inform this ES, with the results indicated in Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES. If disturbed by activities associated with the Proposed Development, sediment would have the capacity to go into (and remain in) suspension within Bideford Bay and to the south-west of the Isles of Scilly during peak spring tides only (and expected to travel towards the south-west). Within Bideford Bay and to the south-west of the Isles of Scilly, the maximum distance travelled has been calculated to be 15.2 and 7.5 km respectively (associated with maximum peak spring tide conditions), with time in suspension ranging from four to six hours. At all other locations across the Offshore Cable Corridor, sediment suspension is anticipated to be highly localised, falling out of suspension rapidly. Additionally, sediment released from cable trenching activities within Bideford Bay is estimated to be deposited with a thickness of up to <1.5 mm depending on the timing of the trenching activities within the tidal cycle and subsequent distance of transport in suspension, and any deposited sediment could be repeatedly suspended (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES).

1.10.60 Temporary increase in suspended sediments and sediment deposition will directly affect benthic receptors during the construction phase. However, the impact is predicted to be of very localised spatial extent (restricted to within the Benthic Ecology study area and close proximity to the source) and would have short-term duration for any specific area of habitat (any suspended sediment will disperse quickly). The magnitude of impact is, therefore, considered to be **low**.

1.10.61 There is potential for sediment resuspended during the works to be transported over the South West Approaches to Bristol Channel MCZ, Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ, East of Haig Fras MCZ and Taw-Torridge Estuary SSSI and then fall out of suspension. The maximum distance over which this could occur has been calculated to be 15.2 km based on semi-empirical calculations within Bideford Bay, however, these calculations also indicate that in the areas near the South West Approaches to Bristol Channel MCZ and East of Haig Fras MCZ sediment suspension is anticipated to be highly localised, with sediment falling out of suspension rapidly (Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES).

1.10.62 Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ and Taw-Torridge Estuary SSSI coincide within an area where it is considered sediment could be dispersed a greater distance (during 'worst case' peak spring tide conditions). Even though there is potential for some sediment to be transported to the Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ and Taw-Torridge Estuary SSSI, most sediment is still anticipated to be deposited within tens to hundreds of metres from the cable trench with only finer materials remaining in suspension and travelling further distances during isolated peak current events only. Even if sediment was transported into the MCZs and SSSI, it has been calculated that it would be deposited within about six hours of being resuspended (Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES). As mentioned above, sediment deposition within Bideford Bay is estimated to be deposited with a thickness of up to <1.5 mm which is far below the 5 mm threshold of 'light' smothering used for MarESA (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). Overall, this would result in a highly localised area of very light smothering. The deposited sediment would likely be repeatedly resuspended by water movements and be within natural variations in sediment deposition regularly experienced in the MCZs and SSSI where organisms in this area are expected to be generally adapted to such levels of deposition e.g. they will routinely encounter similar elevated concentrations during storm events or other disturbance events. Any potential for effects on the MCZs and SSSI would be temporary with only a very small area of the MCZs and SSSI being potentially affected, with the effects only being encountered in the vicinity of active (and transient) trenching or other activities generating sediment disturbance. Overall, the magnitude of impact on the MCZs and SSSI is considered to be **negligible**.

1.10.63 Based on the expectation that sediment will be deposited in the immediate vicinity of activities in the areas near the South West Approaches to Bristol Channel MCZ and East of Haig Fras MCZ, the magnitude of impact on these MCZs is considered to be **negligible**.

Significance of effect

1.10.64 The sensitivity of the benthic receptors is **negligible** to **medium**, and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.10.65 Sediment dispersion calculations i.e. maximum potential sediment mobilisation distances and direction at each of the sediment grab locations (Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES) confirm no pathway for sediment dispersion to reach Lundy SAC. As a result any effects on the SAC would be **negligible**.

1.10.66 When considering the Taw-Torridge Estuary SSSI, the sensitivity of mudflats and sandbanks have a sensitivity of negligible to low, and the magnitude of impact is considered to be negligible. As a result any effects on the SSSI would be **negligible**.

1.10.67 When considering the Bideford to Foreland Point MCZ, the sensitivity of the FOCI is negligible to medium, and the magnitude of impact is considered to be negligible. Overall, it is considered that the effect on the MCZ would be **negligible** and would not hinder the achievement of the conservation objectives stated for the MCZ.

1.10.68 When considering the Hartland to Tintagel MCZ, the sensitivity of the FOCI is low to medium, and the magnitude of impact is considered to be negligible. Overall, it is considered that the effect on the MCZ would be **negligible** and would not hinder the achievement of the conservation objectives stated for the MCZ.

1.10.69 When considering the South West Approaches to Bristol Channel MCZ, the sensitivity of the FOCI is low, and the magnitude of impact is considered to be negligible. It is considered that the effect on the MCZ would be **negligible** and would not hinder the achievement of the conservation objectives stated for the MCZ.

1.10.70 When considering the East of Haig Fras MCZ, the sensitivity of the FOCI is negligible to medium, and the magnitude of impact is considered to be negligible. It is considered that the effect on the MCZ would be **negligible** and would not hinder the achievement of the conservation objectives stated for the MCZ.

Further Mitigation

1.10.71 The effect of 'Temporary increase in suspended sediments and sediment deposition' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.10.72 No significant effects have been identified and no future monitoring is proposed.

Changes to water quality (release of hazardous substances from sediments)

1.10.73 During construction, the potential for disturbance and re-suspension of sediments could lead to the release of any contaminants that may be present within these sediments, which may in turn affect water quality. Increased chemical parameter concentrations have the potential to affect benthic organisms, inhibiting their growth and development and affecting reproduction as well as potentially having lethal and non-lethal effects on embryos and larvae (Suchanek, 1993).

Sensitivity of receptor

1.10.74 The MarESA assessment does not provide an assessment of the relevant chemical pressures for the identified benthic receptors due to limited evidence. The MarESA evidence base considers the effects of pollutants and chemicals should they be accidently released at concentrations that exceed environmental protection standards, However, as indicated in the magnitude section it is anticipated that any release of hazardous substances from sediments will generally be at concentrations below these thresholds.

1.10.75 Many of the benthic habitats recorded are characterised by sessile or low mobility species which will be unable to avoid any release of hazardous substances from sediments as a result of construction and these species may absorb contaminants directly from the water through suspended particulate matter (SPM) via suspension feeding.

1.10.76 For example, bivalve species are able to accumulate heavy metals into their tissues at levels much higher than environmental levels, indicating a degree of tolerance (Widdows and Donkin, 1992). However, sub-lethal levels of heavy metals may cause a range of effects including siphon retraction, valve closure, inhibition of byssal thread production, disruption of burrowing behaviour, inhibition of respiration, inhibition of filtration rate and suppressed growth (Aberkali & Trueman, 1985). Echinoderms are considered to be intolerant of heavy metals, whilst polychaetes are more tolerant (Bryan, 1984; Kinne, 1984).

1.10.77 Echinoderms and amphipods are also regarded as being intolerant of hydrocarbons, whilst polychaetes are considered to be tolerant of elevated hydrocarbon levels (Suchanek, 1993; Cabioch *et al*., 1978).

1.10.78 Recoverability of benthic receptors from chemical contamination will vary considerably between species. For instance, bivalves and crustaceans typically have high fecundity and may recover fully. However, it should be noted that even with good annual recruitment/reproduction, this may take several years (Tyler-Walters, 2008; Sabatini and Hill, 2008). It is anticipated that, following cessation of any potential impact, re-colonisation of affected areas would occur via adult migration and larval settlement. Consequently, benthic subtidal receptors are considered to be sensitive to the changing environment but may have a good capacity to recover from the impact and they are of Regional value. These receptors are therefore assessed as having **medium** sensitivity to 'changes in water quality (release of hazardous substances from sediments)'.

1.10.79 The habitat types which are FOCI of the South West Approaches to Bristol Channel MCZ, Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ (**Table 1.18**), are also considered to have up to

medium sensitivity to 'changes in water quality (release of hazardous substances from sediments)'.

Magnitude of impact

1.10.80 During construction a range of activities will potentially disturb the seabed resulting in the potential release of hazardous substances where these are present within the baseline sediments. The MDS assumes a range of seabed preparation activities including boulder clearance, seabed debris removal and pre-lay trenching. Also included within the MDS is the disturbance of sediments as a result of cable burial (220 km to a target depth of 1.5 m) and HDD (localised excavations and use of jack-up vessels).

1.10.81 Chemical Action Levels (cALs) (or Cefas Action Levels), and Canadian marine Sediment Quality Guidelines were used to characterise the broad contamination status of sediment samples taken during the subtidal ecology surveys for the Proposed Development as detailed in Volume 3, Appendix 8.4: GEOxyz Environmental Report of the ES). cALs are used as a framework for assessment of sediment contamination status in marine licensing decision making associated with disposal of dredge arisings at marine disposal sites. Concentrations below cAL1 are of no concern, chemical levels between cAL1 and cAL2 generally would indicate further consideration would be required for disposal at sea, while dredged material with chemical levels above cAL2 is generally considered unsuitable for sea disposal (MMO 2015).

1.10.82 The Proposed Development analyses of sediment concentrations of heavy metals indicated that arsenic concentrations exceeded cAL1 at eight stations, but they were below cAL2 and the Probable Effects Level (PEL). All of these samples were located within Bideford Bay and off the north coast of Devon. Cefas have confirmed during consultations that natural, background arsenic sediment concentrations along this coast tend to be high, thus this is not indicative of anthropogenic contamination. Furthermore results from the outline CBRA indicate that there are no identified sand waves and/ or large ripples present and as a result, no associated seabed preparation will be required in this area. Heavy metal concentrations were found below cAL1 at all other stations. Concentrations for hydrocarbon compounds (total PAHs) were found to exceed cAL1 at a number of stations sampled during the survey.

1.10.83 Cable laying and rock placement will result in minimal sediment suspension which will likely settle before impacting upon any sensitive receptors in these locations. There may be more potential for chemical distribution at the HDD exit points. Based on the high-level assessment of potential sediment transport (Volume 3, Appendix 8.1 High Level Assessment of Sediment Disturbance of the ES), If disturbed by activities associated with the Proposed Development, sediment would be expected to go into (and remain in) suspension (within Bideford Bay and to the south-west of the Isles of Scilly) during peak spring tides (and would be expected to travel towards the south-west during peak spring tides). Within Bideford Bay and to the south-west of the Isles of Scilly, the maximum distance travelled has been estimated to be 15.2 and 14 km respectively (during peak spring tide conditions), with time in suspension ranging from four to six hours. At all other locations across the Offshore Cable Corridor, sediment is not anticipated to remain in suspension to be transported and dispersed by tidal currents.

1.10.84 Changes to water quality (release of hazardous substances from sediments) could directly affect benthic receptors and would be continuous during the construction phase (noting this would be intermittent / highly temporary at any one location). However, the impact is predicted to be of local spatial extent (restricted to within the Benthic Ecology study area and in close proximity to the source of the chemical release), and of short-term duration (with any release chemicals likely rapidly diluted and dispersed in the water column). The magnitude is, therefore, considered to be **low**.

1.10.85 Potential effects on MCZ FOCI are anticipated to be minimal as any increases in chemical concentration in the water column will be rapidly diluted and increases in chemical concentrations due to the Proposed Development are anticipated to be very low for waters in the MCZs. In addition, only a very small area of an MCZ could potentially be affected. Where effects are associated with sediment dispersal they may reach the Bideford to foreland Point MCZ and Hartland Point to Tintagel MCZ but are not anticipated to reach the South West Approaches to Bristol Channel MCZ or East of Haig Fras MCZ (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). Note, chemical parameters are associated with baseline sediments, thus the same chemical parameters could reasonably be expected to be mobilised under baseline storm events (i.e. during natural disturbance events).

