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East West Interconnector Cable Remedial Works 2023 - Marine Licence Application

Environmental Supporting Information

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East West Interconnector Cable Remedial Works 2023 - Marine Licence Application

Environmental Supporting Information

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GLOSSARY

AA
Appropriate Assessment

AIS
Automatic Identification System

CHSR
Conservation of Habitats and Species Regulations

CIRA
Cable Integrity Risk Assessment

DP
Dynamic Positioning

EIA
Environmental Impact Assessment

ESI
Environmental Supporting Information

EUNIS
European Nature Information System

FCS
Favourable Conservation Status

HRA
Habitats Regulation Assessment

HVDC
High Voltage Direct Current

ICES
International Council for the Exploration of the Sea

IMO
International Maritime Organisation

INIS
Invasive Non-Indigenous Species

MBES
Multibeam Echo Sounding

MCAA
Marine and Coastal Access Act

M
Metre

MIF
Mattress Installation Frame

MSFD
Marine Strategy Framework Directive

NRW
Natural Resource Wales

PTS
Permanent Threshold Shift

PRP
Precise Rock Placement

ROV
Remotely Operated Vehicle

SAC
Special Area of Conservation

SCI
Sites of Community Importance

SPA
Special Protection Area

TTS
Temporary Threshold Shift

WFD
Water Framework Directive

1. INTRODUCTION

1.1 Purpose of this document

The purpose of this document is to support a Marine Licence Application being made under the Marine and Coastal Access Act 2009 by EirGrid Ltd for undertaking remedial works, including placement of cable protection, for the East – West Interconnector (EWIC).

1.2 Overview of the project

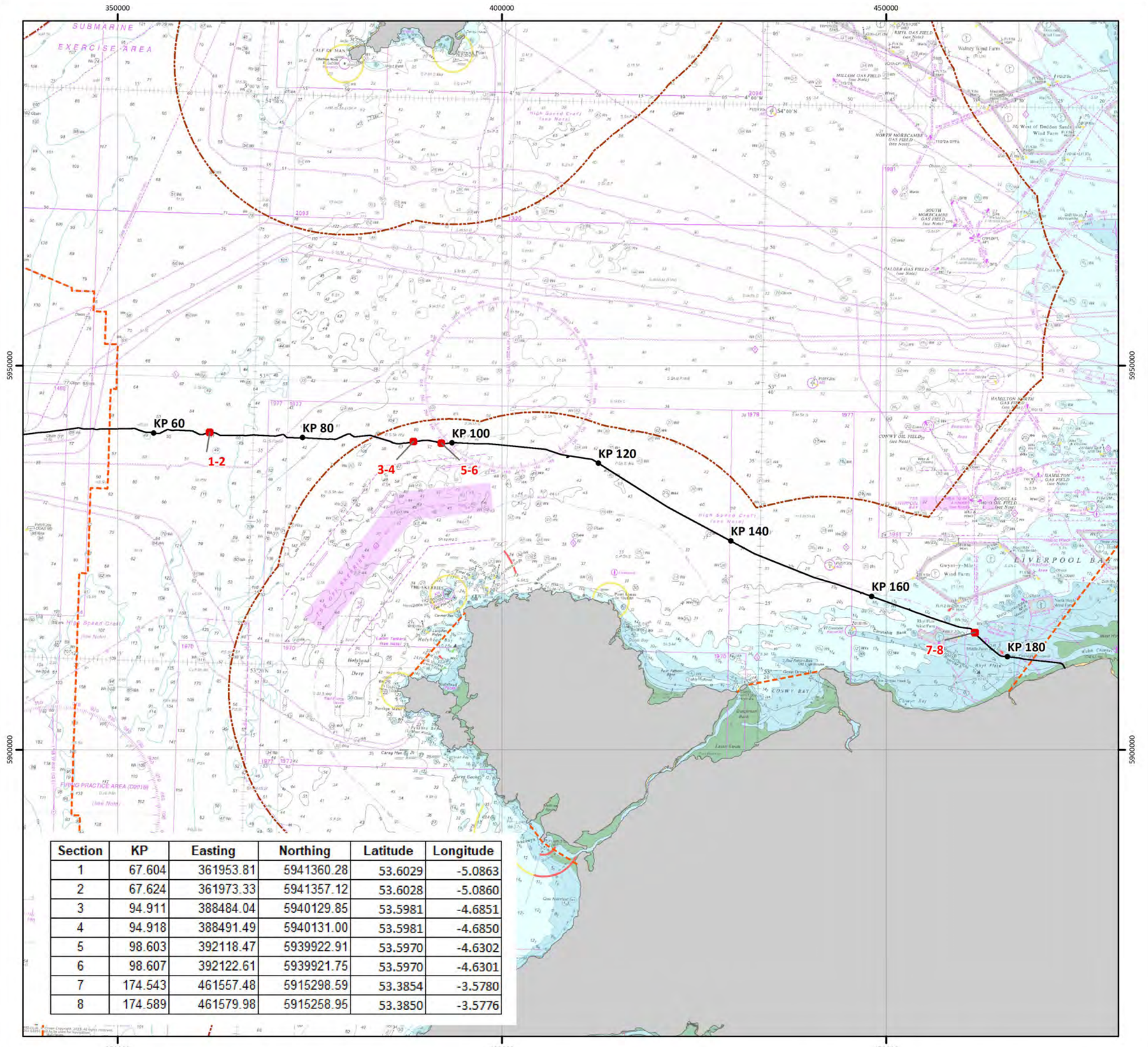
EWIC is a 500 MW High Voltage Direct Current (HVDC) electricity interconnector linking the Irish and British electricity markets. Following post-installation inspection surveys in 2022, one cable exposure and three areas of low sediment cover (less than 0.5m) were identified along the EWIC cable route which need remedial works to reinstate the EWIC cable back to a level of acceptable risk.

The remedial works will consist of placement of external cable protection in the form of Precise Rock Placement (PRP) units (i.e. rock bags) and/or concrete mattresses. A detailed project description is provided in Section 2 and an overview of the proposed remedial works areas is provided in Figure 1-1 (Drawing Ref: P2226K-LOC-004-A).

EAST WEST INTERCONNECTOR

LOCATION OVERVIEW
Marine Licence Application - UK Waters

Drawing No: P2226K-LOC-004 | **A**



Section	KP	Easting	Northing	Latitude	Longitude
1	67.604	361953.81	5941360.28	53.6029	-5.0863
2	67.624	361973.33	5941357.12	53.6028	-5.0860
3	94.911	388484.04	5940129.85	53.5981	-4.6851
4	94.918	388491.49	5940131.00	53.5981	-4.6850
5	98.603	392118.47	5939922.91	53.5970	-4.6302
6	98.607	392122.61	5939921.75	53.5970	-4.6301
7	174.543	461557.48	5915298.59	53.3854	-3.5780
8	174.589	461579.98	5915258.95	53.3850	-3.5776

Legend

- EWIC Remedial Works Location
- KP
- EWIC Cable Route
- 12nm Territorial Sea Limit
- Median Line

N W E S

NOTE:

Coordinates are provided in WGS 84 UTM 30N Eastings and Northings in metres (m), and WGS 1984 Latitude and Longitude in Deicmal Degrees (DD)

NOTE: Not to be used for Navigation

Date	19 October 2023
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; DECC; MarineRegions; MarineFind; GEBCO; EirGrid
File Reference	J:\P2226\Mxd\01_LOC\ P2226K-LOC-004.mxd
Created By	Emma Langley
Reviewed By	Lewis Castle
Approved By	Emma Langley

intertek

0 5 10 15 20 km

1.3 Legislative Background

1.3.1 Environmental Impact Assessment

Submarine cables do not require an Environmental Impact Assessment (EIA) to be conducted as they are not listed under Schedule A1 or A2 of The Marine Works (EIA) (Amendment) Regulations 2017 (HM Government, 2017). However, this Environmental Supporting Information (ESI) Report presents an overview of the baseline environment and provides the necessary environmental assessment to support the Marine Licence Application through consideration of the potential impacts of the proposed works to the marine environment.

1.3.2 Marine Licencing

The placement of cable protection material (concrete mattresses and/or rock bags) on the seabed requires a marine licence under Section 66 of the Marine and Coastal Access Act, 2009 (MCAA). A marine licence is required from Natural Resources Wales (NRW) Marine Licensing Team for any activities involving a deposit (or removal) of a material or substance or object using a vehicle or vessel below the mean high-water springs mark or in any tidal river to the extent of the tidal influence.

1.3.3 Water Framework Directive Assessment

Undertaking a Water Framework Directive (WFD) screening assessment provides the regulator with information to understand the impact of the proposed activity on the immediate water body and any linked water bodies. The assessment also determines if the proposed activities would have an effect on Shellfish Water Protected Areas and Bathing Waters through the River Basin Management Plan (RBMP) Structure.

1.3.4 Habitats Regulation Assessment

In England and Wales, the obligations under the Habitats and Birds Directives are transposed into UK law through The Conservation of Habitats and Species Regulations 2017 (as amended) for inshore waters up to the 12 nautical mile (nm) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) from 12 nm to the extent of the UK's Exclusive Economic Zone (EEZ). Collectively this legislation is known as the Habitats Regulations

The Habitats Regulations transpose into UK law Article 6(3) of the European Commission (EC) Habitats Directive. This requires project-related activities within European sites to be assessed with regard to their implications for the site conservation objectives.

Under the Habitats Regulations, a person applying for consent, permission or other authorisation must provide such information as the competent authority may reasonably require for the purposes of assessment or to enable them to determine whether an Appropriate Assessment (AA) is required.

The three tests set out to determine if a proposal will affect a European site are:

- Is the proposal directly connected with of necessary for the site management for nature conservation?;
- Is the proposal likely to have a significant effect on the site? (this is the screening stage);
- Can it be ascertained that the proposal will not adversely affect the integrity of the site? (this is the Appropriate Assessment Stage).

The tests are known as the HRA process.

1.3.5 European Portected Species (EPS) Licence

Under the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017, it is an offence if you:

- Deliberately capture, injure or kill any wild animal of an EPS
- Deliberately disturb wild animals of any such species
- Deliberately take or destroy the eggs of such an animal, or
- Damage or destroy a breeding site or resting place of such an animal

Disturbance includes, but is not limited to, any disturbance which is likely:

- To impair their ability –
  - To survive, to breed or reproduce, or to rear or nurture their young, or
  - In the case of animals of a migratory species, to migrate; or
- To affect significantly the local distribution or abundance of the species to which they belong

NRW issues licences under Regulation 55 of the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 to allow work to be undertaken within the law. They are issued for specific purposes stated in the Regulations, if the following three tests are met:

- The purpose of the work meets one of those listed in the Habitats Regulations;
- That there is no satisfactory alternative; and
- That the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status (FCS) in their natural range.

The Habitats Regulations permits licences to be issued for a specific set of purposes including:

- Include preserving public health or public safety or other imperative reasons of over-riding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment (including development);
- Scientific and educational purposes;
- Ringing or marking; and
- Conserving wild animals.

It has been concluded that an EPS licence will not be required for the proposed remedial works due to the spatial and temporal limitations of the works. Any disturbance to EPS species will be minimal and will not impair their ability to survive, breed, rear or nurture their young or to significantly affect their local distribution or abundance.

1.4 Objectives and scope of the Environmental Supporting Information Report

On the 7th September 2023, EirGrid requested pre-application advice relating to the marine licence application and required documents. As part of initial consultation with NRW Marine Licencing Team it was confirmed that the marine licence application should be supported by an HRA Screening and WFD Assessment. Further to this on the 5th October 2023, EirGrid held a pre-application consultation meeting with NRW Marine Licensing Team to discuss the approach to and level of content to be provided in the ESI Report. This included providing an overview of the proposed remedial works and discussion of the potential impacts and how they should be assessed further in the ESI Report. The

objective of the meeting was to determine whether the proposed approach to environmental assessment was adequate to support the Marine Licence Application and proportionate to the proposed remedial works.

This ESI Report therefore provides an overview of the baseline environment along the existing EWIC cable route including the physical, biological, and human environment and identifies and assesses potential impacts from the proposed remedial works. The ESI Report and marine licence application is supported by a number of additional documents as listed in Table 1-1 and provided in Appendices A to C.

Table 1-1 Supporting documents for the Marine Licence application

Appendix	Document
A	Habitats Regulations Assessment (HRA) Screening
B	Water Framework Directive (WFD) Assessment
C	Biosecurity Risk Assessment

2. PROJECT DESCRIPTION

2.1 Requirement for the Works

Post-installation inspections undertaken during 2022, incorporating a marine survey and geophysical condition survey, have identified one cable exposure and three areas of low sediment cover (less than 0.5m depth) along the EWIC cable route which need remedial works to reinstate the EWIC cable back to a level of acceptable risk.

The remedial works will include placement of external cable protection in the form of rock bags or concrete mattresses at the four locations. At this stage, a high level assessment indicates that fronded mattresses will be used across the exposure area due to the sandy mobile sediments present, and rock bags will be required at the other locations.

2.2 Description of the Works

2.2.1 Vessels

2.2.1.1 Cable lay vessel (CLV)

To undertake concrete mattress / rock bag placement a cable lay vessel (CLV) NKT Victoria, or similar (as shown in Figure 2-1 below) is likely to be used. A CLV is a specialist ship designed specifically to carry and lay power cables. NKT Victoria is equipped with dynamic positioning (DP) systems, which enable the ship to be held very accurately in position despite the effects of currents and wind. This vessel has been proposed by the contractor NKT and would be suitable to undertake placement of rock bags or concrete mattress. Prior to mobilising to the work site, the vessel will transit to a port close to the work site for final mobilisation of cable handling crew, client personnel and equipment.

Figure 2-1 Figure 2-1 NKT Victoria

2.2.2 External Cable Protection

External protection such as concrete mattressing and PRP units (rock bags) are generally used to protect installed cables.

2.2.2.1 Concrete mattressing

Concrete mattresses are matrices of interlinked concrete blocks which form a close-fitting layer over the cable to provide a strong protective cover to prevent potential impact and snagging by fishing gear or anchors. Typically, concrete mattresses are 6m long by 3m wide. Anti-scour fronds will be attached to the mattresses to promote sedimentation in the relevant area.

The mattresses are installed via a crane from the CLV which lowers them one at a time or in batches using a special mattress installation frame (MIF) (Figure 2-2).

Figure 2-2 Figure 2-2 Concrete mattress deployment (courtesy of FoundOcean)

2.2.2.2 Rock bag placement (with optional frond attachments)

PRP Units are a cost-effective alternative to rock placement. Manufactured from tough marine grade netting and incorporating masterlink for a single point lift, the units can be handled and installed easily using a much smaller capacity vessel.

The stone filled net is designed to encase the stone preventing it from breaking down or migrating from its intended location.

