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CYNGOR GWYNEDD COUNCIL

HRA Screening and Report to Inform Appropriate Assessment (RIAA)

Pwllheli Harbour Dredge Disposal

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DOCUMENT RELEASE FORM

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HRA Screening and Report to Inform Appropriate Assessment (RIAA)

Pwllheli Harbour Dredge Disposal

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SUMMARY

Project Overview

Cyngor Gwynedd Council (CGC) proposes to undertake maintenance dredging within Pwllheli Harbour and dispose of dredged material offshore within the outer bay, approximately 200 metres (m) outside the harbour. The proposed works comprise a corrective maintenance dredge of up to 60,000 m^3 of sediment, followed by periodic maintenance dredging campaigns (of 10,0000 m^3 to 20,000 m^3) to maintain navigable depths within the harbour. This Habitats Regulations Assessment (HRA) has been prepared by Intertek Metoc (Intertek) to support a Marine Licence Application (MLA) and to assist Natural Resources Wales (NRW), as the competent authority, in determining whether the Project could affect any European site, either alone or in combination with other plans or projects.

Purpose of this Report

The HRA forms part of a wider suite of environmental assessments undertaken to support the proposed dredging and disposal activities. An Environmental Impact Assessment (EIA) is not required for the Project following a screening opinion issued by NRW on 11th June 2026. The assessment therefore focused on identifying potential effects on Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites.

Assessment Approach

The assessment considered the following potential impact pathways:

- Smothering and siltation rate changes;
- Physical change to another sediment type;
- Changes in suspended solids (water clarity);
- Transition element and organo-metal contamination;
- Introduction or spread of invasive non-indigenous species (INIS);
- Barriers to species movement; and
- Underwater noise changes.

European sites were identified using sediment transport and dispersion modelling outputs, published ecological evidence, species-specific areas of search (AoS) and established HRA screening principles.

The assessment considered qualifying habitat, fish and associated freshwater species, marine mammal and ornithological features. Ecological connectivity and potential source-pathway-receptor relationships were assessed on a feature-specific basis to determine whether likely significant effects (LSEs) could be excluded.

A total of 36 European sites were identified and screened for potential connectivity with the Project. Of these, 17 sites were taken forward for LSE assessment. The key findings for each receptor group are summarised below.

Fish and Associated Freshwater Features

Fish and associated freshwater species were screened into the assessment where ecological connectivity was identified between the Project and qualifying migratory fish features, including Atlantic salmon (*Salmo salar*), lamprey (*Petromyzon marinus* and *Lampetra fluviatilis*) and shad (*Alosa alosa* and *Alosa fallax*) qualifying features. Relevant impact pathways were assessed in the context of species ecology, migration behaviour and the characteristics of the proposed works.

The assessment concluded that LSEs can be excluded for all fish and associated freshwater features. The proposed dredging and disposal activities are localised, temporary and reversible in nature and would not adversely affect migration routes, supporting habitats, population viability or the ecological processes upon which qualifying fish features depend.

Marine Mammal Features

Marine mammal features were screened into the assessment where ecological connectivity to the Project was identified through species-specific screening areas and recognised ecological ranges. Qualifying features included bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*), grey seal (*Halichoerus grypus*) and otter (*Lutra lutra*). The assessment focused on those pathways capable of influencing the distribution, movements and supporting habitat of qualifying features.

The assessment concluded that LSEs can be excluded for all marine mammal features. The predicted changes in suspended solids (water clarity) and associated water quality effects are localised, temporary and reversible, while underwater noise generated by the Project is limited in extent and duration. The Project would not adversely affect the distribution, movements, supporting habitat, prey availability or population viability of qualifying marine mammal features and would not undermine the conservation objectives of any European site.

Ornithological Features

Ornithological features were screened into the assessment where consideration of species-specific ecology, including published mean-maximum foraging ranges, indicated potential ecological connectivity with the Project. Potential effects on supporting habitat, prey availability and feature use of the area were considered.

The assessment concluded that LSEs can be excluded for all qualifying bird features. Although several qualifying features were identified as having potential ecological connectivity to the Project, the predicted increases in suspended solids are localised, temporary and confined to a small area of available marine habitat. The Project would not adversely affect the distribution, abundance or availability of supporting foraging habitat, prey resources, or the ecological function of any SPA supporting habitat. Consequently, the conservation objectives of qualifying bird features would not be undermined.

Annex I Habitat Features

Annex I habitat qualifying features were screened into the assessment where ecological connectivity was identified between qualifying habitats and the Project through overlap with the modelled sediment deposition and suspended sediment concentration (SSC) footprints. The assessment considered the sensitivity of qualifying habitats to the relevant sedimentation and water quality pressures arising from the Project.

LSEs could not be excluded at the screening stage for qualifying Annex I habitat features of the Pen Llŷn a'r Sarnau SAC due to the overlap between the modelled sediment deposition and SSC footprints and qualifying habitat features within the SAC. These qualifying features were therefore taken forward to Appropriate Assessment (AA).

The AA considered the potential effects of smothering and siltation, physical changes to seabed sediments, changes in suspended solids (water clarity) and contaminant redistribution. The assessment concluded that predicted effects would be localised, temporary and reversible, would not result in permanent habitat loss or deterioration, and would not adversely affect the structure, function or supporting processes of the qualifying habitat features. Accordingly, it was concluded that the Project would not result in an adverse effect on the integrity of the Pen Llŷn a'r Sarnau SAC, either alone or in combination with other plans or projects.

In-Combination Effects

Potential in-combination effects with other plans and projects were considered throughout the assessment. The assessment reviewed relevant activities within the wider study area to determine whether the Project could act cumulatively with other plans and projects to affect the conservation objectives of European sites.

No likely significant in-combination effects were identified for qualifying fish and associated freshwater, marine mammal or ornithological features. In-combination effects were also considered during the AA of Annex I qualifying features of Pen Llŷn a'r Sarnau SAC, and no adverse effects on site integrity were identified.

