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East West Interconnector Cable Remedial Works - Marine Licence Application

Appendix A: Habitats Regulations Assessment Screening



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Appendix A: Habitats Regulations Assessment Screening

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CONTENTS

	DOCUMENT RELEASE FORM	I
	GLOSSARY	IV
1.	INTRODUCTION	1
1.1	Project Background	1
1.2	Requirement for Habitats Regulations Assessment	3
1.3	Legislative Context	3
1.4	Purpose of this Report	5
1.5	Consultation	5
2.	PROJECT DESCRIPTION	6
2.1	Requirement for the Works	6
2.2	Description of the Works	6
2.3	Proposed Works Programme	11
2.4	Design Constraints	12
2.5	Consideration of Alternatives	12
3.	STAGE 1 – APPROPRIATE ASSESSMENT SCREENING	13
3.1	Assessment Approach	13
3.2	Identification of Relevant European Sites	13
3.3	Assessment of Likely Significant Effects	32
	REFERENCES	51

LIST OF TABLES AND FIGURES

Tables

Table 2-1	Indicative locations for external cable protection	10
Table 2-2	Design Constraints	12
Table 3-1	Potential pressures, ZOI and European Site Search Area	15
Table 3-2	Pressures scoped out and justification for exclusion	17
Table 3-3	Development applications near the Proposed Works	19
Table 3-4	Ongoing projects near Proposed Works	20
Table 3-5	European Sites and Screening Conclusions	24
Table 3-6	Proposed Works Continuous Noise Sources	33
Table 3-7	Liverpool SPA Population Estimate and Seasonality Presence	40
Table 3-8	Liverpool Bay SPA Qualifying Features Disturbance Susceptibility and Habitat Specialisation	42
Table 3-9	Anglesey Terns / Morwenoliaid Ynys Môn SPA Tern Species Population Estimate	43
Table 3-10	Anglesey Terns SPA Qualifying Features Disturbance Susceptibility and Habitat Specialisation	45
Table 3-11	Summary - Potential for likely significant effects	49

Figures

Figure 1-1	1-1 Overview of the proposed remedial works areas (P2226k-LOC-003-A)	2
Figure 1-2	Stages of HRA	4
Figure 2-1	Figure 2-1 NKT Victoria	6
Figure 2-2	Figure 2-2 Concrete mattress deployment (courtesy of FoundOcean)	7
Figure 2-3	Figure 2-3 Rock bag deployment (NKT)	8
Figure 2-4	Figure 2-4 Overview of Proposed Remedial Works (P2226K-LOC-003-A)	9
Figure 2-5	Figure 2-5 Kongsberg EM2040 MBES	11
Figure 3-1	HRA Screening Process	13
Figure 3-2	Summary of SAC's within Defined Search Areas of the Proposed Works (P2226K-ENV-001-A)	21
Figure 3-3	Summary of SPA's within 10km of the Proposed Works (P2226-ENV-002-A)	22
Figure 3-4	Predicted Usage for Arctic, Common and Sandwich Terns within the Anglesey Terns SPA	44

GLOSSARY

AA

Appropriate Assessment

BSP

Biosecurity Plan

CIRA

Cable Risk Integrity Assessment

CLV

Cable Lay Vessel

CSHR

Conservation of Habitats and Species Regulations

DAERA

Department of Agriculture, Environment and Rural Affairs

DP

Dynamic Positioning

EDR

Effective Deterrent Range

EMODnet

European Marine Observation and Data Network

EWIC

East West Interconnector

FCS

Favourable Conservation Status

FLO

Fisheries Liaison Officer

GIS

Geographic Information System

HRA

Habitats Regulations Assessment

HVDC

High Voltage Direct Current

IROPI

Imperative Reasons of Overriding Public Interest

JNCC

Joint Nature Conservation Committee

MBES

Multi-Beam Echosounder

MLA

Marine Licence Application

MU

Management Unit

NRW

Natural Resources Wales

OMR

Conservation of Offshore Marine Habitats and Species Regulations

PTS

Permanent Threshold Shift

RMS

Root Mean Square

ROV

Remote Operated Vehicle

SAC

Special Area of Conservation

SEL

Sound Exposure Level

SPA

Special Protection Area

SPL

Sound Pressure Level

SSSI

Site of Special Scientific Interest

TTS

Temporary Threshold Shift

WFD

Water Framework Directive

ZOI

Zone of Influence

1. INTRODUCTION

1.1 Project Background

EWIC is a 500 MW High Voltage Direct Current (HVDC) electricity interconnector linking the Irish and British electricity markets. Following post-installation inspections, incorporating a marine survey and geophysical condition survey, 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 the placement of external cable protection in the form of rock bags or concrete mattresses at four locations. 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 number: P2226k-LOC-003-A).

EAST WEST INTERCONNECTOR REMEDIAL WORKS

LOCATION OVERVIEW - Remedial Assessment Areas

Drawing No: P2226K-LOC-003

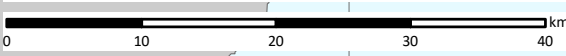
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Legend

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



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



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1.2 Requirement for Habitats Regulations 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) (CHSR) for inshore waters up to the 12 nautical mile (nm) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (OMR) from 12nm to the extent of the UK's Exclusive Economic Zone (EEZ). Collectively, this legislation is known as the Habitats Regulations. Protected sites under the Habitats Regulations are referred to as European sites and include of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In the UK, Ramsar sites are also considered under this category of sites and subsequently are included in the Habitats Regulations Assessment (HRA).

The Habitats Regulations transpose into UK law Article 6(3) of the European Commission (EC) Habitats Directive. This required 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 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.

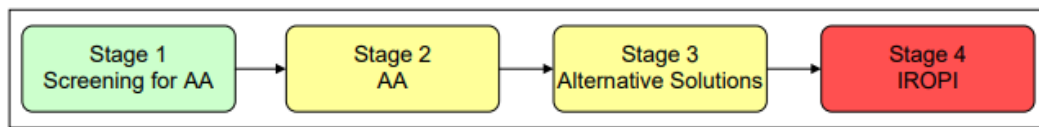
1.3 Legislative Context

Under Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC), any plan or project within or adjacent to a European site must be assessed regarding their implications for the site conservation objectives. If the project is likely to have a significant negative effect on a European site, either alone or in combination with other plans or projects, it must undergo an Appropriate Assessment (AA) by the competent authority (those with decision making powers). Normally, the competent authorities cannot consent the plan / project without first having ascertained that it will not have an adverse effect on the integrity of the site concerned.

If an adverse negative effect is identified it may be possible to adjust the plan/project or introduce certain mitigation measures to avoid or pre-empt, remove or reduce effects to a non-significant level so that the plan/project may be approved (European Commission 2018a).

The European Commission's methodological guidance (European Commission 2002) outlines a four-stage approach to the AA process, where the outcome at each successive stage determines whether a further stage in the process is required. The four stages are shown in Figure 1-2 and described below. Collectively they make up what is referred to in the UK as the Habitat Regulations Assessment (HRA) process.

Figure 1-2 Stages of HRA



Whilst the obligation to undertake the AA is derived from Articles 6(3) and 6(4) of the Habitats Directive, it is Regulation 28(2) of the OMR and 63(1) of CHSR that sets out procedural requirements. They require that the applicant provide such information as the component authority may reasonably require for the purposes of assessment or to enable them to determine whether an AA is required.

There is no statutory method for undertaking the HRA process, but Welsh Government (2017) guidance outlines the steps to be taken by the applicant at each stage.

1.3.2 Stage 1 - Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Regulation 28 of the OMR and Regulation 63 of the CHSR:

- Whether a plan or project is directly connected to or necessary for the management of the site; and
- Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

Where significant effects are likely, uncertain, or unknown at screening stage, then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no effect.

1.3.3 Stage 2 - Appropriate Assessment

If Stage 1 concludes that an AA is required, then the AA must be undertaken by the Competent Authority licensing the plan or project.

To inform the AA the applicant must provide data and information on the project and on the European site. An analysis of potential effects on the site must be completed and presented as 'Information to Inform Appropriate Assessment'. This is a more detailed ecological assessment of the proposed activities and looks to answer two key questions:

- What are the likely effects of the proposed activity?
- How quickly could the Qualifying Feature recover from the effect, if at all?

The duty to undertake AA, having considered the 'Information to Inform AA', and to ensure that the stringent evaluation and decision-making procedure is applied correctly, lies with the competent authority, which for the Proposed Works is Natural Resources Wales (NRW). The AA will be a focused and detailed impact assessment of the implications of the plan or project, alone and in combination with other plans and projects, on the integrity of a European site in view of its conservation objectives.

If the assessment concludes that the plan or project will adversely affect the integrity of a European site, then the process must proceed to Stage 3, or the plan or project should be abandoned.

Any mitigation measures necessary to avoid, reduce or offset negative effects should be proposed at this stage.

1.3.4 Stage 3 – Alternative solutions

This stage examines any alternative solutions or options that enable the plan or project to proceed without adverse effects on the integrity of a European site. The process must return to Stage 2 as alternatives will require AA to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, is necessary to progress to Stage 4.

1.3.5 Stage 4 - Imperative Reasons of Overriding Public Interest (IROPI)/Derogation

Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a European site to proceed in cases where it has been established that no less damaging alternative solution exists.

The extra protection measures for Annex I priority habitats come into effect when making the IROPI case. IROPI reasons that may be raised for sites hosting priority habitats are those relating to human health, public safety, or beneficial consequences of primary importance to the environment. In the case of other IROPI, the opinion of the European Commission is necessary and should be included in the AA. Compensatory measures must be proposed and assessed. The European Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by NRW.

1.4 Purpose of this Report

The purpose of this report is to inform the HRA process in determining whether the Proposed Works, both alone and in combination with other plans or projects, are likely to have a significant effect on any European site in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

The HRA Screening provides a description of the Proposed Works (Section 2); identifies the European sites that could be affected by the plans (Section 3); and identifies the potential pressures that could arise from the planned activities on the sites (Section 3). It determines if there is any connectivity between the Proposed Works and any European sites (Stage 1 Appropriate Assessment Screening, Section 3) and considers the potential for likely significant effects on the qualifying feature(s) within the affected European site(s).

1.5 Consultation

Consultation has been undertaken with Natural Resources Wales (NRW) at various points during the EIA and HRA processes. On the 7th September 2023, the applicant requested pre-application advice relating to the marine licence application and required supporting documents. NRW confirmed that the marine licence application should be supported by HRA and Water Framework Directive (WFD) Assessment. Further to this on the 5th October 2023, the applicant held a pre-application consultation meeting with NRW Marine Licensing Team to discuss the Proposed Works and any associated environmental and constraints or considerations.

2. PROJECT DESCRIPTION

2.1 Requirement for the Works

Post-installation inspections undertaken during 2022, which incorporated 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 to 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) such as the 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 Precise Rock Filter (PRP) units (rock bags) is generally used to protect installed cables.