The units are typically supplied in 250kg, 2 Tonne (T), 4T & 8T sizes, although alternative sizes can be manufactured to suit conditions. They typically have a diameter of 2.2m. Rock bags used in this project will be 2t PRP units with a diameter of 2.2m.

The rock bags are lifted over the side of the vessel with a crane and lowered onto the seabed as shown in Figure 2-3.

Figure 2-3 Figure 2-3 Rock bag deployment (NKT)

2.2.2.3 Positioning

A Remotely Operated Vehicle (ROV) will likely be used for touchdown monitoring during the pre-lay installation activities to verify that the rock/mattress positions are compliant.

2.2.2.4 Indicative locations for external cable protection

At all four remedial works locations external cable protection may be a combination of both concrete mattresses and rock bags. For the purposes of the assessment, worst-case scenarios have been considered relating to either concrete mattress placement or rock bag placement at all four locations.

The locations that require remedial works are shown in in Figure 2-4 (Drawing Number P2226K-LOC-003-A). Table 2-1 provides further details for the locations where remedial works will be required. For the worst-case scenario with either concrete mattresses or rock bags the total requirement is estimated to be:

- Footprint of concrete mattresses[1] = 738m^2
- Footprint of rock bags[2] = 156m^2

[1] Assuming only concrete mattresses are used at all four locations
[2] Assuming only rock bags are used at all four locations

EAST WEST INTERCONNECTOR REMEDIAL WORKS

LOCATION OVERVIEW - Remedial Assessment Areas

Drawing No: P2226K-LOC-003 | A

300000 350000 400000 450000

6000000 5950000 5900000

Legend

- EWIC Remedial Works Location
- KP
- EWIC Cable Route
- 12nm Territorial Sea Limit
- Median Line

N W E S

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984

0 10 20 30 40 km

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Document Path: J:\P2226\Mxd\01_LOC\P2226K-LOC-003.mxd Date: 06/10/2023

Table 2-1 Indicative locations for external cable protection

Assessment Area	Start KP	End KP	Approximate Distance of Required Work (m)	Comment	Primary Action	No. of Concrete Mattresses or PRP units (rock bags) required, including contingency	Footprint of protection (m^2)**, including contingency
1*	67.604	67.624	20m + contingency	Cable exposure	Fronded Concrete Mattresses / Fronded PRP Units	4	72
2	94.911	94.918	8m + contingency	Location adjacent to rock berm	Fronded PRP Units / Fronded Concrete Mattresses	7	27
3	98.603	98.607	4m + contingency	Location at end of a rock berm	Fronded PRP Units/ Fronded Concrete Mattresses	4	15
4	174.543	174.589	46m + contingency	Low sediment cover identified at each side of rock berm	Fronded PRP Units / Fronded Concrete Mattresses	26	99

* Areas of exposed cable

** Based on standard concrete mattress size (W= 3m X L= 6m) at location 1 and 2t PRP units (rock bag) with a diameter of 2.2m at remaining three locations (2, 3 and 4)

2.2.3 Post Remedial Works Geophysical Survey

Following the deployment of external cable protection, a geophysical survey will be undertaken to determine whether the EWIC cable has been covered appropriately at each of the remedial works locations. The geophysical survey acquisition methodology will comprise multi beam echo sounding (MBES) and is non-intrusive and will not interact with the seabed. The geophysical survey is non-invasive but is based on acoustic methods. The bathymetric survey system proposed is characterised by a limited acoustic footprint with the high directional, high frequency, short duration output attenuated within a few hundred metres of the survey vessel.

The specific equipment to be used during the geophysical survey has not yet been specified. Examples of industry standard equipment for the purpose of geophysical and geotechnical survey have therefore been used in this description. The frequencies and decibels of the equipment to be used to obtain the survey data will be within similar ranges for the equipment described.

2.2.3.1 Multibeam echo sounder (MBES)

MBES is a remote sensing acoustic device typically attached to a vessels hull. The purpose of this equipment will be to map the water depth to seabed (bathymetry). The Kongsberg EM2040 is an example of a MBES device that may be used for the proposed survey works (Figure 2-5).

Figure 2-5 Figure 2-5 Kongsberg EM2040 MBES

2.2.3.2 Ultrashort baseline system

An ultrashort baseline (USBL) system has a hull mounted transducer with a transceiver attached to survey equipment. It uses low frequency acoustic sound to verify subsea positioning and is standard across geophysical surveys. Typical ranges for USBL operations are between 19-34kHz.

2.3 Proposed Works Programme

The proposed remedial works are anticipated to take up to 14 days, plus any additional time required for weather downtime and breakdown. It is anticipated that mattressing or rock bag placement could take up to five days.

2.4 Design Constraints

Table 2-2 below lists constraints built into the design of the proposed remedial works so that the installation contractor ensures compliance with national and international statute or adopts best

practice as determined by the cable industry as the basic standard for how to proceed on a project. These are not additional measures proposed specifically to address the potential for environmental effects, but constraints built into the design of the proposed remedial works. The main drivers behind the constraints typically relate to compliance with environmental law; or known health and safety issues.

Table 2-2 Design Constraints

ID	Design Constraints
1	Notices shall be provided to other sea users in the area of operations via issue of a Notice to Mariners
2	A Fisheries Liaison Officer (FLO) has been appointed who will be the direct point of contact between the Applicant and fishing stakeholders
3	Project vessel(s) will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ships standards.
4	Ship Oil Pollution Emergency Plans (SOPEPs) shall be provided by Contractor and implemented covering all vessels in accordance with MARPOL Annex I requirements
5	Ballast water discharges from all vessels shall be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments standard
6	Hazardous chemicals and materials shall be managed in accordance with applicable standards and guidelines, including maintenance of an inventory of such substances that are used and/or stored, provision of Material Safety Data Sheets (MSDSs), preparation of Chemical Risk Assessments and storage in designated, secure facilities with suitable spill protection and control
7	A Biosecurity Plan (BSP) shall be prepared and implemented
8	A 500m safety zone would be established around the Project vessel(s) to ensure the safety of other sea users

2.5 Consideration of Alternatives

If remedial works are not undertaken, the EWIC cable will remain exposed in one area and may become uncovered in the other areas identified with low sediment cover. This means that the cable is at risk from interaction with fishing gear and ships anchors, which may result in damage to the cable, the cable being out of service for a period of time and the requirement for a lengthy repair procedure to be undertaken. The exposed cable may also pose a threat to other vessels including fishing vessels, from anchor strike or should fishing gear become entangled.

3. ENVIRONMENTAL CONSIDERATIONS

An understanding of the potential impacts from an operation on the environment requires a clear understanding of the present state of the environmental baseline. For the purposes of this report this section focuses on the environmental receptors which have the potential to be affected by the proposed remedial works.

3.1 Physical Processes

Semi-diurnal tides are the dominant physical process along the EWIC cable route, propagating into the Irish Sea from the Atlantic Ocean through the North Channel and St Georges Channel. There are areas along the route with a very large tidal range (i.e. at Liverpool Bay where the largest spring tides exceeds 10m) and small tidal range (in proximity to Arklow in the St. George's Channel and between Islay and the Mull of Kintyre in the North Channel. The time of high water varies little over a wide area to the east and west of the Isle of Man, where two waves meet, forming a standing wave. At the landfall site the tide floods to the east-north-east and ebbs to the west-south-west as water moves in and out of the Dee Estuary and along the North Wales Coast. The speed and direction of the tidal currents varies with location due to frictional effects of the seabed and the complex nature of the tidal flow in the area as water enters and exits the River Dee.

The prevailing wind in the Irish Sea is south-westerly with it contributing to the water movements in the Irish Sea with a net flow from the south towards the north responsible for the spatially and temporally variable currents in the North Channel. The constrained nature of the Irish Sea basin makes it susceptible to storm surges, resulting in unpredictable currents. This is complicated by seasonal thermal stratification, which occurs during the summer. Generally, in Liverpool Bay, a counter-clockwise wind-driven circulation adverts run-off from the Mersey northwards towards the Fylde coast. Under calm conditions however, the circulation is driven clockwise by the density circulation induced by run-off from the Mersey, Ribble and Dee. In such cases, run-off from the Mersey moves to the west and can be detected along the North Wales Coast. The maximum tidal current speed during an average spring tide (mean spring tidal current) is 0.7ms^{-1} rising to 2ms^{-1} along the EWIC cable route.

The Irish Sea is sheltered with only two narrow windows, along the axes of the St Georges and North Channels, most waves are locally generated, of fairly short duration. Swell waves are only present near entrances, at the southern end of the St. Georges Channel and the northern end of the North Channel. The wind direction leading to the largest waves depends on the locality, for example in Liverpool Bay, winds from between the west and north-west cause the largest waves, whereas winds from the north cause the largest waves on the North Wales coast. The EWIC cable route and landfall site are exposed to severe wave conditions. The predominantly south-westerly winds have an effective fetch length of over 200km, and the waves are enhanced by the swell entering from St Georges Channel.

A Metocean study completed by HR Wallingford prior to the EWIC cable installation concluded that many points along the route showed a highest significant wave height within 5m. One location situated in the middle of the EWIC cable route in the St Georges Channel exceeded this. Wave heights at that same location reached 7.73m in the previous 10 years from the study and 8.9m in the last century.

The bathymetry throughout the EWIC cable route is variable and generally characterised by ripples and megaripples with isolated areas of sandwaves, where in certain areas, steep slopes of more than 15 degrees and present. The shallowest areas (2m below LAT) are observed in the nearshore areas and locally over sandbanks and sandwaves where typically the highest slopes are also associated. Generally, the seabed morphology changes from smooth and homogenous to textured and rough. The

maximum water depths of roughly 11m below LAT are observed at approximately KP40 further offshore.

The CIRA interpreted superficial sediment types based on the acoustic character of the high and low frequency side scan sonar (SSS) and MBES bathymetric data. The CIRA concluded that the majority of superficial geology within the survey corridor (80m width of the EWIC cable route) comprised of sand, gravelly sand and sandy gravel, with areas of outcropping bedrock and diamicton[3]. The areas of outcropping correspond well with the majority of the existing external cable protection which would indicate shallow or no burial during the original installation campaign.

Seabed features such as trawl scars and boulder fields are present within the survey corridor as well as mobile bedforms, mainly ripples and megaripples and occasionally sandwaves. Rock berms, seemingly intact were observed on top of the existing cable and several concrete mattresses were identified.

3.2 Protected Sites

In accordance with the provisions of Article 6(3) of the EC Habitats Directive (92/43/EEC), Screening for Appropriate Assessment (Stage 1) has been undertaken for European sites and is presented in Appendix A.

The HRA Screening identified 17 protected sites of relevance to the proposed remedial works which are presented in Figure 3-1 (Drawing Number: P2226K-ENV-001-A) and 3-2 (Drawing Number: P2226K-ENV-002-A) below. The 17 sites assessed by the HRA Screening are listed in Table 3-1.

Table 3-1 Protected sites identified within the HRA

Protected Site Type	Site Code & Name
Special Area of Conservation (SAC)	North Anglesey Marine / Gogledd Môn Forol (UK0030398)
	North Channel SAC (UK0030399)
	West Wales Marine / Gorllewin Cymru Forol SAC (UK0030397)
	Bristol Channel Approaches SAC (UK0030396)
	Cardigan Bay/ Bae Ceredigion SAC (UK0012712)
	Pen Llŷn a'r Sarnau/ Lleyn Peninsula and the Sarnau SAC (UK0013117)
	Pembrokeshire Marine/ Sir Benfro Forol SAC (UK0013116)
	Rockabill to Dalkey Island SAC (IE0003000)
	Lambay Island SAC (IE000204)
	Dee Estuary/ Aber Dyfrdwy SAC (UK0030131)
	River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC (UK0030252)
	Carlingford Shore SAC (UK002306)
	Roaringwater Bay and Islands SAC (000101)
	Blasket Islands SAC (002172)

[3] Unsorted to poorly sorted and contains particles ranging in size from clay to boulders suspended in a matrix of mud or sand

Protected Site Type	Site Code & Name
Special Protection Area (SPA)	Irish Seafront SPA (UK9020328)
	Anglesey Terns / Morwenoliaid Ynys Môn SPA (UK9013061)
	Liverpool Bay SPA (UK9020294A)

EAST WEST INTERCONNECTOR REMEDIAL WORKS

ENVIRONMENTAL DESIGNATIONS
SAC's within Zones of Influence

Drawing No: P2226K-ENV-001	A

Legend

- EWIC Remedial Works Location
- KP
- EWIC Cable Route
- 12nm Territorial Sea Limit
- EEZ Boundary
- SAC

Zone of Influence

- 40km - Fish
- 100km - Pinnipeds

NOTE: Not to be used for Navigation

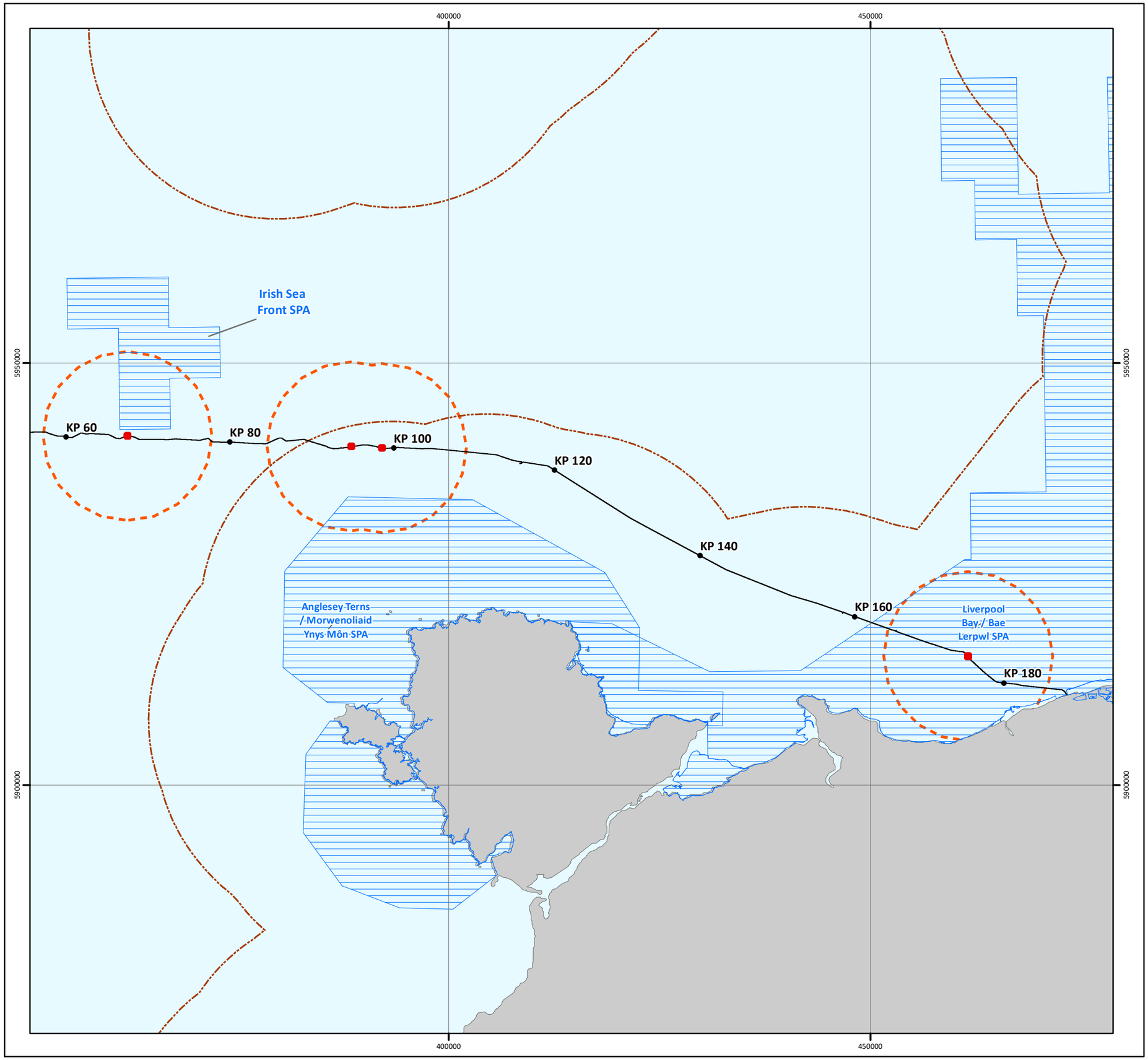
Date	06 October 2023
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	JNCC; NPWS; UKHO; DECC; MARINE REGIONS; GEBCO; ESRI:
File Reference	J:\P2226\Mxd\04_ENV\ P2226K-ENV-001.mxd
Created By	Lewis Castle
Reviewed By	Chris Carroll
Approved By	Andrew Page