1.10.86 Overall, the magnitude of impact on MCZs is considered to be **negligible**.

Significance of effect

1.10.87 The sensitivity of the receptor is **medium** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.10.88 Lundy SAC is considered to be beyond the ZoI for changes to water quality and any effects would be **negligible**.

1.10.89 When considering the Taw-Torridge Estuary SSSI, the sensitivity of mudflats and sandbanks have a medium sensitivity to changes in water quality (release of hazardous substances), and the magnitude of impact is considered to be negligible. Overall, it is considered that the effect on the Taw-Torridge Estuary SSSI would be **negligible**.

1.10.90 When considering the Bideford to Foreland Point MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ the sensitivity of the FOCI is medium, and the magnitude of impact is considered to be negligible. Overall, it is considered that the effect on these MCZs would be **negligible** and would not hinder the achievement of the conservation objectives stated for the MCZs.

Further Mitigation

1.10.91 The effect of changes to water quality (release of hazardous substances from sediments) is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.10.92 No significant effects have been identified and no future monitoring is proposed.

Introduction and spread of INNS

1.10.93 The introduction and spread of INNS may occur during the construction phase of the Proposed Development due to the introduction of structures to the marine environment (e.g. cable protection and cable crossings), and due to the presence of vessels (due to ballast water exchange, and biofouling of hulls and vessel infrastructure).

Sensitivity of receptor

1.10.94 The sensitivity of the receptors identified in the Benthic Ecology study area have been assessed in relation to the following MarESA pressure:

- Introduction or spread of invasive non-indigenous species.

1.10.95 The sensitivity of representative biotopes to INNS is summarised in **Table 1.24**.

1.10.96 Invasive non-native benthic species can include broad groups including molluscs, crustaceans, sea squirts, bryozoans and macroalgae. However, for the purposes of this assessment only key species are mentioned. It should be noted that similar considerations apply to a wide range of invasive and non-native species.

1.10.97 The MarESA assessment indicates that the sensitivity of subtidal sands habitats to INNS ranged from not sensitive to high sensitivity (**Table 1.24**). The biotope 'Infralittoral mobile clean sand with sparse fauna' (MB5231) is characterised by unsuitable habitat conditions and low species richness, limiting the potential for establishment of invasive species such as the slipper limpet *Crepidula fornicata* due to the mobility of the sediment (Bohn *et al*. 2015; Blanchard, 2009). Similarly, the sediments characterising the biotopes '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214) and '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211) are likely too mobile and unstable for most INNS. However, other INNS such as *C. fornicata* and the colonial ascidian *Didemnum vexillum* may colonise these biotopes, resulting in potential changes to assemblages. Once established, potential for removal of INNS would be unlikely. There is no available evidence or records of the introduction or spread of INNS for the biotope '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212). However, any introduction or spread of INNS could potentially have adverse effects on the characterising benthic community. Consequently, representative the subtidal sand biotopes are considered to be sensitive to the potential introduction of INNS, with recovery unlikely if colonisation occurs even at lower densities and are of Regional value. The receptor is therefore assessed as having **high** sensitivity.

1.10.98 The MarESA assessment indicated that the sensitivity of the subtidal coarse sediment habitat '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213) to this impact was high (**Table 1.24**). For instance, *C. fornicata* has been shown to have a preference for gravelly habitats and has the potential to modify the biotope and its associated benthic community (Blanchard, 2009; Bohn *et al*., 2015; Tillin *et al*., 2020). Natural storm events mobilise sediment and can prevent the colonisation of *C. fornicata* at high densities, however, *C. fornicata* has also previously been recorded from areas of strong tidal streams (Hinz *et al*., 2011). Consequently, representative biotopes of the subtidal sand sediments receptor are considered to be sensitive to the introduction of INNS, recovery is unlikely unless by artificial means and the receptor is of Regional value. The receptor is therefore assessed as having **high** sensitivity to this impact.

1.10.99 The MarESA assessment indicated that the subtidal mixed sediment habitats has a high sensitivity to the impact (**Table 1.24**). *C. fornicata* has the potential to colonise the offshore mixed sediment typical of the representative biotope 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) due to the presence of gravel, shells, or any other hard substrata embedded in the substratum that can be used for larvae settlement (Tillin *et al*., 2020). No evidence is available for the effect of *C. fornicata* on the biotope 'Sparse sponges*, Nemertesia spp.,* and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata' (MC1217). However, the sediment characterising the biotope is likely unsuitable for colonisation due to wave action, scour and storms inhibiting the introduction of INNS. Consequently, the subtidal mixed sediment biotopes are considered to be sensitive to the potential introduction of INNS, recovery is unlikely unless by artificial means and the habitat is of Regional value. The receptor is therefore assessed as having **high** sensitivity to this impact.

1.10.100 The MarESA assessment indicates that there is no direct evidence relating to the impact of the introduction or spread of non-indigenous species on the *Sabellaria* habitat recorded. Characterising sediments of the representative biotope '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) are likely to be unsuitable for the colonisation of these species due to wave exposed conditions and storm events (Tillin *et al.,* 2023). Consequently, representative biotopes of the *Sabellaria* habitat receptor may be sensitive to the potential introduction of INNS, recovery is unlikely unless by artificial means and the receptor is of Regional value. The receptor is therefore assessed as having **medium** sensitivity to this impact.

1.10.101 The FOCI receptors associated with the Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ are indicated in **Table 1.18**. Taking a precautionary approach, it is anticipated that representative biotopes for these FOCI could have up to **high** sensitivity to this impact.

Table 1.24: Sensitivity of benthic receptors to the introduction and spread of INNS

Habitats	Representative biotopes	MarESA Assessment
		Introduction or spread of INNS
Annex I habitat		
Rocky reef	Not applicable	High (not MarESA)
Stony reef	Not applicable	High (not MarESA)
Subtidal sand sediment habitat		
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	Not sensitive (based on High resistance and High resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	Medium to High sensitivity (based on No to Medium resistance and Very Low resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Not Relevant[6]
Subtidal coarse sediment habitat		
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	High sensitivity (based on Low resistance and Very Low resilience)
Subtidal mixed sediment habitat		
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	High sensitivity (based on Low resistance and Very Low resilience)
Atlantic circalittoral rock (MC12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Insufficient Evidence[7] (it can be assumed, however, that this habitat could potentially by colonised by NNS if they were present)

[6] There are no records of the introduction or spread of non-indigenous species for the biotope '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212). This pressure is therefore considered Not Relevant.

[7] At present, there is Insufficient Evidence to suggest that the biotope 'Sparse sponges, *Nemertesia* spp., and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata' (MC1217) is sensitive to colonisation by invasive species.

Habitats	Representative biotopes	MarESA Assessment Introduction or spread of INNS
Sabellaria habitat		
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	No Evidence[8]

Magnitude of impact

1.10.102 The presence and movement of construction vessels and introduction of associated cable protection and cable crossings may lead to the introduction and spread of INNS. Within the UK, pathways of introduction involving vessel movements have been identified as the highest potential risk routes for the introduction of non-native species (Carlton, 1992; Pearce *et al*., 2012). This could either be from the discharge of ballast water across the Proposed Development area or via transportation on vessel hulls. Similarly, the introduction of structures (rock placement and cable crossing structures) within the marine environment also represents a pathway for the introduction of INNS.

1.10.103 A number of non-native species are known to be present within the Benthic Ecology study area (see Outline Offshore Biosecurity Plan, document reference 7.19). For example, site-specific benthic surveys identified the polychaete *Goniadella gracilis*, which is thought to have been introduced to the UK through shipping (JNCC, 1997). Desktop review of the NBN Atlas database has identified 469 distinct taxa within the study area. These taxa have been reviewed as part of the ES to identify any non-native species and any associated implications for the wider benthic ecology assessment.

1.10.104 Once non-native species become established and disperse within a new habitat they can out-compete local species for space and resources, prey directly on local species, or introduce pathogens (Roy *et al*., 2012). Consequently, the introduction and spread of INNS represents a potential direct impact to Benthic Ecology.

1.10.105 The MDS assumes up to 32 vessels across the Proposed Development at any given time during the construction phase (likely to be much less than this number in reality). Vessel types include guard vessels, rock placement vessels, cable laying vessels, trenching vessels, pre-installation vessels and jack-up vessels. The precise number of vessel return trips and ports of origin are yet to be determined and the MDS vessel number is a precautionary estimate (it is likely that a much reduced number of guard vessels would be required at any one time). However, the increase in vessel numbers as a result of construction activities is considered small in the context of the baseline environment presented in Volume 3, Chapter 5: Shipping & Navigation of the ES. The baseline characterisation found an average number of 90 vessels operating per day within 5 nm of the Offshore Cable Corridor.

[8] No direct evidence relating to the impacts of the introduction of non-indigenous species on '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211).

1.10.106 Additionally, the MDS assumes cable protection (rock protection) covering a maximum footprint of 450,000 m^2, and cable crossings covering a maximum footprint of 175,000 m^2 will be installed during the construction phase, which INNS could colonise. However, the area of cable protection and cable crossings for colonisation of INNS (625,000 m^2) only represents a small proportion of the habitats present across the Benthic Ecology study area (4,074.82 km^2), which is approximately 0.02%.

1.10.107 As set out in **Table 1.20**, to reduce the likelihood of the introduction and spread of INNS a biosecurity risk assessment has been undertaken to determine potential sources of risk and reported within an Outline Offshore Biosecurity Plan (document reference 7.19). The Plan, which outlines measures to be applied to minimise the risk of introduction and spread of INNS will be adhered to (with final version produced by the offshore principal contractor (secured via the Deemed Marine Licence at Schedule 14 to the draft DCO). Additionally, all ships transiting between international waters will be subject to the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022 requirements and will be obliged to conduct ballast water management in accordance with the Regulations (as outlined in the Outline Offshore CEMP (document reference 7.9)).

1.10.108 The impact is predicted to be of regional spatial extent and long-term duration. However, with the implementation of the embedded mitigation measures mentioned above, the risk of the introduction and spread of INNS is low. The magnitude is therefore **low**.

Significance of effect

1.10.109 The sensitivity of the subtidal sand, subtidal coarse and subtidal mixed sediment habitat receptors is **medium** to **high**. The magnitude of the impact is considered to be **low.** Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.10.110 When considering Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ the sensitivity of receptors is up to **high**. The magnitude of the impact is considered to be **low**. Overall, it is considered that any effects would be minor and would not hinder the achievement of the conservation objectives stated for the MCZs (see MCZ Assessment, document reference 7.15, for further detail).

Further Mitigation

1.10.111 The effect of introduction or spread of INNS is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**.

Future Monitoring

1.10.112 No significant effects have been identified and no future monitoring is proposed.

Underwater noise & vibration

1.10.113 Vibration due to HDD at the landfall has the potential to cause some effects on benthic invertebrates in the intertidal and shallow subtidal zone close to the landfall.