2.2.2.1 Concrete mattresses

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. 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 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 in Welsh waters. For the worst-case scenario with either concrete mattresses or rock bags the total requirement is estimated to be:

- Footprint of concrete mattresses¹ = 738m²
- Footprint of rock bags² = 156m²

¹ Assuming only concrete mattresses are used at all four locations

² Assuming only rock bags are used at all four locations

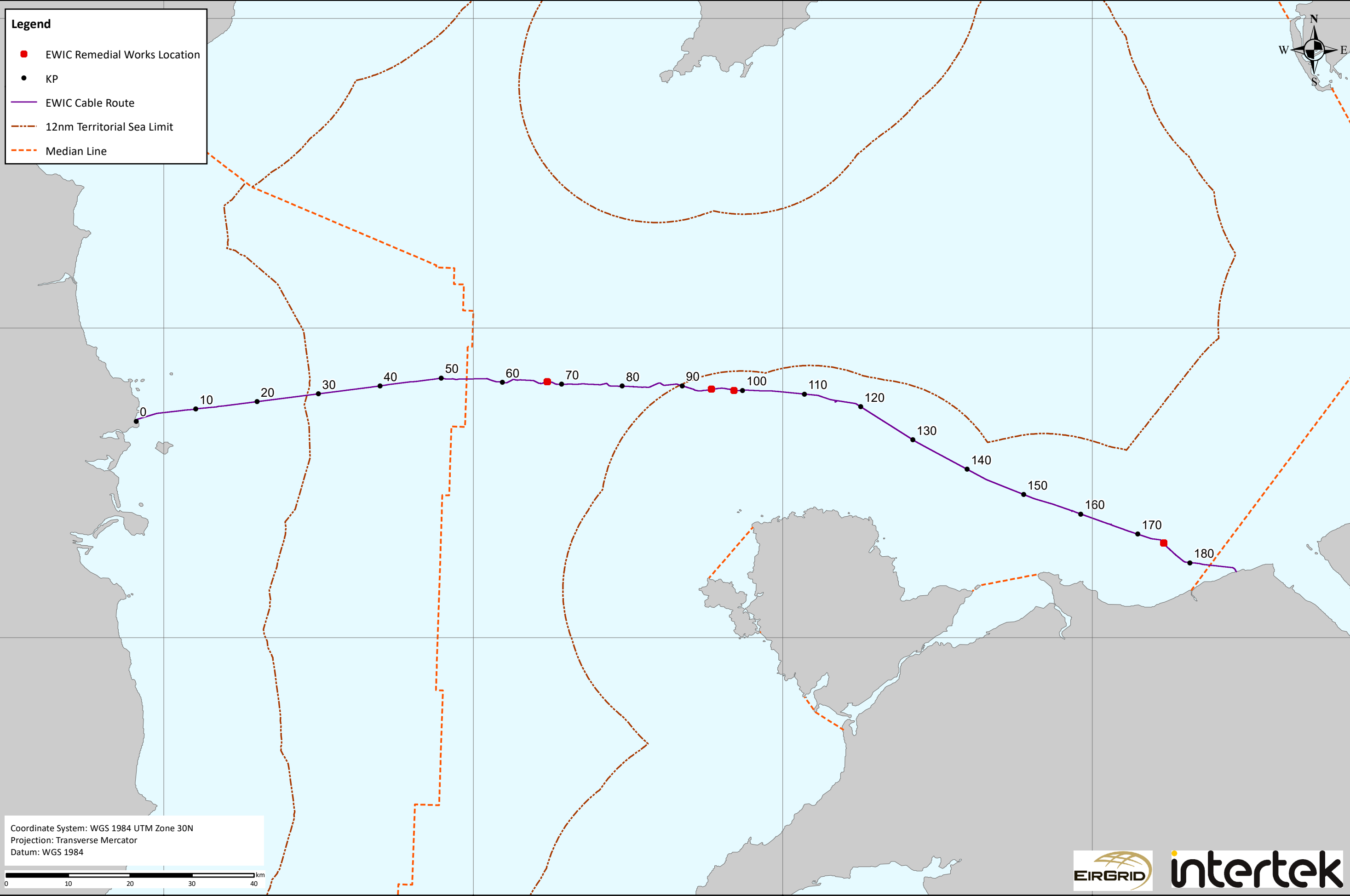


Table 2-1 Indicative locations for external cable protection

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 A 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 to the recommended depth at each of the remedial works locations. The geophysical survey acquisition methodology will comprise multi beam echo sounding (MBES), an acoustic survey method which is non-intrusive and will not interact with the seabed. 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 exact equipment to be used during the geophysical survey has not yet been specified. Examples of industry standard equipment for the purpose of geophysical 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). Typical ranges for MBES operation are 200-500kHz.

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 for all sites combined.

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

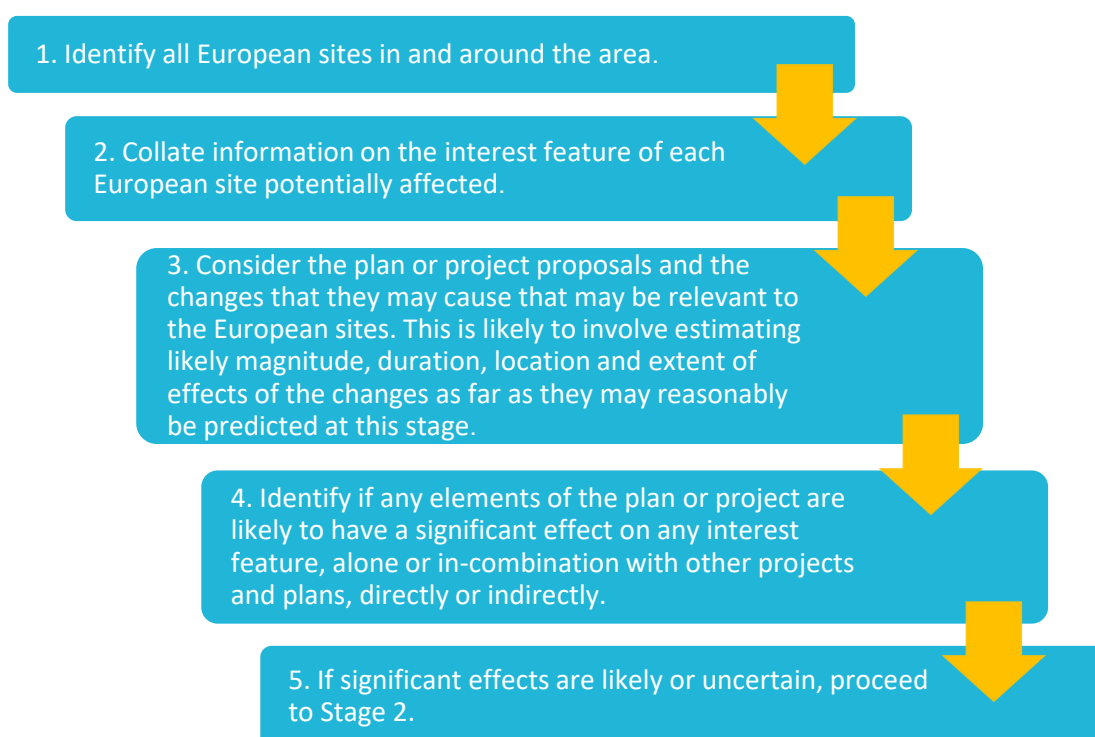
If remedial works are not undertaken, the EWIC cable will remain exposed in one area and may become uncovered in the other areas identified with low sediment cover. This means that the cable is at risk from interaction with fishing gear and ships anchors, which may result in damage to the cable, the 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 fishing gear become entangled.

3. STAGE 1 – APPROPRIATE ASSESSMENT SCREENING

3.1 Assessment Approach

This AA screening has been undertaken according to the process set out in Welsh Government (2017) guidance, as illustrated in Figure 3-1. It has considered all case law relevant to the Habitats Directive summarised in the EC Guidance (2018a).

Figure 3-1 HRA Screening Process



3.2 Identification of Relevant European Sites

The potential for a European site to be significantly affected depends on whether receptors which are designating features of a European Site:

- a. Can come into contact with the Proposed Works; and
- b. Are sensitive to the Proposed Works activities to the extent that the activity is likely to have an adverse effect on the conservation objectives for the features.

Identifying relevant European Sites has therefore been achieved by applying the following steps:

1. Identify the potential pressures the Proposed Works could have on receptors and the zone of influence (ZOI) for identified receptors (i.e. the spatial extent over which effects could occur);

2. Using ZOI as a guide, define a search area within which European Sites are screened for the relevant Qualifying Features; and
3. Screen SACs, SPAs and Ramsar sites within the defined search areas to identify designating features and assess whether interest features of the site could be significantly affected by the Proposed Works.

3.2.1 Identification of Sensitive Receptors

The receptors which could potentially be affected by the Proposed Works and could be the designated interest features of European Sites are:

- Subtidal habitats;
- Fish;
- Birds; and
- Marine mammals (including cetaceans, pinnipeds, and otter).

3.2.2 Defining a search area (identification of potential pressures and ZOI)

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. Listed in Table 3-1, these potential pressures may be direct or indirect, temporary, or permanent, beneficial, or harmful to the site, or a combination of these. The ZOI – spatial extent over which effects may be extend – has also been defined.

The ZOI has been used to establish a search area within which European Sites are screened for the relevant Qualifying Feature. Since mobile species from conservation sites further field may travel into the ZOI, the ZOI cannot be used alone as a distance to screen in relevant conservation sites. Therefore, search areas (distances from the Proposed Works) for each receptor group have been applied taking into consideration other information such as marine mammal management units and expert judgement to use for the initial screening of sites. Justification for the spatial extent of the search area is provided in Table 3-1.

Table 3-2 identifies the pressures that have been scoped out of the HRA and the reason for the exclusion. These pressures will not be discussed further.