Conclusion

LSEs were excluded for all qualifying fish and associated freshwater, marine mammal and ornithological features. Annex I qualifying habitat features of Pen Llŷn a'r Sarnau SAC were the only qualifying features for which LSEs could not be excluded at the screening stage and were therefore taken forward to AA.

The AA concluded that the Project would not result in adverse effects on the integrity of Pen Llŷn a'r Sarnau SAC, either alone or in combination with other plans or projects.

It is therefore concluded, beyond reasonable scientific doubt, that the proposed Pwllheli Harbour maintenance dredging and disposal activities will not result in an adverse effect on the integrity of any European site, either alone or in combination with other plans or projects, having regard to the conservation objectives of those sites.

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GLOSSARY

AA
Appropriate Assessment

AoS
Area(s) of search

BMAPA
British Marine Aggregate Producers Association

BRA
Biosecurity Risk Assessment

CD
Chart datum

Cefas
Centre for Environment, Fisheries and Aquaculture Science

Cefas AL1
Cefas Action Level 1

Cefas AL2
Cefas Action Level 2

CGC
Cyngor Gwynedd Council

CSD
Cutter suction dredger

DBT
Dibutyltin

DDT
Dichlorodiphenyltrichloroethane

Defra
Department for Environment, Food and Rural Affairs

EC
European Commission

EDR(s)
Effective deterrence range(s)

EIA
Environmental Impact Assessment

EMP
Environmental Management Plan

EU
European Union

GIS
Geographic Information System

HRA
Habitats Regulations Assessment

INIS
Invasive non-indigenous species

IROPI
Imperative Reasons of Overriding Public Interest

ITIAA
Information to Inform Appropriate Assessment

JNCC
Joint Nature Conservation Committee

LSE(s)
Likely significant effect(s)

m
Metres

MARA
Maritime Area Regulatory Authority

MARPOL
The International Convention for the Prevention of Pollution from Ships

MCAA
Marine and Coastal Access Act 2009

MCA
Maritime and Coastguard Agency

MF
Mudflat receptor

MDS
Maximum design scenario

MLA
Marine Licence Application

MMO
Marine Management Organisation

MMMU(s)
Marine Mammal Management Unit(s)

NE
Natural England

NRW
Natural Resources Wales

NSN
National Site Network

OSPAR
The Convention for the Protection of the Marine Environment of the North-East Atlantic

PAD
Pressures-Activities Database

PAH
Polycyclic Aromatic Hydrocarbons

PLAS
Pen Llŷn a'r Sarnau

Ramsar Site
Wetland of International Importance designated under the Ramsar Convention

RCAHMW
Royal Commission on the Ancient and Historical Monuments of Wales

RF(s)
Reef receptor(s)

SAC(s)
Special Area(s) of Conservation

SCOS
Special Committee on Seals

SG(s)
Seagrass receptor(s)

SOPEP
Shipboard Oil Pollution Emergency Plan

SPA(s)
Special Protection Area(s)

SSC
Suspended sediment concentration

SSSI(s)
Site(s) of Special Scientific Interest

TBT
Tributyltin

UK
United Kingdom

ZOI(s)
Zone of influence

1. INTRODUCTION

This Habitats Regulations Assessment (HRA) has been prepared by Intertek Metoc (Intertek) on behalf of Cyngor Gwynedd Council (CGC) to accompany a Marine Licence Application (MLA) submitted under the Marine and Coastal Access Act 2009 (MCAA). The HRA has been prepared to support Natural Resources Wales (NRW), as the competent authority responsible for determining the application.

An Environmental Impact Assessment (EIA) will not accompany the HRA. A screening request was submitted to NRW on 29th May 2026, and a screening opinion was subsequently issued on 11th June 2026, confirming that the proposed project does not require a statutory EIA.

1.1 Project Background

Pwllheli Harbour is an operational marina that requires regular maintenance dredging to maintain navigational channels and berth access. As the harbour authority, CGC has statutory powers to undertake maintenance dredging within the Harbour limits in order to maintain safe navigation and operational access.

The Pwllheli Harbour Act 1983 permits dredging within the Harbour and the disposal of dredged material within reclamation areas and other designated locations inside the Harbour limits. To date, dredged material has been placed within the quayside reclamation area, used for beach nourishment projects, or deposited within a stilling basin. The stilling basin has been the preferred disposal option for fine-grained silty material that is unsuitable for beach nourishment.

However, the stilling basin has now reached capacity, and a substantial dredging campaign is required to restore the Harbour to its design depths and maintain safe navigation for marina users. While the Pwllheli Harbour Act 1983 provides powers for dredging within the Harbour, the proposed disposal of dredged material beyond the Harbour limits requires authorisation through an MLA.

1.2 Purpose of this Habitats Regulations Assessment

This HRA has been prepared to support NRW, as the competent authority, in determining whether the proposed dredging and disposal activities are likely to have a significant effect on any European site, either alone or in combination with other plans or projects. Although the MLA relates specifically to the disposal of dredged material, the proposed maintenance dredging and subsequent disposal activities form a single operational project. The environmental effects of dredging and disposal are intrinsically linked and therefore both activities are considered within this HRA to ensure that all relevant source-pathway-receptor relationships are assessed.

This report presents the information required to identify European sites and qualifying features that may be affected by the proposed dredging and disposal activities and assesses whether there is the potential for likely significant effects (LSEs) to occur. Where LSEs cannot be ruled out, further assessment may be required by NRW.

The legislative framework governing the HRA process and the assessment methodology applied within this report are described in Chapter 2.

1.3 Consultation

Consultation has been undertaken with NRW, relevant stakeholders and other interested parties throughout the development of the Project. Engagement with NRW has taken place at key stages, including discussions on sediment sampling requirements, dredge plume and sediment dispersion modelling methodologies, dredged material disposal options, and the proposed approach to the MLA.

Early stakeholder engagement was undertaken on behalf of CGC in April 2026, seeking feedback on local environmental sensitivities, navigation and access considerations, operational constraints, and other matters relevant to the Project. Details of the consultation undertaken, stakeholders consulted, responses received, and how comments have been considered by the Project are provided in the Stakeholder Consultation Report (Intertek, 2026a).