0 10 20 30 40 km

EAST WEST INTERCONNECTOR REMEDIAL WORKS

ENVIRONMENTAL DESIGNATIONS
SPA's within Zones of Influence

Drawing No: P2226K-ENV-002	A



Legend

- EWIC Remedial Works Location
- KP
- EWIC Cable Route
- 12nm Territorial Sea Limit
- SPA

Zone of Influence

- 10km - Birds

NOTE: Not to be used for Navigation

Date	06 October 2023
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	JNCC; UKHO; GEBCO; ESRI:
File Reference	J:\P2226\Mxd\04_ENV\ P2226K-ENV-002.mxd
Created By	Lewis Castle
Reviewed By	Chris Carroll
Approved By	Andrew Page

0 5 10 15 20 km

3.3 Benthic Ecology

Benthic ecology comprises the habitats and species (flora and fauna) present in, on or closely associated with the seabed. A high-level assessment of the key sensitive intertidal and benthic habitats and species within the vicinity of the Proposed Works has been made by reviewing the following desk-based data sources:

- European Marine Observation Data Network (EMODnet) Seabed Habitats project (www.emodnet-seabedhabitats.eu) - EUSeaMap broad-scale predictive mapping based on physical hydrographic information within different habitats areas and water depths.

The MESH project has collated studies and survey data to map European Nature Information System (EUNIS) and Marine Strategy Framework Directive (MSFD) broadscale habitats present on the seabed of north-west Europe. This data is predictive rather than definitive however it does provide some indication to the types of benthic habitats that may be found within the Proposed Works. The EUNIS habitats identified along the EWIC cable route are listed in Table 3-2 and shown in Figure 3-3 (Drawing P2226K-HAB-001-A) below.

Table 3-2 Summary of benthic seabed habitats along the EWIC cable route in Welsh Territorial Waters

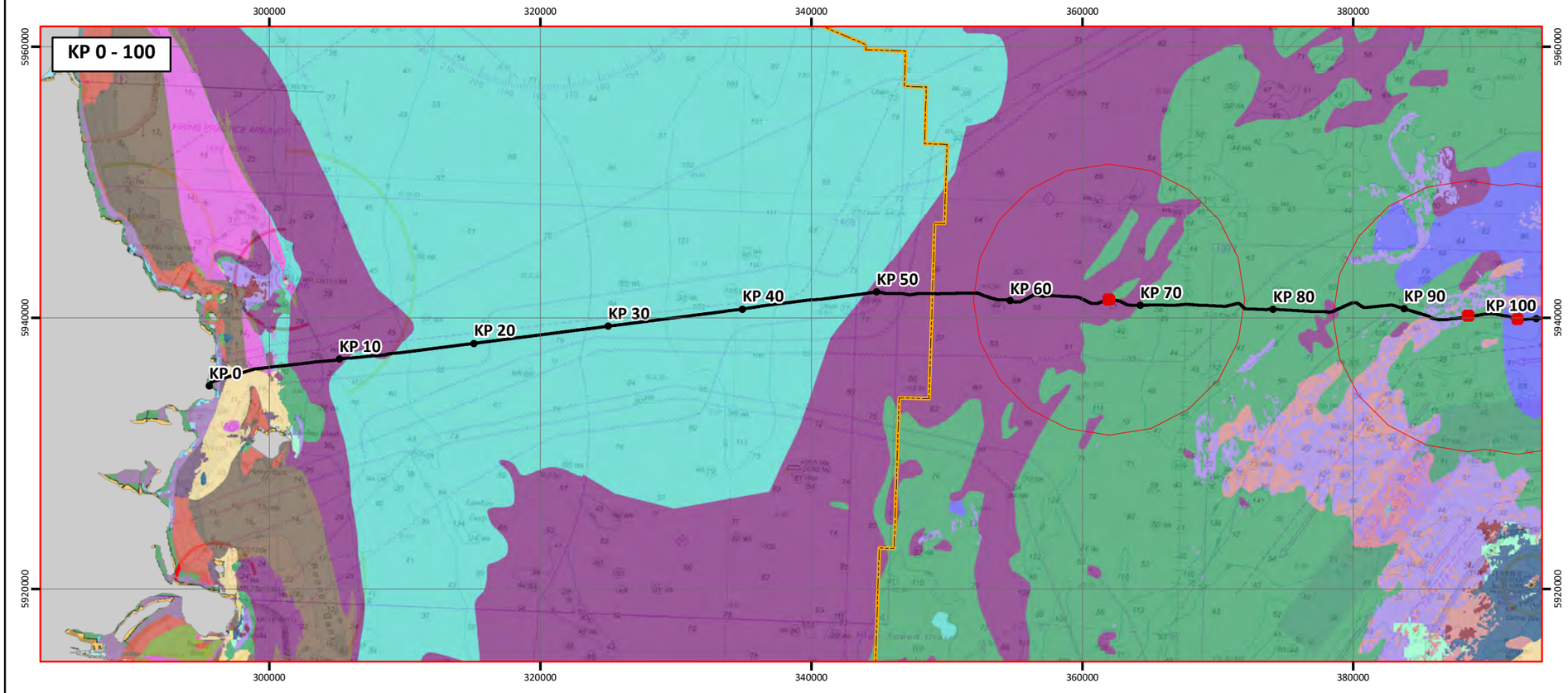
EMODNet Habitat	EUNIS Description
A4.27 Deep circalittoral rock	Offshore (deep) seabed comprised of hard substrata with low hydrodynamics and strong sedimentation. Characterised by epifaunal communities which attach to and inhabit hard substrata. This is the expected biotope at Area Three.
A5.14 Circalittoral coarse sediment	Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g. *Neopentadactyla*) may also be prevalent in these areas along with the lancelet *Branchiostoma lanceolatum*. This is the expected biotope at Area Four.
A5.15 deep circalittoral coarse sediment	Offshore (deep) circalittoral habitats with coarse sands and gravel or shell. Such habitats are quite diverse compared to shallower versions of this habitat and generally characterised by robust infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore mixed sediments and in some areas settlement of *Modiolus modiolus* larvae may occur and consequently these habitats may occasionally have large numbers of juvenile *M. modiolus*. In areas where the mussels reach maturity their byssus threads bind the sediment together, increasing stability and allowing an increased deposition of silt leading to the development of the biotope A5.622.
A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand	**A5.23** - Clean sands which occur in shallow water, either on the open coast or in tide-swept channels of marine inlets. The habitat typically lacks a significant seaweed component and is characterised by robust fauna, particularly amphipods (*Bathyporeia*) and robust polychaetes including *Nephtys cirrosa* and *Lanice conchilega*. **A5.24** - Non-cohesive muddy sand (with 5% to 20% silt/clay) in the infralittoral zone, extending from the extreme lower shore down to more stable circalittoral zone at about 15-20 m. The habitat supports a variety of animal-dominated communities, particularly polychaetes (*Magelona mirabilis*, *Spiophanes bombyx* and *Chaetozone setosa*), bivalves (*Fabulina fibula* and *Chamelea gallina*) and the urchin *Echinocardium cordatum*.
A5.25 or A5.26 Circalittoral fine sand or circalittoral muddy sand	**A5.25** - Clean fine sands with less than 5% silt/clay in deeper water, either on the open coast or in tide-swept channels of marine inlets in depths of over 15-20 m. The habitat may also extend offshore and is characterised by a wide range of echinoderms (in some areas including the pea urchin *Echinocyamus pusillus*), polychaetes and bivalves. This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community. **A5.26** - Circalittoral non-cohesive muddy sands with the silt content of the substratum typically ranging from 5% to 20%. This habitat is generally found in water depths of over 15-20 m and supports animal-dominated communities characterised by a wide variety

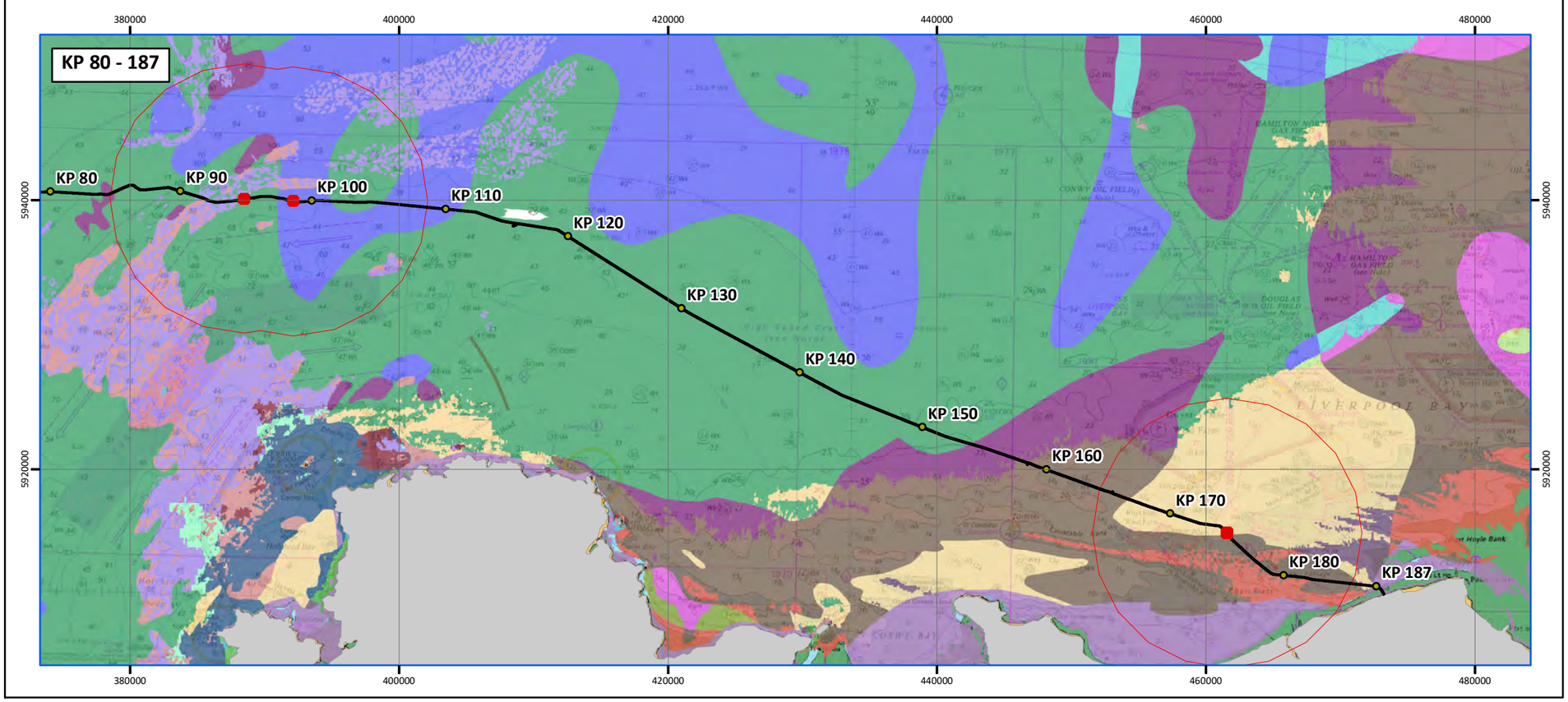
EMODNet Habitat	EUNIS Description
	of polychaetes, bivalves such as *Abra alba* and *Nucula nitidosa*, and echinoderms such as *Amphiura* spp and *Ophiura* spp., and *Astropecten irregularis*. These circalittoral habitats tend to be more stable than their infralittoral counterparts and as such support a richer infaunal community.
A5.27 deep circalittoral sand	Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms. This is the expected habitat at Area One.
A5.37 Deep circalittoral mud	In mud and cohesive sandy mud in the offshore circalittoral zone, typically below 50-70 m, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as *Thyasira* spp., echinoderms and foraminifera.
A5.45 deep circalittoral mixed sediments	Offshore (deep) circalittoral habitats with slightly muddy mixed gravelly sand and stones or shell. Such habitats are often highly diverse with a high number of infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore gravels and coarse sands and in some areas populations of the horse mussel *Modiolus modiolus* may develop in these habitats. This is the expected biotope at Area Two.
High energy infralittoral seabed	Infralittoral zone (Low water down to 5 m) subject to exposed to extremely exposed wave action or strong tidal streams.