Table 3-1 Potential pressures, ZOI and European Site Search Area

Receptor	Potential Pressure	Aspect of Proposed Development	Zone of Influence	Search Area and Justification
Habitats	Water flow (tidal current) changes, including sediment transport considerations	External Cable Protection	Footprint of External Cable Protection	200m Deposit of external cable protection will result in a brief hydrological change which could result in a localised sediment plume. Although levels of suspended sediments will be diluted, as a precaution the maximum distance sediment is anticipated to travel has been used to define the search area.
	Physical change to another seabed/sediment type	External Cable Protection	Footprint of External Cable Protection	
	Introduction or spread of invasive non-indigenous species (INIS)	External Cable Protection	Footprint of External Cable Protection	
Birds	Visual disturbance	External Cable Protection	Radial distances from Proposed Works 4km divers and sea ducks 2km all other species	10km It is recognised that some seabirds from other SPA's will forage and loaf within the ZOI. The disturbance however will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, only sites within 10km of the Proposed Works have been screened for qualifying bird features.
		Geophysical Survey		
	Changes to supporting habitat and prey availability	External Cable Protection		
Fish	Underwater sound changes	Continuous sound from vessel**	Not defined	40km There is the potential that the Proposed Works could impede migration to and from rivers. Therefore, the search area is 40km recognising the mobile and migratory nature of Annex II species within the region.
		Continuous sound – external cable protection**	Not defined	
		Continuous sound – geophysical survey**	Not defined	
	Physical change to another seabed/sediment type	External Cable Protection	Footprint of External Cable Protection	
	Underwater sound changes	Continuous sound from vessel**	Not defined	
Cetaceans	Underwater sound changes Underwater sound changes	Continuous sound – external cable protection**	Not defined	Management Unit In recognition of the highly mobile nature of cetaceans the relevant species management unit will define the search area.
		Continuous sound – geophysical survey**	5km*	
		Continuous sound from vessel**	Not defined	
Pinnipeds	Underwater sound changes	Continuous sound – external cable protection**	Not defined	Management Unit – grey seal 50km harbour seal Harbour seal are not known to make trips greater than 50km from haul out sites (DECC 2016).
		Continuous sound – geophysical survey**	5km*	

Receptor	Potential Pressure	Aspect of Proposed Development	Zone of Influence	Search Area and Justification
Otter	Visual (and above water noise) disturbance	Presence of installation vessel	Not defined	250m Guidance on visual disturbance of otter from survey activities found that beyond approximately 250 m, visual disturbance from the proposed activity is unlikely to be an issue. It is expected that there are unlikely to be adverse disturbance on otter beyond these distances along the shoreline (NatureScot, 2023)

* Based on the Effective Deterrent Range (EDR) for geophysical survey outlined in JNCC, DAERA and Natural England (2020)

** Based on the 370 – 627 m vessel noise from (Hatch et al. 2008)

Table 3-2 Pressures scoped out and justification for exclusion

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	Marine Mammals Fish Birds	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 the 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 based on the strong tidal flows in the area which will disperse suspended solids swiftly.
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 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 (ABPmer 2019). Although the presence of Project vessel(s) marginally increases the level of vessel activity within the area for the duration of the Proposed Works, none of the Project vessel(s) will be travelling at speeds exceeding 14 knots. The Project vessel(s) is 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 HRA as it is not likely to be significant.
Electromagnetic changes	Fish and Shellfish Marine Mammals	EWIC is already in operation, therefore the effects of local temperature changes were considered in the EIA submitted with the marine license application.
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 a Project vessel is extremely low and the risk is no greater than that of any other vessel within vicinity to the Proposed Works. In addition, all 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 as discussed in Table 2-2.
Introduction of light	All	The 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

Pressure Scoped Out of Assessment	Receptor/Topic	Justification for Scoping Pressure Out of Assessment
		out of the assessment.
Litter	Benthic Ecology Fish and Shellfish Marine Mammals Marine Birds	The Remedial Works will not result in the discarding, disposing, or abandoning of marine litter. Any dropped objects will be recovered by the vessel.
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Benthic Ecology	Direct penetration and/or disturbance of substrate below the surface 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	The pathway for species to be smothered because of project activities is by cable protection material being placed on the seabed. The effect from displaced sediment will be very localised, only effecting species in the immediate vicinity of cable protection. 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 fish and shellfish has been scoped out of the HRA.
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 marine license application.
Transition elements and organo-metal contamination;	All	Transition elements and organo-metal contamination will be considered as part of the Water Framework Directive (WFD) Assessment submitted in support of the marine license application.
Deoxygenation	Benthic Ecology Fish and Shellfish	During the Proposed 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, 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.
Nutrient enrichment		
Organic enrichment		
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 HRA.

3.2.3 Screening of European Sites

A geographic information system (GIS) was used to map the boundaries of European Sites in relation to the Proposed Works. All designated sites with marine components which are within the defined search areas for identified receptors have been listed along with their qualifying features in Table 3-5. Figure 3-2 (Drawing number: P2226K-ENV-001-A) identifies SAC's located within the defined search areas outlined in Table 3-1. It should be noted that not all sites within the Irish and Celtic Seas cetacean Management Unit are shown in Figure 3-2 for presentation purposes. Figure 3-3 (Drawing number: P2226K-ENV-002-A) shows SPA's located within 10km of the Proposed Works. No Ramsar sites or SSSI's were identified within 10km of the Proposed Works.

A total of 18 sites were screened in as part of this assessment and are shown in Table 3-5. For each European Site it was determined whether there is the potential for an interaction between the Proposed Works and the Primary and Qualifying Features i.e. whether there is a pressure-receptor pathway. This is determined by comparing information such as the extent of the ZOI with information regarding the Primary and Qualifying Feature e.g. species foraging distances, spatial extent of habitats etc. The interactions were defined as follows:

- **Yes:** A pathway between the Proposed Works and the Primary and Qualifying Feature can be identified that is likely to result in an effect; and
- **No:** Either a pathway between the Proposed Works and the Primary and Qualifying Features cannot be identified or a pathway exists but there is no physical overlap of the pressure and the Primary and Qualifying Feature.

For all Primary and Qualifying Features where it is determined that there is a possible interaction, the potential for likely significant effects is assessed in Section 3.3.

3.2.4 In-combination effects

A key requirement of the Habitats Directive is that the effects of any project on European sites should be considered in combination with other plans or projects. A search of marine licence applications for other activities which could interact with the Proposed Works was conducted using GIS and a review of marine licence applications on the NRW Public Register (NRW 2023). Table 3-3 lists all current and previous applications listed on the Public Register which may interact with the Proposed Works. Table 3-4 lists all ongoing projects near proposed works.

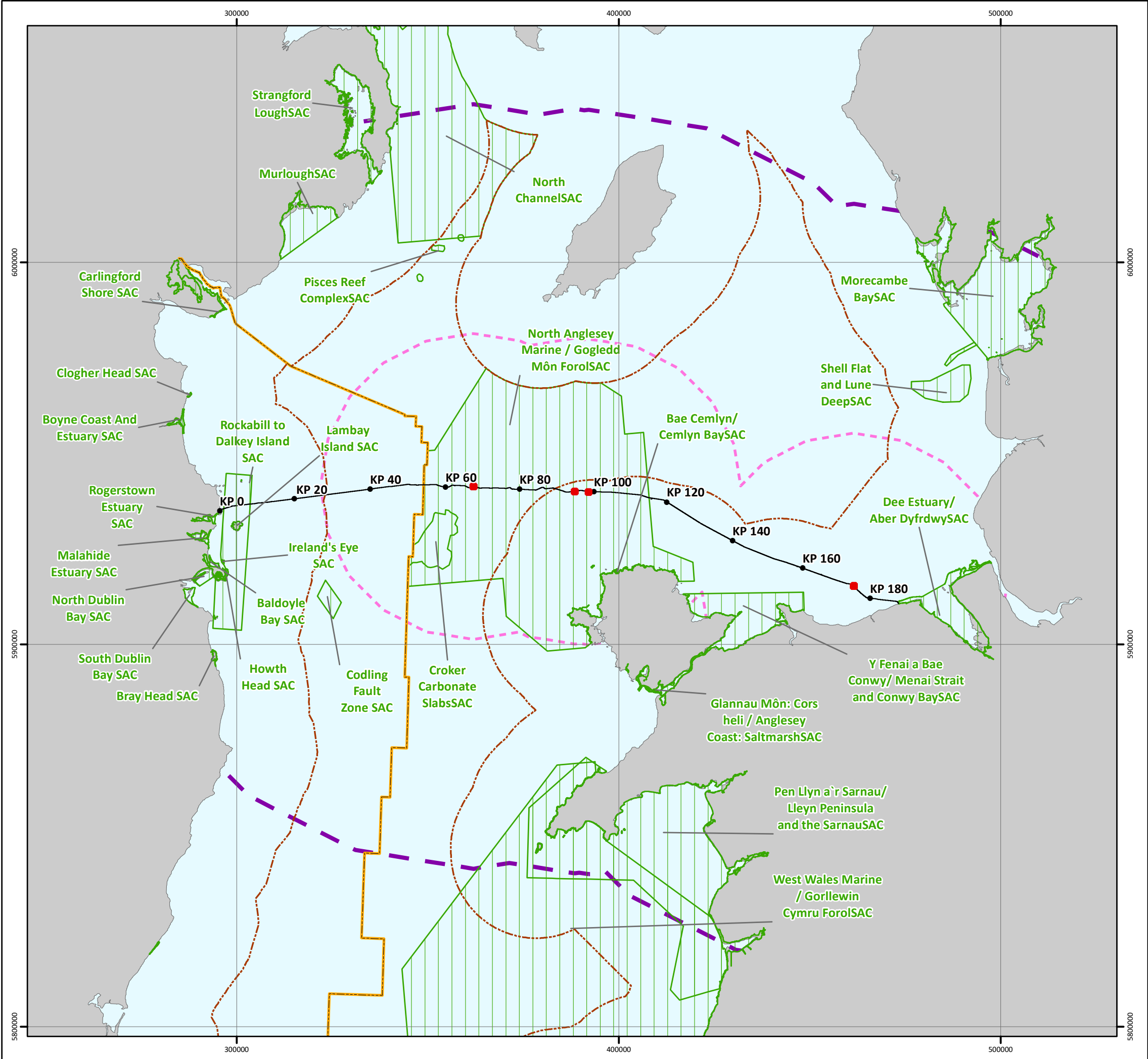
Table 3-3 Development applications near the Proposed Works

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
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

Name of development	Licence ref	Type of survey/activity	When planned to commence	Licence Status	Distance from Proposed Works (km)
Holyhead Breakwater Refurbishment	SC2002	Refurbishment	March 2021-October 2027	Issued	30

Table 3-4 Ongoing projects near Proposed Works

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



EAST WEST INTERCONNECTOR
REMEDIAL WORKS

ENVIRONMENTAL DESIGNATIONS
SAC's within Zones of Influence

Drawing No: P2226K-ENV-001

A

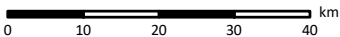
Legend

- EWIC Remedial Works Location
- KP
- EWIC Cable Route
- 12nm Territorial Sea Limit
- EEZ Boundary
- SAC
- Zone of Influence
 - 40km - Fish
 - 100km - Pinnipeds

