XLINKS' MOROCCO-UK POWER PROJECT

Outline Offshore Biosecurity Plan

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Glossary

Term	Meaning
Applicant	Xlinks 1 Limited
Invasive Non-Native Species (INNS)	Invasive non-native species are species that have been introduced (deliberately or accidentally) by people, which are having a detrimental impact on the economy, wildlife or habitats of Britain.
Non-Native Species (NNS)	A non-native species is a species that has been introduced into the country by human intervention (either deliberately or accidentally). The term 'non-native species' is synonymous with alien, non-indigenous, foreign and exotic.
Proposed Development	The element of the 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.

Acronyms

Acronym	Meaning
BAS	Burial Assessment Study
BWMC	Ballast Water Management Convention
CBRA	Cable Burial Risk Assessment
CLV	Cable laying vessel
EC	European Commission
EEZ	Exclusive economic zone
EUNIS	European Nature Information System
FDP	Final (offshore) Decommissioning Plan
FOC	Fibre optic cables
FTU	Formazin Turbidity Units
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
HDD	Horizontal Directional Drilling
IDS	Initial (offshore) Decommissioning Strategy
IMO	International Maritime Organization
INNS	Invasive non-native species
JNCC	Joint Nature Conservation Committee
MBES	Multibeam Echo Sounder
MCZ	Marine Conservation Zone
MEPC	Marine Environment Protection Committee
MFE	Mass Flow Excavation
MMO	Marine Management Organisation
NBN	National Biodiversity Network
NNS	Non-native Species
NNSS	Non-native Species Secretariat
NSES	Non-Statutory Environmental Statement
OCC	Offshore Cable Corridor

Acronym	Meaning
OCEMP	Outline Construction Environmental Management Plan
OOS	Out of Service
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PLONOR	Pose Little Or No Risk
PPE	Personal Protective Equipment
PSA	Particle Size Analysis
PSU	Practical salinity unit
ROV	Remotely operated vehicle
SAC	Special Area of Conservation
SMP	Shoreline Management Plan
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
UK	United Kingdom

Units

Units	Meaning
km	Kilometre
m	Metre
m/s	Metres per Second
%	Percent
m^2	Square metre

1 OUTLINE OFFSHORE BIOSECURITY PLAN

1.1 Introduction

1.1.1 This document forms the Outline Offshore Biosecurity Plan, application document ref. 7.19 (referred to as the 'Plan' herein), which has been prepared 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 as the 'Proposed Development'.

1.1.2 The offshore elements of the Proposed Development in UK waters that are the subject of this Plan will be undertaken within the Offshore Cable Corridor. The extent of the Offshore Cable Corridor is from the UK exclusive economic zone (EEZ) boundary to the landfall site at Cornborough Range on the north Devon coast (

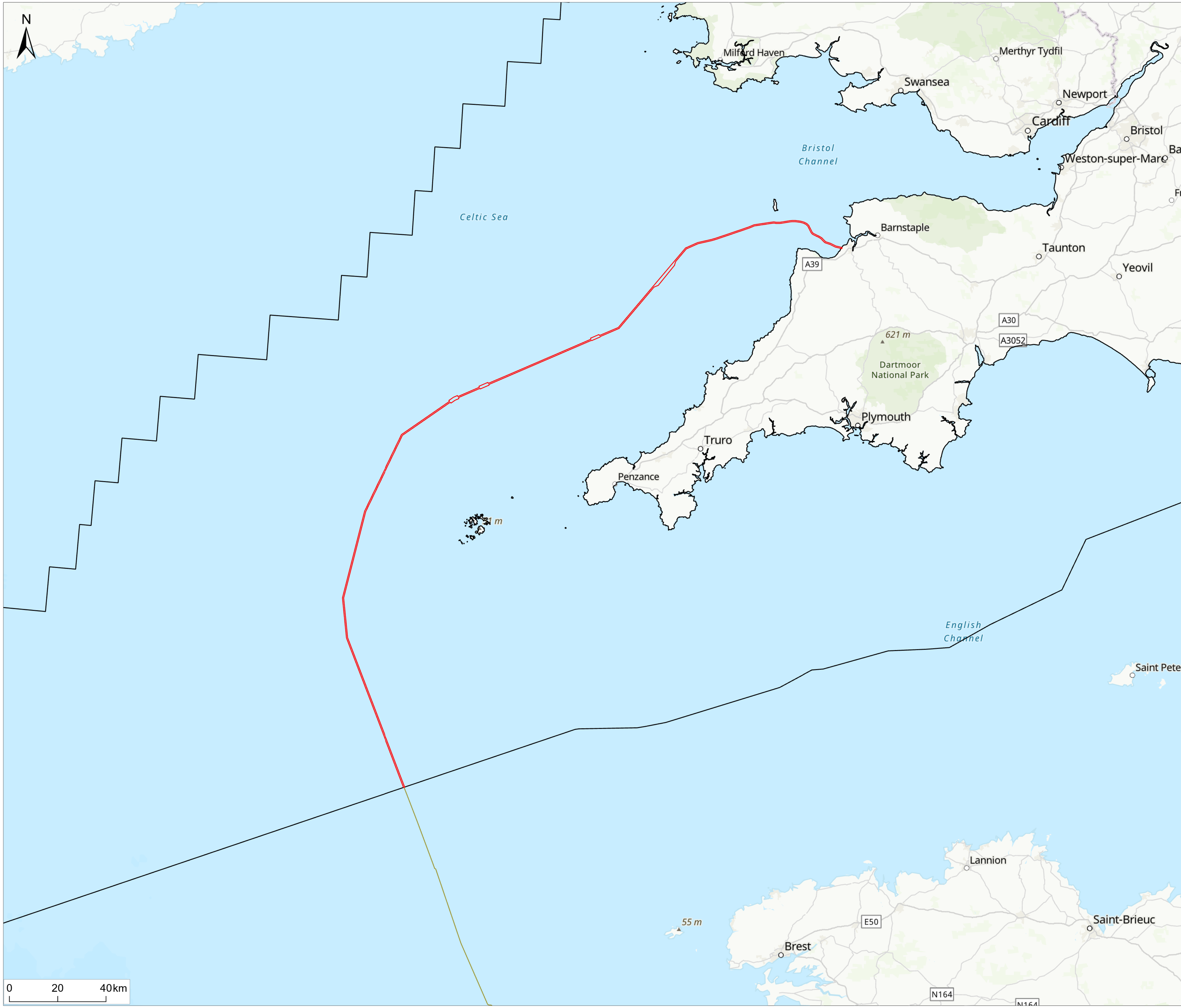
1.1.3

1.1.4 **Figure** 1). The total length of the Offshore Cable Corridor (OCC) in UK waters is approximately 370 km.