EAST WEST INTERCONNECTOR REMEDIAL WORKS

SEABED HABITATS
EMODnet EUSeaMap Habitats

Drawing No: P2226K-HAB-001 | **A**





Legend

- EWIC Remedial Assessment Areas
- KP
- EWIC RPL Rev10
- EEZ Boundary
- Remedial Works 10km Buffer

EU Sea Map

EUNIS classification

- A3
- A3.1
- A3.2
- A3.3
- A4
- A4.1
- A4.12
- A4.2
- A4.27
- A4.3
- A4.33
- A5
- A5.13
- A5.14
- A5.15
- A5.23 or A5.24
- A5.25 or A5.26
- A5.27
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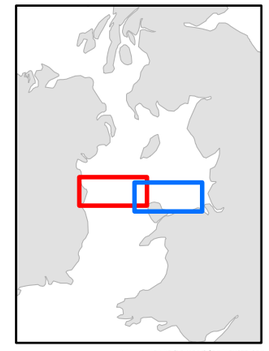
- A5.35
- A5.37
- A5.43
- A5.44
- A5.45
- Na



NOTE: Not to be used for Navigation

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Projection	Transverse Mercator
Datum	WGS 1984
Data Source	MarineRegions; MarineFind; EMODnet; ESRI; GEBCO;
File Reference	J:\P2226\Mxd\03_HAB\ P2226K-HAB-001.mxd
Created By	Lewis Castle
Reviewed By	Chris Carrol
Approved By	Andrew Page

EIRGRID intertek

0 5 10 15 20 km

3.4 Marine mammals

3.4.1 Cetaceans

All available data indicates that the coastal waters of the eastern Irish Sea have a low abundance of cetaceans. To the east of the EWIC cable route, harbour porpoise (*Phocoena Phocoena*), bottlenose dolphin (*Tursiops truncates*) and white-beaked dolphins (*Lagenorhynchus albirostris*) have all been recorded but in low densities during the summer months. The common dolphin (*Delphinus delphis*) has also been recorded in the eastern Irish Sea in offshore waters between June and October, particularly to the south-west of the Isle of Man. Other occasional visitors to the eastern Irish Sea include sperm whale (*Physeter macrocephalus*), striped dolphin (*Stenella coeruleoalba*), Rissos dolphin (*Grampus griseus*), killer whale (*Orcinus orca*) and long-finned pilot whale (*Globicephala melas*).

Most cetaceans are wide-ranging, and individuals encountered within Irish and Welsh waters form part of a much larger biological population whose range extends into adjacent jurisdictions. As a result, management units (MUs) have been outlined for seven of the common regularly occurring species following advice from the Sea Mammals Research Unit (IAMMWG[4] 2022) and the International Council for the Exploration of the Sea (ICES). These provide an indication of the spatial scales at which impacts of anthropogenic activities should be taken into consideration. A summary of the abundance and estimated density of the above species within the Celtic and Irish Seas MU is provided in Table 3-3 (JNCC 2023).

Table 3-3 Cetacean species within the application area

Species	Abundance of animals in MU
Harbour porpoise (*Phocoena phocoena*)	62,517
Bottlenose dolphin (*Tursiops truncatus*)	293
Striped dolphin (Stenella coeruleoalba)	No data available
Risso's dolphin (*Grampus griseus*)	12,262
White-beaked dolphin (*Lagenorhynchus albirostris*)	43,951
Long-finned pilot whale (*Globicephala melas*)	No data available
Minke whale (*Balaenoptera acutorostrata*)	20,118
Killer whale (*Orcinus orca*)	No data available
Sperm whale (*Physeter macrocephalus*)	No data available

Source (JNCC 2023)

3.4.2 Pinnipeds

Two species of seal are resident within UK waters, the grey seal (*Halichoerus grypus*) and harbour (or common) seals (*Phoca vitulina*). Grey seals are present in coastal waters around Wales throughout the year (Baines and Evans 2012). It is estimated that the mean number of individuals in the waters in the vicinity of the EWIC cable route will vary from 0 to 10 individuals per 5km^2 (Russel, Jones & Morris 2017). Numbers generally increase towards the Welsh coast with individuals using Liverpool Bay to haul out, feed and moult (Cheshire Wildlife Trust 2020). Based on a recent review on the status of harbour seals in the UK (Thompson *et al*. 2019), harbour seals are effectively absent from the UK

[4] Inter-Agency Marine Mammal Working Group

coastline between Dover and the Solway Firth. The only exception is occasional sightings of individuals or small groups of seals in the Dee estuary in North Wales (Thompson *et al*. 2019). The estimated mean number of individuals present in coastal waters off the north Wales coast is 0-1 individuals per 5km^2 (Russell, Jones & Morris 2017).

3.4.3 Otter

Otter (*Lutra lutra*) are semi-aquatic mammals which may inhabit rivers, lakes, coastal areas and marshy areas some distance from open water. Coastal populations utilise shallow, inshore marine areas for feeding but also require fresh water for bathing and terrestrial areas for resting and breeding holts. They are commonly seen foraging within a narrow zone close to the shore (<100m) and only rarely cover larger distances, moving between islands (DECC 2016). Otter are a qualifying feature of both the Pen Llŷn a'r Sarnau/ Lleyn Peninsula and the Sarnau, Pembrokeshire Marine/ Sir Benfro Forol and River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SACs.

3.5 Marine birds

The coastal sea cliffs, estuaries and offshore islands of Wales are host to several nationally and internationally important bird species, with many areas designated as SPA's and Ramsar sites. Coastal habitats provide important breeding sites for many species of seabirds, several of which are protected under national and European legislation. Several large seabird colonies exist around the coast of northern Wales with species such as gannets, shearwaters, petrels, auks and gulls breeding, feeding and migrating in significant numbers. Due to the extensive area of good feeding opportunities, these species will tend to be well dispersed throughout the Irish Sea, including within proximity to the Proposed Works.

Birds are mobile and for this reason accurate assessments of their temporal and spatial distribution are difficult to make, particularly at sea. There are a wide variety of birds and seabirds that are either endemic or regular visitors to the coastline and offshore waters of the Irish Sea.

The Proposed Works are located within or near to the following SPAs:

- Liverpool Bay SPA;
- Anglesey Terns SPA;
- Irish Seafront SPA

The Liverpool Bay SPA is designated for nationally important red-throated diver (*Gavia stellata*), little gull (*Hydrocoloeus minutus*), little tern (*Sternula albifrons*), common tern (*Sterna hirundo*) and migratory common scoter populations. Diving species including red-throated diver, common scoter and tern species rely on plunge diving in order to feed. Little gull typically feeds of fish and insects on the sea surface. An assessment of numbers and distribution of wintering waterbirds in Liverpool Bay SPA over 5 years (Lawson *et al*. 2016) showed all species are commonly found and other than little gull, their distribution is primarily restricted to the coast. Further information on the density and distribution of bird species is provided in Appendix A: HRA Screening.

The Anglesey Terns SPA historically included Ynys Feurig, Cemlyn Bay and the Skerries SPA. These SPA's have recently been reclassified and extended to form the Anglesey Terns / Morwenoliaid Ynys Môn SPA. This site regularly supports more than 1% of the Great Britain population of Common tern, Arctic tern (*Sterna paradisea*), Roseate tern (*Sterna dougalli*) and Sandwich tern (*Sterna sandvicensis*).

The Irish Seafront SPA is known to regularly support a population of European importance for Manx shearwater *(Puffinus puffinus*), which are likely to use the area as a foraging location during the breeding season. It is situated in the Irish Sea, approximately 35km south-west of the Isle of Man and 36 km to the north-west of Anglesey and has an area of 180km^2. The Irish Sea Front SPA is the UK's

third-largest marine breeding Manx shearwater assemblage (Kober et al., 2012). More than 12,000 Manx shearwater may be present in the area, according to data from the European Seabirds at Sea (ESAS) database (ESAS, 2022).

Further details on these sites are provided in Appendix A: HRA Screening.

3.6 Fish and Shellfish

Cefas have undertaken a series of trawls in the Irish Sea to inform the North West Groundfish Survey. The data collected highlighted trawls were dominated by European plaice (*Pleuronectes platessa*), small-spotted catshark (*Scyliorhinus canicular*), thornback ray (*Raja clavata*), dragonet (*Synchiropus splendidus*), grey gurnard (*Eutrigla gurnardus*), whiting (*Merlangius merlangus*), dab (*Limanda limanda*) and sole (*Solea solea*), all of which are considered abundant within the eastern Irish Sea and Liverpool Bay (Innogy 2020).

Otter trawls conducted across the Irish Sea as part of the Northern Ireland Groundfish Surveys were dominated by whiting, haddock, small spotted catshark, plaice and herring. In addition, *Nephrops* were recorded in high abundance closer to the Isle of Man (Innogy 2020).

Previous studies have shown two shellfish resources within the Irish Sea, a scallop ground across the eastern Irish Sea and a *Nephrops* resource located to the north of Liverpool Bay, between the Isle of Man. Inshore shellfish species are primarily cockles, crab, lobsters, mussels, shrimp and whelk (Innogy 2020).

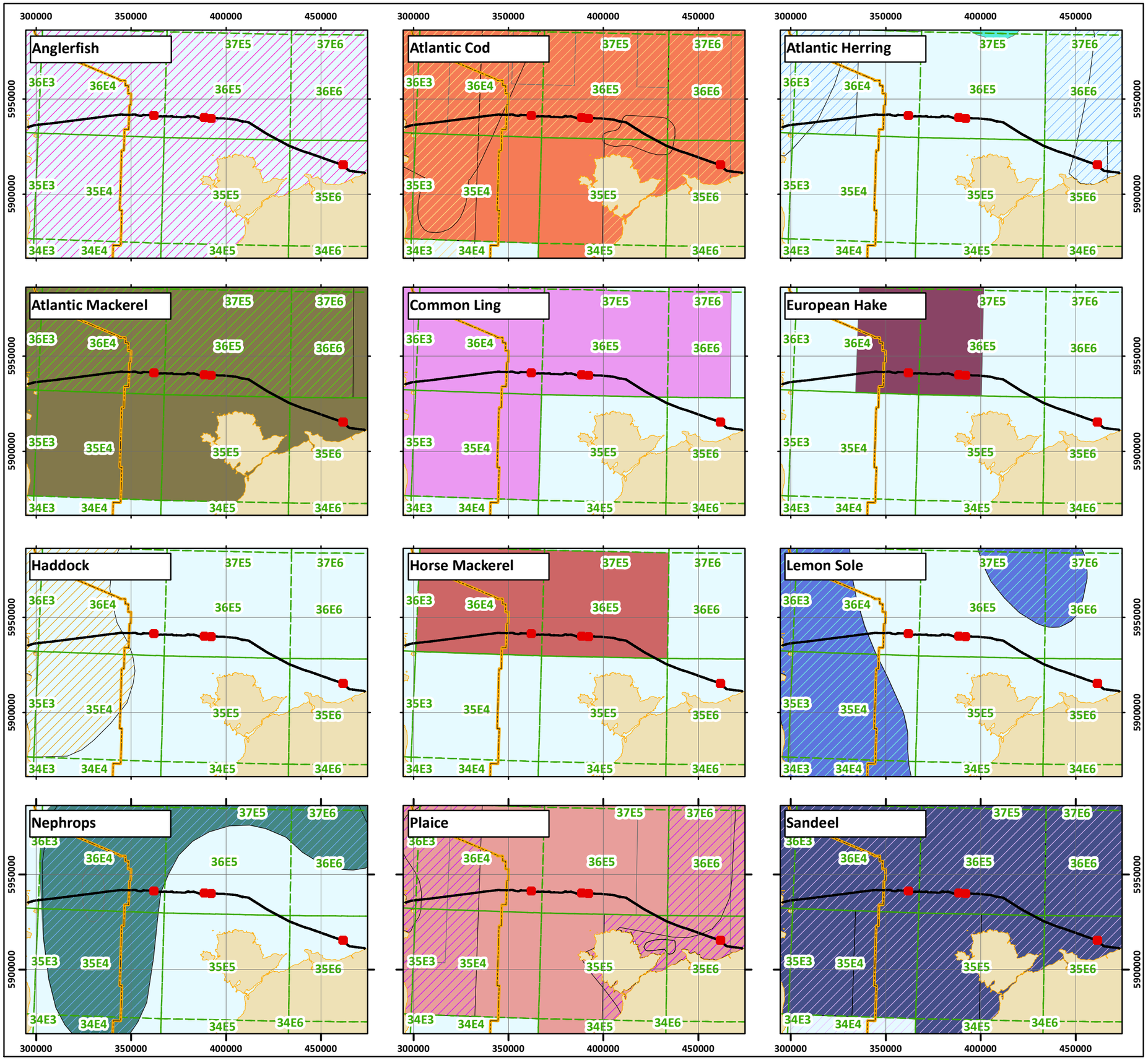
3.6.1 Fish Spawning and Nursery Grounds

The EWIC cable route is within important spawning and nursery grounds as summarised in Table 3-4 and Figures 3-4 and 3-5. The Proposed Works are within the spawning and nursery grounds for seventeen species of fish (Figure 3-4 (Drawing Number P2226K-FISH-001-A) and Figure 3-5 Drawing number: P2226K-FISH-002-A)). The application area is a spawning ground for eleven species and a nursery ground for thirteen species.

Table 3-4 Summary of spawning and nursery grounds present within and proximity to the EWIC cable route

Species	Within Spawning Grounds	Within Nursery Grounds
Anglerfish (*Lophiiformes*)	×	✓
Cod (*Gadus morhua*)	✓	✓
Haddock (*Melanogrammus aeglefinus*)	×	×
Hake (*Merluccius merluccius*)	✓	×
Herring (*Clupea harengus*)	×	✓
Mackerel (*Scomber scombrus*)	✓	✓
Horse Mackerel (*Trachurus trachurus*)	✓	×
Lemon Sole (*Microstomus kitt*)	×	×
Ling (*Molva molva*)	✓	×
Nephrops (*Nephrops norvegicus*)	✓	✓
Plaice (*Pleuronectes platessa*)	✓	✓
Sandeel (*Hyperoplus lanceolatus*)	✓	✓
Sole (*Solea solea*)	✓	✓

Species	Within Spawning Grounds	Within Nursery Grounds
Spotted ray (*Raja montagui*)	×	✓
Sprat (*Sprattus sprattus*)	✓	×
Spurdog (*Squalus acanthias*)	×	✓
Thornback ray (*Raja clavata*)	×	✓
Tope shark (*Galeorhinus galeus*)	×	✓
Whiting (*Merlangius merlangus*)	✓	✓



EAST WEST INTERCONNECTOR REMEDIAL WORKS

FISH ACTIVITY

Spatial Patterns of Fish Spawning and Nursing

Sheet 1 of 2

Drawing No: P2226K-FISH-001	A

Legend

- EWIC Remedial Works Location
- EWIC RPL Rev10
- EEZ Boundary
- ICES Block

Nursery Grounds

Species

- Anglerfish
- Atlantic Cod
- Atlantic Herring
- Atlantic Mackerel
- Haddock
- Lemon Sole
- Nephrops
- Plaice
- Sandeel

Spawning Grounds

Species

- Atlantic Cod
- Atlantic Herring
- Atlantic Mackerel
- Common Ling
- European Hake
- Horse Mackerel
- Lemon Sole
- Nephrops
- Plaice
- Sandeel

NOTE: Not to be used for Navigation

Date	06 October 2023
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	MarineRegions; CEFAS; OSOD; ESRI; ICES
File Reference	J:\P2226\Mxd\05_FISH\ P2226K-FISH-001.mxd
Created By	Lewis Castle
Reviewed By	Chris Carrol
Approved By	Andrew Page