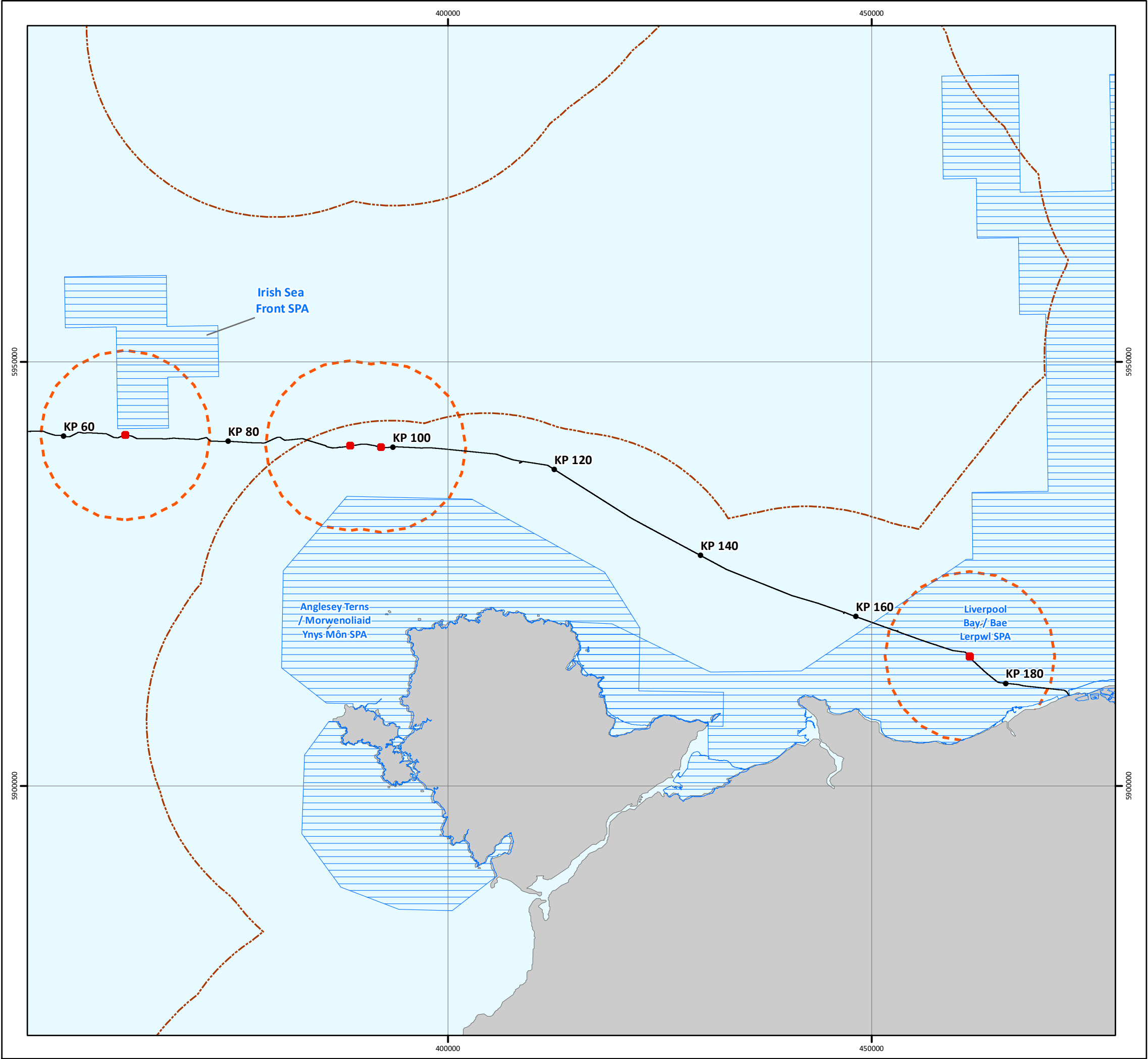


NOTE: Not to be used for Navigation

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



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EAST WEST INTERCONNECTOR
REMEDIAL WORKS

ENVIRONMENTAL DESIGNATIONS
SPA's within Zones of Influence

Drawing No: P2226K-ENV-002

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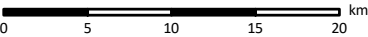
Legend

- 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
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Approved By	Andrew Page



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3.2.5 Summary of screening outcome

Table 3-5 below considers whether the Proposed Works has the potential for in-combination effects with other projects and plans identified within Table 3-3 and Table 3-4.

Table 3-5 European Sites and Screening Conclusions

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
North Anglesey Marine / Gogledd Môn Forol SAC (UK0030398)	Harbour porpoise (<i>Phocoena phocoena</i>)	Area 1,2 and 3 within SAC	Underwater sound changes	Yes – the Harbour porpoise is present within the SAC and individuals may be affected by underwater sound changes because of Project vessel(s), external cable protection and geophysical survey activities.	Yes – there are four other projects located within the North Anglesey Marine SAC	SCREENED IN
Liverpool Bay SPA (UK9020294A)	Breeding Little tern (<i>Sternula albifrons</i>) Common tern (<i>Sterna hirundo</i>)	Area 4 within SPA	Visual disturbance	Yes – the Proposed Works are near the coastline which is utilised by qualifying species for a range of activities.	Yes – there are five other projects located within the Liverpool Bay SPA	SCREENED IN
	Overwintering (Non-breeding) Red throated diver (<i>Gavia stellata</i>) Little gull (<i>Hydrocoloeus minutus</i>) Common scoter (<i>Melanitta nigra</i>) Waterbird assemblage (Non-breeding) Including species above Red-breasted merganser (<i>Mergus serrator</i>) Great cormorant (<i>Phalacrocorax carbo</i>)		Changes to supporting habitat and prey availability	Yes – the Proposed Works will involve disturbance to the seabed which has the potential to affect preferred prey choice of diving species		SCREENED IN
Anglesey Terns / Morwenoliaid Ynys Môn	Breeding	5.9	Visual disturbance	Yes – the Proposed Works have the potential to cause visual	Yes – there are three other projects located	SCREENED IN

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
SPA (UK9013061)	Common tern			disturbance to foraging terns	within the Anglesey Terns / Morwenoliaid Ynys Môn SPA	
	Arctic tern (<i>Sterna paradisaea</i>) Roseate tern (<i>Sterna dougalli</i>) Sandwich tern (<i>Sterna sandvicensis</i>)		Changes to supporting habitat and prey availability	Yes – the Proposed Works will involve disturbance to the seabed which has the potential to affect preferred prey choice of tern		SCREENED IN
Irish Seafront SPA (UK9020328)	Breeding Manx shearwater	0.8	Visual disturbance	Yes – the Proposed Works have the potential to cause visual disturbance to foraging Manx Shearwater	Yes - there is one other project located within the Irish Seafront SPA	SCREENED IN
			Changes to supporting habitat and prey availability	Yes – the Proposed Works will involve disturbance to the seabed which has the potential to affect preferred prey choice of Manx shearwater		SCREENED IN
North Channel SAC (UK0030399)	Harbour porpoise	65	Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
West Wales Marine / Gorrlewin Cymru Forol SAC (UK0030397)	Harbour porpoise	70	Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
Bristol Channel Approaches SAC (UK0030396)	Harbour porpoise	250	Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
Cardigan Bay/ Bae Ceredigion SAC (UK0012712)	Sandbanks which are slightly covered by sea water all the time	140	No pressure-receptor pathway	No – these features are outside the search area for habitats	No – there is no potential for in-combination effects as there is no pressure-receptor	SCREENED OUT

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
	Reefs Submerged or partially submerged sea caves				pathway	
	Bottlenose dolphin		Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
	Sea lamprey (<i>Petromyzon marinus</i>) River lamprey (<i>Lampetra fluviatilis</i>)		Underwater sound changes	No – these features are outside the search area for fish	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Grey seal		Underwater sound changes	Yes – the site is within Management Unit for Grey seals, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
Pen Llŷn a'r Sarnau/ Llein Peninsula and the Sarnau SAC (UK0013117)	Sandbanks which are slightly covered by sea water all the time Estuaries Coastal lagoons Large shallow inlets and bays Reefs Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonising mud and sand Atlantic salt meadows (Glauco-Puccinellietalia)	55	No pressure-receptor pathway	No – these features are outside the search area for habitats	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
	maritimae) Submerged or partially submerged sea caves					
	Bottlenose dolphin		Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
	Otter		No pressure-receptor pathway	No – the Proposed Works will not interact with this qualifying feature	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Grey seal		Underwater sound changes	Yes – the site is within the Management Unit for grey seals; therefore, the potential exists for individuals to be affected by underwater sound from the Proposed Works	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
Pembrokeshire Marine/ Sir Benfro Forol SAC (UK0013116)	Estuaries Large shallow inlets and bays Reefs Sanbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Submerged or partially	184	No pressure-receptor pathway	No – these features are outside the search area for habitats	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
	submerged sea caves					
	Grey seal		Underwater sound changes	Yes – the site is within the OSPAR Region III Management Unit for Grey seals, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
	Shore dock (<i>Rumex rupestris</i>)		No pressure-receptor pathway	No – this species grows on rocky, sandy, and raised beaches, shore platforms and the lower slopes of cliffs. The Proposed Works will not interact with this species based on the distance and habitat occurrence of this species.	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Sea lamprey (<i>Petromyzon marinus</i>) River lamprey (<i>Lampetra fluviatilis</i>) Allis shad (<i>Alosa alosa</i>) Twaithe shad (<i>Alosa fallax</i>)		Underwater sound changes	No – these features are outside the search area for fish	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Otter		No pressure-receptor pathway	No – the Proposed Works will not interact with this qualifying feature	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
Rockabill to Dalkey Island SAC (IE0003000)	Reefs	57	No pressure-receptor pathway	No – this feature is outside the search area for habitats	Yes - there is one other project located within the Rockabill to Dalkey Island SAC	SCREENED OUT
	Harbour porpoise		Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	Yes - there is one other project located within the Rockabill to Dalkey Island SAC	SCREENED IN

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
Lambay Island SAC (IE000204)	Reefs Vegetated sea cliffs of the Atlantic and Baltic coasts	61	No pressure-receptor pathway	No – this feature is outside the search area for habitats	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Grey seal (<i>Halichoerus grypus</i>)		Underwater sound changes	Yes – the Proposed Works are within the OSPAR Region III Management Unit for grey seals, therefore there is the potential for individuals from this site to be affected.	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
	Harbour seal (<i>Phoca vitulina</i>)			No – this feature is outside the search area for Harbour seals.	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED IN
Dee Estuary/ Aber Dyfrdwy SAC (UK0030131)	Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonising mud and sand Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) Estuaries Annual vegetation of drift lines Vegetated sea cliffs of the Atlantic and Baltic Coasts Embryonic shifting dunes Shifting dunes along the shoreline with	12	No pressure-receptor pathway	No – this feature is outside the search area for habitats	Yes - there is one other project located within the Dee Estuary / Aber Dyfrdwy SAC	SCREENED OUT

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
	Ammophila arenaria Fixed coastal dunes with herbaceous vegetation Humid dune stacks					
	Sea lamprey (<i>Petromyzon marinus</i>) River lamprey (<i>Lampetra fluviatilis</i>)		Underwater sound changes	Yes – the Proposed Works are within the search area for fish	Yes - there is one other project located within the Dee Estuary / Aber Dyfrdwy SAC	SCREENED IN
	Petalwort		No pressure-receptor pathway	No – this species inhabits open, damp dune slacks and occasionally within coastal grassland. The Proposed Works will not interact with this species based on the distance and habitat occurrence of this species	Yes - there is one other project located within the Dee Estuary / Aber Dyfrdwy SAC	SCREENED OUT
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC (UK0030252)	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	37km	No pressure-receptor pathway	No – this feature is outside the search area for habitats	No – there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Atlantic salmon (<i>Salmo salar</i>) Sea lamprey (<i>Petromyzon marinus</i>) River lamprey (<i>Lampetra fluviatilis</i>)		Underwater sound changes	Yes – all these species are migratory and could be present during the Proposed Works	No – given the distance of the Proposed Works from the other projects there will be no in-combination effects	SCREENED IN
	Bullhead (<i>Cottus gobio</i>) Brook lamprey (<i>Lampetra planeri</i>)		No pressure-receptor pathway	No – both species inhabit freshwater, there is no pressure-receptor pathway with these features.	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Floating water-plantain (<i>Luronium natans</i>)		No pressure-receptor pathway	No – this species inhabits freshwater, there is no pressure-	No - there is no potential for in-	SCREENED OUT

Site Name and EU Code	Qualifying Feature(s)	Distance from Proposed Works (km)	Potential Pressure	Connectivity between Proposed Works and Qualifying Feature(s)	Potential for In-combination effects	Screening Conclusion
				receptor pathway with this feature.	combination effects as there is no pressure-receptor pathway	SCREENED OUT
	Otter		Underwater sound changes	No – while this species is known to forage in coastal waters these are typically in shallow areas restricted to 0-3m deep. Considering the distance of required shallow coastal waters from the Proposed Works, therefore no significant effects will occur, and this qualifying feature will not be assessed further.	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	
Carlingford Shore SAC (UK002306)	Annual vegetation of drift lines Perennial vegetation of stony banks	79km	No pressure-receptor pathway	No – this feature is outside the search area for habitats	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED OUT
Roaringwater Bay and Islands SAC (UK000101)	Harbour porpoise	370km	Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED IN
Blasket Islands SAC (UK002172)	Harbour porpoise	397km	Underwater sound changes	Yes – the site is within the Irish and Celtic Sea Management Unit, therefore there is the potential that underwater sound could cause temporary injury or disturbance.	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED IN
	Grey seal (<i>Halichoerus grypus</i>)			Yes – the Proposed Works are within the OSPAR Region III Management Unit for grey seals, therefore there is the potential for individuals from this site to be affected.	No - there is no potential for in-combination effects as there is no pressure-receptor pathway	SCREENED IN

3.3 Assessment of Likely Significant Effects

3.3.1 Underwater Sound Changes – Annex II Cetacean and Pinniped Species

Table 3-5 identified a pressure-receptor pathway for the pressure underwater sound changes between the Proposed Works and nine European sites where the Primary or Qualifying Features are Annex II cetacean or pinniped species.