Consultation will continue throughout the licensing process, including a pre-application meeting with NRW prior to submission of the MLA. Any feedback received will be considered, where relevant, in the final project design, supporting assessments, and licence application documentation.

The stakeholders included in the early engagement included:

- Cyngor Gwynedd;
- Cyngor Gwynedd Biodiversity;
- Clwb Hwylio Pwllheli Sailing Club;
- Pwllheli Marina Berth Holders Association (Cymdeithas Deiliaid Angorfeydd Marina Pwllheli);
- Pwllheli Maritime Merchants Association (Cymdeithas Masnachwyr Morwrol Pwllheli);
- Pwllheli Lifeboat Station (Bad Achub Pwllheli);
- NRW, including:
  - Marine Licensing;
  - Marine Area Advice;
- Trinity House;
- The Crown Estate;
- Maritime and Coastguard Agency (MCA);
- Gwynedd Archaeology Service;
- Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW);
- Cadw;
- Heneb;
- Welsh Fishermen's Association; and
- Project Seagrass.

Table 1-1 summarises the consultation responses relevant to this HRA and describes how the issues raised have been considered and addressed within the assessment.

Table 1-1 Summary of Issues Raised During Consultation and Associated Project Responses

Issue raised	Consultee	Project response	Outcome
Potential impact on designated sites (e.g. SAC, SPA, SSSIs)	NRW and CGC	All identified designated sites will be included in the ML application and assessed through the HRA process	Designated features will be fully assessed, ensuring compliance with conservation legislation and protection of site integrity
Potential impacts on harbour porpoises and marine mammals	NRW and Project Seagrass	Marine mammals will be included in environmental assessments, including consideration of nearby SACs	Potential impacts will be identified and mitigated, ensuring protection of marine mammals and compliance with regulations
Sediment transport and deposition on sensitive habitats	NRW, CGC and Project Seagrass	Dredge plume modelling is underway and will be used to assess dispersion and deposition patterns	Evidence-based assessment of sediment impacts will enable targeted mitigation to protect sensitive habitats
Potential impacts on seagrass restoration areas	Project Seagrass	Restoration areas will be included in the environmental assessment, with indirect impacts considered	Potential risks will be identified early and minimised, supporting the success of ongoing restoration efforts
Need for robust ecological baseline and cumulative effects assessment	Project Seagrass	Baseline ecological data and cumulative effects will be incorporated into the assessment	A robust evidence base will support transparent decision-making and reduce uncertainty in impact evaluation
Navigation safety during works	MCA and Plas Heli	Relevant guidance and good practice will be adopted, with navigational planning incorporated into the works design	Navigational risks will be minimised, ensuring safe vessel movement and continuity of marine operations
Temporary disruption to marine users	Plas Heli	Timing and operational constraints will be considered to minimise disruption to marina users	Disruption will be reduced through careful planning, maintaining usability of the marina during works
Need for continued marina access and dredging to maintain viability	Pwllheli Marina Beth Holders' Association	Stakeholder concerns will be recognised and incorporated into project justification	Supports long-term marina operation and demonstrates clear need for maintenance dredging
Potential impacts on archaeological material	RCAHMW	Modelling outputs will be reviewed in relation to archaeological receptors and procedures will be followed	Archaeological assets will be safeguarded, with appropriate procedures in place to manage any unexpected finds
Potential disturbance to unknown archaeological remains	RCAHMW	Dredging activities will be confirmed; PAD not required, but guidance will be adhered to	Low archaeological risk will be managed effectively, ensuring protection if previously unknown remains are encountered
General archaeological and heritage concerns	Heneb and Cadw	No significant impacts are anticipated based on historic dredging activity	Heritage assets are unlikely to be affected, providing confidence in negligible impact
Requirements for adherence to marine navigation guidance	MCA	Relevant guidance documents (e.g. British Marine Aggregate Producers Association (BMAPA) good practice) will be followed	Alignment with industry best practice will ensure safe and compliant project delivery
Requirement for agreement relating to disposal (commercial considerations)	The Crown Estate	Engagement will continue to agree any required arrangements	Necessary agreements will be secured, enabling compliant and commercially viable disposal activities

2. LEGISLATIVE AND POLICY CONTEXT

2.1 European Sites

The European Union (EU) Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC) established a framework for the protection of sites of international importance for birds, habitats and species through the creation of a network of protected areas. This network comprises Special Protection Areas (SPAs), designated for bird species and their habitats under the Birds Directive, and Special Areas of Conservation (SACs), designated under the Habitats Directive for habitats and species of European importance.

Following the UK's withdrawal from the EU and the end of the transition period on 31st December 2020, SACs and SPAs in the UK no longer formed part of the Natura 2000 network. Instead, they formed the UK National Site Network (NSN). Protection of these sites continues through the Conservation of Habitats and Species Regulations 2017, as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. The amendments transferred functions previously undertaken by the European Commission (EC) to the relevant UK authorities while maintaining the existing protections afforded to designated sites, habitats and species.

In addition, UK Government policy affords Ramsar sites protection equivalent to that of SACs and SPAs. Therefore, Ramsar sites have been screened and assessed using the same principles and methodology. For the purposes of HRA, SACs, SPAs and Ramsar sites are collectively referred to as European sites.

2.2 Requirement for Habitats Regulations Assessment

The requirement to undertake an HRA is set out in Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), which transposes into domestic legislation the assessment requirements established under Articles 6(3) and 6(4) of the Habitats Directive.

This HRA Report has been prepared to support NRW in determining whether the proposed operation is likely to have a significant effect on any European site, including its qualifying features and conservation objectives, either alone or in combination with other plans or projects.