0 20 40 60 80 km

Flanders Marine Institute (2019). Maritime Boundaries Geodatabase: Exclusive Economic Zone (EEZ), version 11. Available online at http://www.marineregions.org/. https://doi.org/10.14284/386; Contains Ordnance Survey data © Crown copyright and database right 2013; Contains public sector information licensed under Open Government Licence v3.0. Data from Ellis, J.R. et al. (2012) Spawning and Nursery Grounds of Selected Fish Species in UK Waters. CEFAS Lowestoft Science Series Technical Report, 147: 55pp. © ESRI; ©ICES

EAST WEST INTERCONNECTOR REMEDIAL WORKS

FISH ACTIVITY

Spatial Patterns of Fish Spawning and Nursing Sheet 2 of 2

Drawing No: P2226K-FISH-002	A

Legend

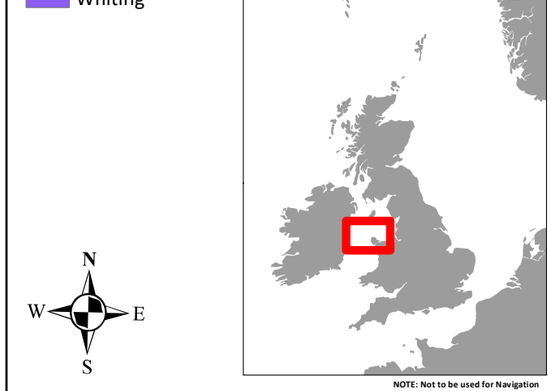
- EWIC Remedial Works Location
- EWIC RPL Rev10
- EEZ Boundary
- ICES Block

Nursery Grounds

Species
- Sole
- Spotted Ray
- Spurdog
- Thornback Ray
- Tope Shark
- Whiting

Spawning Grounds

Species
- Sole
- Sprat
- Whiting



NOTE: Not to be used for Navigation

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Created By	Lewis Castle
Reviewed By	Chris Carrol
Approved By	Andrew Page

0 20 40 60 80 km

Flanders Marine Institute (2019). Maritime Boundaries Geodatabase: Exclusive Economic Zone (EEZ), version 11. Available online at http://www.marineregions.org/. https://doi.org/10.14284/386; Contains Ordnance Survey data © Crown copyright and database right 2013; Contains public sector information licensed under Open Government Licence v3.0. Data from Ellis, J.R. et al. (2012) Spawning and Nursery Grounds of Selected Fish Species in UK Waters. CEFAS Lowestoft Science Series Technical Report, 147: 55pp. © ESRI; ©ICES

The EC Habitats Directive Annex II listed species, sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*) and Atlantic salmon (*Salmo salar*) are listed as designated features of the Dee Estuary and River Dee SACs. Although these sites lie more than 10km distant from the Proposed Works, all are migratory species that may be found in the application area at certain times of the year:

- Sea lamprey – October - December
- River lamprey – October - December
- Atlantic salmon – Early summer – late autumn

Brook lamprey do not migrate and are a freshwater species, therefore will not be observed in proximity to the Proposed Works.

3.7 Marine Activity

3.7.1 Commercial fishing

Fishing activity in the southern Irish Sea and in the vicinity of the EWIC cable route can be divided into two key areas. Fishing activity in Irish waters and in the area along the EWIC cable route between approximately KP10 to KP55 is primarily carried out by Irish prawn trawlers that concentrate on fishing soft, muddy ground. This was further evidenced by extensive trawl scars highlighted in the 2015 and 2019 geophysical data. Between KP55 and KP160, the primary fishing activity is beam trawling and scallop dredging (on harder, rocky ground). Static gear fishing activity using crab and whelk pots is also carried out in English/Welsh waters. Static gear fishing is also carried out on the inshore grounds off Barkby Beach, north Wales between KP160 and KP185. Inshore fishing activity mainly involves local inshore boats fishing with pots and set nets.

3.7.2 Shipping and Navigation

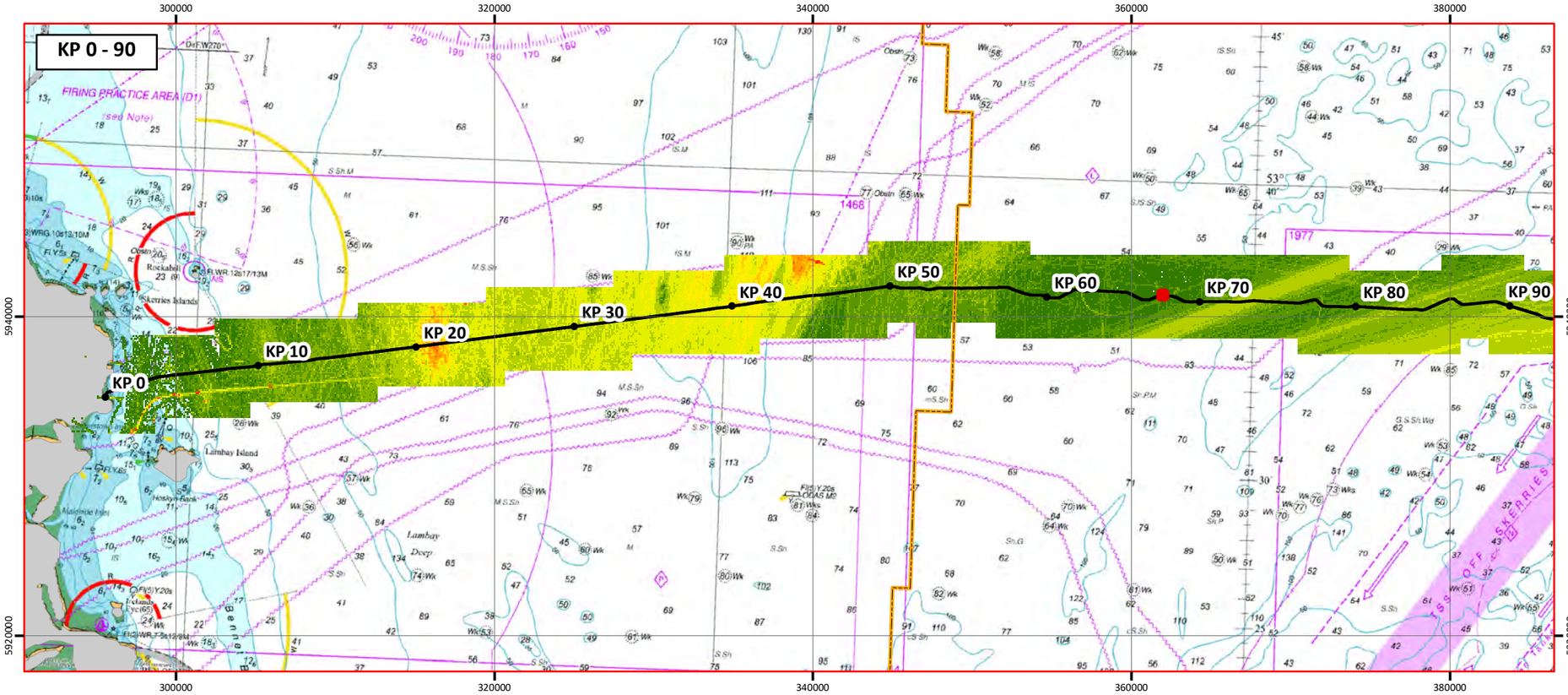
AIS (Automatic Identification System) is an automatic tracking system used on ships for identifying and locating vessels by electronically exchanging data with other nearby ships and AIS base stations and satellites. The International Maritime Organisation (IMO) requires AIS to be fitted aboard international voyaging ships with gross tonnage of 300 or more tons, and all passenger ships regardless of size. This would cover almost all commercial vessels and most private vessels that would be of risk to the cable; however, some smaller fishing vessels could be missing from the AIS dataset. Information provided by the AIS equipment usually consists of unique identification number for each vessel, vessel name, vessel type, vessel position, course and speed. Other attributes like vessel deadweight tonnage and draught may be completed by the AIS supplier. To quantify the anchoring risk to the cable, Intertek was provided historical AIS (by EIDAC) data along the EWIC cable route for the period of January 2019 to December 2019 (inclusive) from Ultramap for a study area of approximatively 3km wide either side of the cable route. The 3km study area allows insight into vessel movements by vessel type/size in the surrounding geography. For the purpose of evaluating changes in the key shipping routes in the region, Intertek obtained free, anonymised AIS data from the EMODNET for the year 2018. Figure 3-6 (Drawing number: P2226K-AIS-004-A) provides a visualisation of this dataset which provides an overview of vessel movement density.

There are four areas of high shipping density along the cable route, between KP 20 to 45, KP 90 to 125. and KP135 to 140 orientated in an east/west direction. The EWIC cable crosses these areas in a relatively perpendicular direction.

EAST WEST INTERCONNECTOR REMEDIAL WORKS

AIS VESSEL DENSITY & ASSESSMENT AREAS
Vessel Hours Per Year Per km²
All Vessel Bands

Drawing No: P2226K-AIS-004 | **A**

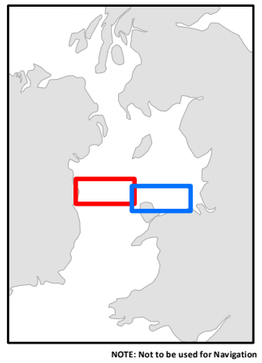


Legend

- KP
- EWIC Remedial Works Location
- EWIC RPL Rev10
- EEZ Boundary

Vessel Density
vhpy/km²

- <1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 25
- 25 - 50
- 50 - 75
- 75 - 100
- 100 - 150
- 150 - 200
- 200 - 500
- >500



NOTE: Not to be used for Navigation

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File Reference	J:\P2226\Mxd\02_AIS\ P2226K-AIS-004.mxd
Created By	Lewis Castle
Reviewed By	Chris Carroll
Approved By	Andrew Page

EIRGRID intertek

0 5 10 15 20 km

3.7.3 Subsea Infrastructure and Wrecks

There are several offshore oil and gas fields located within the Irish Sea. The Liverpool Bay Development consists of four oil and gas fields within Irish Sea block 110/13 and 110/15 which are located in excess of 10km to the north east of the proposed remedial works. Blocks awarded under the 31st licensing rounds are located north of the proposed remedial works in the central Irish Sea. A gas pipeline between Ireland and Scotland runs in parallel to the EWIC cable route from landfall to KP44. Furthermore, there is a pipeline that transports gas from the Douglas complex south to a processing terminal at Point of Ayr which is located to the east of the proposed remedial works.

The EWIC cable route is crossed by or crosses 11 existing cables, all of which are in service. Each crossing has either mattressing or rock berms in place for external protection measures when the EWIC cable was originally surface laid or crossing assets surface laid across EWIC.

There are several wrecks in proximity to the existing EWIC cable route, however the route was designed to avoid all of these.

3.7.4 Aggregate Extraction

Within UK and Irish waters all active and historical dredging areas are known and have detailed surveys undertaken to ascertain sediment levels. All disposal and dumping sites are also known and are contaminated with material such as heavy metals and in some extreme cases radioactive waste. Aggregation extraction areas have also been avoided. There are no observed areas in the vicinity of the EWIC cable route.

3.7.5 Recreation

Recreational activities in the coastal areas of north Wales include kayaking, canoeing, sail boats and personal watercraft which are primarily restricted to the Welsh coastline. Recreational marine traffic is most abundant within Conwy Bay and in the mouth of the Menai Straits and in Liverpool Bay. Recreational boating takes place around English, Welsh and Irish coasts as well as routes to and from the Isle of Man. The RYA UK Coastal Atlas of Recreational Boating identifies low intensity route across the majority of the Irish Sea, with higher intensity areas restricted to the Irish and north Wales coastline and at entrances and exits of various ports (RYA 2020). The north Wales coastline has extensive areas of beaches from Rhos point to the Point of Ayr which are highly utilised.

3.8 Other Proposed Activities in the Area

A search of marine licence applications for other activities which could interact with the proposed remedial works was conducted using GIS and a review of marine licence applications on the NRW Public Register (NRW 2023). Table 3-5 lists all current and previous applications listed on the Public Register which may interact with the Proposed Works.

Table 3-5 Development applications near the Proposed Works

Name of development	Licence ref	Type of survey/activity	When planned to commence	Licence Status	Distance from Proposed Works (km)
ENI Conwy to Douglas Pipeline Spill Monitoring Survey	N/A	Survey	April 2023 – April 2024	Received	3.8
Mona Offshore Wind Limited	RML2285	Suction Bucket Foundation Trials	June 2023 – May 2024	Issued	28.8
SOBR1	RML2336	Seabed Survey	August 2023 – February 2024	Received	0

Name of development	Licence ref	Type of survey/activity	When planned to commence	Licence Status	Distance from Proposed Works (km)
Bangor University	RML2324	Sample Collection	June 2023 – June 2024	Issued	0
Awel y Môr Offshore Windfarm Ltd	RML2323	Geotechnical Survey	July 2023 – May 2024	Issued	9.8
Holyhead Breakwater Refurbishment	SC2002	Refurbishment	March 2021-October 2027	Issued	30

Table 3-6 Ongoing projects near Proposed Works

Name of development	Type of survey/activity	Distance from Proposed Works (km)
Walney Extension	Maintenance of existing wind farm	73
The Douglas Complex	Oil and Gas Operations	30

4. SCOPE OF ENVIRONMENTAL ASSESSMENT

4.1 Identification of Pressures

The JNCC Marine Pressures Activities Database (PAD) pressure list and descriptions (JNCC 2022) have been used to describe the expected from the proposed remedial works. A list of all relevant pressures identified has been provided below:

- Above water noise;
- Abrasion/disturbance of the substrate on the surface of the seabed;
- Barrier to species movement;
- Changes in suspended solids (water clarity);
- Changes to supporting habitat and prey availability;
- Collision above/below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures);
- Death by injury or collision;
- Deoxygenation;
- Electromagnetic changes;
- Habitat structure changes – removal of substratum (extraction);
- Hydrocarbon and PAH contamination;
- Introduction of light;
- Introduction or spread of invasive non-indigenous species (INIS);
- Litter;
- Nutrient enrichment;
- Organic enrichment;
- Penetration and/or disturbance of the substrate below and on the surface of the seabed, including abrasion;
- Physical change (to another seabed/sediment type);
- Physical loss (to land or freshwater habitat);
- Siltation rate changes, including smothering (depth of vertical sediment overburden);
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals);
- Temperature changes – local;
- Transmission elements and organo-metal contamination;
- Underwater noise changes;
- Visual disturbance;
- Water flow (tidal current) changes – local, including sediment transport considerations; and
- Wave exposure changes.