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 mammals to be affected by sound associated with activities undertaken during the Proposed Works, such as vessel movements and geophysical survey.

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 noise and may influence 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 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 sound changes.

Continuous noise

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, all noise-generating activities will produce continuous sound. This includes the use of thrusters on the Project vessel(s) for dynamic positioning (DP); the placement of deposits on the seabed i.e. (rock bags and concrete mattresses); and the use of the geophysical survey equipment (MBES and USBL systems). Continuous sound will be produced intermittently over a period of 24hrs (several hours at each location). Table 3-6 below outlines the parameters for the Proposed Works.

Table 3-6 Proposed Works Continuous Noise Sources

Activity	DP vessel (Genesis 2011)	Rock placement (Wyatt 2008)	MBES (Genesis 2011)	USBL (van der Sman 2020)
SL: SPL RMS (dB re 1 μ Pa2 @ 1m)	184	188	210 – 245	194 - 207
SL: 24 hr SEL RMS (dB re 1 μ Pa2s @ 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 120dB re 1 μ Pa-2s (RMS) has been used for continuous sound for all cetacean species (Gomez et al. 2016, BOEM 2017, NMFS 2018).

It is important to note that the Project vessel(s) and external cable protection placement will not occur continuously during the Proposed Works. The Project vessel(s) will use thrusters sporadically, to maintain a position over the Proposed Works, therefore the source level will fluctuate throughout the duration of the Proposed Works and will only peak at the 184 dB re 1 μ Pa @ 1m for short periods. In the worst-case, external cable protection may be required at up to four locations, therefore sound generated by this activity will be at discrete points along the route and will be temporary, lasting several hours at each location.

It is assumed that all marine mammals will flee at a speed of 1.5m/s (Otani et al. 2000, Lepper et al. 2012) from a source. 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 flee 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 suggested that any individuals in proximity of the Project vessel(s) expected that any individuals in proximity to the survey vessel will be able to move away from the area affected to avoid injurious noise levels. Whilst the action of moving away from a sound level is a behavioural response, animals will be able to return to the area immediately following the vessels transit through the area. The likelihood of potential injury is therefore considered low and limited to discrete windows during the Proposed Works. Whilst disturbance is considered more likely to occur, the disturbance will be temporally and spatially limited with no long-term effects. The Proposed Works also need to be considered in the context of the existing noise 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 natural levels of underwater sound and therefore underwater sound from the Proposed Works will not be discernible above natural and anthropogenic noise in the region.

The geophysical survey will produce continuous noise of up to 245dB re 1 μ Pa @ 1m (SPL RMS) from the MBES as a worst-case scenario. 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. Additionally, the MBES and USBL systems operate at frequencies outside of the hearing ranges of all qualifying species in this assessment (Southall et al., 2019).

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).

3.3.1.2 Harbour porpoise

Conservation objectives

The conservation objectives for the four sites (North Anglesey Marine / Gogledd Môn Forol, North Channel, West Wales Marine/ Gorllewin Cymru Forol, Bristol Channel Approaches/Dynesfeydd Môr Hafren) in UK waters are the same: To avoid deterioration of the habitats of the harbour porpoise or significant disturbance to the harbour porpoise, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for the UK harbour porpoise.

To ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:

1. The species is a viable component of the site.
2. There is no significant disturbance of the species.
3. The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

The conservation objectives for the three (Rockabill to Dalkey Island, Roaringwater Bay and Islands, and Blasket Islands) Irish sites are to maintain the favourable conservation condition of Harbour porpoise in the SACs, which is defined by the following list of attributes and targets:

- Access to suitable habitat – species range within the site should not be restricted by artificial barriers to site use.
- Disturbance - Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.

Assessment against conservation objectives – harbour porpoise

It is likely that harbour porpoise will be observed in the proposed remedial works. The four UK European sites and three Irish SACs are within same management unit (Celtic and Irish Sea MU), with harbour porpoise using the different European sites at different times of the year. For example, the Bristol Channel Approaches is a winter ground whilst densities of harbour porpoise within the West Wales Marine SAC are higher during summer, with only a small inshore area supporting winter populations.

Heinänen and Skov (2015) identified areas of persistent high porpoise density in UK waters. They concluded that winter densities of harbour porpoise off the North Anglesey coast ranged from less than 0.3 – 0.9 individuals per km². Densities of harbour porpoise within the West Wales Marine SAC range from less than 0.3 – 1.2 individuals per km² during the winter season. The North Channel SAC and Bristol Channel Approaches SAC both have harbour porpoise densities ranging from less than 0.3 – 3 individuals per km² during the winter season. There is no density information available for the Rockabill to Dalkey Island SAC, however a study by the Irish Whale and Dolphin Group estimated that the site supported 424 harbour porpoises (IWDG Consulting 2016).

The North Anglesey Marine SAC is designated for summer densities (April to September) of harbour porpoise, however the Proposed Works are being undertaken outside of this period. Therefore, there will be lower densities of harbour porpoise that have the potential to be affected by underwater sound changes.

The thresholds for temporary and permanent injury from continuous noise in very high-frequency cetaceans are 153dB re 1 μ Pa (SEL) and 173dB re 1 μ Pa (SEL) respectively (Southall *et al.* 2019). Continuous noise thresholds overlap with the sound levels for the Project vessel(s) and rock placement. It should be noted that toothed whales such as harbour porpoise are not typically considered sensitive to ship noise due to their poor hear frequencies below 1kHz with the sensitivity of their hearing improving with frequency and at its best between 10 and 120kHz (Dyndo *et al.* 2015). Similarly, sound levels for MBES have been reported ranging from 2010 - 245dB re 1 μ Pa-m (Genesis 2011). Evidence has shown that MBES operating at greater than 200 kHz do not cause behavioural responses in harbour porpoise, known to be highly sensitive to disturbance (Dyndo *et al.* 2015). This is because the frequency range falls outside the hearing thresholds of marine mammals and the sound attenuates more swiftly than lower frequencies and operate at a lower power (JNCC 2017). The MBES survey will have a minimum frequency of 200 kHz, which is outside of the auditory range of harbour porpoise and will therefore not cause injurious or disturbance effects. The USBL system operates at low frequencies that only low-frequency cetaceans can hear and cannot be heard by the harbour porpoise. As discussed in Section 3.3.1, the zone of influence for injurious effects is considered spatially limited and that harbour porpoise will be capable of moving away from the zone of influence for injurious effects from vessel noise. Whilst harbour porpoise are expected to move away from the vessel during operations (which is a disturbance response), based on the limited spatial and temporal range of the Proposed Works this will not be considered significant disturbance (as defined by JNCC, Natural England and Countryside Council for Wales (2010) and JNCC, 2020).

Given the small scale of the injurious effects from these activities, the ability of individuals to move away from the sound source and the limited nature of any potential disturbance, there will be no likely significant effects on the species viability of harbour porpoise within any of the sites as a result of continuous noise sources from the proposed remedial works.

Screening Conclusion: No likely significant effects.

3.3.1.3 Bottlenose dolphin

Conservation objectives

The conservation objectives for the two screened in European sites (Cardigan Bay/ Bae Ceredigion SAC and Pen Llŷn a'r Sarnau/ Llyn Peninsula and the Sarnau SAC) are the same:

- The population is maintaining itself on a long-term basis as a viable component of its natural habitat;
- The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future;
- The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance, and population dynamics of the species within the site and population beyond the site is stable or increasing.

Assessment against conservation objectives – bottlenose dolphin

It is possible that bottlenose dolphin from the two European sites may be observed in the proposed remedial works area given that the Proposed Works are in the same management unit as the Cardigan Bay / Bae Ceredigion and Pen Llŷn a'r Sarnau/ Llyn Peninsula and the Sarnau SACs (i.e. the Irish Sea MU). The MBES and USBL operate outside of the hearing range of bottlenose dolphin (150Hz – 160kHz, Southall *et al.* 2019), and will therefore not have any injurious or disturbance

effects to individuals. The noise from the vessel or rock placement activity may disturb individuals, however as discussed in Section 3.3.1, the zone of influence for injurious effects is considered spatially limited and bottlenose dolphin will be capable of moving away from the ZOI for injurious effects from vessel noise. Whilst individuals are expected to move away from the vessel during operations (which is a disturbance response), based on the limited spatial and temporal range of the Proposed Works this will not be considered significant disturbance (as defined by JNCC (2010 and 2020)). The Proposed Works will not reduce the natural range of this species within the sites and will not affect the long-term population viability or the natural range of bottlenose dolphin within these sites.

Screening Conclusion: No likely significant effects.

3.3.1.4 Grey seal - UK

Conservation objectives

The conservation objectives for these three European sites are the same:

- The population is maintaining itself on a long-term basis as a viable component of its natural habitat;
- The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future;
- The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance, and population dynamics of the species within the site and population beyond the site is stable or increasing

Assessment against conservation objectives – grey seal

Cardigan Bay/ Bae Ceredigion, Pen Llŷn a'r Sarnau/ Llyn Peninsula and the Sarnau, Pembrokeshire Marine/ Sir Benfro Forol SACs are within the OSPAR Region III Marine Management Unit for Grey Seals. It is also recognised that the three European sites are likely to be connected in terms of grey seal populations. The Welsh 'population' of grey seals is estimated to form 3.3% of the UK and roughly 2.7% of the European population (NRW 2018). As the Llyn Peninsula and the Sarnau SAC is within 100km of the Proposed Works, there is the potential for seals from the European site but also transient individuals from the two other European sites to be present in the area of the Proposed Works. Given the distance of the Proposed Works from all three European sites potential effects from underwater sound changes will be limited to foraging seals.