2.3 Habitats Regulations Assessment Process

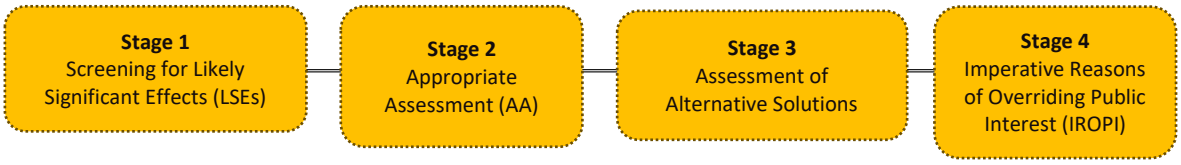
The HRA process is applied to determine whether a plan or project is likely to have a significant effect on a European site, either alone or in combination with other plans or projects. Where LSEs cannot be excluded, the competent authority must undertake an Appropriate Assessment (AA) of the implications of the proposal for the affected European site(s). The HRA process is underpinned by the precautionary principle, whereby potential effects are taken forward for further assessment where they cannot be objectively ruled out on the basis of available information (The Department for Environment, Food and Rural Affairs (Defra) *et al.,* 2021; EC, 2021; EC, 2018).

In accordance with the judgment of the Court of Justice of the European Union in *People Over Wind and Peter Sweetman v Coillte Teoranta* (Case C-323/17), measures intended to avoid or reduce potentially harmful effects on a European site have not been considered at the screening stage of this HRA (CJEU, 2018). Where LSEs cannot be ruled out, these effects are taken forward to AA. However, consistent with the principles established in *Langton v Secretary of State for Environment, Food and Rural Affairs* (2018), elements that are properly characterised as integral features of the project design rather than measures introduced specifically to avoid or reduce effects on European sites may be considered at the screening stage (England & Wales High Court, 2018).

EC guidance describes a four-stage process for undertaking an HRA, whereby the outcome at each stage determines whether progression to a subsequent stage is required (EC, 2021). Although there is

no prescribed statutory methodology for undertaking an HRA, Welsh Government (2025) guidance provides a framework for the assessment process and the stages that should be followed. The four stages are presented in Figure 2-1 and summarised below.

Figure 2-1 Stages of the Habitats Regulations Assessment



2.3.3 Guidance Documentation

This HRA has been informed by, and undertaken with reference to, the following legislation, guidance and case law:

- *Habitats Regulations Assessments: Protecting a European Site* (Defra *et al.*, 2021);
- *Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive* (EC, 2021);
- *Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive* (EC, 2018); and
- Relevant domestic and European case law, including *People Over Wind and Peter Sweetman v Coillte Teoranta* (C-323/17) (CJEU, 2018) and *Langton v Secretary of State for Environment, Food and Rural Affairs* (England and Wales High Court, 2018).

2.3.4 Stage 1 – Screening for Likely Significant Effects

Screening is the first stage of the HRA process and addresses the initial tests under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) and Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). These tests consider:

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

Where LSEs cannot be ruled out at the screening stage, either because effects are identified or there is insufficient certainty to conclude otherwise, the assessment must proceed to Stage 2.

Screening should be undertaken without taking account of mitigation measures intended to avoid or reduce effects on European sites. Where modifications to the project are proposed to remove potential impact pathways, the screening assessment should be revisited to determine whether LSEs can be excluded for the amended proposal.

2.3.5 Stage 2 – Appropriate Assessment

Where Stage 1 concludes that LSEs on a European site cannot be ruled out, the assessment must proceed to AA. This is undertaken by the competent authority responsible for determining the application.

To inform the AA, the applicant must provide sufficient information on the proposed project, the European site(s) that may be affected, and the potential effects arising from the proposed activities. This information is presented as Information to Inform Appropriate Assessment (ITIAA) and comprises a detailed ecological assessment of the implications of the proposal for the conservation objectives of the relevant European site(s).

The AA considers:

- The likely effects of the proposed activities on the qualifying features and conservation objectives of the European site(s);
- The extent to which those effects may affect the integrity of the site(s); and
- The effectiveness of any mitigation measures proposed to avoid or reduce adverse effects.

Having considered the ITIAA, the competent authority must determine whether the plan or project, either alone or in combination with other plans or projects, would adversely affect the integrity of a European site in view of its conservation objectives.

Where adverse effects on site integrity cannot be excluded, the assessment must proceed to Stage 3, unless the proposal is modified or withdrawn. Any mitigation measures necessary to avoid or reduce adverse effects should be identified and assessed at this stage.

2.3.6 Stage 3 – Alternative Solutions

Where an AA concludes that a plan or project would adversely affect the integrity of a European site, Stage 3 requires consideration of alternative solutions. This stage examines whether there are alternative means of achieving the objectives of the plan or project that would avoid adverse effects on site integrity.

Alternative solutions may include changes to the location, design, scale, timing or construction methods of the proposal. Any identified alternative must be capable of achieving the project's objectives and must be assessed to determine its implications for the relevant European site(s).

Before a project can progress to Stage 4, it must be demonstrated that all feasible alternative solutions have been considered and that no less damaging alternative exists that would avoid adverse effects on site integrity. Where a suitable alternative is identified, it should be taken forward in place of the original proposal.

2.3.7 Stage 4 – Imperative Reasons of Overriding Public Interest

Stage 4 represents the derogation process under Article 6(4) of the Habitats Directive and applies where it has been concluded that a plan or project will adversely affect the integrity of a European site, and no feasible alternative solutions exist. This stage considers whether there are Imperative Reasons of Overriding Public Interest (IROPI) that justify allowing the plan or project to proceed despite the identified adverse effects.

Where a European site contains Annex I priority habitats or Annex II priority species, additional protections apply. In such cases, IROPI considerations are generally restricted to reasons relating to human health, public safety, or beneficial consequences of primary importance to the environment. Other IROPI justifications may only be relied upon in exceptional circumstances and may require consultation with the relevant authorities.

Where a proposal proceeds under IROPI, appropriate measures must be identified to ensure the overall coherence of the NSN is maintained. Such measures must be practical, proportionate, enforceable and capable of being successfully implemented. The proposed compensatory measures must be assessed and approved by the competent authority before consent can be granted.

3. PROJECT DESCRIPTION

3.1 Overview

The current dredging strategy for Pwllheli Harbour identified local coastal processes as the primary driver of sediment accumulation within the harbour, rather than material transported by river flows (Arup, 2016). The study also found that the harbour's wide entrance and access channel contribute to elevated rates of sediment accretion throughout the basin. Based on the findings of the strategy, a design depth of 3 metres (m) below chart datum (CD) was established for the marina basin to provide adequate water depth for the majority of vessels. Previous dredging campaigns have removed sediment beyond the volume required to maintain these design depths.