1.1.5 The Plan assesses the potential risks of introduction of non-native species (NNS) during the construction, and operation and maintenance phases of the Proposed Development. An initial assessment of the decommissioning phase of the Proposed Development is also included, acknowledging that the full decommissioning plan will be developed at a later stage.

1.1.6 The main aim of the Plan is to minimise the risk of introduction and establishment of NNS as a result of Proposed Development activities, and to help prevent the spread of NNS (and Invasive Non-Native Species (INNS)) already present within the OCC to new locations.

1.1.7 This plan is considered an outline plan and 'live' document until any post consent licence conditions relating to biosecurity and INNS for the Proposed Development have been received and incorporated into the plan. This outline plan will be revised and finalised ahead of construction by the construction contractor, as conditioned by the Outline Offshore Construction Environmental Management Plan (OCEMP) (document ref. 7.9).



Notes
1. This plan is scaled at paper size A3. If received electronically it is the recipients responsibility to print to the correct scale. Only written dimensions should be used.

Legend

- UK Offshore Cable Corridor
- Indicative Cable Centreline
- UK Exclusive Economic Zone (EEZ)

Rev	Description	By	CB	Date
P01	FINAL	PN	MB	Nov 2024

Client: Xlinks 1 Limited

Project: Xlinks' Morocco-UK Power Project

Title: Offshore Cable Corridor

Status	Scale @ A3	Date Created
FINAL	1:1,500,000	Nov 2024

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Background

1.1.8 A NNS (also known as an alien, non-indigenous, foreign or exotic species) is a species or subspecies occurring outside its native range, i.e. the range it occupies naturally without the intervention of human activity. This includes any part of an organism that might survive and subsequently reproduce (Payne et al., 2014; Cook et al., 2015).

1.1.9 The number of marine NNS in the UK and Ireland is increasing each year, with their spread primarily due to shipping (ballast water, biofouling of hulls) and imported consignments of cultured species (Nall et al., 2016; Cook et al., 2015). Estimates suggest that approximately 10–12 new NNS establish annually in both the terrestrial and aquatic environments (NNSS, 2015; Kakkonen et al., 2019). It is estimated that there are currently over 100 marine non-native species in the UK (Payne et al., 2014; Kakkonen et al., 2019).

1.1.10 While most NNS are harmless, it is estimated that 10-15% of NNS cause significant negative environmental, social and economic impacts, and these are termed INNS (NNSS, 2023). The environmental impacts that INNS cause include direct and indirect competition with native species, the introduction and spread of novel diseases, and habitat alteration, leading to INNS being recognised as a major driver of global biodiversity loss (IPBES, 2023).

Policy & Legislation

1.1.11 National and international policy and legislation set out requirements for compliance with the implementation of biosecurity[1] measures and the control of NNS. In the UK, the primary policy and legislative drivers include the following:

- **Marine Strategy Regulations 2010** – Transpose the Marine Strategy Framework Directive 2008 (EU Directive 2008/56/EC) into UK law. Requires that Non-Native species introduction is at levels that do not adversely alter ecosystems.
- **The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017** – Non-native species are one of the 'other pressures' incorporated into water body assessments under this regulation. The presence of non-native species could result in a water body failing to meet environmental objectives laid out in these Regulations.
- **Wildlife and Countryside Act (1981 as amended)** – it is illegal to allow any animal which is not ordinarily resident in Great Britain, or that is listed on Schedule 9 to the Act, to escape into the wild, or to release it into the wild. It is also illegal to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 of the Act.

[1] The term biosecurity, in relation to INNS, is defined by Cook *et al.* (2015) as "*taking action in order to minimise the introduction, spread and establishment of invasive non-native species*"

- **Retained EU Regulation on the prevention and management of the introduction and spread of invasive alien species (Regulation No 1143/2014) & The Invasive Non-native Species (Amendment etc.) (EU Exit) Regulations 2019 (No. 223)** – came into force in January 2015, amended in 2019 to become a part of retained regulations after the UK left the EU. Under this retained Regulation listed species are prohibited from being kept, imported, sold, bred, grown and released into the environment, and are targeted for prevention, early detection, rapid response, and management. Pathway action plans to control the introduction and spread of listed species are required under the retained regulation and incorporate biosecurity guidance.
- **The Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022** – these regulations implement the requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Ballast Water Management Convention, BWMC) which aims to control the transfer of harmful aquatic organisms.

1.1.12 Additional guidelines and policy strategy further define requirements with respect to INNS control:

- **International Maritime Organisation (IMO) Marine Environment Protection Committee (MEPC) Guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species 2023 (MEPC, 2023)** – this guidance provides a globally consistent approach to managing biofouling by providing useful recommendations of general measures to reduce the risk associated with biofouling for all types of ships.
- **The Great Britain Invasive Non-Native Species Strategy (2023 to 2030) (Defra, Scottish Government and Welsh Government, 2023)** – a national policy framework on INNS in terrestrial, freshwater and marine environments, addressing the key weaknesses in UK's capacity to respond to the threats posed by non-native species. The strategy builds on success from 2008 and 2015 with specific outcomes to minimise the risk of introduction and establishment and reduce the negative impacts of INNS.
- **Southwest Inshore and Southwest Offshore Marine Plan (Defra, 2021)** – contains two policies on invasive non-native species to achieve the high-level marine objectives set out in the UK Marine Policy Statement:
  - **SW-INNS-1**: Proposals that reduce the risk of introduction and/or spread of invasive non-native species should be supported. 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.

– **SW-INNS-2:** Public authorities with functions to manage activities that could potentially introduce, transport or spread invasive non-native species should implement adequate biosecurity measures to avoid or minimise the risk of introducing, transporting or spreading invasive non-native species.

1.2 Methodology

1.2.1 This Plan has been prepared following guidance in Cook et al. (2015) which indicates there are two types of biosecurity plans, namely 'Site' and 'Operations' plans:

- A 'Site' Biosecurity Plan covers the long-term, on-going activities at a single location such as a marina (e.g., vessel activity or routine dredging activities).
- An 'Operations' Biosecurity Plan is for a particular activity or set of activities which are time-limited (e.g., construction of marine infrastructure or one-off activities) (Cook et al., 2015).