Sensitivity of receptor

1.10.114 There is some evidence that anthropogenic sources of underwater noise and vibration could potentially have an effect on benthic invertebrates. Studies of invertebrates have indicated that increased noise and vibration levels can result in increased mortality, injury to tissues, and increased growth and reproductive rates, and food uptake in invertebrates (Popper & Hawkins, 2018; Hawkins & Popper, 2016; Solan *et al*., 2016; Aguilar de Soto *et al*., 2016; Spiga *et al*., 2012). For example, the effects of pile driving (which is a much louder activity than the cable laying activities associated with this Proposed Development) on bivalve molluscs have been studied by Spiga *et al*. (2016). It was found that individuals subjected to pile driving exhibited increased feeding (filtering) rate compared to those in ambient conditions (Spiga *et al*. 2016).

1.10.115 The effects of underwater noise and vibration on benthic invertebrates is a developing area of research, and currently there are insufficient data on the effects of underwater noise and vibration on invertebrates to establish noise criteria (Popper *et al*., 2014). It is currently assumed that invertebrates are sensitive to particle motion and are not sensitive to the sound pressure component of underwater noise and vibration.

1.10.116 Invertebrate species are unable to detect sound pressure but are likely to be able to detect particle motion through a variety of organs such as hairs on the body that respond to mechanical stimulation, chordotonal organs associated with joints, or vibrations transmitted through the exoskeleton from the substrate (Popper & Hawkins, 2018). The benthic invertebrates within the study area vary in value from **local** to **regional** value. Overall, benthic species are considered to have a **low** sensitivity to underwater noise and vibration effects.

Magnitude of impact

1.10.117 The noise levels that would be generated by construction vessels, by cable laying equipment and during boulder clearance would be very low compared to e.g. those generated by pile driving, and therefore any effects on benthic invertebrates are anticipated to be minimal. Due to potential effects of vibration, focus is placed here on the HDD aspects of the works.

1.10.118 HDD rigs operate from on shore and the sound and vibration that reaches the water column is often negligible (Hall & Francine 1991; Nguyen 1996; Willis *et al*. 2010). Sparse data are available for sound levels generated by HDD works, however, for HDD operations within a riverine environment 39 m below the riverbed, Nedwell *et al*. (2012) indicated that an unweighted Sound Pressure Level of 129.5 dB re: 1 µPa was recorded, although no frequency data were available. Corrected to a measurement at 1 m, the SPL would be 153 dB_{rms} re 1 µPa@1m.

1.10.119 Studies of vibration levels have been conducted for a 450 mm diameter HDD operation in south Dublin, Ireland (Reilly *et al*. 2020). The operation was on land with a HDD profile approximately 150 m long, and the drill was 9 m below the ground level. During this project, vibration limits of no more than 10 mm/s were imposed during the HDD works and the vibration levels recorded were typically less than 1 mm/s with a maximum of 5 mm/s.

1.10.120 Specific vibration levels have not been modelled for the Proposed Development. In the absence of other sources of information, however, the British Standards Institute has published empirical predictors for groundborne vibration arising from mechanised construction works including tunnelling (BS 5228-2:2009; BSI 2009). This equation is:

$$v_{res} \leq \frac{180}{x^{1.3}}$$

Where v_{res} is the resultant Peak Particle Velocity (PPV) in millimetres per second (mm/s) and x is the distance measured along the ground surface in metres (m).

1.10.121 Application of the equation requires the assumption that vibration travels up through the sediment in the same way as along the ground surface. As the drill depth is proposed at 20 m below the seabed the v_{res} is calculated to be 3.66 mm/s which is within the range reported by Reilly *et al*. (2020).

1.10.122 Sparse information is available to relate these vibration levels to effects on benthic invertebrates, however, Spiga *et al*. (2016) found that blue mussels (*Mytilus edulis*) exhibited higher clearance rates during pile driving when the peak velocity for one strike was measured to be 0.025 m/s (25 mm/s) which was measured at approximately 25 m range. This could have been a stress response to the particle motion caused by piling.

1.10.123 Based on the information available, the magnitude of the impact is assessed to be of localised spatial extent (distinct HDD locations) and medium term duration (several weeks per HDD borehole) resulting in behavioural changes in small proportion of the benthic invertebrate population. The magnitude of impact is therefore **low**.

Significance of effect

1.10.124 The sensitivity of the receptor is **low** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **negligible** to **minor** adverse significance, which is not significant in EIA terms.

Further Mitigation

1.10.125 The effect of underwater noise and vibration is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.10.126 No significant effects have been identified and no future monitoring is proposed.

Accidental pollution

1.10.127 The effects of accidental pollution may arise from vessels, vehicles, equipment and machinery undertaking construction activities, namely: seabed preparation, route clearance, cable laying, HDD and burial activities.

1.10.128 Accidental pollution may be associated with e.g. unintended release of pollutants such as fuel, lubricants (including drill fluids), and anti-fouling biocides.

Sensitivity of receptor

1.10.129 The MarESA assessment does not provide an assessment of the relevant chemical pressures for the identified benthic receptors due to limited evidence. The MarESA evidence base considers the effects of pollutants and chemicals should they be accidently released at concentrations that exceed environmental protection standards. However, it is anticipated that any accidental pollution released from the Proposed Development would be less than environmental standards as detailed further in the magnitude section below.

1.10.130 Benthic subtidal and intertidal habitats recorded during the surveys for the Proposed Development are largely characterised by sessile or low mobility species which will be unable to avoid any accidental pollution from the Proposed Development and many of these suspension feeding species may absorb contaminants directly from the water column by taking in SPM. Further survey of the intertidal habitats has been undertaken, which has informed the ES (see Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES).

1.10.131 Hydrocarbons and Polycyclic Aromatic Hydrocarbon (PAH) contamination can occur as a result of oil spills and during high swell and winds, this can cause oil pollutants to mix with the seawater and potentially negatively affect sublittoral habitats (Castège *et al*., 2014). Filter feeders are highly sensitive to oil pollution, particularly bottom dwelling organisms in areas where oil components are deposited by sedimentation (Zahn *et al*., 1981). Bivalve contact with oil causes an increase in energy expenditure and a decrease in feeding rate, resulting in less energy available for growth and reproduction (Suchanek, 1993). Echinoderms and amphipods are also regarded as being intolerant of hydrocarbons, whilst polychaetes are considered to be tolerant of elevated hydrocarbon levels (Suchanek, 1993; Cabioch *et al*., 1978). Limited evidence is available for the effects of oil pollution on hydroids. Houghton *et al*. (1996) found a reduction in abundance of encrusting bryozoa following an oil spill, however, Soule & Soule (1979) found that broyoza returned to an area close to an oil spill within 5 months of the incident, suggesting that recoverability is high. Crustaceans are widely reported to be intolerant of synthetic chemicals (Cole *et al*., 1999).

1.10.132 Recoverability of benthic receptors will vary considerably between species. For instance, bivalves and crustaceans typically have high fecundity and may recover fully. However, it should be noted that even with good annual recruitment/reproduction, this may take several years (Tyler-Walters, 2008; Sabatini and Hill, 2008). It is anticipated that, following cessation of any potential impact, re-colonisation of affected areas would occur via adult migration and larval settlement thereby allowing a return to ecological baseline conditions and baseline levels of contaminants. Consequently, benthic subtidal and intertidal receptors are considered to be sensitive to the changing environment but may have a good capacity to recover from the impact and are of **regional** value. These receptors are therefore assessed as having **medium** sensitivity to this impact.

1.10.133 The FOCI receptors associated with the Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ are indicated in **Table 1.20**. Overall, it is considered that representative biotopes for these FOCI could have up to **medium** sensitivity to this impact.

Magnitude of impact

1.10.134 Proposed Development construction activities may lead to the accidental release of pollutants through spills and leaks from vessels and equipment. The MDS indicates up to 32 vessels on site at any given time (worst case). Vessel types include guard vessels, rock placement vessels, cable laying vessels, trenching vessels, pre-installation vessels and jack-up vessels. Whilst this will lead to an uplift in vessel activity, the movements will primarily be along the Offshore Cable Corridor and along existing shipping routes to / from port. Vessel traffic associated with the Proposed Development will lead to an increase in vessel movements within the study area, albeit to a small degree when compared to the baseline numbers (Volume 3, Chapter 5: Shipping & Navigation of the ES). This increase could lead to an increased risk of accidental pollution through the release of synthetic compounds, for example from antifouling biocides, heavy metal, and hydrocarbon contamination as a result of seabed preparation, route clearance, cable laying and burial activities.

1.10.135 Although many of the large vessels (e.g., installation vessels) may contain large quantities of diesel oil, any accidental spill from vessels, vehicles, machinery from construction activities would be subject to immediate dilution and rapid dispersal.

1.10.136 The embedded mitigation measures include the application of a Final Offshore CEMP and MPCP, and SOPEP for Project vessels above 400 tonnes (to be included as part of the Final Offshore CEMP, which is secured via the Deemed Marine Licence at Schedule 14 of the draft DCO). Adherence to the embedded measures and good working practices outlined in **section 1.8** will significantly reduce the likelihood of an accidental pollution incident occurring and the magnitude of its impact. Given the embedded measures, the likelihood of accidental release is considered to be extremely low.

1.10.137 There is also a risk to benthic habitats and species from water-based drilling mud, including bentonite, which is used as a lubricant during the HDD process. HDD will be undertaken to install the cable at the landfall and nearshore environment. Drilling muds are used in a closed system to minimise loss to the environment; however, it is possible that muds (including bentonite) could accidentally break out during drilling operations, which may occur in intertidal or subtidal areas (in addition to modest unavoidable releases when the borehole breaks through the seabed). Bentonite is low toxicity drilling mud and therefore the risk to benthic receptors is minimal, particularly when considering that any break outs will be quickly diluted (seawater degrades the bentonite fluid, causing it to flocculate and allowing faster dispersal). However, any potential break outs or accidental spills of bentonite will be managed via good working practices (e.g., monitoring of mud volumes and pressure, detection of break outs and pausing drilling, self-sealing platelet drill fluid (including Bentonite) and ongoing monitoring) such that any accidental loss of bentonite to the environment is likely minimal. A Bentonite Breakout Plan incorporating these good working practices will be provided as part of the final offshore CEMP.

1.10.138 Accidental release of pollutants during the construction phase will directly affect benthic receptors. However, the impact is predicted to be of local spatial extent and short-term duration (any pollutant will be quickly dispersed or contained) and highly intermittent. The magnitude of impact is, therefore, considered to be **low**.

Significance of effect

1.10.139 The sensitivity of the receptor is (up to) **medium** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.10.140 When considering Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ the sensitivity of receptors is up to **medium**. The magnitude of the impact is considered to be **low**. Overall, it is considered that any effects would be minor and would not hinder the achievement of the conservation objectives stated for the MCZs (an MCZ Assessment is provided alongside the ES (document reference 7.15)).

Further Mitigation

1.10.141 The effect of accidental pollution is not significant, therefore, no further mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.10.142 No significant effects have been identified and no future monitoring is proposed.

1.11 Assessment of Operation and Maintenance Effects

1.11.1 The impacts of the operation and maintenance phase of the Proposed Development have been assessed. The impacts arising from the operation and maintenance phase of the Proposed Development are listed in **Table 1.21**, along with the maximum design scenario against which each impact has been assessed.

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

Long-term habitat loss/change

1.11.3 During the operational and maintenance phase, permanent habitat loss/change will occur as a result of the installation and presence of rock placement for cable protection to achieve sufficient burial depth (where full target depth is unable to be trenched due to local bed conditions) and at crossings of pre-existing in-service cables.

Sensitivity of receptor

1.11.4 The installation of rock protection (or concrete mattresses) for the cable at crossings and in very hard seabed areas would result in the loss of subtidal habitat and potentially the characterising benthic communities.