Historically, dredged material has been managed through a combination of quayside reclamation, beach nourishment projects and disposal within a stilling basin. The stilling basin has been the preferred option for finer silty material that is unsuitable for beach nourishment. The harbour was last dredged in October 2024, during which approximately 10,000 m^3 of sediment was removed. Following the 2024 maintenance dredging campaign, the stilling basin has reached capacity, while substantial dredging is still required to restore the harbour to its design depths. Therefore, CGC must continue routine maintenance dredging to ensure the harbour remains safe and navigable. As a result, alternative disposal options have been investigated. Disposal of dredged material within the outer bay was identified as the most practicable solution.

Dredging will be undertaken using a cutter suction dredger (CSD). This type of dredger uses a rotating cutter head in combination with a suction pump to loosen and remove sediment from the seabed. While this approach minimises sediment losses at the dredge head, some release of fine material is unavoidable. The dredged material is expected to comprise a slurry of approximately 20% solids and 80% seawater. Due to operational constraints and the additional stresses imposed on discharge pipelines by local oceanographic conditions, the pipeline length cannot exceed approximately 200 m from the dredge location. Therefore, disposal of the dredged material within the outer bay represents the most practical management option.

Two dredging scenarios are currently being considered:

- A corrective maintenance dredge of up to 60,000 m^3; and
- An annual maintenance dredge of approximately 10,000 - 20,000 m^3 to maintain the design depth.

The corrective maintenance dredge is anticipated to take place during Spring 2027, outside the bathing season. The final programme will be dependent on project development and prevailing weather conditions. Dredging rates are expected to be approximately 600 - 700 m^3 per day.

Subsequent annual maintenance dredging campaigns are expected to be undertaken between 1st October and 1st May, ensuring that works are completed outside the bathing season. The duration of each campaign will depend on the quantity of sediment requiring removal, which is expected to vary annually.

The dredging footprint covers up to 101,865 m^2. The maximum dredge depth across the site is expected to be 2.8 m, with an average dredge depth of approximately 0.77 m (Intertek, 2026b).

3.2 Mitigation Measures

A range of embedded and additional mitigation measures will be implemented to avoid, reduce or prevent significant environmental effects associated with the Project. These measures include best practice techniques, control of sediment dispersion, contamination management, vessel management, and environmental monitoring. Measures will be secured through an Environmental

Management Plan (EMP) and any relevant licence conditions. In accordance with the approach described in Section 2.3 and the principles established in *People Over Wind and Peter Sweetman v Coillte Teoranta* (C-323/17), these mitigation measures have not been relied upon to inform the screening assessment. Where relevant, mitigation measures are considered only at the AA stage.

3.2.1 Embedded Mitigation

An EMP will be developed and implemented. This will include:

- Pollution prevention measures and spill response procedures;
- Roles and responsibilities of personnel;
- Emergency response protocols; and
- Compliance with relevant legislation and guidance.

All personnel will receive site inductions and toolbox talks to ensure awareness of environmental sensitivities and required mitigation measures.

All operations will be undertaken using best practice dredging techniques to minimise sediment suspension and plume formation. Mitigation measures will include, where practicable:

- Timing dredging and disposal to favourable tidal conditions (e.g. ebb tide only where feasible);
- Avoiding dredging during slack water periods;
- Intermittent dredging and disposal to allow suspended sediments to settle within the tidal cycle; and
- Limiting daily disposal volumes to manage suspended sediment.

Turbidity and water quality will be monitored throughout the works. Where trigger levels are exceeded, activities will be adjusted, reduced or temporarily suspended, and additional sediment control measures implemented where necessary.

All vessels will operate in accordance with relevant maritime legislation, including the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I, and will maintain Shipboard Oil Pollution Emergency Plans (SOPEPs). Standard pollution prevention and spill response procedures will be implemented throughout the works.

Navigation and public safety will be maintained through coordination with the Harbour Authority, appropriate marking of work areas, advance notification of activities through Notices to Mariners, and the implementation of suitable access restrictions and signage where required.

Where practicable, dredging and disposal activities will be scheduled outside the bathing water season (May to September) to minimise interactions with recreational users and temporary water quality effects during peak periods. Working hours will be agreed with relevant stakeholders in advance and, where practicable, managed to minimise noise disturbance.

A Traffic Management Plan will be implemented for any land-based activities associated with the Project to define haul routes, manage delivery schedules and ensure safe vehicle movements while minimising disruption to local receptors.

The risk of introducing or spreading invasive non-native species (INIS) is considered low. A Project Biosecurity Plan will be implemented throughout the works, supported by a vessel register recording inspections, maintenance activities and any required decontamination measures. Plant, vessels and equipment will be inspected and cleaned, where necessary, prior to mobilisation to minimise the risk of transferring INIS between locations.

4. SCREENING METHODOLOGY

4.1 Evidence Base and Data Sources

The screening assessment has been informed by a range of project-specific studies, published datasets and spatial information, including:

- Sediment transport and dispersion modelling undertaken for the proposed dredging and disposal activities (Intertek, 2026b);
- Sediment chemistry and contaminant analysis results from sediment sampling investigations (SOCOTEC & Ocean Ecology, 2026);
- Benthic ecology, habitat and species information obtained from NRW, JNCC and other publicly available sources;
- Geographic Information System (GIS) datasets relating to European sites, qualifying features and designated site boundaries;
- Conservation objectives, conservation advice packages and feature condition assessments for relevant European sites;
- Information relating to marine mammals, migratory fish and ornithological receptors; and
- Other supporting technical documents prepared for the MLA, including the Biosecurity Risk Assessment (BRA).

4.2 Maximum Design Scenario

In accordance with the precautionary principle underpinning the HRA process, this assessment has been undertaken using a maximum design scenario (MDS) representing the realistic worst-case parameters of the proposed Project (Defra *et al.,* 2021; EC, 2021; EC, 2018). The MDS has been applied throughout the screening assessment and, where required, the AA stage to ensure that potential effects on European sites are assessed on a precautionary basis.