4.2 Pressures Scoped Out of Assessment

While the above pressures have been identified, using professional judgement, and considering the description of the proposed remedial works, a number of pressures have been scoped out of the assessment. These pressures, including justification for being scoped out are provided in Table 4-1. The remaining pressures have been assessed for each receptor/topic where relevant.

Table 4-1 Pressures Scoped Out of the Assessment

Pressure Scoped Out of Assessment	Receptor/Topic	Justification for Scoping Pressure Out of Assessment
Above water noise	Marine birds	The only above water noise from the project will be from the vessel. As there is high levels of vessel traffic in the Irish Sea, this Project vessel(s) will be imperceptible above background levels and so this pressure has been scoped out.
Barrier to species movement	All species	The Project will not introduce any elements that will represent a significant barrier to the movement of species. The presence of Project vessel(s) may lead to temporary disturbance
Changes in suspended solids (water clarity)	Benthic Ecology Fish and Shellfish Marine Mammals Marine Birds	Any changes to water clarity will be temporary and localised based on the strong tidal flows in the area which will disperse suspended solids rapidly.
Collision above/below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Fish and Shellfish Marine Mammals Marine Birds	Based on the limited spatial extents of the Project and the short duration of the works (up to 14 days), there will be limited opportunity for collision with project vessels. Similarly, the vessel will be operating away from coastal areas, where the lighting from vessels can cause confusion to seabirds. The vessels will also be travelling at a slow speed, allowing time for any individuals to avoid any collision. As a result, this pressure has been scoped out.
Death by injury or collision	Marine mammals	Although shipping collision is a recognised cause of basking shark and marine mammal mortality worldwide, the key factor influencing the injury or mortality caused by collisions is ship size and speed. Ships travelling at 14 knots or faster are most likely to cause lethal or serious injuries (Scottish Executive 2007) . Although the presence of Project vessel(s) marginally increases the level of vessel activity within the area for the duration of the proposed remedial works, none of the Project vessel(s) will be travelling at speeds exceeding 14 knots. The Project vessel(s) are likely to traverse the EWIC cable at a rate of 190m per hour (equivalent to 0.1 knots) resulting in a low likelihood of collision. Given that Project vessel(s) will be operating at less than 14 knots, the effect is scoped out of the assessment as it is not likely to be significant.
Electromagnetic changes	Fish and Shellfish Marine Mammals	EWIC is already in operation, therefore the effects of EMF were considered in the EIA submitted with the original marine licence application prior to installation.
Habitat structure changes – removal of substratum (extraction)	Benthic Ecology	The Proposed Works will only include deployment of cable protection and no trenching. Therefore, there will be no removal of substratum and no consequent habitat structure changes.
Hydrocarbon and PAH contamination	All	Unplanned events (accidental oil spill or chemical spills) have been scoped out of the assessment for the following reasons; the likelihood of a large oil spill occurring from Project vessel(s) is extremely low and the risk is no greater than that of any other vessel within vicinity to the Proposed Works. In addition, Project vessel(s) will have control measures and shipboard oil pollution emergency plans (SOPEP) in place and will adhere to International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I requirements.

Pressure Scoped Out of Assessment	Receptor/Topic	Justification for Scoping Pressure Out of Assessment
Introduction of light	All	The proposed remedial works will only be carried out during daytime hours, therefore there will be no introduction of light other than navigational and safety lights on the Project vessel(s) and ROV during the geophysical survey. Therefore, this pressure has been scoped out of the assessment.
Litter	Benthic Ecology Fish and Shellfish Marine Mammals Marine Birds	The proposed remedial works will not result in the discarding, disposing or abandoning of marine litter.
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Benthic Ecology	Direct penetration and/or disturbance of habitat will not take place from project activities. The only cable protection methods to be used include the deployment of concrete mattresses and rock bags which will not penetrate the substrate. Additionally, the cable protection will cover a small area resulting in minimal impact to substrate below the seabed.
Physical loss (to land or freshwater habitat)	Benthic Ecology	No habitat will be altered to land or a freshwater environment, so this pressure has been scoped out.
Siltation rate changes, including smothering (depth of vertical sediment overburden)	Fish/ Benthic Ecology	The main pathway for species to be smothered as a result of project activities will be by the deposition of cable protection material being placed on the seabed, potentially resuspending sediment. The effect from displaced sediment will be very localised, only effecting species in the immediate vicinity of the activity. At the location of remedial works the sediments recorded are relatively coarse and lack fines (silts and clay). Suspended sediment settlement levels are expected to be minimal with any material deposited likely to be quickly re-suspended and distributed by natural hydrodynamic processes. Therefore, this aspect of the effect on benthic ecology and fish and shellfish has been scoped out.
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Benthic Ecology	No synthetic compounds will be released as part of the Project's activities. The vessel(s) to be used will undergo an antifouling regime, however due to their limited presence in the region and the ongoing maintenance and checks of the vessel(s) required for commercial operation it is considered unlikely that any contamination will occur. As a result, this pressure has been scoped out.
Temperature changes - local	Benthic Ecology Fish	EWIC is already in operation, therefore the effects of local temperature changes were considered in the EIA submitted with the original marine licence application prior to installation.
Transmission elements and organo-metal contamination;	All	Transmission elements and organo-metal contamination has been considered as part of the Water Framework Directive (WFD) Assessment submitted in support of the marine licence application.
Wave exposure changes - local	Physical Processes	The introduction of external cable protection of height 1m will not significantly influence wave action based on the water depth at remedial works locations and strong wave action in the region.
Deoxygenation Nutrient enrichment	Benthic Ecology Fish and Shellfish	During the proposed remedial works, it is possible that the Project vessel(s) will discharge grey water (sewage, food waste and drainage water) which can have potentially toxic effects on species and lead to localised nutrient enrichment,

Pressure Scoped Out of Assessment	Receptor/Topic	Justification for Scoping Pressure Out of Assessment
Organic enrichment		organic enrichment and deoxygenation. Considering the temporary nature of the Proposed Works and the relatively small volume of discharges from the Project vessel(s), the marine environment will be able to rapidly assimilate any discharges. In addition, strong tidal action is likely to disperse and organic matter or nutrients swiftly, therefore nutrient and organic enrichment and deoxygenation has been scoped out of the assessment.
Visual disturbance	Fish	The effect could occur during the deployment of external cable protection and geophysical survey due to the presence of Project vessel(s) and equipment. This may result in the displacement of fish within the water column. The disturbance from these activities will be temporary, localised and not considered likely to result in significant effects given existing levels of shipping within the Irish Sea. Therefore, this pressure has been scoped out of the assessment.

5. ASSESSMENT OF EFFECTS

5.1 Approach to Assessment

To assess the significance of effects on the environment from the Proposed Works it is first necessary to identify the pressures and impacts the works may have.

Pressures are the mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by the activity type, intensity and distribution. A list of marine physical / chemical and biological pressures and their definitions has been formally agreed by the JNCC Marine PAD pressure list and descriptions (JNCC 2022) and has been used in the assessment. The JNCC pressure list does not include human pressures, and therefore, categories have been developed based on industry experience.

An impact is the consequence of the pressure i.e. a predicted change in the baseline environment. The effect is the consequence of the impact and is usually measurable. Effects only occur when an impact is present within an environment that is sensitive to it. In assessing the significance of the effect, the magnitude (the spatial extent of the impact, the duration and frequency) and sensitivity, recoverability and importance of the receptor are considered. The following definitions of significance have been used in the assessment as follows:

- **Imperceptible** – An effect capable of measurement but without significant consequences.
- **Not Significant** – An effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Slight** – An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate** – An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- **Significant** – An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- **Very Significant** – An effect which, by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment.
- **Profound** – An effect which obliterates sensitive characteristics.

For the purposes of assessment, cable burial through external cable protection has been considered.

5.2 Physical Processes

5.2.1.1 Physical change (to another seabed/sediment type)

In areas requiring external cable protection, there will be a permanent change to the seabed from coarse natural materials to a hard-anthropogenic structure. Despite this, it is important to consider the addition of anthropogenic structures in the context of the existing seabed types. The geophysical survey undertaken in 2019 along the EWIC route identified frequent outcrops of diamicton and bedrock and several localised boulder fields (MMT 2019). The introduction of external cable protection is therefore not outside the existing character of the seabed. Considering this and the small footprint of external cable protection, effects relating to a physical change in seabed type are considered to be Not Significant.

5.2.1.2 Water flow (tidal current) changes, including sediment transport considerations

The introduction of external cable protection has the potential to cause localised changes in water flow. Typically, it is the action of waves on seabed sediments that causes the development of pits, roughs or depressions (i.e. scour) in the seabed sediment around the edges of external cable protection. Where this modifies the seabed from its natural state it can affect sensitive receptors through habitat alteration and rate of additional sediment suspension. The placement of external cable protection can also result in turbulent flow from acceleration or deceleration of tidal flow over the cable protection structure. The magnitude of turbulence created by external cable protection corresponds to the shape and size of the protection. It is considered that hydrodynamic changes as a result of the low profile of external cable protection will be highly localised with turbulent flow present for a few metres downstream of each external cable protection structure. While there is a slight difference in the heights of concrete mattresses (0.15 – 0.45m) and rock bags, for the purposes of this assessment there will not be noticeable differences in potential water flow changes.

As changes to water flow are limited to within a few metres of the external cable protection there will be no significant changes to sediment transport at the areas of the proposed remedial works, especially considered the strong nature of currents experienced in the region.

Effects on water flow due to placement of external cable protection on the seabed are considered Not Significant based on the localised changes anticipated and the exiting strong current and sediment transport processes in the region.

5.3 Protected Sites

The HRA screening presented in Appendix A assessed 17 European sites that are either within the direct zone of influence of the proposed remedial works or contain mobile Annex II species which could potentially travel into the area of the proposed remedial works.

It was identified that the proposed remedial works had the potential to induce the following pressures on European sites:

- Underwater noise changes;
- Visual disturbance;
- Changes in supporting habitat and prey availability.

Consideration was given to other planned activities in the region that could interact with the Proposed Works and result in in-combination effects. The Proposed Works are temporary and localised.

Of the 17 sites assessed, it was considered possible that a pressure-receptor pathway between the Proposed Works and the qualifying features of 16 sites. Table 5-1 provides a summary of the HRA Screening assessment which concluded that potential likely significant effects could be ruled out for all sites identified.

Table 5-1 Summary - Potential for likely significant effects

Site Code & Name	Qualifying Interest Screened In for LSE	Potential pressure	Potential in-combination effects	Conclusion
North Anglesey Marine / Gogledd Môn Forol SAC (UK0030398)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Liverpool Bay SPA (UK9020294A)	Red throated diver Little gull Little tern Common tern	Visual disturbance	**No LSE**	**No LSE**
		Changes to supporting habitat	**No LSE**	**No LSE**

Site Code & Name	Qualifying Interest Screened In for LSE	Potential pressure	Potential in-combination effects	Conclusion
	Common scoter	and prey availability		
Anglesey Terns / Morwenoliaid Ynys Môn SPA (UK9013061)	Common tern Arctic tern Roseate tern Sandwich tern	Visual disturbance	**No LSE**	**No LSE**
		Changes to supporting habitat and prey availability	**No LSE**	**No LSE**
Irish Seafront SPA (UK9020328)	Manx shearwater	Visual disturbance	**No LSE**	**No LSE**
		Changes to supporting habitat and prey availability	**No LSE**	**No LSE**
North Channel SAC (UK0030399)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
West Wales Marine / Gorllewin Cymru Forol SAC (UK0030397)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Bristol Channel Approaches SAC (UK0030396)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Cardigan Bay/ Bae Ceredigion (UK0012712)	Bottlenose dolphin Grey seal	Underwater noise changes	**No LSE**	**No LSE**
Pen Llŷn a'r Sarnau/ Lleyn Peninsula and the Sarnau (UK0013117)	Bottlenose dolphin Grey seal	Underwater noise changes	**No LSE**	**No LSE**
Pembrokeshire Marine/ Sir Benfro Forol SAC (UK0013116)	Grey seal	Underwater noise changes	**No LSE**	**No LSE**
Rockabill to Dalkey Island SAC (IE0003000)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Lambay Island SAC	Grey seal	Underwater noise changes	**No LSE**	**No LSE**
Dee Estuary/ Aber Dyfrdwy SAC (UK0030131)	Sea lamprey River lamprey	Underwater noise changes	**No LSE**	**No LSE**
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC (UK0030252)	Atlantic salmon Sea lamprey River lamprey	Underwater noise changes	**No LSE**	**No LSE**
Rockabill to Dalkey Island SAC (IE0003000)	Habour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Roaringwater Bay and Islands SAC (000101)	Harbour porpoise	Underwater noise changes	**No LSE**	**No LSE**
Blasket Islands SAC (002172)	Harbour porpoise Grey seal	Underwater noise changes	**No LSE**	**No LSE**

5.4 Benthic Ecology

5.4.1 Potential Impacts

5.4.1.1 Abrasion/disturbance of the substrate on the surface of the seabed

Small areas of seabed will be affected by activities associated with the installation of external cable protection. A worst case footprint by external protection measures will be up to 894m^2, broken down as 738m^2 for concrete mattresses and 156m^2 for rock bag placement.

Any benthic communities within the direct footprint of rock bags and concrete mattresses will be impacted through mortality, injury or displacement. As external cable protection is a permanent feature, it can be assumed that epifaunal communities on hard substratum and infaunal communities inhabiting sedimentary habitats will be lost. However, it is understood that some infaunal species will be able to burrow short distances away from areas of disturbance to survive (Hinchey *et al*., 2006 & Rijnsdorp *et al*., 2018). In areas where of hard substratum are disturbed by abrasion, these habitats are known to show low sensitivity and high resilience to such pressures with recovery expected with around 2-6 years (Bishop & Earll 1984 & Castège *et al*. 2014).

The benthic habitats identified within the EWIC cable route are widespread and common for the region. Therefore, any disturbance is not expected to have an impact on the wider population of benthic fauna and the significance of any effect will be Imperceptible.

5.4.1.2 Physical change (to another seabed/sediment type)

There is the potential for a worst case of 894m^2 of seabed to be permanently changed from sand mixed/coarse sediment and rock to a hard-anthropogenic structure on the seabed. When considering the infaunal nature of the benthic communities present along the EWIC route, this will result in the permanent loss of primarily sedimentary habitats. Any effects experienced by benthic communities due to external cable protection will be highly localised and considering the wider context of sedimentary habitat along and surrounding the EWIC route, external cable protection is not considered to have a significant effect on benthic communities. Furthermore, it should be noted that the introduction of hard substrate is not outside the context of existing habitats in the region with an area of faunal communities on deep moderate energy circalittoral rock (EUNIS Habitat: A4.27) located between KP90 and KP100. Remediation work planned within this habitat type (Area Three), will also have experience loss of fauna within the immediate footprint of cable protection installed. However, the introduction of anthropogenic hard substrata (rock bags and/or concrete mattresses) is expected to be colonised by sessile encrusting organisms and mobile macrofauna, similar to the surrounding hard substratum and can also attract mobile macrofauna (Taormina *et al*., 2018).