1.2.2 This assessment has been conducted following this guidance, taking into account the 'Operations' type of plan to cover the particular marine activities involved with the construction, operation and (outline) decommissioning of the Proposed Development. As activities are planned, and vessels used will be either owned by the Applicant or will be contracted for the purposes of undertaking activities, there is a high level of control.

1.2.3 The preparation of this Plan involved the following aspects:

- Defining the construction, operation and (outline) decommissioning activities to be undertaken including methods, frequency, size of operation, location etc.
- Defining all potential NNS pathways (pathways for introduction and spread) associated with Proposed Development activities.
- Establishing environmental site conditions including: a description of the location, current speed data, physiochemical conditions ((e.g. temperature, salinity, pH etc.) and how these affect the risk of the introduction and the spread of NNS); this included consideration of benthic ecology baseline survey results and NNS known to be present at the site.
- Assessment of the risk of introduction and spread of NNS for each pathway associated with construction, operation and (outline) decommissioning activities (High, Medium, Low).
- Proposing biosecurity control measures for the medium and high-risk pathways.
- Proposing a contingency plan, e.g., rapid response and containment measures if there is any evidence of high-risk incidents or if new NNS are detected.
- Proposing monitoring, site surveillance and reporting procedures.
- Providing additional sources of information relating to NNS and the control of the spread of NNS.

1.3 Description of Proposed Development

1.3.1 A full description of the construction activities and methods, and requirements for operation and (outline) decommissioning associated with the Proposed Development is provided in Volume 1, Chapter 3: Project Description of the ES. A summary of key aspects of relevance to this assessment are provided below. Some of the text below provides more information than is required for a Biosecurity Plan and is included for wider context. Principal considerations are vessel activity and any activities involving introduction of equipment, materials or infrastructure to the marine environment (which could provide a pathway for the introduction and spread of NNS).

Construction Phase

Horizontal Directional Drilling – Marine Works

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

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

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

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

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

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

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

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

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

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

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

HDD Duct Installation

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

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

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

1.3.15 All methods of duct installation require marine vessels, however, the pull method would require additional vessels relative to the push method.

Pre-Lay Marine Surveys

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

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

Route Preparation

1.3.18 The marine baseline investigation surveys (see e.g. Volume 3, Appendix 8.4 GEOxyz Environmental Report of the ES) and any pre-cable laying ground condition survey would inform the requirements for, and extent of, seabed preparation and clearance along the Offshore Cable Corridor in UK waters. Types of seabed preparation that could be required prior to cable installation include:

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

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

Seabed Debris

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

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

Out of Service Cables

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

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

Sandwaves and Large Ripples

1.3.24 The outline Cable Burial Risk Assessment (CBRA) (Volume 1, Appendix 3.4: Outline CBRA of the ES) has determined that there are no sandwaves or large sand ripples in UK waters that would require pre-sweeping / large-scale flattening. The scale of sandwaves and ripples is such that cable burial below mobile sediment layers is expected to be achieved during normal installation procedures i.e. using MFE and/or 'surface plough'/leveller.

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

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

Boulder Clearance

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

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

Trench Ploughing

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

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

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

Cable Installation Methods

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

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

Cable Burial Method

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

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

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

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

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

Additional Cable Protection

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

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

Cable Crossings

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

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

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

1.3.44 As outlined in paragraph 1.3.22, there are also x27 OOS cables that cross the Offshore Cable Corridor which will have a short section removed where possible. As a worst case (given removal conversations with historical asset owners are ongoing), it is assumed that x5 of the OOS cables will require crossings (5 OOS cables x 2 bipoles = 10 OOS cable crossing protection structures in total).

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

Cable Burial Depth, Width and Spacing

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

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

Operational Phase

Inspection Surveys

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

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

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

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

- Routine surveys of the offshore submarine cables shall commence two years from the commissioning of the first Bipole.

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

Maintenance and Repair

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

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

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

Decommissioning Phase

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

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

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

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

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

Outline Decommissioning Strategy

1.3.12 An Outline Decommissioning Strategy containing the anticipated approach to, and methods associated with decommissioning has been prepared at DCO application stage (document reference 7.17).

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

- be developed in the years that precede decommissioning (separate to the current application for DCO); and
- be subject to EIA or similar environmental appraisal and permitting at that time (separate to the current application for DCO).

1.3.14 The Outline Decommissioning Strategy represents an initial statement of:

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

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

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

- The seabed would be restored, as reasonably as possible and to the extent reasonably practicable, to the condition that it was in before the offshore cables were installed.

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

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

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

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

Cable Recovery

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

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

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

ROV grab method

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

ROV water jets or MFE can be used to weaken the soil along the route line and reduce the resistance on the cables.

Diver method

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

Grapnel method

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

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

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

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

Cable recovery

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

Crossings

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

Landfall sections

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

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

De-burial

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

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

Offshore Decommissioning Schedule

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

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

Post-Decommissioning - Additional Surveys & Seabed Clearance

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

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

Vessel activity

1.3.19 Pathways of introduction involving vessel[2] movements are anticipated to be the highest potential risk for the introduction of NNS. This could either be from discharge of ballast water at site or via transportation on vessel hulls.

1.3.20 Cable installation activities would be undertaken by vessels on a 24 hour / 7-day basis, unless interrupted by weather or other disruptions.

1.3.21 Although details have not been finalised at this stage, **Table 1** sets out the proposed vessel types and initial indications of their anticipated number and total vessel movements (where available) and their role during the Construction, Operation and (outline) Decommissioning phases of the Proposed Development.

[2] For the purpose of this Plan, 'vessel' refers to any boat, barge or floating plant.

Table 1. Proposed vessels to be used during construction.