1.11.5 The sensitivity of the receptors identified in the Benthic Ecology study area have been assessed in relation to the following MarESA pressures relevant to long-term habitat loss/change:

- Physical change (to another seabed type).

1.11.6 The sensitivity of representative biotopes to temporary habitat loss/disturbance pressures is summarised in **Table 1.25**.

1.11.7 The boundaries of SACs and MCZs within the Benthic Ecology study area are located beyond the Cable Corridor (Volume 3, Figure 1.4 of the ES). Consequently, there is no potential for interaction between benthic habitat/species features of these SACs and MCZs (**Table 1.18**) and the activities associated with long-term habitat loss/change. Therefore, these receptors have not been considered in this 'long-term habitat loss/change' assessment section.

1.11.8 Similarly, there is no potential for interaction between activities associated with long-term habitat loss/change and intertidal benthic receptors due to the installation of cables at the landfall via HDD. Therefore, these receptors have not been considered in the assessment.

1.11.9 There will also be micro-routing of the cable to avoid potential impacts on Annex I bedrock and stony reef habitats (as set out in the Commitments Register (Volume 1, Appendix 3.1 of the ES) and the Deemed Marine Licence at Schedule 14 to the draft DCO).

1.11.10 The MarESA assessment of the subtidal habitats recorded during the site-specific surveys, suggests that all representative habitats have no resistance and very low resilience to physical change (to another seabed type), (**Table 1.25**).

1.11.11 Biotopes including 'Sparse fauna in Atlantic infralittoral mobile clean sand' (MB5231), '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213), '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211), '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (MC5214) and 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) are characterised by sand and mixed sediment habitat whilst the biotope '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212) is characterised by muddy habitat. Change to artificial or rock substratum would alter the character of the biotope leading to the reclassification and loss of the sedimentary community including characterising polychaetes, amphipods, isopods and echinoderms. Consequently, these receptors are considered to have low capacity to recover or adapt to the impact and are of Regional value. These receptors are therefore assessed as having **high** sensitivity.

1.11.12 For the biotope '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211), it has been noted that *S. spinulosa* can colonise bedrock and artificial structures and an increase in the availability of hard substrate may support the recovery of characterising species (Mistakidis, 1956). However, a change to artificial or rock substratum would alter the character of the biotope leading to the reclassification of the biotope (Tillin *et al*., 2023). Consequently, the receptor is considered to be highly sensitive to the changing environment but may have a good capacity to recover from the impact and is of Regional value. This receptor is therefore assessed to have **medium** sensitivity to long-term habitat loss/change.

Table 1.25: Sensitivity of benthic receptors to long-term habitat loss/change

Habitats	Representative biotopes	MarESA Assessment
		Physical Change (to another seabed type)
Annex I habitat		
Rocky reef	Not applicable	High (not MarESA)
Stony reef	Not applicable	High (not MarESA)
Subtidal sand sediment habitat		
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	High Sensitivity (based on No resistance and Very Low resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	High Sensitivity (based on No resistance and Very Low resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	High Sensitivity (based on No resistance and Very Low resilience)
Subtidal coarse sediment habitat		
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	High Sensitivity (based on No resistance and Very Low resilience)
Subtidal mixed sediment habitat		
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	High Sensitivity (based on No resistance and Very Low resilience)
Atlantic circalittoral rock (MC12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	High Sensitivity (based on No resistance and Very Low resilience)
***Sabellaria* habitat**		
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	High Sensitivity (based on No resistance and Very Low resilience)

Magnitude of impact

1.11.13 The MDS considers a maximum of 625,000 m^2 of permanent habitat loss/change as a result of the installation and presence of rock placement for cable protection and at cable crossings (of in-service cables and up to 5 OOS cable crossings).

1.11.14 The impact will directly affect receptors through the long-term loss / change of benthic habitats and will occur continuously throughout the lifetime of the Proposed Development (anticipated to be c.50 years). However, long-term habitat loss/change (max. 625,000 m^2) will only affect a small proportion of the habitats present across the Benthic Ecology study area (4,074.82 km^2) and will be restricted to the footprint of the Offshore Cable Corridor. This equates to approximately 0.02% of long-term habitat loss/change within the Benthic Ecology study area.

1.11.15 The ES presents the Outline CBRA (Volume 1, Appendix 3.4 of the ES) which interprets the indicative rock placement required (Volume 3, Figure 1.19 of the ES) and the locations of in-service cable crossings (Volume 3, Figure 1.14 of the ES) across the Offshore Cable Corridor.

1.11.16 Although the Outline CBRA assesses the risk of rock placement being required, at this stage the precise level of rock placement at any specific location cannot be determined and may range between extremely little rock placement to a high degree of rock placement (Volume 3, Figure 1.19 of the ES). Where it is anticipated that a high degree of rock placement is required (i.e. 6-7 t/m), it is estimated that approximately 78.4 ha of habitats will be impacted by rock placement which is approximately 0.3% of habitats across the entire Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES). For other levels of rock placement, a moderate degree of rock placement (3.6-4.8 t/m) could impact 140.7 ha of habitats (0.6% of habitats across the Offshore Cable Corridor), low levels of rock placement (1.2-2.4 t/m) could impact 347.3 ha of habitats (1.5% of habitats across the Offshore Cable Corridor) and extremely low levels of rock placement (<1.2 t/m) could impact 690.8 ha of habitats (35% of habitats across the Offshore Cable Corridor are associated with the lowest predicted category of potential rock placement). It is not anticipated that extensive levels of rock placement (4.8-6 t/m) will be required across the Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.11.17 For in-service cable crossings, it is anticipated that approximately 18.4 ha of habitats will be impacted, which is approximately 0.08% of habitats across the entire Offshore Cable Corridor (Volume 3, Appendix 1.2: Benthic Habitat Disturbance Calculations of the ES).

1.11.18 There is potential for epifauna to colonise cable protection measures which could lead to a localised increase in biodiversity along the cable route. However, where such changes differ considerably from the type of habitat previously in place (e.g. soft substrate habitats), such increases in biodiversity may not necessarily be considered as beneficial change.

1.11.19 The impact is predicted to be of local spatial extent and long-term duration. The magnitude is therefore **low**.

Significance of effect

1.11.20 The sensitivity of the benthic receptors is **medium** to **high** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

Further Mitigation

1.11.21 The effect of 'Long-term habitat loss/change' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.22 No significant effects have been identified and no future monitoring is proposed.

Temporary habitat loss/disturbance

1.11.23 Temporary habitat loss / disturbance will occur during the operation and maintenance phase as a result of repair and re-burial activities.

Sensitivity of receptor

1.11.24 The sensitivity of benthic receptors to temporary habitat loss/disturbance is the same as that described for the construction phase in **section 1.10** of this ES chapter. They are generally considered to have low or medium sensitivity to 'abrasion / disturbance of the surface of the substratum or seabed' and 'penetration or disturbance of the substratum surface', and medium sensitivity to 'Smothering and siltation rate changes (heavy)'.

Magnitude of impact

1.11.25 The MDS considers the de-burial, repair and re-burial of segments of the cable at failure points when they are required. In the event of a cable failure the cable would be cut, recovered to the surface, repaired using a section of new cable and redeployed for re-burial using similar methods to those used for installation. Given additional cable length would be required to join the cut ends at the surface, the relayed cable would take up a greater footprint than the original cable. However, the relayed cable would still fall within the Offshore Cable Corridor. The magnitude of temporary habitat loss / disturbance from operation and maintenance is expected to be significantly less than that for construction.

1.11.26 Temporary habitat loss/disturbance will directly affect benthic receptors. However, the impact will be intermittent throughout the operational phase, would be of localised spatial extent (restricted to the footprint of the Offshore Cable Corridor, and the locality of the repair) and of short-term duration. The magnitude is, therefore, considered to be **low**.

Significance of effect

1.11.27 The sensitivity of receptors is **low** to **medium** and the magnitude of the impact is considered to be **low**. Overall, it is considered that the effect will be of **minor** adverse significance, which is not significant in EIA terms.

Further Mitigation

1.11.28 The effect of 'Temporary habitat loss/disturbance' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.29 No significant effects have been identified and no future monitoring is proposed.

Temporary increase in suspended sediments and sediment deposition

1.11.30 Increases in suspended sediments and deposition will occur during the operation and maintenance phase as a result of repair activities.

Sensitivity of receptor

1.11.31 The sensitivity of benthic receptors to temporary increase in suspended solids and sediment deposition is the same as that described for the construction phase in **section 1.10** of this ES chapter. They are generally considered to have **negligible** to **medium** sensitivity to 'changes in suspended solids (water clarity)' and 'smothering and siltation rate changes (light)'. No MarESA assessment is available for these impacts for bedrock and stony reef but taking a precautionary approach a sensitivity of **medium** has been applied, noting for example that the level of sediment coverage can influence the number of organisms visible on bedrock and if a low percentage of bedrock is visible under the sediment with sparse fauna it can affect whether it is considered to represent reef habitat or not (Golding *et al*. 2020).

Magnitude of impact

1.11.32 The MDS considers the de-burial, repair and re-burial of segments of the cable at failure points when they are required. In the event of a cable failure the cable would be cut, recovered to the surface, repaired using a section of spare cable and redeployed for re-burial using similar methods to those used for installation. The magnitude of increased suspended sediments and deposition from operation and maintenance is expected to be significantly less than that for construction.

1.11.33 Temporary increase in suspended sediments and sediment deposition will directly affect benthic receptors during the operational phase. However, the impact is predicted to be of local spatial extent (restricted to within the Benthic Ecology study area and in close proximity to the source), short-term duration (any suspended sediment will disperse quickly) and highly intermittent. The magnitude is, therefore, considered to be **low**.

1.11.34 There is potential for sediment resuspended during any operational repair works to be transported over the South West Approaches to Bristol Channel MCZ, Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ, East of Haig Fras MCZ and Taw-Torridge Estuary SSSI and then fall out of suspension. The maximum distance over which this could occur has been calculated to be 15.2 km (from disturbance activity) based on semi-empirical calculations within Bideford Bay, however, these calculations also indicate that in the areas near the South West Approaches to Bristol Channel MCZ and East of Haig Fras MCZ sediment suspension is anticipated to be highly localised, with sediment falling out of suspension rapidly (Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES).

1.11.35 Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ and Taw-Torridge Estuary SSSI coincide within an area where it is considered sediment could be dispersed a greater distance (during 'worst case' peak spring tide conditions). Even though there is potential for some sediment to be transported to the Bideford to Foreland Point MCZ, Hartland Point to Tintagel MCZ and Taw-Torridge Estuary SSSI, most sediment is still anticipated to be deposited within tens to hundreds of metres from the cable trench with only finer materials remaining in suspension and travelling further distances during isolated peak current events only. Even if sediment was transported into the MCZs and SSSI, it has been calculated that it would be deposited within about six hours of being resuspended (Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of the ES). As mentioned above in **paragraph 1.10.51**, sediment deposition within Bideford Bay is estimated to be deposited with a thickness of up to <1.5 mm which is far below the 5 mm threshold of 'light' smothering used for MarESA (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). Overall, this would result in a highly localised area of very light smothering. The deposited sediment would likely be repeatedly suspended by water movements and be within natural variations in sediment deposition regularly experienced in the MCZs and SSSI where organisms in this area are expected to be generally adapted to such levels of deposition e.g. they will routinely encounter similar elevated concentrations during storm events or other disturbance events. Any potential for effects on the MCZs and SSSI would be temporary with only a very small area of the MCZs and SSSI being potentially affected, with the effects only being encountered in the vicinity of active (and transient) trenching or other activities generating sediment disturbance. Overall, the magnitude of impact on the MCZs and SSSI is considered to be **negligible**.