Considering this, effects as a result of external cable protection measures will be Not Significant.

5.4.1.3 Introduction or spread of invasive non-indigenous species

There is the potential that INIS could enter the marine environment in this area through several routes, including ballast water or the vessel hull. Cable protection deposits will be new and therefore pose no threat. The type of INIS will be dependent on where the vessel has travelled from, however potential INIS that pose a current risk in north Wales include the slipper limpet (*Crepidula fornicata*) and Japanese wireweed (*Sargassum muticum*). These species can result in outcompeting native species for space and resources, and dominating the supporting qualifying habitats. The slipper limit form large aggregations on the seabed, which can lead to smothering and can also alter sediment movements (Welsh Government, 2017).

Without mitigation, there is the potential for INIS to be introduced or to spread further throughout the area, damaging habitats and their ability to support native populations of various flora and fauna. All vessels working on the project will adhere to the International Convention for the Control and Management of Ship's Ballast Water and Sediments. As standard practice, any equipment to be used

will be thoroughly cleaned before transport to the site, to ensure no INIS from where it was used previously are present. The CLV will also undergo regular anti-fouling treatment. The vessel will also not discharge any ballast water during operations as it will be too close to the shore for the full duration of operations (no more than 200nm from land at any point during the work). It is therefore considered, that with the discussed mitigation in place, it is very unlikely that the Proposed Works will lead to the introduction or spread of INIS which is assessed as Not Significant.

5.5 Marine Mammals

5.5.1 Potential Impacts

5.5.1.1 Underwater noise changes

One of the most important environmental considerations related to the Proposed Works is the potential effects of underwater sound. This pressure considers the potential for marine mammal species to be affected by sound associated with activities undertaken during the Proposed Works, such as vessel movements and geophysical survey. Focus has been given to harbour porpoise as they are a primary feature within the North Anglesey Marine / Gogledd Môn Forol SAC (UK0030398) and are most sensitive to underwater noise changes. An assessment of underwater noise changes on protected sites has been undertaken within Appendix A: HRA Screening.

Both cetaceans and pinnipeds have evolved to use sound as an important aid in navigation, communication and hunting (Richardson et al. 1995). It is generally accepted that exposure to anthropogenic sound can induce a range of behaviour effects and, in the extreme, to permanent injury in marine mammals. Loud and prolonged sound above background levels is considered to be noise and may have an effect on marine life. This may mask communicative or hunting vocalisations, preventing social interactions and effective hunting.

High intensity noises can cause temporary or permanent changes to animals' hearing if the animal is exposed to the sound in close proximity and, in some circumstances, can lead to the death of the animal (Richardson et al. 1995). Where the threshold of hearing is temporarily damaged, it is considered a temporary threshold shift (TTS), and the animal is expected to recover. If there is permanent damage (permanent threshold shift (PTS)) where the animal does not recover, social isolation and a restricted ability to locate food may occur, potentially leading to the death of the animal (Southall et al. 2007).

Behavioural disturbance from underwater sound sources is more difficult to assess than injury and is dependent upon many factors related to the circumstances of the exposure (Southall et al. 2007, NFMS 2018). An animal's ability to detect sounds produced by anthropogenic activities depends on its hearing sensitivity and the magnitude of the noise compared to the amount of natural ambient and background anthropogenic sound. In simple terms for a sound to be detected it must be louder than background and above the animal's hearing sensitivity at the relevant sound frequency.

For the purposes of this assessment, a qualitative approach has been taken using existing literature as this was considered proportionate to the Proposed Works being undertaken and their potential to generate underwater noise changes which could affect marine mammals.

Continuous sound

Continuous sound, e.g. from shipping, is non-pulsed and can be broadband, narrowband or tonal. Continuous sound can either be intermittent or continuous within a 24hr period (NMFS 2018). Of the activities to be undertaken during the proposed remedial works, the following produce continuous sound: the use of thrusters on the Project vessel(s) for dynamic positioning (DP); and the placement of deposits on the seabed i.e. (potentially concrete mattresses). Continuous sound will be produced intermittently over a period of 24hrs (several hours at each location). Table 5-2 below outlines the parameters for the Proposed Works.

Table 5-2 Proposed Works Continuous Sound Sources

Activity	DP vessel (Genesis 2011)	Rock placement (Wyatt 2008)	MBES (Genesis 2011)	USBL (van der Sman 2020)
SL: SPL RMS (dB re 1 µPa2 @ 1m)	184	188	210 – 245	194 - 207
SL: 24 hr SEL RMS (dB re 1 µPa2s @ 1m)	233	237		
Frequency	63Hz	10kHz	200 – 500kHz	19 – 34kHz

There are no published guidelines on disturbance thresholds due to the complexity and variability of the responses of marine mammals to anthropogenic disturbance. For the purposes of this assessment the threshold for behavioural disturbance is considered to be 120dB re 1 $\mu Pa^{-2}s$ (RMS) (Gomez et al. 2016, BOEM 2017, NMFS 2018) and has been used for continuous sound for all cetacean species.

It is important to note that the Project vessel(s) DP thrusters and concrete mattress will not occur continuously during the Proposed Works. The Project vessel(s) will use thrusters sporadically, to maintain a position over the remedial works locations, therefore the source level will fluctuate throughout the duration of the Proposed Works and will only peak at the 184 dB re 1 µPa @ 1m for short periods. Activities at each Remedial Works location will therefore be limited to a few hours.

At the estimated sound levels, the likelihood of potential injury has been assessed as low and limited to discrete windows during the Proposed Works and only in close vicinity (<10m) to the works. It is assumed that all marine mammals will move away at a speed of 1.5m/s (Otani et al. 2000, Lepper et al. 2012) from a sound source level. This is considered conservative as there is data (McGarry et al. 2017, Kastelein et al. 2018, van Beest et al. 2018) to suggest that animals will move away at much higher speeds (e.g. harbour porpoise at 1.9m/s (Kastelein et al. 2018), at least initially. During the Proposed Works, the Project vessel(s) will be operating at slow speeds, therefore it is expected that any individuals in proximity of the Project vessel(s) will be able to move away from the area affected to avoid injurious noise levels. However, the action of moving away from a sound level is a behavioural response. Whether this can be considered disturbance relates to whether the animal(s) is significantly affected by the response e.g. will it lead to a change in the animals' condition. immediately following the proposed remedial works, individuals will be able to return to the area once activities have ceased.

The Proposed Works also need to be considered in the context of the existing baseline sound environment. Shipping density in the area was considered as part of the CIRA which concluded there were four areas of high shipping density, between KP 20 to 45, KP 90 to 125, KP135 to KP140 and KP170, all orientated in an east-west orientation across the Proposed Works. The high shipping density in the region suggests individuals are already habituated to higher levels of underwater sound and therefore underwater sound from the Proposed Works will not be discernible above natural and anthropogenic noise in the region. Overall, effects of continuous underwater noise changes as part of the Proposed Works are considered Not Significant based on the temporary and intermittent activities occurring at discrete locations and the localised effects and ability for marine mammals to avoid areas temporarily affected.

The geophysical survey will also produce continuous noise of 235dB re 1 µPa @ 1m (SPL RMS). There are no published guidelines on disturbance thresholds due to the complexity and variability of the responses of marine mammals to anthropogenic disturbance. Prior modelling for similar geophysical surveys (Lurton 2016) has demonstrated the zone of influence for injurious effects from geophysical survey is within proximity to the equipment, therefore individuals would need to be present near the Project vessel(s) to experience injurious effects. It is suggested that cetacean and pinniped species can swim out of the spatially limited zone for injurious effects. The zone of influence relating to

disturbance from geophysical survey is expected to be larger, however considering the temporary nature of the geophysical survey, individuals can return to the area immediately after the activity ceases.

It is noted in the JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys (JNCC 2017) that JNCC advise that mitigation is not required for multi-beam echosounder surveys in shallower waters (<200m). This is because the higher frequencies used typically fall outside the hearing frequencies of cetaceans and the sounds produced are likely to attenuate more quickly than the lower frequencies used in deeper waters (JNCC 2017).

Based on the above, the effects of geophysical survey on marine mammals is Not Significant when considering the localised zone of influence and temporary nature of the proposed remedial works.

5.6 Marine Birds

5.6.1 Potential Impacts

5.6.1.1 Visual disturbance

The additional activity in the region during the Proposed Works may disturb birds in the vicinity which use the area for feeding and loafing.

Disturbance can lead to a number of physiological and behavioural responses which can affect demographic characteristics of the population. Responses to disturbance can result in loss of energy; impaired breeding; unrest through increased vigilance; and disruption to incubation leading to increased nest failures due to predation and nest abandonment (Valente and Fischer 2011).

The extent to which a seabird responds to disturbance is dependent upon a number of factors including: period of breeding cycle during which disturbance occurs; duration, type and intensity of the disturbance; presence of opportunistic predators; and the degree of habituation with the disturbance (Showler et al. 2010). Some seabirds are more resilient to disturbance than others.

Whilst birds present on the surface waters in the vicinity of the Project vessel(s) could be temporarily displaced from their chosen feeding/resting location, they are likely to readily move to another nearby location. Given the short duration of the Proposed Works (14 days maximum at discrete locations), any disturbance at a given location is likely to be minimal and given the level of shipping activity in the region, disturbance is unlikely to be felt against background levels. Therefore, the significance of effects on birds from the Proposed Works will be Imperceptible.

The HRA screening (Appendix A) concluded that the likelihood of breeding birds being present in the area during the Proposed Works was very low as the areas recognised for breeding and nesting bird populations within the Liverpool Bay SPA and Anglesey Terns SPA are located over 10km from the Proposed Works, and the works will take place outside of the breeding season. The works are also located in close vicinity to the Irish Sea Front SPA, however due to the short duration of the works in this area it was concluded there would be no likely significant effects to the population of the Manx shearwater. In addition, disturbance from the Proposed Works will be transient and take place against a background of existing sources of disturbance such as other vessels/ recreational boating and fishing activities.

5.6.1.2 Changes to supporting habitat and prey availability

Due to the installation of cable protection, the Proposed Works will lead to a change in supporting habitat type which could impact prey availability for marine birds. This is particularly pertinent to benthic species such as sandeel, bivalves, crustaceans, molluscs and worms which are common prey for several species that reside in the area including red-throated diver, common tern and little tern.

The use of external cable protection will disturb the surface of the seabed. Any fish, mollusc, or crustacean species within the direct footprint of the external cable protection are likely to be lost through mortality, injury, or disturbance. The remedial works will result in a worst-case permanent loss of approximately 894m^2 of sedimentary seabed. Where there is a change to the seabed sediment, this could have localised effects on the benthic communities and suitability of the seabed for sensitive fish species with demersal life stages such as herring and sandeel. The permanent change of the seabed would make it no longer viable if used by demersal fish species, however the total footprint of external cable protection is small compared to the wider supporting habitat. The deposit of external cable protection will likely result in the permanent loss and change in seabed type, however this will not result in significant changes to supporting habitat and prey availability for any marine birds due to the availability of additional habitat (and therefore prey species) elsewhere in the area.

5.7 Fish and Shellfish

5.7.1 Potential Impacts

5.7.1.1 Abrasion/disturbance of the substrate on the surface of the seabed

Species with demersal life stages are most vulnerable to this pressure. This particular pressure focusses on the permanent penetration and/or disturbance associated with external cable protection. A worst case of 894m^2 of the seabed will be affected by the installation of external cable protection. Species such as sandeel and herring if present within the direct footprint of the external cable protection will be lost through mortality, injury, or disturbance.

Adult sandeel remain burrowed in the substrate during winter in response to decreased food availability, day length and temperature. Sandeel emerge briefly from hibernation to spawn in December or January. The adhesive eggs stick to the substrate and are often partly buried within the upper few centimetres of substrate; hatching occurs during February and March (Wright and Bailey 1996). Considering the lifecycle of sandeel, the Proposed Works are likely to be undertaken during a sensitive time for this species. However, based on the footprint of the Proposed Works, the effects of this pressure on sandeel communities are considered Not Significant. Herring in the Irish Sea spawn between late September over a period of 3-4 weeks. Eggs hatch after 1-3 weeks, depending on the water temperature, and pelagic larvae will drift towards important nursery grounds (Coull et al. 1998). Based on the timing of the Proposed Works, there is the potential for direct loss or injury to spawning herring and eggs. Despite this, any loss will have no impact of the population or viability of herring within the Irish Sea. Effects to herring and sandeel as a result of this pressure are considered Not Significant based on the localised footprint of external cable protection and wider availability of spawning and egg-laying habitat.

For more mobile demersal fish species, the effects of abrasion and/or disturbance of the seabed are considered Imperceptible based on their ability to move away from the area of disturbance.

5.7.1.2 Physical change (to another seabed/sediment type)

Any species with egg laying or larval juvenile ages and species that rely on the seabed sediment are most likely to be affected by this pressure. The deployment of external cable protection will result in a permanent change to another seabed type of a worst-case of 894m^2. The wider availability of spawning habitat within the region means the effects of this pressure have been assessed as Not Significant.

5.7.1.3 Underwater noise changes

The ability of fish to hear noise is dependent on their hearing structures, which indicate their sensitivity to sound. Sound pressure is only detected by those species possessing a swim bladder; the otolith organ acts as a particle motion detector and where linked to the swim bladder, converts sound pressure into particle motion, which is detected by the inner ear. High sensitivity hearing species such

as clupeids (e.g. herring, sprat, twaite shad and allis shad) have specialisations of the auditory apparatus where the swim bladder and inner ear are intimately connected and are able to detect frequencies to over 3kHz; with optimum sensitivity between 300Hz-1kHz (Nedwell et al. 2007). Medium sensitivity species (including cod and European eel) have a swim bladder but no specialisation of the auditory apparatus. Low sensitivity species with no swim bladder include bass and flat fish such as plaice (Nedwell et al. 2004). There is also potential for some fish and shellfish species to be vulnerable to acoustic survey activities during sensitive life stages, for example during the egg and larvae development stages.

Existing environmental conditions of background sound within the sea are considered when assessing anthropogenic activities that produce additional sound. Sources of background sound come from shipping, interaction of waves and currents with the seabed, seabed development and operation, fishing industry and recreational activities (Bass and Clark 2003, Southall et al. 2007, Hawkins and Popper 2012, Popper et al. 2014). Fish are likely to become habituated to levels of background sound. A decreased responsiveness over time could arise through a change in tolerance, through habituation (Radford et al. 2016). Therefore, effects are only expected if sound produced during the Proposed Works is significantly above the background sound levels. For continuous activities it is unlikely that death or tissue damage (barotrauma) will occur to fish. The typical behavioural response to sounds by fish might range from no change in behaviour, to a mild awareness (startle response) to larger movements of temporary displacement for the duration of the sound (Popper and Hastings 2009). Popper et al. (2014) identified that there is no direct evidence of permanent injury to fish species from shipping and other continuous noise.