Proposed vessel	Anticipated No. of Vessels	Indicative total number of days	Home port	Role
Construction				
Pre- and post-installation survey vessels	2	90	Likely UK or European ports	To undertake both pre- and post-installation survey works.
Small tug	1	51	Likely UK (local ports where possible)	Pre-lay grapnel run
CLVs	2 (maximum of 2 at crossover, but only one laying at a time)	144	Likely UK or European ports	CLVs will be used to install HVDC cables along the cable route. It is anticipated that two turntables would be mounted on the CLV(s), each holding up to approximately 160 km of HVDC cable. As the CLV travels along the route, the two turntables release cable at the same rate and the two cables are bundled together at the stern of the vessel and fed overboard. An additional cable tank would contain the fibre optic cables, which would be installed as part of the bundle. Tensioners control the cable tension and cameras monitor the cable to ensure it is laid safely on target.
Guard vessel	Up to 20 (likely to be much less)	3,500	Likely UK (local ports where possible)	Guard vessels will accompany the CLV to maintain surveillance around the worksite ensuring other vessels are kept clear i.e. reducing the risk of collision; guard vessels would also be deployed to protect the cable prior to burial.
Construction support vessel e.g. trenching support	5	457	Likely UK or European ports	Workboats/construction vessels and tugs for all works including route clearance/preparation, trenching, installation of rock protection/concrete mattresses, duct installation, cable pull and floating in, and dive support, depending on requirements. These workboats often deploy ROVs and would utilise geophysical survey and positioning equipment to monitor the progress of the works, and for positioning of any ROVs or other underwater equipment needed to complete the works

Proposed vessel	Anticipated No. of Vessels	Indicative total number of days	Home port	Role
Rock protection vessel	2	352	Likely UK or European ports	Where rock placement is required for additional cable protection (e.g. at cable crossings), a rock placement vessel may be used. Such vessels feature a rock storage hopper and equipment by which rock can be placed *in-situ* on the seabed, such as fall pipes.
Jack up barge	2	120	Likely UK or European ports	For the HDD works (excavation of exit pits, breakthrough, duct push/pull and duct sealing works) near the landfall, jack up vessels would be deployed to enable stable and safe marine works in the subtidal environment
Operation				
Inspection vessel	1	Not yet known	Likely UK or European ports	Inspections via use of a single survey vessel equipped with an inspection ROV and geophysical survey equipment including Multibeam Echo Sounder (MBES), Side Scan Sonar (SSS) and a magnetometer. As built survey, then routine surveys which will decrease in frequency to approximately every 5 years where no issues are found. Routine surveys will be undertaken for the full operational life of the cables (anticipated 50 years).
Repair works vessel (equivalent to CLV)	1	Not yet known	Likely UK or European ports	Repair works for cable failure would require the exposure of the cable at the point of failure, which would require de-burial of the cable from the trench. The cable would then be cut, recovered to the surface, repaired using a section of spare cable and redeployed for reburial using similar methods to those used for installation.
Decommissioning (outline)				
Recovery ship or barge	1	Not yet known	Likely UK or European ports	Would operate to recover offshore cables, sections of offshore cables, or cable ends which are exposed at the time of decommissioning, as required.

Proposed vessel	Anticipated No. of Vessels	Indicative total number of days	Home port	Role
Smaller ship with recovery ship for de-burial	1	Not yet known	Likely UK or European ports	This vessel would conduct any de-burial activities needed before recovery of the cable by the recovery ship or barge.

1.4 Plan Period

Construction Phase

1.4.1 The following dates are indicative at this time, and may be influenced by e.g. weather limitations of the CLV:

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

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

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

Operational Phase

1.4.4 The operational phase of the Proposed Development is considered to be from the end of the construction phase, until the end of the operational lifespan (approximately 50 years).

1.5 Baseline Information

Physical Processes

1.5.1 For shallow and coastal areas of the Proposed Development, data within the North Devon and Somerset Shoreline Management Plan (SMP) indicate that currents within Bideford Bay are moderate ranging between 0.5 and 1 m/s during peak tidal periods (see Volume 3, Chapter 8: Physical Processes of the ES).

1.5.2 Peak flows from ABPmer's UK Renewables Atlas were slightly lower than those extracted from the SMP with peak spring flows between 0.36 m/s and 0.67 m/s and neap peak flows of between 0.23 m/s and 0.45 m/s (see Volume 3, Chapter 8: Physical Processes of the ES).

1.5.3 Tidal currents extracted from the DHI Global Tide model indicated larger depth-averaged spring peak velocities within Bideford Bay were larger compared to the SMP and ABPmer's UK Renewables Atlas, in the region of 1.14 m/s. Whilst depth-averaged neap peak currents were comparable to current velocities provided within the SMP, calculated at 0.57 m/s (see Volume 3, Chapter 8: Physical Processes of the ES).

1.5.4 The Proposed Development also passes through offshore waters. Tidal currents within the Celtic Sea/Bristol Channel Approaches vary in strength and direction throughout the year in these deeper waters but are typically 0.6 m/s during a spring tide (Uncles and Stephens, 2007). The ABPmer's UK Renewables Atlas is in agreement with Uncles and Stephens (2007) with typical spring peak flows in the region of 0.6 m/s. However, faster spring peak flows are located around Lands End (approximately 0.81 m/s – 1.23 m/s) and the Isles of Scilly (approximately 0.83 m/s). This is also in agreement with the DHI Global Tide model, with depth-averaged spring tides between 0.64 and 0.97 m/s (see Volume 3, Chapter 8: Physical Processes of the ES).

1.5.5 Along the proposed offshore cable corridor, typical neap peak flows are between 0.26 m/s and 0.47 m/s (DHI global model), increasing to 0.58 m/s near to Lands End and 0.52 m/s to the north of the Isles of Scilly (UK Renewables Atlas) (see Volume 3, Chapter 8: Physical Processes of the ES).

1.5.6 A multi-parameter seawater profiler was used to measure salinity, temperature, depth, dissolved oxygen, pH and turbidity at locations along the Proposed Development between August and October 2023 (Appendix 8.4 GEOxyz Environmental Report of the ES). An overview of the profile results is:

- Surface temperatures offshore of approximately 16°C, maximum of 19.4°C, decreasing down to 11°C with depth;
- Salinity 35.4 PSU to 35.7 PSU;
- Dissolved oxygen (% saturation) was 100% up to 30 m, decreasing to 90% at 35 m water depth. The lowest was approximately 80% at 60 m and deeper;

- pH offshore ranged between 8.2 and 8.4 up to 30 m, decreasing to 8.1 at the seabed;
- pH remained constant throughout the water column, between 8.2 and 8.3 in shallow waters; and
- Turbidity was generally low in deep waters, with occasional increases where suspended material was present. In shallower waters, turbidity varied between 0 FTU (Formazin Turbidity Units) and approximately 66 FTU at depth.

1.5.7 Areas of full salinity, with no freshwater input and areas of slow tidal currents are often the highest risk areas in terms of potential for marine INNS establishment.

Benthic Ecology

1.5.8 Extensive project-specific benthic characterisation surveys were conducted of the subtidal environment from the landfall to the UK EEZ boundary between August and October 2023 (Appendix 8.4 GEOxyz Environmental Report of the ES).