1.11.36 Based on the expectation that sediment will be deposited in the immediate vicinity of activities in the areas near the South West Approaches to Bristol Channel MCZ and East of Haig Fras MCZ, the magnitude of impact on these MCZs is considered to be **negligible**.

Significance of effect

1.11.37 The sensitivity of the receptor is **medium** the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.11.38 As indicated in **section 1.10**, any effects on Lundy SAC, Taw-Torridge Estuary SSSI would be negligible as they are beyond the ZoI for sediment dispersal (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). It is considered that any effects on Bideford to Foreland Point MCZ**,** South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of

Haig Fras MCZ would be negligible and would not hinder the achievement of the conservation objectives stated for the MCZs.

Further Mitigation

1.11.39 The effect of 'Temporary increase in suspended sediment and sediment deposition' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.40 No significant effects have been identified and no future monitoring is proposed.

Changes to water quality (release of hazardous substances from sediments)

1.11.41 Release of any (baseline existing) hazardous substances from sediments may occur during the operation and maintenance phase as a result of repair and re-burial activities.

Sensitivity of receptor

1.11.42 The sensitivity of benthic receptors to changes to water quality (release of hazardous substances from sediments) is the same as that described for the construction phase in **section 1.10**. They are generally considered to have **medium** sensitivity to 'changes to water quality (release of hazardous substances from sediments)'.

Magnitude of impact

1.11.43 The MDS considers the de-burial, repair and re-burial of segments of the cable at failure points when they are required. In the event of a cable failure the cable would be cut, recovered to the surface, repaired using a section of spare cable and redeployed for re-burial using similar methods to those used for installation. The magnitude of changes to water quality from resuspension of sediments from operation and maintenance is expected to be less than that for construction (very small volumes of disturbed sediment associated with isolated works).

1.11.44 Changes to water quality (release of hazardous substances from sediments) will directly affect benthic receptors during the operational phase. However, the impact is predicted to be of local spatial extent (restricted to within the Benthic Ecology study area and in close proximity to the source), of short-term duration (any suspended sediment will disperse quickly) and intermittent. The magnitude is, therefore, considered to be **low**.

1.11.45 Potential effects on MCZ FOCI are anticipated to be minimal as any increases in chemical concentration in the water column will be rapidly diluted and increases in chemical concentrations due to the Proposed Development are anticipated to be very low for waters in the MCZs. In addition, only a very small area of an MCZ could potentially be affected. Where effects are associated with sediment dispersal they may reach the Bideford to Foreland Point MCZ and Hartland Point to Tintagel MCZ but are not anticipated to reach the South West Approaches to

Bristol Channel MCZ or East of Haig Fras MCZ (Volume 3, Appendix 8.1: Sediment Dispersion Technical Note of the ES). Note, chemical parameters are associated with disturbance of baseline unconsolidated sediments, thus the same chemical parameters could reasonably be expected to be mobilised under baseline storm events (i.e. during natural disturbance events).

1.11.46 Overall, the magnitude of impact on MCZs is considered to be **negligible**.

Significance of effect

1.11.47 The sensitivity of the receptor is **medium** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.11.48 As indicated in **section 1.10**, any effects on Lundy SAC, Taw-Torridge Estuary SSSI would be negligible. It is considered that any effects on Bideford to Foreland Point MCZ**,** South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ would be negligible and would not hinder the achievement of the conservation objectives stated for the MCZs.

Further Mitigation

1.11.49 The effect of 'changes to water quality (release of hazardous substances from sediments)' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.50 No significant effects have been identified and no future monitoring is proposed.

Introduction and spread of INNS

1.11.51 The introduction and spread of INNS may occur during the operational phase of the Proposed Development. The main risks would be associated with introduction of any new materials to the water column, discharge of ballast water and potential biofouling of vessel hulls or other parts of vessel infrastructure.

Sensitivity of receptor

1.11.52 The sensitivity of benthic receptors to introduction and spread of INNS is the same as that described for the construction phase in **section 1.10**. They are generally considered to have up to a **high** sensitivity to 'introduction and spread of INNS'.

Magnitude of impact

1.11.53 The introduction and spread of INNS may occur during the operation and maintenance phase of the Proposed Development due to the presence and movement of vessels.

1.11.54 The MDS assumes one survey vessel to undertake routine post installation inspection surveys under the proposed schedule outline in **Table 1.21**, as well as vessels to support unplanned maintenance and repair, as and when needed. The precise number of vessels, vessel return trips and ports of origin are yet to be determined. However, the increase in vessel numbers as a result of operational phase activities will be small when compared to the baseline environment presented in Volume 3, Chapter 5: Shipping & Navigation of the ES, which suggests an average number of 90 vessels per day within 5 nm of the Offshore Cable Corridor. The baseline activity is described as an average of 90 vessels per day within 5 nm of the Offshore Cable Corridor.

1.11.55 As set out in Volume 1, Chapter 3: Project Description of the ES, to reduce the likelihood of the introduction and spread of INNS an Offshore Biosecurity Plan (an Outline Offshore Biosecurity Plan is included as part of the application for development consent as document reference 7.19) will be adhered to, with the incorporation of a biosecurity risk assessment to identify potential pathways of introduction for INNS, and critical control points for minimising the risks. Additionally, all ships transiting between international waters will be subject to the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022 and will be obliged to conduct ballast water management in accordance with the Regulations. These measures will be provisioned in the Final Offshore CEMP (an Outline Offshore CEMP is included as part of the application for Development consent, document reference 7.9).

1.11.56 The impact is predicted to be of regional spatial extent and long-term duration. However, with the implementation of the embedded mitigation measures mentioned above, the risk of the introduction and spread of INNS is low. The magnitude is therefore **low**.

Significance of effect

1.11.57 The sensitivity of the subtidal sand, subtidal coarse and subtidal mixed sediment habitat receptors is **high** and the sensitivity of the *Sabellaria* habitat receptor is **medium**. Overall, the magnitude of the impact is considered to be **low.**

1.11.58 The effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.11.59 As indicated in **section 1.10**, any effects on Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ, Hartland Point to Tintagel MCZ and East of Haig Fras MCZ are considered to be minor and would not hinder the achievement of the conservation objectives stated for the MCZs.

Further Mitigation

1.11.60 The effect of introduction or spread of INNS is not significant in EIA terms, therefore, no mitigation measures are proposed beyond those embedded measures outlined above (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.61 No significant effects have been identified and no future monitoring is proposed.

Change in hydrodynamic regime (scour & accretion)

1.11.62 Changes in hydrodynamic regime (scour & accretion) may occur as a result of the presence of cable protection and cable crossings during the operational phase of the Proposed Development, which could subsequently affect seabed habitats through changes to locations of sediment scour, sediment deposition and grain size distribution.

Sensitivity of receptor

1.11.63 The sensitivity of the receptors identified in the Benthic Ecology study area have been assessed in relation to the following MarESA pressure relevant to change in hydrodynamic regime (scour & accretion):

- Water flow (tidal current) changes (local).

1.11.64 The sensitivity of representative biotopes to changes in hydrodynamic regime (scour & accretion) pressures are summarised in **Table 1.26**.

1.11.65 The MarESA assessment of representative biotopes indicates that the subtidal sands sediment, subtidal coarse sediment, subtidal mixed sediment and *Sabellaria* habitat receptors are not sensitive to water flow (tidal current) changes (local) (**Table 1.26**).

1.11.66 Water movement is a key factor determining the physical structure of biotopes. Representative biotopes of subtidal benthic receptors, occur where tidal streams range from strong to weak and organisms in these habitats may be tolerant of changes to water flow. For the biotope, '*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand' (MD5212), characterising species show behavioural adaptations to changes in which a decrease in water flow and subsequently sediment deposition may allow species to utilise the additional deposits and burrow through sediment (De-Bastos, 2023). Characterising species of the representative biotopes '*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand' (MC3213) and 'Polychaete-rich deep Venus community in offshore circalittoral mixed sediment' (MD4211) are infaunal and generally intolerant of changes to water flow (Tillin & Watson, 2023). Water flow is important for the bryozoan communities of the biotope 'Sparse sponges*, Nemertesia spp.,* and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata' (MC1217) and any substantial decrease in water flow may result in impaired growth due to a reduction in food availability (Readman *et al*., 2023). Similarly, reduced water flow for the biotope '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) may result in in a reduction in the supply of suspended sediment for tube building and growth (Tillin *et al*., 2023). However, these biotopes have been indicated to have a broad tolerance to different levels of water flow (Jones *et al*., 2000; Braithwaite *et al*., 2006; Davies *et al*., 2009). Consequently, representative biotopes of benthic subtidal receptors will have a reasonable capacity to tolerate the impact with good recovery (i.e. within 5 years) and are of Regional value. The receptors are therefore assessed as having **low** sensitivity.

Table 1.26: Sensitivity of benthic receptors to change in hydrodynamic regime (scour & accretion)

Habitats	Representative biotopes	MarESA Assessment
		Water flow (tidal current) changes (local)
Bedrock reef	Not applicable	Not Applicable
Stony reef	Not applicable	Medium (not MarESA)
Subtidal sand sediment habitats		
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	Not Sensitive (based on High resistance and High resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	Not Sensitive (based on High resistance and High resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Not Sensitive (based on High resistance and High resilience)
Subtidal coarse sediment habitats		
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	Not Sensitive (based on High resistance and High resilience)
Subtidal mixed sediment habitats		
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	Not Sensitive (based on High resistance and High resilience)
Atlantic circalittoral rock (MC12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Not Sensitive (based on High resistance and High resilience)
Sabellaria habitat		
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	Not Sensitive (based on High resistance and High resilience)

Magnitude of impact

1.11.67 The MDS considers a maximum of 625,000 m^2 of placed rock (and other protection including concrete mattresses) for cable protection and cable crossings at in-service cables (and up to five OOS cable crossings).

1.11.68 The cable protection will be designed to have a low profile (maximum of 1 m above the seabed for cable protection; 1.4 m maximum height at crossings – as defined in Commitments Register (Volume 1, Appendix 3.1 of the ES) and design parameters of the Deemed Marine Licence at Schedule 14 to the draft DCO) which will minimise potential effects on water flow and local hydrodynamics. All crossings will adhere to industry standard, as outlined in the Commitments

Register (Volume 1, Appendix 3.1 of the ES) and secured via the Outline Offshore CEMP (document reference 7.9), which includes shallow (1:3) slopes which will further mitigate against impacts on local currents, and associated scour.

1.11.69 The impact will directly affect benthic receptors through highly localised changes to physical processes and will occur continuously throughout the lifetime of the Proposed Development. The predicted spatial scale of potential scour is set out in Volume 3, Appendix 8.1 Sediment Dispersion Technical Note of this ES. In summary, it is anticipated that any changes in hydrodynamic regime as a result of cable protection will only affect a small proportion of the habitats immediately adjacent to the Offshore Cable Corridor.

1.11.70 The impact is predicted to be of local spatial extent and long-term duration. Overall, the magnitude of impact is considered to be **low**.

Significance of effect

1.11.71 The sensitivity of the receptor is **low** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **negligible** to **minor** adverse significance, which is not significant in EIA terms.