Grey seals are generalist feeders, foraging on the seabed consuming a wider variety of prey including sandeel, gadoids and flatfish (NRW 2018). Sandeel are typically the dominant prey species, but diet varies with region, with a study of seals in Pembrokeshire showing that whiting and sole dominated the grey seal diet (NRW 2018). Based on the seabed type and the location of the Proposed Works within spawning and nursery habitats for seal prey species, it is likely grey seals may forage in the area. The MBES and USBL systems operate outside of the hearing range of grey seal (Southall et al. 2019), so will not disturb or injure individuals, however they could be disturbed by noise from the vessel or cable protection placement. Seals are likely to move away if vessels approach within several hundred metres (Britton 2015); suggesting that they will avoid the area before they encounter sound levels that will harm them. Grey seals foraging in the area may be interrupted, however this disturbance will be temporary (lasting a maximum of 14 days over two installation campaigns) and will not have a likely significant effect on the range or long-term population viability of grey seal.

Screening Conclusion: No likely significant effects.

3.3.1.5 Grey seal - Ireland

Conservation objectives

The conservation objectives for grey seal in the Lambay Islands and Blasket Islands SACs are:

“To maintain the favourable conservation condition of grey seal in Lambay Island SAC which is defined by the following list of attributes and targets” including:

- Target 1 – Species range within the site is not restricted by artificial barriers to site use;
- Target 2 – Conserve the breeding sites in a natural condition;
- Target 3 – Conserve the moult haul-out sites in a natural condition;
- Target 4 – Conserve the resting haul-out sites in a natural condition
- Target 5 – Human activities should occur at levels that do not adversely affect the grey seal population at the site

Assessment against conservation objectives – grey seal

The Lambay Island SAC grey seal population is contained within the OSPAR Region III Management Unit. Based on the foraging range of grey seals there is potential for individual seals to be foraging within the area of the Proposed Works. Similarly, to the UK grey seal European sites, the temporary and localised nature of underwater sound will not significantly affect a grey seals ability to forage. Seals are likely to move away if vessels approach within several hundred metres (Britton 2015); suggesting that they will avoid the area before they encounter sound levels that will harm them. The MBES and USBL systems operate outside of the grey seal’s hearing range (Southall et al. 2019) and so will not be disturbed by the equipment. Grey seals foraging in the area may be interrupted by the presence of the vessel and cable protection works, however this disturbance will be temporary. In relation to the targets, the Proposed Works will not create an artificial barrier to the European site and will not affect breeding, moulting or resting haul-out sites. The Proposed Works will not cause underwater sound effects that have adverse effects on the grey seal population of the Lambay Island and Blasket Islands SAC sites.

Screening Conclusion: No likely significant effects.

3.3.2 Underwater Sound Changes – Annex II fish species

Table 3-5 identified a pressure-receptor pathway for the pressure underwater sound changes between the Proposed Works and two European sites for which the Qualifying Features are sea lamprey, river lamprey and Atlantic salmon. These sites are the Dee Estuary/ Aber Dyfrdwy SAC, Cardigan Bay / Bae Ceredigion SAC and the River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC.

It is recognised that fish are mobile species and therefore Annex II listed migratory species have the potential to cross the Proposed Works. In general, most fish hear well in the range within which most energy from anthropogenic noise sources is emitted, i.e. relatively low frequency sound below 1kHz, with peak perception between approximately 100-400Hz (Carroll, A.G., et al. 2017).

Several features of a fish’s anatomy, life cycle and habitats will determine the potential effects of sound on fish. Popper et al. (2014) classified sensitivity of fish species to underwater sound based on the presence or absence of 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. Specialist hearing species include species such as herring, sprat, twaite shad and allis shad. Swim bladders are used by certain fish species for buoyancy control, hearing, respiration etc. Pressure changes for fish with a swim bladder, from impulsive sound, can result in physiological trauma.

3.3.2.1 UK – sea and river lamprey

Conservation objectives

The conservation objectives for these sites are:

“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Assessment against conservation objectives – sea and river lamprey

Dee Estuary/ Aber Dyfrdwy SAC, Cardigan Bay / Bae Ceredigion SAC, and the River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC are designated for sea lamprey (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*) which use the estuary as part of a migratory route to the River Dee. Sea and river lamprey spend their adult life in the sea or estuaries but spawn and spend the juvenile part of their life cycle in rivers. Mature lamprey migrates into fresh water from the sea or primarily estuaries from October to December. During winter and early spring, they continue to migrate upstream at night where conditions are suitable, hiding under stones and vegetation during the day. Spawning typically starts once water temperatures reach 10-11°C, typically between March and April (Natural England 2003). Based on the lifecycle of both lamprey species and the timing of the Proposed Works, there is no potential for underwater sound changes from the Proposed Works to influence the migration of lamprey to the Dee Estuary.

There is some limited research on the vestibular response of the lamprey ear however, there are no studies examining the response of the lamprey to sound or whether they exhibit a behavioural response to noise (Mickle *et al.* 2018). Given that lamprey species lack specialist hearing structures and their ear is simple (lacking a swim bladder or structure tuned to amplify sound signals), they are considered to be hearing generalists, with a maximum hearing range of up to several hundred Hz (Popper 2005). Behavioural and physiological effects on lamprey are only likely to occur if individuals are close to the noise source (Popper 2005; Popper and Hastings 2009). It is noted however that the assumption of lamprey being hearing generalists is based on limited data. A recent study attempting to address this gap looked at the behavioural response of lamprey. Mickle *et al.* (2018) found both adult and juvenile sea lamprey exhibited an increase in activity levels (swimming) when exposed to certain low frequency tones. The study suggests that the ear of a sea lamprey can respond to frequencies between 50-200Hz.

While the Project vessel(s) will produce sound within the frequency range to which lamprey could respond, the Project vessel(s) will only be present on location for a maximum of 14 days across the installation windows. The temporary addition of one vessel needs to be considered in the context of the existing environment. At Remedial Works Area 4, the shipping density is highest, reaching 200-500 vessel hours per Km² per year (EMODnet 2020). Shipping density at the Remedial Works Areas 1, 2, 3 range from <1 to 75 vessel hours per km² per year. At Remedial Works Area 4, the shipping density is highest, reaching 200-500 vessel hours per Km² per year (EMODnet 2020). The temporary addition of the Project vessel(s) will be within the normal fluctuations experienced in the region in

terms of underwater sound. In addition, the Proposed Works are occurring greater than 10km from any of the SAC's designated for lampreys, therefore d will not cause significant injury or disturbance to lamprey migrating within the estuary.

Screening Conclusion: No likely significant effects.

Atlantic salmon

Salmon spend most of their lives out at sea but return to spawn in the same stretch of river or stream in which they hatched. They travel upstream in early summer and breed when the conditions are right in late autumn. Once hatched, juveniles will stay in freshwater for up to six years, after which they migrate back to the sea. Salmon are predators, feeding on invertebrates and small fish as juveniles, and squid and fish in the sea (Wildlife Trust Wales 2020). Atlantic salmon are known to detect low frequency acoustic stimuli below 380Hz (Harding *et al.* 2016). Considering this, only noise emitted from the Project vessel(s) is likely to be detected by Atlantic salmon.

The zones of influence for injurious effects and disturbance will be limited to within a few hundred metres of the Project vessel(s) and the Project vessel(s) will not be operating continuously, with thrusters being used sporadically to maintain a position over the Proposed Works. Furthermore, the Proposed Works are temporary lasting a maximum of 14 days and are within a region that experiences high marine traffic. Atlantic salmon are already exposed to elevated sound levels and underwater sound changes from the Proposed Works will not be above the natural variation experienced by Atlantic salmon in the region. During the Proposed Works, some individuals may show avoidance behaviour in vicinity of the Proposed Works, however this will not affect the migration of Atlantic salmon into the Dee Estuary SAC and River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC. In relation to the conservation objectives, the Proposed Works will not affect the extent and distribution, the supporting habitats or the population and distribution of Atlantic salmon within both SACs.

Screening Conclusion: No likely significant effects.

3.3.3 Visual Disturbance and Changes to Supporting Habitat and Prey Availability

Table 3-5 identified a pressure-receptor pathway between the proposed survey and the Qualifying Features of the Liverpool Bay SPA, Anglesey Terns SPA and the Irish Sea Front SPA for the pressure Visual Disturbance and Changes to Supporting Habitat and Prey Availability.

3.3.3.1 Liverpool Bay SPA (UK9020294A)

The SPA covers an area of 252,757.73 hectares, with one of the proposed locations for Remedial Works located within the European Site. The seabed of the SPA consists of a wide range of mobile sediments including large areas of muddy sand stretching from Rossall point to the Ribble Estuary with sand predominating the remaining areas with a concentrated area of gravelly sand off the Mersey Estuary and several sandbanks off the English and Welsh coasts (Natural England 2017). The tidal currents within the SPA are generally weak, when combined with the large tidal range results in the deposition of sediments. The SPA qualifies under Article 4.1 and 4.2 of the Birds Directive (79/409/EEC), with several qualifying overwintering and breeding birds (outlined in Table 3-7 below). The site also qualifies under SPA selection stage 1.3 as it is used regularly by over 20,000 waterbirds (as defined by the Ramsar Convention) in any season. Between 2015 and 2020, the site supported a waterbird assemblage ranging from 101,831 to 216,824 (Natural England 2020). In addition, the main components of the assemblage include all non-breeding qualifying features in Table 3-7 as well as two species present in numbers exceeding 1% of the Great Britain total, including: Red-breasted merganser (*Mergus serrator*) and Great cormorant (*Phalacrocorax carbo*).

Table 3-7 Liverpool SPA Population Estimate and Seasonality Presence

Bird species	Season	Interest Type	Estimated Population*	J	F	M	A	M	J	J	A	S	O	N	D
Red-throated diver (<i>Gavia stellata</i>)	Non-breeding	Annex I Species	1,800 individuals (2015- 2020)												
Little gull (<i>Hydrocoloeus minutus</i>)	Non-breeding	Annex I Species	319 individuals (2004/05 – 2010/11)												
Little tern (<i>Sternula albifrons</i>)	Breeding	Annex I Species	260 individuals (2010 – 2014)												
Common tern (<i>Sterna hirundo</i>)	Breeding	Annex I Species	360 individuals (2011 – 2015)												
Common scoter (<i>Melanitta nigra</i>)	Non-breeding	Regularly occurring migrant	141,801 individuals (2015 – 2020)												
Internationally important waterbird assemblage of over 20,000 individuals	N/A	Assemblage													

*Source: Liverpool SPA Citation Document (Natural England 2020)

Red-throated diver

Higher densities of red-throated diver are typically found along the coastline and close inshore with the main aggregation of red-throated diver within the existing Liverpool Bay SPA, with a satellite aggregation evident to the north adjacent to the Duddon Estuary SPA and towards Morecombe Bay (Lawson *et al.* 2016). At Remedial Works Area 4, the density of red-throated diver ranges from 0.51-1 individuals per km² (Lawson *et al.* 2016). The red throated diver has a disturbance susceptibility of five and a habitat specialisation of four meaning this species is sensitive to disturbance (Joint SNCB 2022).