1.5.9 Particle Size Analysis (PSA) results indicated that sediments were primarily characterised by sand within the nearshore section of the OCC (0 to 15 km), shifting to gravelly sand up to 50 km along the OCC. Between 50 and 200 km along the OCC, sediment was primarily slightly gravelly sand and gravelly sand with some instances of sand and sandy gravel sediments. From ~ 210 to 250 km, the OCC 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 OCC (300 to 373 km) was characterised by gravelly sand, gravelly muddy sand, and slightly gravelly sand and slightly gravelly muddy sand.

1.5.10 Grab samples found that Annelida (segmented worms) was the most abundant taxonomic group across the grab stations. The pea urchin *Echinocyamus pusillus* was also found at 85 of the 96 grab sample replicates taken for macrofaunal analysis. Other abundant species included the polychaetes *Magelona minuta* (recorded at 18 grab stations) and *Ampharete falcata* (recorded at 23 grab stations).

1.5.11 Grab sample stations across the OCC were assigned to a range of habitat types according to EUNIS (2022) and JNCC (2022). A general summary of changes in habitat type along the OCC is provided below:

- Close to the coast (0 to 6 km along the OCC), 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).
- From approximately 6 to 15 km along the OCC, the predominant recorded habitat was 'Sparse fauna in Atlantic infralittoral mobile clean sand' (EUNIS: MB5231 / JNCC: SS.SSa.IFiSa.IMoSa).
- From approximately 15 to 40 km along the OCC 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. However, there was no evidence of Sabellaria reef along the OCC.

- 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).
- 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).
- For the remainder of the Offshore Cable Corridor, approximately 205 to 373 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).

1.5.12 A project-specific intertidal Phase I survey was also conducted in June 2024 to determine intertidal habitat composition/distribution, extent of sub-features and notable habitats/species within the proposed intertidal portion of the Offshore Cable Corridor (at the proposed Landfall location) (see Volume 3, Appendix 1.1: Offshore Intertidal Survey Report of the ES, for more details). It should be noted, however, that due to the utilisation of the HDD approach at landfall there would not be any equipment, plant or personnel within the intertidal zone and no potential pathways for the introduction and spread of intertidal INNS are anticipated.

Protected Sites

1.5.13 The Proposed Development crosses the Bristol Channel Approaches / Dynesfeydd Môr Hafren Special Area of Conservation (SAC), and a section runs immediately adjacent to the Southwest Approaches to Bristol Channel Marine Conservation Zone (MCZ). Other designated sites with biological marine features within 15 km of the Proposed Development are:

- Bideford to Foreland Point MCZ (0.5 km);
- East of Haig Fras MCZ (0.65 km);
- Lundy MCZ (3.5 km);
- Lundy SAC (3.5 km);
- Taw-Torridge Estuary Site of Special Scientific Interest (SSSI), (5 km); and
- Hartland Point to Tintagel MCZ (11.5 km)

1.6 Current and Horizon NNS

1.6.1 Due to its close proximity to northern Europe and Ireland, as well as its history of supporting commercial shipping activities, the Celtic Sea experiences a large volume of shipping and is known to support many species not native to the area. NNS known to be present within the vicinity of the Proposed Development are listed in **Table 2** from project-specific surveys conducted for the Proposed Development and open-source records of NNS available from the National Biodiversity Network (NBN) Atlas (NBN, 2024). Records from the NBN Atlas have been spatially clipped to include NNS within the benthic ecology study area for the Proposed Development (see Volume 3, Chapter 1: Benthic Ecology of the ES). The benthic ecology study area consists of a 5 km buffer along the OCC, with the exception of Bideford Bay where the buffer was extended to 15.2 km (where physical processes modelling identified the potential for sediments to remain in suspension during peak current periods; c.f. Appendix 8.1 Sediment source concentrations and assessment of disturbance, of the ES). As a result, records are not shown for locations outside the benthic ecology study area.

1.6.2 It is important to note that some of the NNS listed in **Table 2** may have very little to no impact on the receiving ecosystem. However, there are several NNS species that are known to have negative ecological, economic and/or social impacts that are present within the benthic ecology study area and are of concern for further spread. These NNS are noted in **Table 2** as being present on the UK Marine INNS Priority List (Stebbing *et al*., 2020), which is a monitoring and surveillance list for 'priority' marine NNS on which to focus efforts, as these are known to cause negative environmental impacts.

1.6.3 It is also important to consider the following:

- There may be records of other NNS within the benthic ecology study area that have not been uploaded to the NBN Atlas, are unverified or are not open-source.
- Records of NNS within the benthic ecology study area may not mean that there is an established population there. The record may be of an empty/dead individual or in an area from where the species has since been removed.
- Conversely, if there is no record of a certain NNS present, it may not mean that there is no population present. There may be a lack of monitoring, a delay in reporting or a lag in communication.

1.6.4 Horizon species are those which are not yet present in the area but have a high likelihood of introduction and establishment, and of which are likely to have negative ecological, economic and/or social impacts, including impacts yet unknown. It is important to understand which species of concern are not yet within the area but may be present in adjacent or connected areas, and protocols should be in place should any of these species be observed on-site or on construction equipment and vessels (i.e. contingency planning, see Section 1.10 in this report). A list of horizon species identified by Roy *et al*. (2019) is provided in **Table 3**.

Table 2. NNS known to be present within the vicinity of the Proposed Development[3]

Major Taxonomic Group	Scientific Name	Common Name	Is the taxon considered to be invasive?	Additional notes[4]	Recorded during project-specific survey?
Bacillariophyceae	*Biddulphia sinensis*	Diatom	No		No
Bryozoa	*Watersipora subatra*	Red Ripple Bryozoan	Yes	UK Marine Priority INNS	No
Chlorophyta	*Codium fragile*	Dead man's fingers	Yes		No
Crustacea	*Austrominius modestus*	Modest barnacle	Yes		Yes[5]
Mollusca	*Crepidula fornicata*	Slipper limpets	Yes	UK Marine Priority INNS WCA Schedule 9	No
	Magallana gigas	Pacific Oyster	Yes	UK Marine Priority INNS	No
Monocotyledonae	*Spartina anglica*	Common cordgrass	No		No
Ochrophyta	*Sargassum muticum*	Japanese wireweed	Yes	UK Marine Priority INNS WCA Schedule 9	Yes[5]
	Colpomenia peregrina	Bladder weed	Yes		No
Polychaeta	*Goniadella gracilis*	Polychaete worm	No		Yes[5]
Rhodophyta	*Caulacanthus okamurae*	Pom-Pom weed	Yes	UK Marine Priority INNS	No
	Dasysiphonia japonica	Red seaweed	No		No
	Melanothamnus harveyi	Harvey's siphon weed	No		No
	Grateloupia turuturu	Devils tongue seaweed	Yes	UK Marine Priority INNS	No
Tunicata	*Botrylloides violaceus*	Colonial sea squirt	Yes		No
	Perophora japonica	Creeping sea squirt	No		No

[3] Data sources: NBN (2024), supplemented by Hiscock and Earll (2023); Appendix 1.1 Offshore Intertidal Survey Report and Appendix 8.4 GEOxyz Environmental Report of the ES.