Further Mitigation

1.11.72 The effect of 'temporary increase in change in hydrodynamic regime (scour & accretion)' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.73 No significant effects have been identified and no future monitoring is proposed.

Sediment heating

1.11.74 When operational, the HVDC cables will emit heat causing a rise in local sediment temperature and possibly of the water column in the immediate vicinity of the buried cables. A project specific Electromagnetic Field and Thermal Study on the likely temperature increase resulting from the cables was conducted to inform the assessment (Amplitude Consultants, 2021).

Sensitivity of receptor

1.11.75 A rise in sediment temperature could have an effect on benthic species as the resident species in the area may not be able to tolerate an increase in temperature causing mobile individuals within the ZoI to move away. Sessile species may become stressed which could reduce their survival rate. MarESA does not assess the sensitivity of increased temperature in sediment on benthic invertebrates but does assess their sensitivity to increases in temperature of water and so these sensitivity assessments have been used as a proxy in this assessment. Decapods such as the edible crab (*Cancer pagurus*) have a low sensitivity to increase in temperature based on an intermediate intolerance and very high recoverability (Neal & Wilson, 2008).

1.11.76 Sensitivities of key benthic species and habitats within the study area (**Table 1.27**) range between **not sensitive** and **low**.

Table 1.27: Sensitivity of benthic receptors to sediment heating

Receptor	Representative Biotope	MarESA Assessment
		Temperature increase (local)
Edible crab (*Cancer pagurus*)	Not applicable	Low (based on Intermediate resistance and Very high resilience)
Blue mussel (*Mytilus edulis*)	Not applicable	Very low (based on Low resistance and Very high resilience)
Subtidal sand sediment habitats		
Atlantic infralittoral sand (MB52)	Sparse fauna in Atlantic infralittoral mobile clean sand (MB5231)	Not sensitive (based on High resistance and High resilience)
Atlantic circalittoral sand (MC52)	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (MC5211) *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (MC5214)	Low (based on Medium resistance and High resilience)
Atlantic offshore circalittoral sand (MD52)	*Owenia fusiformis* and *Amphiura filiformis* in deep circalittoral sand or muddy sand (MD5212)	Not sensitive (based on High resistance and High resilience)
Subtidal coarse sediment habitats		
Atlantic circalittoral coarse sediment (MC32)	*Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand (MC3213)	Not sensitive (based on High resistance and High resilience)
Subtidal mixed sediment habitats		
Atlantic circalittoral mixed sediment (MD42)	Polychaete-rich deep Venus community in offshore circalittoral mixed sediment (MD4211)	Low (based on Medium resistance and High resilience)
Atlantic circalittoral rock (C12)	Sparse sponges, *Nemertesia spp.*, and *Alcyonidium diaphanum* on Atlantic circalittoral mixed substrata (MC1217)	Not sensitive (based on High resistance and High resilience)
***Sabellaria* habitat**		
Atlantic circalittoral biogenic habitat (MC22)	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment (MC2211) (no *Sabellaria* reef was recorded)	Not sensitive (based on High resistance and High resilience)

Magnitude of impact

1.11.77 The Electromagnetic Field and Thermal Study (Amplitude Consultants, 2021) presents increases to ambient sediment temperature associated with the proposed HVDC cable technology. Temperature uplift (sediment heating) predictions for the planned cable bundle(s) can be made by assuming a precautionary 15°C 'soil' ambient temperature (anticipated to be 5 – 10 °C along the Offshore Cable Corridor) and a seabed thermal resistivity of 0.7 K.m/W. The target burial depth across the Offshore Cable Corridor is 1.5 m (as indicated by the Outline CBRA (Volume 1, Appendix 3.4 of the ES)) therefore the max temp uplift of the surface sediment directly above the cable is estimated to be 4 ºC[9], which would rapidly decrease (exponential temperature decline) to a negligible temperature increase at approximately 2.5 m distance from the cable. Given that in most locations the cable will be buried below the seabed surface, the horizontal seabed surface distance to negligible temperature uplift would therefore be less than 2.5 m.

1.11.78 Any effects associated with localised sediment / sea bed temperatures will therefore be limited to the immediate seabed overlying the cable bundles.

1.11.79 For context, the cable specifications for the Greenlink Interconnector are equivalent to those for the Proposed Development cable. The Environmental Impact Assessment for Greenlink acknowledged a potential influence of temperature on receptors, but it was Scoped out at the Scoping stage on the basis that it was not anticipated to have a potential significant effect (Intertek, 2018).

1.11.80 The impact of sediment heating from the cables is predicted to be of highly local spatial extent and long-term duration. The magnitude of impact is therefore assessed to be **low**.

Significance of effect

1.11.81 Overall, the magnitude of the impact is **low** and the sensitivity of the most sensitive receptors is **low**. The effect will, therefore, be of **negligible** to **minor** adverse significance.

Further Mitigation

1.11.82 The effect of 'sediment heating' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.83 No significant effects have been identified and no future monitoring is proposed.

[9] Temperature/Distance to cable estimates based on modelled horizontal temperature decay relationships derived at 1.05m depth (Amplitude Consultants, 2021)

Electromagnetic field (EMF) effects

1.11.84 EMFs are generated by the current that passes through an electric cable. It is known that EMF can be detected by fish, in particular elasmobranchs, and it is thought that benthic invertebrates can also detect EMF. Three types of fields are generated by underwater electric cables: electric fields (E-fields), magnetic fields (B-fields) and induced electric fields (iE-fields). Standard industry practice is for the cables used to have sufficient shielding to contain the E-fields generated. Shielding and/or burial does not reduce the B-fields and it is these fields that allow the formation of iE-fields. As such, further reference here to EMF is limited to B-fields and associated iE-fields.

Sensitivity of receptor

1.11.85 The sensitivity of benthic invertebrates to EMF has not been assessed by MarLIN using the MarESA approach as there is currently a lack of evidence to determine sensitivity (Gibson-Hall *et al*. 2020; Perry *et al.*, 2023; Tillin *et al*., 2017; Tyler-Walters & Sabatini, 2017).

1.11.86 Sparse experimental data are available to consider effects, for example Bochert and Zettler (2004) exposed the blue mussel (*Mytilus edulis*), brown shrimp (*Crangon crangon*) and estuarine mud crab (*Rhithropanopeus harrisii*) to a static B-field of 3.7 µT (37 G) for several weeks, however, no differences in survival between experimental and control animals was detected (Bochert and Zettler 2004). In contrast, B-fields were found to have effects on biochemical parameters in blue mussel (Aristharkhov *et al*., 1988). It was found that changes in B-field action of 5.8, 8, and 80 µT (58, 80, 800 G, respectively) led to a 20% decrease in hydration and a 15% decrease in amine nitrogen values, regardless of the induction value (Aristharkhov *et al*., 1988).

1.11.87 Love *et al*. (2016) studied the benthic community occupying two energised submarine power cables (average 73 µT / 730 mG and 91.4 µT / 914 mG) in comparison to adjacent non-energised pipes and natural habitats, off Southern California over a two-year period. They failed to find any significant difference in fish or invertebrate assemblages between energised cables, non-energised pipes and natural habitat. They concluded that EMF are unlikely to impact fish and invertebrate assemblages to any great extent.

1.11.88 Based on the information currently available, benthic invertebrates have been assessed to have a **low** sensitivity to EMFs.

Magnitude of impact

1.11.89 EMF occurs naturally in the marine environment. The Earth's static magnetic field (geomagnetic field) is present in all environments, terrestrial and aquatic, and lies in the range of 25 to 65 µT (250 to 650 mG) (Hutchison *et al*., 2018; Normandeau *et al*., 2011). Movement of seawater through the Earth's magnetic field (geomagnetic field) creates localised E-fields, which are typically very small, in the order of 10s of µV m-1 (Tasker *et al*., 2010; Normandeau *et al*., 2011). Small electric fields are also directly produced by marine organisms.

1.11.90 The Maximum Design Scenario assumes the presence of four 525 kV HVDC cables, with a diameter of 175 mm, across a length of 370 km. Cables are intended to be buried along their entire length, to a target depth of 1.5 m. Where full target trench depth is not able to be achieved because of bed conditions, or where softer sediments are unavailable to backfill the installation trench, additional rock protection will be installed. The calculated static magnetic field levels of the bundled cables is 79 μT (790 mG), with no static electric fields being emitted due to the cable shielding system (Amplitude Consultants, 2021).

1.11.91 CSA (2019) compared offshore subsea cables and found magnetic fields between seafloor and 1 m above seafloor (for buried 75 – 500 kV cables) to range between 590 and 1250 mG for Direct Current (DC) export cables. CSA (2019) also compared offshore Alternating Current (AC) subsea cables from wind farms and found magnetic field levels directly over the cables to range between 20 to 65 mG for 34.5 to 161 kV inter-array cables and 30 to 165 mG for 138 to 400 kV export cables at the seafloor. A reduction in magnetic field levels was seen 1 m above the seafloor, with 5 to 15 mG for inter-array cables and 10 to 40 mG for export cables. Induced electric field levels were 0.1 to 1.2 mV/m for inter-array and 0.2 to 2.0 mV/m for export cables, 1 m above the seafloor. Love *et al*. (2016) made a similar observation, with EMF levels being undetectable 1 m away from most of the energised submarine power cables monitored as part of their study.

1.11.92 Impacts from changes in EMFs arising from cables, are not considered to result in a measurable change in benthic subtidal and intertidal receptors. EMFs generated by subsea cables are considered likely to be detectable above background levels only in close (immediate) proximity to the cables. Although burial does not mask EMFs, it increases the distance between species that may be affected by EMFs and the source.

1.11.93 It is considered that any potential effects of EMFs on benthic invertebrates would be confined to a very localised area surrounding the cables and will be long-term. Overall, the magnitude of impact is assessed to be **low**.

Significance of effect

1.11.94 The sensitivity of the most sensitive receptors is **low** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **negligible** to **minor** significance.

Further Mitigation

1.11.95 The effect of 'electromagnetic fields' is not significant, therefore, no mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**).

Future Monitoring

1.11.96 No significant effects have been identified and no future monitoring is proposed.

Accidental pollution

1.11.97 Accidental release of pollutants (such as fuel, lubricants, and anti-fouling biocides) from vessels or equipment associated with the Proposed Development has the potential to occur during maintenance and repair activities.

Sensitivity of receptor

1.11.98 The sensitivity of benthic receptors to accidental pollution is the same as that described for the construction phase in **section 1.10**. They are generally considered to have **medium** sensitivity to 'accidental pollution'.

Magnitude of impact

1.11.99 The maintenance associated with the Proposed Development Operational and Maintenance phase may lead to the accidental release of pollutants through spills and leaks from vessels and equipment. The MDS considers the presence of one survey vessel to undertake routine post installation inspection surveys under the proposed schedule outline in **Table 1.21**. Additionally, vessels to support unplanned maintenance and repair will also be present, when required. Whilst this will lead to an uplift in vessel activity, the movements will primarily be along the Offshore Cable Corridor and along existing shipping routes to / from port. Vessel traffic associated with the Proposed Development will lead to an increase in vessel movements within the study area, albeit to a very small degree when compared to the baseline numbers. This increase could lead to an increased risk of accidental pollution through the release of synthetic compounds, for example from antifouling biocides, heavy metal, and hydrocarbon contamination. However, vessel activity and unplanned maintenance and repair works would occur much less frequently than during the construction phase, reducing the likelihood of an accidental pollution incident occurring.