Little gull

The density and distribution of little gull within the Liverpool Bay SPA is concentrated off the coast of Blackpool near to the 12 nautical mile limit. At Remedial Works Area 4, the density of little gull is comparatively low, ranging from 0-0.04 individuals per km² (Lawson *et al.* 2016).

Common scoter

There are two main aggregations of common scoter located to the north-west of the Dee Estuary and the Ribble Estuary. Both aggregations are restricted to the coastline and several miles out. Densities within Remedial Works Area 4 range from 50 - >50 individuals per km².

Conservation objectives

The conservation objectives for the site are: *“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring”*:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and
- The distribution of the qualifying features within the site.

Assessment against conservation objectives – visual disturbance

Disturbance can be defined as when a bird's normal behaviour is changed by anthropogenic activities. Individuals using a given area of sea for a range of activities including foraging, resting, and commuting could be disturbed by human activities. As a result, birds are likely to avoid sources of disturbance and return later once the disturbance source is no longer apparent. The level of disturbance can be affected by the duration of return times for individuals combined with the frequency of disturbance events which could combine in longer term effects (JNCC 2017b). The disturbance susceptibility and habitat specialisation scores feature within the Joint SNCB Interim Displacement Advice Note (JNCC 2022) have been provided in Table 3-8 below.

Whilst the Joint SNCB Interim Displacement Advice Note (2022) recommends a displacement radius of 10 km for the red throated diver species regarding wind farm operation, it has been acknowledged that models suggest a displacement distance of 2 km for shipping may be appropriate (Natural England, NRW and JNCC, 2022). Due to the survey impacts on the species being more similar to shipping than the magnitude of a wind farm development, a displacement buffer of 2 km has been used (Joint SNCB 2022).

Table 3-8 Liverpool Bay SPA Qualifying Features Disturbance Susceptibility and Habitat Specialisation

Species*	Disturbance Susceptibility (Out of 5)	Habitat Specialisation (Out of 5)
Red-throated diver	5	4
Little tern	2	4
Common tern**	2	3
Common scoter	5	4

* Little gull is not included in the Joint SNCR Interim Displacement Advice Note (2020) assessment and there is limited information within literature pertaining to the disturbance susceptibility and habitat specialisation for this species. Therefore, this species has not been included in the above table.

**Common tern is not included in the Joint SNCR Interim Displacement Advice Note (2020) assessment therefore disturbance sensitivity and habitat specialism for other tern species has been used as a guide. Little tern, black tern, sandwich tern, roseate tern and Arctic tern are all classed as having a moderate habitat specialisation and low susceptibility to disturbance (score of 3 out of 5 for specialism and 2 out of 5 for disturbance) therefore it has been assumed that common tern is also likely to have low susceptibility to disturbance.

Remedial Works Area four is within the Liverpool Bay SPA. Considering the aggregations and densities of qualifying features and disturbance susceptibility and habitat specialisation presented above, there is a high likelihood that the Proposed Works will interact with qualifying species of waterbirds. During the Remedial Works at these locations temporary visual disturbance from the Project vessel(s) has the potential to interrupt feeding activities of qualifying species within the SPA, in particular the red-throated diver and common scoter which have higher disturbance susceptibilities. Despite this, the Proposed Works will be temporary, taking up to a maximum of 14 days with the Project vessel(s) and activities occurring for a few hours at each Remedial Works Area. In addition, the Project vessel(s) will be slow moving and take place in the context of existing sources of disturbance. At such slow speeds, the Project vessel(s) is effectively stationary in terms of bird displacement. Studies have shown that slow moving vessels cause little disturbance to birds and birds may habituate to frequent and relatively benign events and noises (Hill et al 1997). At Remedial Works Area 4, the shipping density is highest, reaching 200-500 vessel hours per Km² per year (EMODnet 2020). Shipping density at the Remedial Works Areas 1, 2, 3 range from <1 to 75 vessel hours per km² per year. At Remedial Works Area 4, the shipping density is highest, reaching 200-500 vessel hours per Km² per year (EMODnet 2020). In addition, there is a high shipping density associated with the entrance to the River Mersey located to the north east and east of the Remedial Works. The introduction of the Project vessel(s) will be within the normal weekly fluctuations of shipping activity experienced in the area. Therefore, qualifying bird species will be habituated to noise from vessel traffic and other activities going on in the area. Considering the above, the Proposed Works will not result in potential likely significant effects that will affect the distribution, structure, and function, supporting processes, the populations, or distributions of any of the qualifying features within the site.

Screening Conclusion: No likely significant effects.

Assessment against conservation objectives – changes to supporting habitat and prey availability

Red-throated diver is an opportunistic species primarily feeding on several species of small fish. The sandbanks of Liverpool Bay support the nursery and feeding grounds for many fish species that red-throated diver feed on including cod, herring, gobies, and sand eels (Natural England 2012). Common scoters feed by diving, usually synchronously in flocks and primarily feed on cockles, clams, other bivalves and a variety of other molluscs, crustaceans, and worms. Previous studies have shown the percentage occurrence of molluscs in their diet exceeded 90% and that for bivalves exceeded 88% (Kaiser *et al.* 2002). It is also noted that common scoter are opportunistic and will feed on whatever mollusc is locally abundant. Both common and little tern are plunge diving species with

sandeel and clupeids being the primary food sources for colonies on the North Wales coast (RSPB 2017). Little gull typically feed by picking small fish, crustaceans, and other invertebrates of the surface of the sea.

Based on the above feeding methods and diets, the Proposed Works has the potential to affect the supporting habitats within the Liverpool Bay SPA which could influence prey availability. Furthermore, most species have a high habitat specialisation making these species vulnerable to this pressure.

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 894m² 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 qualifying species of the Liverpool Bay SPA.

Screening Conclusion: No likely significant effects.

3.3.3.2 Anglesey Terns / Morwenoliaid Ynys Môn SPA (UK9013061)

The SPA covers an area of 101,931 hectares and 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 qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting more than 1% of the Great Britain population of four species of tern as outlined in Table 3-9.

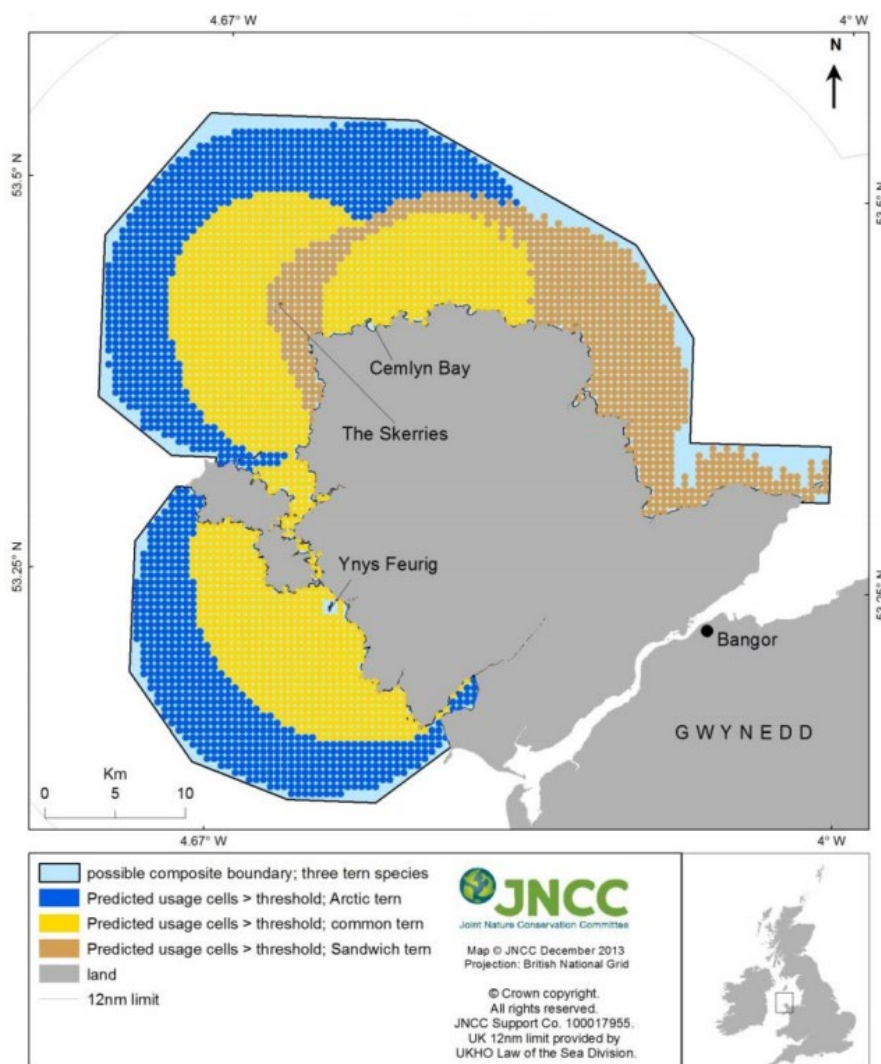
Table 3-9 Anglesey Terns / Morwenoliaid Ynys Môn SPA Tern Species Population Estimate

Bird species	Season	Interest Type	Estimated Population*	J	F	M	A	M	J	J	A	S	O	N	D
Common tern	Breeding	Annex I Species	189 pairs												
Arctic tern	Breeding	Annex I Species	1,290 pairs												
Roseate tern	Breeding	Annex I Species	3 pairs												
Sandwich tern	Breeding	Annex I Species	460 pairs												

*Source: Anglesey Terns SPA Advice to the Welsh Government 2016

Modelling of predicted usage of the extant Ynys Feurig, The Skerries and Cemlyn Bay sites demonstrates that the distribution of all tern species is primarily restricted to the coast. The highest densities of Arctic tern (between 8.08 – 20.98 individuals per km²) are within 10km of the North Anglesey Coast. Densities of common tern are also their highest (between 10.12 – 55.22 individuals per km²). The Sandwich tern has peak densities (15.31 – 29.48 individuals per km²) within the immediate vicinity of the coastline, with densities reducing to 0 to 0.08 individuals per km² within 10km of the coastline. Figure 3-4 below, highlights the predicted usage for three of the four qualifying features within the SPA.

Figure 3-4 Predicted Usage for Arctic, Common and Sandwich Terns within the Anglesey Terns SPA



Source: Natural Resources Wales (2016)

Conservation objectives

The conservation objectives for each Qualifying Feature include:

- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term;
- The distribution of the population should be being maintained, or where appropriate increasing;
- There should be sufficient habitat, of sufficient quality, to support the population in the long term; and
- Factors affecting the population, or its habitat should be under appropriate control.

Assessment against conservation objectives – visual disturbance

There are no Remedial Works Areas within the SPA. However, Remedial Works Areas two and three are within 5km of the SPA boundary. All other Remedial Works Areas within proximity to the SPA are a more than 20km from the SPA boundary. Breeding and nesting will be unaffected as the Proposed

Works are outside the breeding season and based on the distance of the Proposed Works from nesting sites onshore. The presence of a Project vessel(s) therefore only has the potential to disturb individuals foraging and loafing. Despite this, given the distance of the SPA to the Proposed Works disturbance effects will not occur. In addition, disturbance susceptibilities for terns provided in Table 3-10 demonstrates all species have a low susceptibility to disturbance.