[4] 'UK Marine Priority INNS' refers to species listed on the UK Marine INNS Priority List (Stebbing et al. (2020)). 'WCA Schedule 9' refers to species listed in Schedule 9 of the Wildlife and Countryside Act (1981 as amended).

[5] G. gracilis was recorded during the site-specific subtidal survey. A. modestus and S. muticum were both recorded during the site-specific intertidal survey.

Table 3. Horizon species identified by Roy *et al*. (2019) as highly likely to arrive and establish in UK waters.

Scientific Name	Common name	Primary Impact	Native Range
Asterias amurensis [6]	Northern Pacific seastar	Biodiversity	North Pacific
Bispira polyomma	Tube worm	Biodiversity	Not well defined
Celtodoryx ciocalyptoides [6]	Cauliflower sponge	Biodiversity	Northwest Pacific
Cephalothrix simula [6]	Nemertean worm (no common name)	Biodiversity / human health	Northwest Pacific
Ciona savignyi	Sea squirt	Biodiversity	Northwest Pacific
Dyspanopeus sayi	Small mud Crab	Biodiversity	Western Atlantic
Geukensia demissa	Ribbed horse mussel	Biodiversity	Atlantic coast of N. America
Hemigrapsus sanguineus [6]	Asian shore crab	Biodiversity	Western Pacific
Homarus americanus [6]	American lobster	Biodiversity / economic	Northwest Atlantic
Megabalanus coccopoma	Titan acorn barnacle/ large pink barnacle	Biodiversity	Tropical Eastern Pacific
Megabalanus tintinnabulum	Sea tulip	Biodiversity	Tropical Eastern Pacific
Mnemiopsis leidyi [6]	American comb jelly	Biodiversity / economic	Western Atlantic
Mulinia lateralis [6]	Dwarf surf clam	Biodiversity	Western Atlantic
Mytilicola orientalis	Parasitic copepod (red worm disease)	Biodiversity	Northwest Pacific
Ocinebrellus inornatus [6]	Japanese oyster drill	Biodiversity / economic	Northwest Pacific
Pterois volitans	Red lionfish	Human health	Indo-Pacific
Rapana venosa	Veined rapa whelk	Biodiversity / economic	Western Pacific
Rhithropanopeus harrisii	Harris mud crab	Biodiversity	Northwest Atlantic
Rugulopteryx okamurae	Asian fan weed	Biodiversity	Northwest Pacific
Styela plicata	Pleated tunicate	Biodiversity	Northwest Pacific
Theora lubrica	Asian semele	Biodiversity	Northwest Pacific

[6] Denotes species which are in the top 30 NNS most likely to become invasive in GB in the next 10 years, as per Roy et al. (2019).

1.7 Pathways of Introduction and Spread of NNS

1.7.1 An evaluation of pathways of potential introduction and spread of NNS associated with the construction, operation and (outline) decommissioning of the Proposed Development has been made. Activities can be summarised into five key pathways.

Vessel movements

1.7.2 There are two mechanisms of NNS transfer associated with vessel movements i.e. via biofouling and ballast water. NNS can be attached to the hull or other submerged niche areas (seawater intake and outflows, positioning thrusters, vents and grills, prop shafts and other complex hull structures) of vessels arriving into, and leaving, the Proposed Development site. There is risk of NNS introduction and spread if fouling organisms detach (including release of viable fragments and life stages) from vessels in locations where they have not previously been recorded. NNS can also be transported in ballast water used to maintain the stability of vessels. There is risk of NNS introduction and spread if NNS taken up in ballast water are released with discharged ballast into locations where they have not previously been present.

Equipment & Personnel PPE

1.7.3 NNS can also be transported on equipment and PPE, for example, attached to their surface or trapped in damp areas created during storage. If biofouled equipment or PPE is used there is risk of NNS introduction and spread if a NNS detaches when equipment or PPE is submerged in locations where the species has not previously been found.

Introduction and removal of construction and maintenance materials

1.7.4 NNS can also be transferred with construction and maintenance materials. For example, NNS can attach to rocks used for cable protection. There is risk of NNS introduction and spread if contaminated construction material is introduced to the Proposed Development site or removed from the Proposed Development site (e.g. via full or partial removal decommissioning scenarios).

Cable laying preparations and maintenance including seabed preparations and trench ploughing

1.7.5 In the context of the Proposed Development the localised dispersal of NNS may be facilitated by preparation and maintenance activities such as boulder removal, seabed preparation activities and trenching. For example, organisms attached to the seabed or objects on the seabed such as boulders may be dislodged or fragmented and dispersed on currents when the seabed is disturbed.

Introduction of hard substrates in soft substrate areas

1.7.6 The introduction of hard substrates could provide a new potential habitat for epifaunal NNS where hard substrates are introduced to baseline soft substrate habitats.

1.7.7 Over time these structures will naturally be colonised by epibiota and could potentially facilitate establishment of some NNS which are usually found on hard substrates which would not otherwise be present in the area i.e. this pathway does not necessarily introduce NNS but could provide optimal / preferential habitats for epifaunal NNS.

1.8 Risk Assessment

Risk of introduction and spread of NNS

1.8.1 For each potential NNS pathway of introduction and /or spread highlighted in Section 1.7, possible scenarios have been assessed and a risk category (high, medium or low) assigned to them following principles presented in the Marine Biosecurity Planning guidelines (Cook *et al*., 2015) and professional judgement (**Table 5**). To eliminate duplication, pathways and risk scenarios are described in a way that covers activity associated with construction, operation and decommissioning phases of the Proposed Development. As a precautionary approach, the overall pathway risk has been categorised at the highest risk category of any of the individual possible scenarios.