Clupeids are the only hearing specialist fish present within the Proposed Works. Nedwell *et al*. (2012) reviewed herring sensitivity to sources of noise from non-pulse cable laying operations (i.e. cable lay and trenching) and proposed effect ranges. Clupeids are expected to show strong avoidance behaviour (i.e. reaction by virtually all individuals) within 8m of the works, whilst significant avoidance (85% of individuals will react to noise) is expected within 66m. Upon reviewing AIS data, it is clear that shipping density, particularly towards the coast of North Wales is relatively high compared to the surrounding area. Therefore, it is likely that existing background noise levels from shipping within the Irish Sea will mask the disturbance effect to herring within the Proposed Works.

The presence of a Project vessel(s) means it is likely that the most hearing specialist fish will demonstrate temporary avoidance behaviour. The Proposed Works will not lead to any long-term displacement as they are transient and temporary. Individuals would be expected to be able to return once the Proposed Works are complete. However, it should be noted that the ability of small fish to take avoiding action may be limited, and temporary displacement may not therefore occur.

Geophysical survey activity is not considered in the discussion above. Multi-beam echosounder geophysical survey will be used during post-installation inspection surveys. Most noise from a geophysical survey is likely to be generated at frequencies greater than 1kHz, above the auditory capacity of fish (generally between 0.2Hz to 1kHz). In addition, sound from survey equipment is targeted towards the seabed, meaning that effects to fish are only expected if they are within the immediate zone of ensonification below the ROV or Project vessel(s). It is expected that fish will avoid the area once the geophysical survey has started and are extremely unlikely to move towards the sound source. Therefore, fish will experience temporary displacement from the immediate area surrounding the Proposed Works, however individuals will return to the area quickly based on the temporary nature of the geophysical survey and as it progresses to each location. In conclusion, underwater noise changes will be Not Significant on fish or shellfish receptors.

All SAC's within 40km of the Proposed Works were screened for the presence of Annex II migratory fish species as qualifying features in recognition that as mobile species, fish could potentially migrate through the Proposed Works. The HRA Screening identified the following Annex II species that are likely to migrate through or be present within the Proposed Works:

- Sea lamprey
- River lamprey
- Atlantic salmon

An assessment of underwater noise changes for these species has been considered within the HRA Screening provided in Appendix A. The HRA Screening concluded no likely significant effects from underwater noise changes on all of these species, and that Appropriate Assessment is not required.

5.8 Marine Activity

5.8.1 Commercial Fisheries

5.8.1.1 Potential Impacts

Snagging hazard

A potential impact from external cable protection on commercial fishing is the risk of fishing gear becoming snagged or entangled on concrete mattresses or rock bags. Fishing activity along the route is primarily Irish prawn trawlers between KP10 to KP55, beam trawling and scallop dredging between KP55 and KP 160 with further commercial fishing activity taking place in inshore waters of North Wales. The risk of snagging hazards is higher for rock bags compared to concrete mattresses as most fishing activities can still occur over concrete mattresses based on their lower profile. While the level of external cable protection in the region will be increasing, the risk of snagging does not increase over and above the risk presented by the original EWIC external cable protection and will decrease when taking into account the purpose of the Proposed Works, which is to reduce the risk represented by the identified cable exposure and the two areas of low sediment cover at the remedial works locations. The effect of snagging hazards on commercial fisheries as a result the proposed remedial works is considered Not Significant. This assessment considers design constraint two which ensures Notice to Mariners are issued to make other sea users aware of the Proposed Works and design constraint three which involves the FLO communicating and informing fishing stakeholders in the region.

Displacement of fishing vessels

The Proposed Works are minor, temporary activities involving Project vessel(s) on location for a maximum of 14 days. Therefore, any potential impact is expected to be localise and temporary and therefore minor.

Notices to Mariners will be issued by the installation contractor requesting that vessels keep a safe distance from the works. The Applicant's Fisheries Liaison Officer for the Proposed Works will ensure that all local fishing organisations are in receipt of the Notice to Mariners and are aware of the Proposed Works ahead of mobilisation. The safety zone is generally 500m radial distance, although might be extended further to the rear of the Project vessel(s) if towed gear is in use. The FLO will request fishermen with static gear in the application area move static gear until the survey has been completed. The installation contractor will define specific 'blocks' in which Proposed Works will be completed before the next block starts. This will minimise the time a particular area has to be cleared by static gear. Section 3.7 indicates that between KP55 and KP160, the primary fishing activity is beam trawling and scallop dredging (on harder, rocky ground). In addition, there are static fishing activities in Welsh waters and the inshore grounds off Barkby Beach, north Wales between KP160 and KP185.

As the safety zone moves with the installation vessel or survey spread, potential displacement impacts will be temporary and restricted to this relatively small zone.

The execution of the Proposed Works will increase the volume of shipping traffic by an Imperceptible amount; within the boundary of seasonal fluctuations. Therefore, there will be no additional

navigational safety implications. However, established marine navigation practices will be adhered to and maintained by the Project vessel(s) involved.

As the works are temporary there will be no effect on marine navigation and fishing activity once the Proposed Works has been completed. Therefore, the significance of effects on commercial fisheries in the area will be Imperceptible.

Loss or damage to fisheries habitats/fish stocks
External cable protection could result in the permanent loss of habitats providing for target species in local fisheries. There are no shellfish areas within the proximity of Proposed Works. Therefore, this has not been considered further.

The deployment of external cable protection may reduce the availability of habitat for species that rely on sedimentary habitats such as herring and sandeel. However, as discussed in Section 5.7, any potential loss of habitat will have no impact on the population or viability of sandeel and herring within the Irish Sea based on the localised footprints of disturbance and seabed change and the wider availability of sedimentary habitats throughout the region. Therefore, effects of the Proposed Works on fisheries habitats and potential fish stocks is considered to be Not Significant.

5.8.2 Shipping and Navigation

5.8.2.1 Potential Impacts

Displacement of vessels
As mentioned in Section 5.8.8.1 Notices to Mariners will be issued by the installation contractor requesting that vessels keep a safe distance from the works. The Applicant's Fisheries Liaison Officer for the Proposed Works will ensure that all local fishing organisations are in receipt of the Notice to Mariners and are aware of the Proposed Works ahead of mobilisation. The safety zone is generally 500m radial distance, although might be extended further to the rear of the Project vessel(s) if towed gear is in use. As the safety zone moves with the survey spread, potential impacts will be temporary and restricted to this relatively small zone.

As the works are temporary there will be no effect on marine navigation and shipping and navigation activity once the survey has been completed. Therefore, the significance of effects on shipping and navigation in the area will be Imperceptible.

Snagging hazard
This requirement for external cable protection is dependent on the level of cable exposure or sediment cover that is identified along the cable. The number of concrete mattresses and/or rock bags will be dependent on the level of exposure of the cable and the level of risk from the potential impact of vessels anchors snagging the cable. The deployment of external cable protection is expected to result in a Not Significant effect on shipping and navigation.

5.8.3 Recreation

5.8.3.1 Potential Impacts

Restricted access to recreational users
The main recreational activities with potential to be affected by the Proposed Works is likely to be restricted to personal watercraft, with water sports such as kayaking, canoeing and sailing restricted to the North Wales coastline due to the strong tidal action in the region. The Proposed Works will involve the addition of one Project vessel(s) at any one time over a maximum period of 14 days (at discrete locations over two separate campaigns). During this time, the Project vessel(s) will be moving slowly between each Remedial Works Area and almost stationary during external cable protection

deployment. Recreational receptors will have restricted access during this time due to the application of a Safety Zone around the operations, however as identified within Section 3.7.5, the region is primarily within low intensity recreational routes. Considering the temporary nature of the Proposed Works (maximum of 14 days), this will not have a significant effect on recreational receptors in the region. Design constraint two includes Notices to Mariners that will be issued by the installation contractor to ensure other sea users are made aware and maintain a safe distance from the Proposed Works. Considering the above, effects of restricted access to recreational users will be Imperceptible.

5.9 Other Proposed Activities in the Area

5.9.1.1 Cumulative and in-combination effects

Section 3.8 identified 10 projects within the proximity and that have the potential to overlap with the Proposed Works based on their proposed time of operation. A high-level assessment for each project is presented below.

Holyhead Breakwater Refurbishment

A screening and scoping opinion was provided by NRW on the 23rd July 2020 stating that the remedial works at Holyhead Breakwater will be subject to an EIA. According to the scoping report, the remedial works would involve fabrication and regrading works anticipated to take place between March 2021 to January 2023 depending on the construction programme selected. The other option is to begin works in March 2022 over three stages lasting until October 2027. There is the potential for the Proposed Works to overlap with the Holyhead Breakwater Refurbishment should a second installation campaign be required.

ENI Conwy to Douglas Pipeline Spill Monitoring Survey

On the 3rd February 2023, NRW granted a marine licence in relation to a pipeline spill monitoring survey at Conwy to Douglas. The survey is set to take place between April 2023 and April 2024.

Mona Offshore Wind Suction Bucket Foundation Trials

In May 2023, NRW issued a marine licence for wind suction bucket foundation trials at the Mona Offshore Wind farm. These trials are due to take place between June 2023 and December 2024.

SOBR1 Seabed Survey

On the 19th July 2023, NRW granted a marine licence for marine survey and site investigation works SOBR1. The works are set to take place between the 19th July 2023 and the 29th February 2024.

Bangor University Sample Collection

On the 9th May 2023, NRW granted a marine licence for the collection of sediment grab samples by Bangor University. These samples are set to be collected between June 2023 and June 2024.

Awel y Môr Offshore Windfarm Ltd Geotechnical Survey

On the 17th May 2023, NRW granted a marine licence for the geotechnical survey at Awel y Môr Offshore Windfarm. The survey is set to take place between November 2023 and May 2024.

Walney Extension Windfarm Maintenance

The Walney Extension Windfarm has been operational since 2018. Regular maintenance of this windfarm has been granted by the Marine Management Organisation (MMO). Considering that maintenance is ongoing, it is likely that Proposed Works will overlap with these activities.

The Douglas Complex Oil and Gas Operations

Within the Liverpool Bay Area, there are ongoing works within the Douglas Complex for Oil and Gas which are likely to overlap with the Proposed Works.

5.9.1.2 Assessment

Considering the above, the potential exists for the Proposed Works to overlap with ten other projects within the area. For the purposes of the assessment, these schemes have been grouped by pressures based on the activities being undertaken for each scheme. The pressures identified are:

- Underwater noise changes;
- Habitat structure changes – removal of substratum (extraction); and
- Siltation rate changes, including smothering (depth of vertical sediment overburden)

Underwater Noise Changes

The Holyhead Breakwater Refurbishment, Mona Offshore Wind Suction Bucket Trails, Walney Extension Maintenance and Gwynt y Môr Windfarm Structure Removal are all likely to result in underwater noise changes as a result of construction or maintenance works. The Holyhead Refurbishments are located within the North Anglesey Marine SAC designated for harbour porpoise. Cumulative effects on this site have been considered as part of the HRA Screening. Cumulative effects of underwater noise for all other receptors are considered Imperceptible based on the temporary nature of the Proposed Works and the distance from the other schemes (>30km).

Habitat structure changes – removal of substratum (extraction) and penetration and/or disturbance of the substrate below and on the surface of the seabed, including abrasion

Several of the identified schemes involve either grab sampling or ground investigation including the SOBR1 Seabed Survey and the Bangor University Sediment Sample Collection. The above schemes will involve the temporary disturbance of the seabed and the associated benthic and intertidal communities that may be present. The Proposed Works will involve the temporary disturbance of benthic habitat at discrete sites. However, these effects will not combine with those of other projects. This is considering the highly localised and reversible nature of the disturbance and the fact that all schemes are not likely to occur at the same time as the Proposed Works, cumulative effects will be Imperceptible. This is based on the ability of sedimentary habitats to rapidly recover and the distance from the Proposed Works. Therefore, it is unlikely that cumulative effects on the habitat structure of the seabed will take place between Proposed Works and other projects.

Siltation rate changes, including smothering (depth of vertical sediment overburden)

All other projects involving dredging, grab sampling or ground investigation works will result in sediment plumes of different forms and scales. The magnitude of the plume is dependent on the volume of sediment to be disturbed and the sediment type. Activities such as dredging are likely to result in larger changes in siltation rates and are anticipated to travel further than grab sampling and ground investigation works. The Proposed Works will not result in significant siltation rates as only the deployment of external cable protection is taking place. Although the Proposed Works are in close proximity to the SOBR1 Seabed Survey and the Bangor University Sediment Sample Collection, these activities are unlikely to take place at the same time. Similarly, each activity is only likely to result in small siltation rate changes, which will not accumulate to a larger scale effect, therefore cumulative effects from this pressure are Imperceptible.

6. CONCLUSIONS

The conclusion of the environmental assessment is that the Proposed Works will not result in significant effects to any receptors or as a result of any pressures identified. A summary of the receptors, pressures identified, and significance of effect is provided in Table 6-1.

Table 6-1 Summary of Assessment

Receptor	Pressure	Significance of Effect
Physical Process	Penetration and/or disturbance of the substrate below and on the surface of the seabed, including abrasion	No Likely Significant Effects
	Physical change (to another seabed/sediment type)	No Likely Significant Effects
	Water flow (tidal current) changes, including sediment transport considerations	No Likely Significant Effects
Protected Sites	Underwater noise changes	No Likely Significant Effects
	Visual Disturbance	
	Changes in supporting habitat and prey availability	
Benthic Ecology	Penetration and/or disturbance of the substrate below and on the surface of the seabed, including abrasion	No Likely Significant Effects
	Physical change (to another seabed/sediment type)	No Likely Significant Effects
	Introduction of spread of invasive / non-native species	No Likely Significant Effects
Marine Mammals	Underwater noise changes	No Likely Significant Effects
Marine Birds	Visual Disturbance	No Likely Significant Effects
	Changes in supporting habitat and prey availability	No Likely Significant Effects
Fish and Shellfish	Habitat structure changes – removal of substratum (extraction)	No Likely Significant Effects
	Penetration and/or disturbance of the substrate below and on the surface of the seabed, including abrasion	No Likely Significant Effects (Herring and Sandeel) Imperceptible (All other species)
	Siltation rate changes, including smothering (depth of vertical sediment overburden)	No Likely Significant Effects
	Physical change (to another seabed/sediment type)	No Likely Significant Effects
	Underwater noise changes	No Likely Significant Effects
Marine Activity	Snagging hazard	No Likely Significant Effects
	Displacement of vessels	No Likely Significant Effects
	Loss or damage to fisheries habitats/fish stocks	No Likely Significant Effects
	Restricted access for recreational users	No Likely Significant Effects

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