Table 3-10 Anglesey Terns SPA Qualifying Features Disturbance Susceptibility and Habitat Specialisation

Species*	Disturbance Susceptibility (Out of 5)	Habitat Specialisation (Out of 5)
Arctic tern	2	3
Common tern*	2	3
Sandwich tern	2	3
Roseate tern	2	3

*Common tern is not included in the Joint SNCR Interim Displacement Advice Note (2022) assessment therefore disturbance sensitivity and habitat specialism for other tern species has been used as a guide. Little tern, black tern, sandwich tern, roseate tern and Arctic tern are all classed as having a moderate habitat specialisation and low susceptibility to disturbance (score of 3 out of 5 for specialism and 2 out of 5 for disturbance) therefore it has been assumed that common tern is also likely to have low susceptibility to disturbance.

Based on predicted usage, the sea beyond the Anglesey Terns SPA boundary is unlikely to be used by qualifying species. There may be the potential for very small numbers of individuals to be disturbed if they venture beyond the predicted usage, however this is unlikely given that predicted usage accounts for such behaviour as foraging. In relation to the conservation objectives, it can be concluded that the Proposed Works will not have potential likely significant effects on the population, distribution and supporting habitat for Qualifying Features of the Anglesey Terns SPA.

Screening Conclusion: No likely significant effects.

Assessment against conservation objectives - Changes to supporting habitat and prey availability

As discussed above, the Proposed Works are located outside of the SPA boundary and outside of the main areas utilised by qualifying features for foraging. While any prey species within the direct footprint of the external cable protection are likely to be lost through mortality, injury or disturbance, the overall footprint is extremely small. There will be no changes to supporting habitat as the Proposed Works are outside the main areas utilise by qualifying features and while there may be a highly localised loss of prey species, this will not result in significant effects to prey availability for qualifying species of the Anglesey Terns SPA.

Screening Conclusion: No likely significant effects.

3.3.3.3 Irish Sea Front SPA (UK9020328)

The Irish Sea Front 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 180km². 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).

Conservation objectives

To avoid significant deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long term and makes an appropriate contribution to achieving the aims of the

Birds Directive for each of the qualifying species. This contribution would be achieved through delivering the following objectives for each of the sites qualifying features:

- Avoid significant mortality, injury and disturbance of the qualifying features, so that the distribution of the species and ability to use the site are maintained in the long-term;
- Maintain the habitats and food resources of the qualifying features in favourable condition; and
- Ensure access to the site from linked breeding colonies.

Assessment against conservation objectives – visual disturbance

Disturbance is predicted to be limited to that initiated by the movement of the survey vessels. Birds may take evasive action, but a single disturbance event does not have any immediate effect on the survival or productivity of an individual bird. Repeated disturbance, or disturbance over an extended period of time, can affect survival and productivity. The proposed survey will be a one-off event over a short period of time with the vessel moving along the survey corridor. It is estimated that both survey vessels will be present in the site collectively for a maximum of 14 days.

Manx shearwater score 1 for both disturbance susceptibility and habitat specialisation and therefore would not normally require further assessment (Joint SNBC Advice Note, 2022). However, as breeding Manx shearwater is a qualifying feature of the Irish Sea Front SPA and the marine survey area is within the site it is considered further here.

During the breeding season (April to August) prior to dusk, adult Manx shearwaters assemble in flocks or 'rafts' on the surface of the sea 1-10 km from the colony. When darkness falls, these 'rafting' birds, of up to 10,000 individuals in some locations, fly to their burrows to feed their chicks (McSorley et al. 2008).

The magnitude of the impact will depend on the degree of disturbance. The most disruptive activities are those that are sudden, noisy or fast. Vessels travelling at faster speeds cause a greater level of disturbance in terms of the proportion of birds flushing and at further distances (Bellefleur et al. 2009). Survey vessels will be slow moving, at speeds that are effectively stationary in terms of bird displacement.

Studies have shown that slow moving vessels cause little disturbance to birds and birds may habituate to frequent and relatively benign events and noises (Hill et al., 1997). Additionally, the Proposed Works will take place outside of the breeding season for Manx shearwaters. It is therefore concluded that any disturbance will be temporary and localised and will not result in any likely significant effects on Manx shearwater.

Screening Conclusion: No likely significant effects.

3.3.4 In-combination effects

Section 3.8 identified eight development applications and ongoing projects within proximity and that have the potential to overlap with the Proposed Works. A high-level summary for each project is presented below. Based on the timescales presented by each project, there is the potential for project activities to overlap with the Proposed Works.

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 in 2021.

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).

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.

3.3.4.1 Underwater Sound Changes – In-combination effects assessment

North Anglesey Marine SAC

Of the other projects identified within the North Anglesey Marine SAC, only the Holyhead Breakwater Refurbishments are likely to result in underwater sound changes because of construction within this area. The Proposed Works are 30km from the Holyhead Refurbishments, therefore the potential for spatial overlap within the SAC are concurrently limited. Noisy activities associated with construction have the potential to combine with the Proposed Works to cause disturbance effects within the SAC, however, given the temporary nature of the works (four locations limited to a few hours at each location) the potential for in-combination effects will be limited. It should also be noted that the Proposed Works are being undertaken outside of the summer season for which the SAC is designated, therefore the potential for significant in-combination effects to arise is unlikely.

Screening Conclusion: No likely significant effects.

Rockabill to Dalkey Island SAC

The SOBR1 Seabed Survey is the only identified project taking place at the same time as Proposed Works within the Rockabill to Dalkey Island SAC. Although this survey is in the same location as the Proposed works, it is unlikely to cause significant underwater sound changes. Additionally, due to the short operational period of Proposed Works (14 days), it is unlikely there will be any overlap between the two projects. Therefore, the potential for in-combination effects resulting in underwater sound changes are minimal.

Screening Conclusion: No likely significant effects.

Dee Estuary/ Aber Dyfrdwy SAC, the River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC

The Douglas Complex in which ongoing oil and gas operations are taking place, was the only project identified in the Dee Estuary SAC that could result in underwater sound changes. Given the distance between the Proposed Works and the Douglas Complex (30km) and the spatially limited effects on fish species from the Proposed Works, there should be limited to no interaction between the two projects. Therefore, no in-combination effects from underwater sound are anticipated on Annex II fish species designated in this site.

Screening Conclusion: No likely significant effects.

North Anglesey Terns, Liverpool Bay and Irish Seafront SPAs

The Holyhead Breakwater Refurbishment, Bangor University Benthic Sample Collection, and SOBR1 Seabed Survey are all located within the North Anglesey Terns SPA. Sample collection and seabed surveys are likely to cause visual disturbance to terns because of vessel movements or the works themselves. The Proposed Works are expected to be in the direct vicinity of these two projects. Therefore, in-combination effects could be considered possible. However, this is assuming the Proposed works occur concurrently to the other projects which is unlikely considering the Proposed Works will be short (over a period of 14 days), therefore, it is unlikely that the operations will overlap. Similarly, this also applies for in-combination effects because of changes to supporting habitat or prey availability. The Holyhead Breakwater Refurbishment is the only Project located within North Anglesey Terns SPA that could result in in-combination effects because of underwater sound changes (in Liverpool Bay SPA). However, the Proposed Works are located 30km from this Project. Considering the separation between the two operations, there will be no interaction.

The ENI Conwy to Douglas Oil Spill Monitoring Survey and Bangor University Benthic Sediment Collection are both located with Liverpool Bay SPA. All these projects are surveys and will therefore requires the use of survey vessels. This will likely result in visual disturbance to birds. Given the distance between the Proposed Works and the Bangor University Benthic Sediment Collection, it is likely that in-combination visual disturbance effects could occur. However, this is assuming the Proposed Works take place at the same time as these surveys which is considered unlikely. In the event this does occur, disturbance effects will be temporary, given the short-term nature of the Proposed Works and therefore will not result in significant in-combination effects. Furthermore, the disturbance from Proposed Works and Seabed Surveys will not have significant effects on supporting habitat and prey availability. This is based on the temporary and highly localised nature of disturbance to the seabed and the reversible and swift recovery of sedimentary habitats in the region.

Consequently, in-combination effects are unlikely to occur.

Screening Conclusion: No likely significant effects.

3.3.5 Screening Statement and Conclusions

To determine whether the Proposed Works is likely to have a significant effect on any European sites, either individually or in-combination with other plans or projects, AA screening was carried out.

The screening assessed 18 European sites that were either within the direct zone of influence of the Proposed Works or contain mobile Qualifying Features which could potentially travel into the Proposed Works.

It was identified that the Proposed Works would induce the following pressures on Qualifying Features:

- Underwater sound changes;
- Visual disturbance; and
- Changes to supporting habitat and prey availability.

Other projects and plans in the area were identified and assessed to determine if they could interact with the Proposed Works to have an in-combination effect.

Initial screening of the 18 European sites identified there exists a pressure-receptor pathway between the Proposed Works and the Qualifying Features of all 18 sites (Table 3-3). It was concluded that potential likely significant effects resulting from the Proposed Works either alone or in-combination with other plans and projects could be ruled out for all 18 sites.

Table 3-11 summarises the conclusions of the assessment of likely significant effects.

Table 3-11 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 sound changes	No LSE	No LSE
Liverpool Bay SPA (UK9020294A)	Red throated diver Little gull Little tern Common tern Common scoter	Visual disturbance	No LSE	No LSE
		Changes to supporting habitat and prey availability	No LSE	No LSE
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 sound changes	No LSE	No LSE
West Wales Marine / Gorllewin Cymru Forol SAC (UK0030397)	Harbour porpoise	Underwater sound changes	No LSE	No LSE
Bristol Channel Approaches SAC (UK0030396)	Harbour porpoise	Underwater sound changes	No LSE	No LSE
Cardigan Bay/ Bae Ceredigion (UK0012712)	Bottlenose dolphin Grey seal	Underwater sound changes	No LSE	No LSE
Pen Llŷn a'r Sarnau/ Llyn Peninsula and the Sarnau (UK0013117)	Bottlenose dolphin Grey seal	Underwater sound changes	No LSE	No LSE
Pembrokeshire Marine/ Sir Benfro Forol SAC (UK0013116)	Grey seal	Underwater sound changes	No LSE	No LSE
Rockabill to Dalkey Island	Harbour porpoise	Underwater sound	No LSE	No LSE

Site Code & Name	Qualifying Interest Screened In for LSE	Potential pressure	Potential in-combination effects	Conclusion
SAC (IE0003000)		changes		
Lambay Island SAC (IE000204)	Grey seal	Underwater sound changes	No LSE	No LSE
Dee Estuary/ Aber Dyfrdwy SAC (UK0030131)	Sea lamprey River lamprey	Underwater sound changes	No LSE	No LSE
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC (UK0030252)	Atlantic salmon Sea lamprey River lamprey	Underwater sound changes	No LSE	No LSE
Roaringwater Bay and Islands SAC (IE000101)	Harbour porpoise	Underwater sound changes	No LSE	No LSE
Blasket Islands SAC (IE002172)	Harbour porpoise	Underwater sound changes	No LSE	No LSE
	Grey seal			

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