1.8.2 Recommendations for biosecurity actions for pathways identified as high or medium risk are subsequently provided.

1.8.3 Challinor *et al*. (2014) developed a risk matrix as indicated in **Table 4** below to indicate the potentially greatest risk of the establishment of NNS given successful transfer based on high level biogeographical conditions. The matrix indicates the closer the geographical climate match, the greater the risk of establishment of NNS. This has been considered when assessing the potential risk of transfer of NNS from vessels arriving from or going to different geographic regions.

Table 4. Likelihood of establishment of NNS, according to the matching biogeographical region (from Challinor *et al*., 2014).

Recipient Region	Donor Region			
	Arctic & Antarctic [e.g. Arctic Coast]	**Cold-temperate** [e.g. North Sea]	**Warm-temperate** [e.g. Mediterranean Sea]	**Tropics** [e.g. Caribbean]
Arctic & Antarctic [e.g. Arctic Coast]	**High**	**Medium**	**Low**	**Low**
Cold-temperate [e.g. North Sea]	**Medium**	**High**	**Medium**	**Low**
Warm-temperate [e.g. Mediterranean Sea]	**Low**	**Medium**	**High**	**Medium**
Tropics [e.g. Caribbean]	**Low**	**Low**	**Medium**	**High**

Table 5. Risk assessment of introduction and spread of NNS during the construction, operation and decommissioning of the Proposed Development. Risk categories were assigned using guidelines in Cook *et al.* (2015) and professional judgement.

Pathway	**INNS Vector/Mechanism of transfer**	**Risk Scenario**	**Risk (High / Medium / Low)** (c.f. Table 4)	**Overall Pathway Risk (High / Medium / Low)**
Construction & Operation				
Vessel movements - to and from Proposed Development	Biofouling and Ballast	Vessel from the same regional waterbody as the Proposed Development (e.g. Bristol Channel, Celtic Sea)	Low	High
		Vessel from cold temperate waters outside the same regional waterbody as the Proposed Development	High	
		Vessel from polar waters.	Medium	
		Vessel from warm temperate waters.	Medium)	
		Vessels from tropical waters.	Low	
	Ballast	Vessel coming from and going to region outside UK territorial waters adhering to the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations.	Low	
		Vessel coming from and going to region within UK territorial waters for which the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations do not apply	Medium	
	Biofouling	Vessel adhering to MEPC biofouling management guidelines (MEPC 2023)	Low	
		Vessel heavily fouled and not adhering to MEPC biofouling management guidelines (MEPC 2023)	Medium	

Pathway	INNS Vector/Mechanism of transfer	Risk Scenario	Risk (High / Medium / Low) (c.f. Table 4)	Overall Pathway Risk (High / Medium / Low)
Equipment & Personnel PPE	Equipment such as drills, and PPE contaminated with INNS	Equipment/PPE used outside the Proposed Development location and not cleaned prior to deployment	High	High
		Equipment/ PPE cleaned since last use	Low	
Introduction and removal of construction / maintenance materials	Material such as protective rock contaminated with INNS	Material is introduced to site from the marine environment and is fouled, or fouled material is removed from site.	High	High
		Material is from land source and cleaned prior to deployment or material is unfouled/cleaned prior to removal.	Low	
Introduction of hard substrates in soft substrate areas	Material such as protective rock not contaminated with INNS when introduced, but becomes colonised by INNS over time	Hard substrate is introduced into a soft substrate area (e.g. rock protection). Epibiota colonise the hard substrate over time, which could include NNS. The NNS would arrive to the area naturally from surrounding waters and would likely also be able to colonise any naturally occurring hard structures along the OCC, such as boulders, and baseline areas of exposed rock.	Low	
Cable laying preparations and maintenance including seabed preparations and trenching	Physical disturbance and displacement of INNS	INNS present at activity site and viable fragments/ organisms dispersed by activity. Localised dispersal of species already present at site.	Low	Low
		No INNS present at activity site	Negligible	
Decommissioning				

Pathway	INNS Vector/Mechanism of transfer	Risk Scenario	Risk (High / Medium / Low) (c.f. Table 4)	Overall Pathway Risk (High / Medium / Low)
At the end of the operational life of the cable (c.50 years after commissioning) the options for decommissioning will be evaluated and a detailed decommissioning plan developed. Having regard for other Proposed Development constraints (e.g., safety and liability), the least environmentally damaging option would be chosen where possible. Should full or partial removal of the sub-sea cable(s) be required, it is considered that the risk of INNS will be similar to construction and operation and therefore the risks above will apply, but at a lower frequency. If cables are de-energised and left *in-situ*, it is considered that this would not pose an additional INNS risk, as no future decommissioning activities such as vessel activity are anticipated to be required.				

1.9 Biosecurity Control Measures

1.9.1 Biosecurity control measures have been proposed for construction, operation and (outline) decommissioning pathways assessed to be Medium and High risk in **Table 5**. It is anticipated that a Biosecurity Manager will be designated for the construction, operation and decommissioning phases of the Proposed Development. The Biosecurity Manager will be responsible for ensuring appropriate management measures are in place and implemented. Control measures provided in **Table 6** will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. It will be the responsibility of the Biosecurity Manager to know the location of the logbook at all times and to ensure that the logbook is updated and maintained. This process will allow the identification of any breaches in control measures. If such a breach occurs, it will be recorded in the biosecurity log and the contingency plan will be triggered as outlined in Sections 1.10 and 1.11.

Table 6. Biosecurity control measures proposed for the construction, operation and (outline) decommissioning of the Proposed Development.

Pathway	Biosecurity Control Measures	Where	When
Vessel movements - to and from Proposed Development	• Origin of vessels used for Proposed Development works to be confirmed by the Biosecurity Manager and information on high risk NNS located at the origin port for a vessel but not at the Proposed Development site, or vice versa, should be sought[7]. Operators of vessels deemed to be particularly high risk should be approached by the Biosecurity Manager and scope for additional biosecurity practices discussed and implemented. These may include enhanced checking and cleaning protocols. • Vessel operators should be made aware of their responsibilities with respect to biosecurity and provided with the contact details of the Biosecurity Manager so that advice can be sought if needed. • Vessel operators should be provided with an INNS guide and made aware of any specific INNS risk at the start of the Proposed Development and throughout. • Vessels must follow IMO Biofouling Guidance (MEPC, 2023). • Where applicable, vessels must adhere to the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations	Home / previous port or at Proposed Development site; dependant on whether vessel is arriving to site or leaving.	Prior to transit to the OCC, at all times when working within the OCC, and prior to leaving the OCC. Specific timing is dependent on whether vessel is arriving to site or leaving.
Equipment & personnel PPE	• Equipment operators and personnel should be made aware of their responsibilities with respect to biosecurity and provided with the contact details of the Biosecurity Manager so that advice can be sought if needed.	Home / previous port or at Proposed Development site, as applicable	Prior to transit to the OCC, or prior to leaving the OCC, as applicable

[7] For example, *Didemnum vexillum*, the carpet sea squirt, is a high-risk priority INNS not recorded within the Offshore Cable Corridor but recently introduced into the Milford Haven area (autumn 2023), which may be a potential origin of vessels. For further information on this recent introduction and advice regarding *D. vexillum* see NNSS (2024b).