The Project comprises an initial corrective maintenance dredging campaign and periodic maintenance dredging campaigns within Pwllheli Harbour, together with the disposal of dredged material at the proposed site located approximately 200 m offshore of Pwllheli Harbour.

For the purposes of this HRA, the MDS comprises the dredging and disposal of up to 60,000 m³ of material arising from the initial corrective maintenance dredging campaign. This represents the greatest volume of material that could be dredged and disposed of during any single campaign and therefore the maximum potential extent of seabed disturbance, sediment mobilisation, increases in suspended sediment concentration (SSC), sediment deposition, and any associated ecological effects.

Sediment dispersion modelling undertaken for the 60,000 m³ corrective dredging scenario assumed a dredging period of approximately 44 days (Intertek, 2026b). The modelling indicates that sediment deposition and elevated SSC are transient, with suspended material settling during periods of slack water and resuspending during periods of higher tidal flow. Generally, the modelled sediment plume moves offshore within one to two weeks, dispersing into deeper water at very low concentrations (<1 mg/L). Therefore, any increases in SSC and sediment deposition are considered temporary and reversible, rather than persistent for the duration of the dredging campaign (Intertek, 2026b). Annual maintenance dredging campaigns are anticipated to involve smaller dredge volumes and are expected to result in effects of a lesser magnitude and spatial extent than those assessed under the MDS. Therefore, the assessment of the corrective maintenance dredging campaign provides a precautionary

assessment which encompasses all subsequent maintenance dredging activities proposed as part of the Project.

4.3 Identification of Relevant European Sites

The Habitats Regulations require the following European sites to be assessed:

- SPAs: designated under the Birds Directive (Council Directive 2009/147/EC) for the conservation of rare, vulnerable and migratory bird species, including those listed under Article 4 of the Directive;
- SACs: designated under the Habitats Directive (Council Directive 92/43/EEC) for the protection and maintenance of Annex I habitats and Annex II species of European importance; and
- Ramsar sites: designated under the Convention on Wetlands of International Importance (Ramsar Convention, 1971). These sites are recognised for their ecological importance and are designated to protect internationally important wetland habitats and the species they support. For the purposes of this HRA, Ramsar sites have been screened and assessed using the same principles and methodology applied to SACs and SPAs.

4.3.1 Sites of Special Scientific Interest

Sites of Special Scientific Interest (SSSI) are nationally important areas of land and water (above mean low water) in Great Britain. SSSIs provide statutory protection for important wildlife, geological and geomorphological sites in England and Wales under the Wildlife Countryside Act 1981 (as amended).

While SSSIs are not subject to the requirements of the Habitats Regulations and do not form part of the HRA process, information on nearby SSSIs has been reviewed as a matter of best practice. Where relevant, this includes component SSSIs underpinning European site designations. This helps inform the baseline understanding of local ecological sensitivities and the distribution of qualifying features and habitats within the study area.

4.4 Site Selection Process

Figure 4-2 (P2843_PROT_001) provides an overview of the designated sites located within the vicinity of the Project. The potential for a European site to be significantly affected by the Project depends on whether a credible source-pathway-receptor relationship exists between the proposed disposal activity and the site's qualifying features, as shown in Figure 4-1.

To identify European sites requiring consideration within the assessment, zones of influence (ZOIs) and areas of search (AoS) were defined using the outputs of the dredge plume modelling study (Intertek, 2026b). The modelling was used to determine the maximum predicted extent of impact pathways associated with the disposal activity (Figure 4-3; P2843_ENV_005).

Two principal ZOIs were defined based on the dredge plume modelling study:

- Sediment Deposition ZOI: the maximum predicted spatial extent of deposited material; and
- SSC ZOI: the maximum predicted extent of elevated SSC.

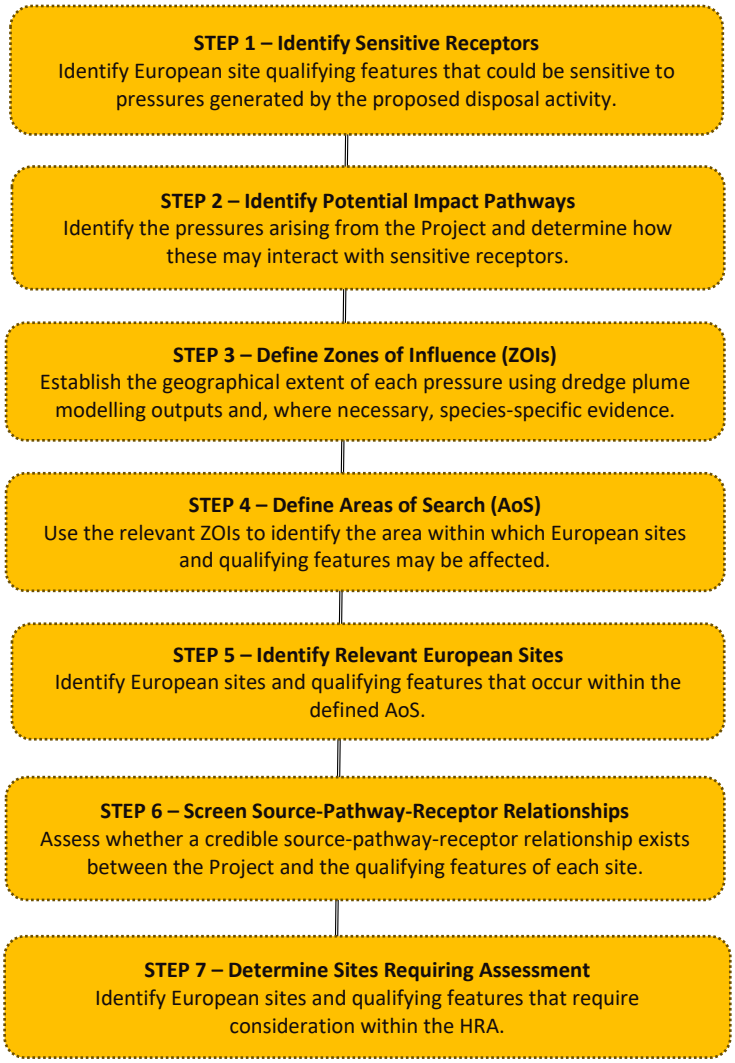
These ZOIs were used to assess pressures associated with sediment deposition and plume behaviour, including smothering and siltation rate changes, physical change (to another seabed type), changes in suspended solids (water clarity), transition element and organo-metal contamination, and the introduction or spread of INIS. Where pressures were not directly associated with sediment deposition or plume dispersion, additional species-specific ZOIs were applied using the best available scientific evidence, as described in Section 4.7.