1.11.100 Although many of the large vessels may contain large quantities of diesel oil, any accidental spill from vessels, vehicles, machinery from construction activities would be subject to immediate dilution and rapid dispersal.

1.11.101 The embedded mitigation measures include the application of a final offshore CEMP, which will include a Marine Pollution Contingency Plan (MPCP). Where relevant (as per MARPOL requirements), Project vessels will ensure a Shipboard Oil Pollution Emergency Plan (SOPEP) which will be included with the Final Offshore CEMP. An Outline Offshore CEMP is included as part of the application for DCO (document reference 7.9) which includes outline content of the MPCP and SOPEP, with the final plans to be included in the Final Offshore CEMP to be produced post consent by the contractor. Adherence to the embedded measures and good working practices outlined in **section 1.8** of this chapter will significantly reduce the likelihood of an accidental pollution incident occurring and the magnitude of its impact. Given the embedded measures, the likelihood of accidental release is considered to be extremely low.

1.11.102 Accidental release of pollutants during the operational and maintenance phase would directly affect benthic receptors. However, the impact is predicted to be of local spatial extent and short-term duration (any pollutant will be quickly dispersed) and highly intermittent (unlikely). The magnitude of impact is, therefore, considered to be **low**.

Significance of effect

1.11.103 The sensitivity of the receptor is **medium** and the magnitude of the impact is considered to be **low**. Overall, the effect is assessed to be of **minor** adverse significance, which is not significant in EIA terms.

1.11.104 As indicated in **section 1.10**, any effects on Bideford to Foreland MCZ, South West Approaches to Bristol Channel MCZ and East of Haig Fras MCZ are considered to be minor and would not hinder the achievement of the conservation objectives stated for the MCZs.

Further Mitigation

1.11.105 The effect of accidental pollution is not significant, therefore, no further mitigation measures are proposed (beyond the embedded mitigation presented in **Table 1.20**.

Future Monitoring

1.11.106 No significant effects have been identified and no future monitoring is proposed.

1.12 Assessment of Decommissioning Effects

1.12.1 At the end of the operational life of the cable (c.50 years after commissioning) the options for decommissioning will be evaluated and having regard for other Proposed Development constraints (e.g., safety and liability), the least environmentally damaging option would be chosen where possible.

1.12.2 Should full removal of the cable from the seabed be required, this would have the potential to cause similar impacts to those associated with the construction phase (**section 1.10**), noting that the magnitude of impact associated with cable removal would likely be reduced relative to construction phase impacts (on account of the smaller footprint and scale of works). As a precautionary approach, the impacts identified in the assessment for the construction phase are considered to also apply to cable removal during decommissioning.

1.12.3 If cables are de-energised and left *in-situ*, this would result in permanent impacts similar to those identified for the operational phase (**section 1.11**), with the exclusion of those impacts associated with the energised cable i.e. EMF and sediment heating. In addition, potential impacts have been considered for INNS and Accidental pollution for the *in-situ* option as vessels may be required.

1.12.4 Overall, no effects from decommissioning activities are considered to be significant in EIA terms.

1.13 Cumulative Environmental Assessment

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

1.13.2 The benthic ecology CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA Methodology of the ES. As part of the assessment, all projects and plans considered alongside the Proposed Development have been allocated into 'tiers' reflecting their current stage within the planning and development process.

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

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

1.13.4 The CEA also considers the Proposed Development and the anticipated National Grid Electricity Transmission (NGET) substation (which will be implemented by NGET and thus, does not form part of the Proposed Development) together. This is because the NGET substation will be required for the connection of the Proposed Development to the national grid.

1.13.5 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 1.28**. The locations of such projects, plans and activities are presented on Figure 1.2 of Volume 1, Appendix 5.3: CEA Screening Matrix of the ES.

1.13.6 All of the identified projects, plans and activities are currently at the Tier 1 or Tier 3 stage.

Table 1.28: List of cumulative developments considered within the CEA

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
Tier 1						
White Cross Floating Offshore Windfarm	Permitted	7.8 (with the Offshore Cable Corridor overlapping / directly adjacent to the White Cross Cable Corridor)	Proposed offshore windfarm located in the Celtic Sea with a capacity of up to 100 MW. The Windfarm Site is located over 52 km off the North Cornwall and North Devon coast (west-north-west of Hartland Point), in a water depth of 60m – 80 m. The Windfarm Site covers 50 km^2. The current wind turbine design envelope for the project is a wind turbine generator capacity of 12-24 MW, 6-8 three bladed horizontal axis turbines with a rotor diameter of 220-300 m.	2028 - 2029	2029 onwards	Construction and operational overlap with the Proposed Development
Celtic Interconnector	Under construction	Crosses offshore cable corridor	700 MW high-voltage direct current submarine power cable under construction between the southern coast of Ireland and the north-west coast of France. The UK elements of the Celtic Interconnector comprise: • A submarine cable within the UK EEZ approximately 211 km in length placed on or beneath the seabed. It passes approximately 30 km west of the Isles of Scilly and approximately 75 km west of	2025-2026 (commencement of offshore marine cable installation)	2027	No overlap with construction, however there will be operational overlap with the Proposed Development

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			Land's End, but does not enter UK Territorial Waters. • Secondary rock protection using rock placement (if required), where target depth of cable lowering is not fully achieved or at cable crossings, with a linear extent of between 0 km and 80 km or 0 to 270 tnnes. • A fibre optic link shall be laid along the cable route for operational control, communication and telemetry purposes.			
New dwelling and flood defence wall flanking River Torridge	Permitted	4.5	It is proposed to construct a new four bedroom, three-storey residential dwelling with ground floor parking, driveway, and landscaped border. As part of the proposed development, it is proposed to modify and extend the existing flood defence wall which runs for a 40 metre (m) length along the eastern site boundary. These works are required to provide necessary flood protection to the proposed dwelling. The works are proposed to take place from August 2024 - March 2025.	2024 - 2025	2025 onwards	No overlap with construction, however there will be operational overlap with the Proposed Development
Shellfish cultivation pilot at seaweed farm	Permitted	1	Algapelago Marine Limited intend to trial a shellfish cultivation pilot to establish the commercial feasibility of shellfish cultivation at their existing site in Bideford Bay. The shellfish pilot study will last four years, to enable species to reach full market size. Two species are in scope for the cultivation pilot trials: i)	N/A	2024 - 2028	No overlap with construction, however there will be operational overlap with the Proposed Development

Project	Status	Distance from Proposed Development (nearest point, km)	Description	Dates of Construction (if available)	Dates of Operation (if available)	Overlap with the Proposed Development?
			blue mussel - spat sourced from natural settlement and ii) king scallop - spat sourced from Scallop Ranch Ltd. The pilot trial is anticipated to run from August 2024 - August 2028. Infrastructure: Algapelago intend to install 4 x 200 m submerged longlines for the propagation of shellfish. All infrastructure will be deployed within Algapelago's existing licenced area.			
Tier 2						
None identified						
Tier 3						
The Crown Estate's Celtic Sea Floating Offshore Wind Leasing Round 5 - Project Development Area 3 (PDA3)	Future planned development	Overlaps with portion of the offshore cable corridor	PDA 3 sits within English Governance and is one of three suitable PDAs identified within the Celtic Sea for floating offshore wind development, each of which having a potential capacity of up to 1.5 GW.	Unknown (the schedule for PDA 3 is unknown, however, pre-consent surveys were scheduled for 2024).	Unknown	As the schedule for PDA 3 is currently unknown, there is the potential for overlap with both the construction and operational phases of the Proposed Development

Scope of Cumulative Effects Assessment

1.13.7 The cumulative effects presented and assessed in this section have been based on the PDE set out in Volume 1, Chapter 3: Project Description of the ES as well as the information available on other projects and plans. The maximum design scenario as described for the Proposed Development (see **Table 1.21**) has been assessed cumulatively with the following other projects/plans:

- White Cross Floating Offshore Windfarm
- Celtic Interconnector
- New dwelling and flood defence wall flanking River Torridge
- Shellfish cultivation pilot at seaweed farm
- The Crown Estate's Celtic Sea Floating Offshore Wind Leasing Round 5 - Project Development Area 3 (PDA3).

1.13.8 It should be noted that the Celtic Interconnector is contained within the planned 20 in-service crossings for the Proposed Development. It is assumed that the Celtic Interconnector will be in place prior to construction of the crossing.

1.13.9 In undertaking the CEA for the Proposed Development, it is important to consider that it is less certain if projects and plans in Tier 3, which are not yet consented, may contribute to cumulative impacts with the Proposed Development. This is because some projects may not achieve approval or may not be built due to other factors (e.g. client withdrawal). It is understood that the Crown Estate's Celtic Sea Floating Offshore Wind Leasing Round 5 - Project Development Area 3 (PDA3) is proposed to have landfall in North Devon which means it is likely to have a future cable crossing with the Proposed Development. However, there is not sufficient information available to allow a site specific assessment of the impacts on benthic ecology receptors and therefore, this Tier 3 project has been scoped out of this assessment with no CEA of the Proposed Development alongside Tier 3 projects undertaken.

1.13.10 No Tier 2 projects have been identified and therefore a CEA of the Proposed Development alongside Tier 2 projects has not been undertaken.

Cumulative Effects Assessment

1.13.11 A description of the significance of cumulative effects upon benthic ecology receptors arising from construction, operation and maintenance and decommissioning is given below.

Construction

Tier 1 Projects

1.13.12 There is potential for cumulative impacts as a result of construction, operation and decommissioning activities associated with the other projects overlapping with that of the construction phase for the Proposed Development.

1.13.13 Other than the White Cross Floating Offshore Windfarm, the projects identified under Tier 1, which include subsea cables and aquaculture sites, will all be operational at the time that the Proposed Development enters construction (i.e.

there will be no overlap of construction of the Proposed Development with the construction of other projects).

1.13.14 Construction phases of the Proposed Development and White Cross Floating Offshore Windfarm are anticipated to temporally overlap, with the export cable for White Cross being in close proximity to the Proposed Development. The two developers will continue to liaise and collaborate to ensure that the corridors are complementary i.e. they account for each other's microrouting whilst maintaining maximum separation distance. The schemes would coordinate such that temporal overlap of activities are avoided, to minimise any cumulative impacts. All of the construction impacts are anticipated to be infrequent, short term in duration and/or low in extent, and therefore, the risk of cumulative impact on benthic ecology receptors is anticipated to not be higher than that described in **section 1.10**. Any impacts are considered not significant in EIA terms.

1.13.15 Operation and maintenance activities associated with these Tier 1 projects is expected to be broadly similar in nature to that of the Proposed Development. Cumulative impacts between the construction phase of the Proposed Development and the operational phase of the Tier 1 projects may include temporary habitat loss / disturbance, temporary increases in suspended sediments, underwater noise & vibration and changes to water quality. All of these impacts are expected to be very infrequent, short term in duration and low in extent with regards to operation and maintenance activities. While there may be some overlap with these activities with that of the construction of the Proposed Development, it is expected for the majority of the time these impacts would be temporally and / or physically separated. Therefore, the risk of cumulative impact on benthic ecology receptors is anticipated to not be higher than that described in **section 1.10**. Any impacts are considered not significant in EIA terms.

Operation and Maintenance

Tier 1 Projects

1.13.16 Cumulative impacts may arise as a result of the operation and maintenance phase of the Proposed Development overlapping with that of the other Tier 1 projects.