Pathway	Biosecurity Control Measures	Where	When
	• Equipment operators and personnel should be provided with an INNS guide and should be made aware of any specific INNS risk at the start of the proposed development and throughout. • All equipment and PPE should be checked cleaned and dried prior to deployment, following the 'Check, Clean, Dry' biosecurity principles where appropriate (NNSS, 2024a). Cleaning debris should be disposed of appropriately (i.e. preventing its entry back into the aquatic environment). • The Biosecurity Manager should check equipment and PPE where a residual risk is identified.		
Introduction and removal of construction / maintenance materials	• Construction material from terrestrial origin should be sought as a priority. If not available, material should be cleaned and dried for at least 72 hours prior to use. Cleaning debris should be disposed of appropriately. • The Biosecurity Manager should check material prior to use/removal. • Where possible, removed material should be contained until cleaned appropriately on land. Cleaning debris should be disposed of appropriately.	Home / previous port, or at Proposed Development site, as applicable	Prior to transit to the OCC, when working within the OCC, or prior to leaving the OCC, as applicable

1.10 Contingency Plan

1.10.1 In the event of any control measures being breached, detection of new INNS to the area or to the UK, or detection of high alert marine species from the Non Native Species Secretariat (NNSS)[8], all necessary steps should be taken to control the spread and dispersal of the INNS. The proposed contingency plan in the event of failure of prevention of INNS introduction and spread is provided in **Table 7**.

Table 7. Proposed Development Construction, Operation and Maintenance Phase and Decommissioning Contingency Plan.

Action	Responsibility
Stage One – Suspected arrival of INNS or high alert species	
Take photographs of the organism suspected to be an INNS or high alert species if safe to do so. If possible, collect the whole organism, or a sample in a sealable vessel (zip lock bag, screw top jar).	Designated Biosecurity Manager, Site Manager, Contractor Environmental Manager or Project Environmental Manager (depending on the phase of the project), or any member of staff at the site of INNS discovery.
Check organism against identification sheets (see https://www.nonnativespecies.org/non-native-species/id-sheets/) Report to the GB Non Native Species Secretariat (NNSS) via the email: alertnonnative@ceh.ac.uk (For further information see https://www.nonnativespecies.org/non-native-species/recording/)	Designated Biosecurity Manager, Site Manager, Contractor Environmental Manager or Project Environmental Manager (depending on the phase of the project).
Stage Two – Presence of INNS or high alert species confirmed	
Initiate immediate containment measures, including restricted vessel movements, and make Proposed Development staff aware.	Designated Biosecurity Manager, Site Manager, Contractor Environmental Manager or Project Environmental Manager (depending on the phase of the project).
Carry out wider survey of vessels, equipment, and structures as relevant	Designated Biosecurity Manager, qualified ecologist.
Stage Three – Eradication / employ long-term control measures	
Seek advice from GB NNSS (https://www.nonnativespecies.org/) on appropriate measures and actions for long term control.	Designated Biosecurity Manager and Contractor Environmental Manager or Project Environmental Manager (depending on the phase of the project).

[8] https://www.nonnativespecies.org/non-native-species/species-alerts/

1.11 Monitoring, Site Surveillance and Reporting Procedure

1.11.1 The Marine Biosecurity Planning guidelines (Cook *et al*., 2015) require the use of a biosecurity logbook to record training, surveillance, control measures carried out and any other activities of concern regarding the biosecurity of the operation. Formal steps should be put in place to quickly inform the Biosecurity Manager of any potential introduction of INNS.

1.11.2 Information to be recorded in the logbook includes:

- Any routine inspections of vessels, construction equipment, and materials in the water column;
- Inspections of 'high risk' vessels (i.e. those originating from areas outside the water body of the Proposed Development (e.g. Bristol Channel/Celtic Sea) but within the same biogeographic region; those that do not adhere to the IMO biofouling guidelines or for which Ballast Water Management does not apply and those originating from locations where high-risk INNS are present);
- Details of when the Biosecurity Manager was informed if any INNS were found;
- Any biosecurity measures that were taken if INNS were found;
- Which organisations were notified when INNS were found (e.g. GB NNSS);
- The application of any antifouling or cleaning of vessels, equipment and materials/structures working on site; and
- Any events undertaken to raise NNS/INNS awareness.

1.11.3 All logbook entries should be dated and signed by the Biosecurity Manager.

1.11.4 A table template indicating the key information required in the Biosecurity Plan to be completed on site is provided in Section 6 of Cook *et al*. (2015).

1.12 Key Sources of Advice

1.12.1 The following sources provide additional information relating to NNS and the control of the spread of NNS.

- Guidance on Marine Biosecurity planning
    - England and Wales (Cooke *et al*., 2015) www.nonnativespecies.org/downloadDocument.cfm?id=1401
- GB NNSS Website
    - Biosecurity in the field (including biosecurity for boat users, submerged structures and event biosecurity support pack) http://www.nonnativespecies.org/index.cfm?pageid=174
    - Alert Species:

      Species alerts https://www.nonnativespecies.org/non-native-species/species-alerts/

  - Reporting NNS:

    How to report https://www.nonnativespecies.org/non-native-species/recording/
- National Biodiversity Network
  - Distribution maps and information about species: NBN Atlas www.nbnatlas.org
- European Commission
  - EC Alien Species Information http://ec.europa.eu/environment/nature/invasivealien/index_en.htm
- Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)
  - GESAMP Working Group 44 - Marine Biofouling: Non-Indigenous Species and Management Across Sectors https://www.glofouling.imo.org/_files/ugd/186760_5ed50a78840049149d7326ffdd42ee29.pdf
- Invasive Species Ireland
  - https://invasives.ie/
- IMO (International Maritime Organization) MEPC (Marine Environment Protection Committee) Guidelines for The Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species
  - MEPC 378 80 (imo.org)
- DASSH - The Archive for Marine Species and Habitats Data
  - www.dassh.ac.uk/

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