The modelling-derived and species-specific ZOIs were then used to define the AoS, identify European sites requiring assessment, and determine the qualifying features that may be affected by the Project.

For the purposes of this assessment:

- ZOI: the geographical extent over which a project-related pressure is predicted to affect the receiving environment; and
- AoS: the area within which European sites and qualifying features are identified based on the relevant ZOIs and the best available scientific evidence.

Figure 4-1 European Site Selection and Screening Process



PWLLEHLI MARINA

Protected Sites

Local Environmental Designations

Drawing No: P2843_PROT_001	A

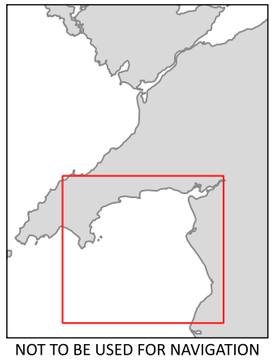
Legend

- Indicative Proposed Disposal Location
- Dredging Area

SAC

- SAC
- SPA
- SSSI

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Created By	Eloïse Boblin
Reviewed By	Adam Johns
Approved By	Emma Langley

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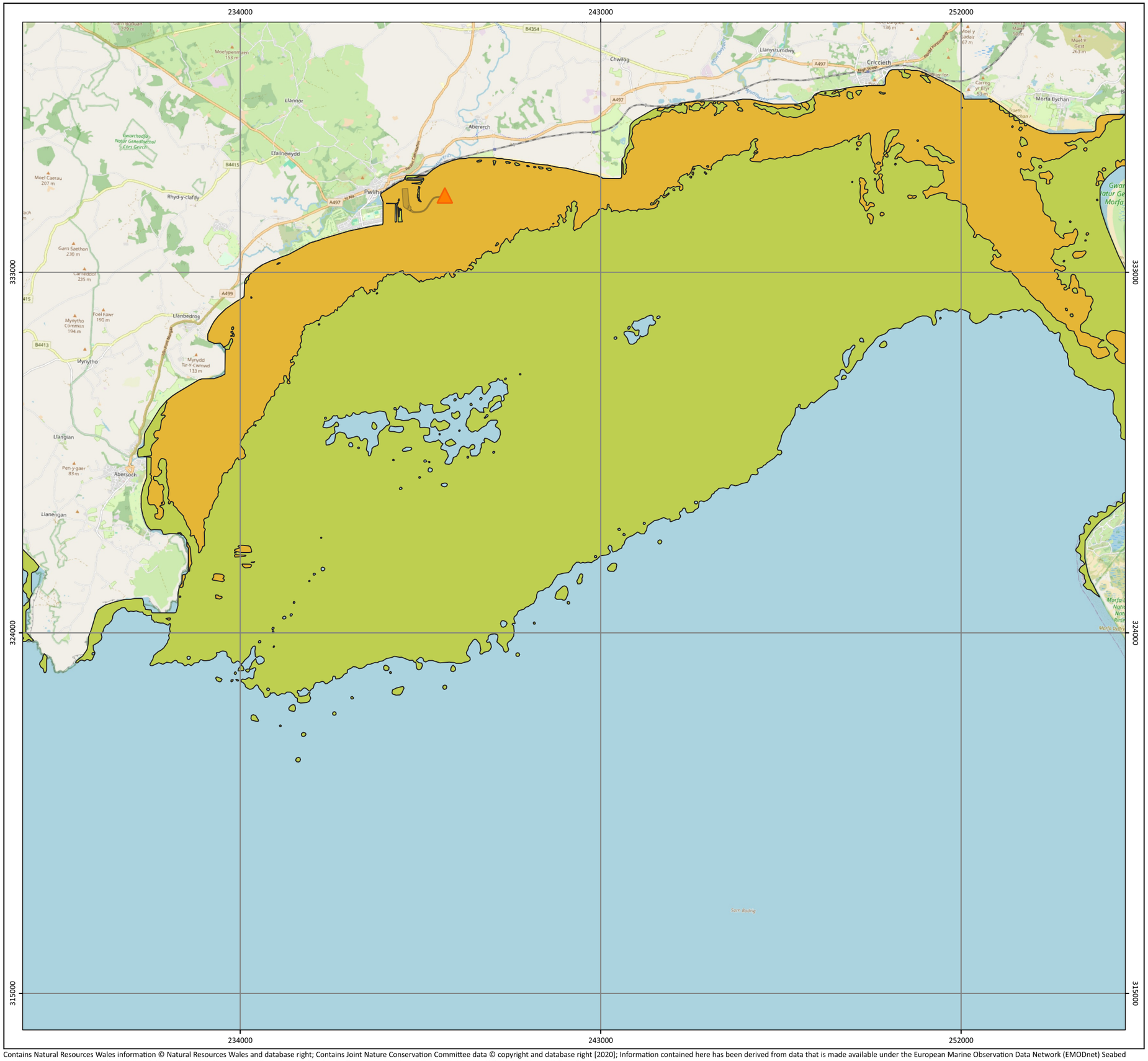
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DREDGE & DISPOSAL OPERATION

Sediment Dispersion Modelling

Drawing No: P2843_ENV_005	A



Legend

- Indicative Proposed Disposal Location
- Dredged Area

Dredge Plume Modelling Zones of Influence (ZOIs)

- Sediment Deposition ZOI
- Suspended Sediment Concentration (SSC) ZOI



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Created By	Isabelle Harrington
Reviewed By	Adam Johns
Approved By	Eloïse Boblin

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4.5 Identification of Sensitive Receptors

The proposed Project has the potential to affect a range of ecological receptors that form qualifying features of European sites within the study area. The sensitive receptors considered within this assessment comprise:

- Annex I habitats, including coastal, intertidal and subtidal marine habitats;
- Fish and shellfish species, including migratory fish species, and freshwater pearl mussel (*Margaritifera margaritifera*), which forms a qualifying feature of relevant European sites within the wider study area;
- Annex I bird species and supporting habitats associated with SPAs; and
- Annex II marine mammals, including bottlenose dolphin (*Tursiops truncatus*), grey seal (*Halichoerus grypus*) and European otter (*Lutra lutra*).