1.13.17 Operation and maintenance activities associated with these Tier 1 projects is expected to be similar in nature to that of the Proposed Development. Cumulative impacts between the operation and maintenance phase of the Proposed Development and the operational phase of the Tier 1 projects may include those impacts associated with repair activities (temporary habitat loss / disturbance, temporary increases in suspended sediments and changes to water quality). All of these impacts are expected to occur very infrequently, be short term in duration and low in extent. While there may be some overlap between repair activities associated with the Proposed Development and that of the other Tier 1 projects, it is expected for the majority of the time these impacts would be temporally separated.

1.13.18 Cumulative impacts may also arise from non-repair activity related impacts, which include EMF effects, long term habitat loss, changes in hydrodynamic regime and sediment heating. While all of these impacts are continuous and long term, they are likely to be small in extent and no cumulative effects are predicted.

1.13.19 Therefore, the risk of cumulative impact on benthic receptors is not considered to be greater than that described in **section 1.11**. Any impacts are considered not significant in EIA terms.

Decommissioning

Tier 1 Projects

1.13.20 At the current stage of development, there is limited information on the decommissioning programmes of the different projects and whether these would temporally overlap with any decommissioning activities of the Proposed Development. However, it is anticipated that in general the decommissioning impacts would be similar in nature to those of construction for both the Proposed Development and other projects but with a lower magnitude of effect (on account of the smaller footprint and scale of works). In addition, it is not confirmed at this time, if the Proposed Development will be decommissioned and cables removed, or decommissioned and cables left *in-situ*. As mentioned in **section 1.12**, during decommissioning, cable removal would have the potential to cause similar impacts to those associated with the construction phase (**section 1.10**) and cables left in-situ would have the potential to cause similar impacts to those associated with the operational phase (**section 1.11**)

1.13.21 Any impacts are considered not significant in EIA terms.

1.14 Transboundary Effects

1.14.1 A screening of transboundary impacts has been carried out (Volume 1, Appendix 5.2 of the ES) and has identified that there was no potential for significant transboundary effects with regard to benthic ecology from the Proposed Development upon the interests of other states.

1.14.2 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to benthic ecology from the Proposed Development upon the interests of other states has been assessed as part of this ES.

1.14.3 The potential transboundary impacts assessed within Volume 1, Appendix 5.2: Transboundary Screening of the ES are summarised below:

1.14.4 Those UK activities with potential to disturb sediment may result in a sediment plume. This plume could potentially cause some transboundary effects, in the French EEZ, given that the Proposed Development boundary extends up to the UK EEZ boundary. Similarly, the Proposed Development in the vicinity of the UK EEZ boundary could cause changes in the hydrodynamic regime within the French jurisdiction.

1.14.5 The Project will extend in an uninterrupted linear fashion, into the French EEZ (beyond the UK Proposed Development), with installation works undertaken in a continuous manner across jurisdictions and using the same construction methods. Parallel French environmental assessments will be undertaken which will be submitted to the French consenting authorities. Furthermore, the benthic habitat types and macrofaunal assemblages in the vicinity of the UK / French EEZ boundary are sufficiently broadscale (see Volume 3, Figure 1.2 and Figure 1.3 of the ES) to have confidence that the characterisation of effects will be very similar on either side (within the near vicinity) of the EEZ boundary. Thus, any transboundary effects from the UK Proposed Development on benthic ecology receptors in French waters, or vice versa, will, on account of inherently greater distance from the impact generating activity, be of lesser impact magnitude than the similar impacts deriving from the immediate jurisdiction.

1.14.6 No other effects on benthic ecology receptors are likely to be transboundary other than those occurring at the boundary of the UK EEZ.

1.14.7 Referring to the assessments of each individual Proposed Development phase (**sections 1.10**, **1.11** and **1.12** of this chapter), it is concluded that there is no potential for significant transboundary effects on Benthic Ecology receptors from the Proposed Development upon the interests of other states.

1.15 Inter-related Effects

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

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Proposed Development (construction, operation and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases.
- Receptor led effects: Assessment of the scope for all relevant effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.

1.15.2 A description of the likely interactive effects arising from the Proposed Development on benthic ecology is provided in Volume 4, Chapter 5: Inter-related effects of the ES.

1.16 Summary of Impacts, Mitigation Measures and Monitoring

1.16.1 Information on benthic ecology within the study area was collected through desk-based review and site-specific surveys.

1.16.2 **Table 1.29** presents a summary of the impacts, measures adopted as part of the Proposed Development and residual effects with respect to benthic ecology. The impacts assessed included:

- Temporary habitat loss/disturbance
- Temporary increase in suspended sediments and sediment deposition
- Changes to water quality (release of hazardous substances from sediments)
- Introduction and spread of INNS
- Underwater noise & vibration
- Change in hydrodynamic regime (scour & accretion)
- Sediment heating
- Electromagnetic Fields
- Long-term habitat loss/change

- Accidental pollution

1.16.3 Overall, it is concluded that there will be **no significant effects** arising from the Proposed Development during the construction, operation and maintenance or decommissioning phases.

1.16.4 Potential effects on the Lundy SAC and Taw-Torridge Estuary SSSI due to temporary increase in suspended sediments and sediment deposition (the only impact considered relevant for these sites) were considered to be **negligible** (as they were beyond the calculated zone of sediment dispersal).

1.16.5 Potential effects on the Bideford to Foreland Point MCZ, Hartland to Tintagel MCZ, South West Approaches to Bristol Channel MCZ and the East of Haig Fras MCZ due to temporary increase in suspended sediments and sediment deposition, changes to water quality (release of hazardous substances from sediments), introduction and spread of INNS and accidental pollution were determined to be **negligible** or **minor** and it was considered that they would not hinder achievement of the conservation objectives for the MCZs (an MCZ Assessment is also provided alongside the ES (document reference 7.16)).

1.16.6 A cumulative assessment was undertaken which found that the risk of impact on benthic ecology receptors in combination with other projects is not higher than that assessed for the Proposed Development alone. It was concluded that there will be no significant cumulative effects from the Proposed Development alongside other projects / plans.

1.16.7

1.16.8 **Table** 1.30 presents a summary of the cumulative impacts, mitigation measures and residual effects.

1.16.9 Potential transboundary and inter-related impacts have been assessed and no potential significant effects were identified.

Table 1.29: Summary of environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Temporary habitat loss/disturbance	✓	✓	✓	OFF05 and OFF03 (see **Table 1.20**)	**Benthic habitats and species** C: Low to Medium O: Low to Medium D: Low to Medium	**Benthic habitats and species** C: Low O: Low D: Low	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None	C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None
Temporary increase in suspended sediments and sediment deposition	✓	✓	✓	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Negligible to Medium O: Negligible to Medium D: Negligible to Medium **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Changes to water quality (release of hazardous substances from sediments)	✓	✓	✓	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Medium O: Medium D: Medium **Protected sites** C: Medium O: Medium D: Medium	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None
Introduction and spread of INNS	✓	✓	✓	OFF05, OFF04, OFF06 and OFF11 (see **Table 1.20**)	**Benthic habitats and species** C: Medium to High O: Medium to High D: Medium to High **Protected sites** C: High O: High D: High	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Low O: Low D: Low	**Benthic hábitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
									Protected sites C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	
Underwater noise & vibration	✓	×	×	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Low	**Benthic habitats and species** C: Low	**Benthic habitats and species** C: Minor adverse (not significant)	None	**Benthic habitats and species** C: Minor adverse (not significant)	None
Change in hydrodynamic regime (scour & accretion)	×	✓	✓	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None
Sediment heating	×	✓	×	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
									(not significant)	
Electromagnetic Fields	×	✓	×	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse (not significant)	None
Long-term habitat loss/change	×	✓	✓	OFF05, OFF01 and OFF03 (see **Table 1.20**)	**Benthic habitats and species** O: Medium to High D: Medium to High	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None
Accidental pollution	✓	✓	✓	OFF05, OFF07, OFF08, OFF10 and OFF11 (see **Table 1.20**)	**Benthic habitats and species** C: Medium O: Medium D: Medium **Protected sites** C: Medium O: Medium D: Medium	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Low O: Low D: Low	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites**	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
									C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	

[a] C = construction phase O = operational and maintenance phase D = decommissioning phase

Table 1.30: Summary of cumulative environmental effects

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect Further Mitigation	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Tier 1										
Temporary habitat loss/disturbance	✓	✓	✓	OFF05 and OFF03 (see **Table 1.20**)	**Benthic habitats and species** C: Low to Medium O: Low to Medium D: Low to Medium	**Benthic habitats and species** C: Low O: Low D: Low	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None
Temporary increase in suspended sediments and sediment deposition	✓	✓	✓	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Negligible to Medium O: Negligible to Medium D: Negligible to Medium **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect Further Mitigation	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Changes to water quality (release of hazardous substances from sediments)	✓	✓	✓	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Medium O: Medium D: Medium **Protected sites** C: Medium O: Medium D: Medium	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Negligible O: Negligible D: Negligible	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Negligible O: Negligible D: Negligible (not significant)	None
Introduction and spread of INNS	✓	✓	✓	OFF05, OFF04, OFF06 and OFF11 (see **Table 1.20**)	**Benthic habitats and species** C: Medium to High O: Medium to High D: Medium to High **Protected sites** C: High O: High D: High	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Low O: Low D: Low	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites**	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect Further Mitigation	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
							C: Minor adverse O: Minor adverse D: Minor adverse (not significant)			
Underwater noise & vibration	✓	×	×	OFF05 (see **Table 1.20**)	**Benthic habitats and species** C: Low	**Benthic habitats and species** C: Low	**Benthic habitats and species** C: Minor adverse (not significant)	None	**Benthic habitats and species** C: Minor adverse (not significant)	None
Change in hydrodynamic regime (scour & accretion)	×	✓	✓	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None
Sediment heating	×	✓	×	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect Further Mitigation	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
Electromagnetic Fields	×	✓	×	OFF05 and OFF01 (see **Table 1.20**)	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Low	**Benthic habitats and species** O: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse (not significant)	None
Long-term habitat loss/change	×	✓	✓	OFF05, OFF01 and OFF03 (see **Table 1.20**)	**Benthic habitats and species** O: Medium to High D: Medium to High	**Benthic habitats and species** O: Low D: Low	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None	**Benthic habitats and species** O: Minor adverse D: Minor adverse (not significant)	None
Accidental pollution	✓	✓	✓	OFF05, OFF07, OFF08, OFF10 and OFF11 (see **Table 1.20**)	**Benthic habitats and species** C: Medium O: Medium D: Medium **Protected sites** C: Medium O: Medium D: Medium	**Benthic habitats and species** C: Low O: Low D: Low **Protected sites** C: Low O: Low D: Low	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Minor adverse	None	**Benthic habitats and species** C: Minor adverse O: Minor adverse D: Minor adverse (not significant) **Protected sites** C: Minor adverse O: Minor adverse D: Minor adverse (not significant)	None

Description of Impact	Phase[a]			Embedded Mitigation	Sensitivity of receptor	Magnitude of impact	Significance of Effect Further Mitigation	Further Mitigation	Residual Effect	Proposed Monitoring
	C	O	D							
							O: Minor adverse D: Minor adverse (not significant)			
Tier 2										
None identified										
Tier 3										
The projects categorised under Tier 3 could not provide sufficient information to allow a robust assessment of the impacts on benthic ecology receptors and therefore, all Tier 3 projects have been scoped out of this assessment.										

[a] C = construction phase O = operational and maintenance phase D = decommissioning phase

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