The distribution of sensitive receptors within the vicinity of the Project is shown in Figure 4-4 (P284_ENV_006).

4.6 Identification of Potential Pressures

The JNCC Marine Pressures-Activities Database (PAD) and associated definitions were used to identify and describe the pressures arising from the Project (JNCC, 2022). These pressures may result in direct or indirect effects and may be temporary or permanent in nature. The pressures scoped into the assessment are described below, along with the pathways by which they may affect European site qualifying features.

4.6.1 Smothering and Siltation Rate Changes

Smothering and siltation rate changes are defined as alterations to the natural rates of sediment deposition resulting from the settling of suspended sediments onto the seabed, leading to the accumulation of material and changes in seabed conditions (JNCC, 2022).

Smothering and siltation rate changes may occur as a result of the discharge and deposition of dredged material during disposal activities. The proposed disposal activities involve the release of a sediment-water slurry comprising predominantly fine-grained silts and clays, a proportion of which will settle from the water column and accumulate on the seabed. This may result in localised sediment deposition within the modelled deposition footprint (Figure 4-3; P2843_ENV_005). Deposited sediments may alter seabed characteristics and result in the temporary burial of benthic habitats and species, potentially affecting their structure, function and ecological processes.

4.6.2 Physical Change (to Another Sediment Type)

Physical change to another sediment type is defined as the alteration of one habitat or sediment type to another through changes in seabed substrate characteristics, resulting in the loss of one sediment type and the creation of another (JNCC, 2022).

Physical change to another sediment type may occur where the deposition of dredged material alters the existing sediment characteristics of the receiving environment. The proposed disposal activities involve the deposition of predominantly fine-grained silts and clays within an area characterised by coarser sediments, including sands and mixed sediments. Disposal of dredged material may result in localised changes to sediment composition within the deposition footprint and may affect the suitability of habitats for benthic species and communities (Figure 4-3; P2843_ENV_005). The extent of any physical change to sediment type has been assessed using the outputs of the sediment transport and dispersion modelling study. Any changes would be limited to areas where deposited material accumulates sufficiently to alter the characteristics of the existing sediment.

4.6.3 Changes in Suspended Solids (Water Clarity)

Changes in suspended solids (water clarity) are defined as the mobilisation of sediment, organic particulate matter and associated substances into the water column, resulting in changes to suspended sediment concentrations (SSC), turbidity, water clarity and light penetration (JNCC, 2022).

Changes in suspended solids (water clarity) may occur as a result of the discharge and dispersion of dredged material during disposal activities. The proposed disposal activities involve the release of a sediment-water slurry comprising predominantly fine-grained silts and clays, a proportion of which may remain suspended within the water column before settling. This may result in increased SSC and turbidity within the modelled sediment plume footprint (Figure 4-3; P2843_ENV_005). Elevated SSC may reduce water clarity and light penetration and may influence the behaviour and distribution of marine species.

4.6.4 Transition Elements and Organo-Metal (e.g. TBT) Contamination

Transition elements and organo-metal (e.g. TBT) contamination is defined as an increase in the concentration of transition elements and organo-metallic compounds in the receiving environment above background levels (JNCC, 2022). Transition elements of potential concern within the marine environment include arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc, whilst organo-metallic compounds such as tributyltin (TBT) and its derivatives may cause adverse biological effects in marine organisms.

Transition elements and organo-metal contamination may occur where contaminants associated with dredged sediments are released into the marine environment during disposal activities. The proposed disposal involves the deposition of dredged sediments from Pwllheli Harbour, which may contain sediment-bound contaminants. Disposal activities may result in the resuspension, dispersion and subsequent deposition of contaminants within the water column and surrounding seabed. Exposure pathways may include direct contact with contaminated sediments, uptake by benthic organisms, bioaccumulation within prey species and subsequent transfer through the food web to higher trophic level receptors such as fish, seabirds and marine mammals.

Sediment chemistry analysis was undertaken to characterise the material proposed for disposal (SOCOTEC & Ocean Ecology, 2026). The results were compared with those obtained during the previous sediment characterisation survey undertaken in 2023 to identify any notable changes in contaminant concentrations within the dredged material (Ecospan, 2023). The 2026 survey identified generally low to moderate contaminant concentrations within the dredged sediment. Concentrations of nickel, lead and zinc exceeded Cefas Action Level 1 (AL1) thresholds in some samples. However, no determinands exceeded Cefas AL2 thresholds. Maximum recorded concentrations were 31.6 mg/kg nickel, 182 mg/kg lead and 140 mg/kg zinc. Nickel and zinc concentrations were broadly comparable to those recorded during the 2023 sediment characterisation survey, which identified maximum concentrations of 35.3 mg/kg and 137 mg/kg respectively. Lead concentrations were higher in the 2026 survey, with a maximum concentration of 182 mg/kg compared with 48.2 mg/kg in 2023. Arsenic, cadmium, chromium, copper and mercury were below AL1 thresholds in the 2026 survey. All organotins, including TBT and dibutyltin (DBT), were below detection limits and below AL1 thresholds, consistent with the 2023 survey. Polycyclic aromatic hydrocarbons (PAHs) were detected in both surveys and therefore do not represent a new contaminant source, with some individual PAHs recorded at higher concentrations during the 2023 survey. SOCOTEC & Ocean Ecology (2026) advised that the dichlorodiphenyltrichloroethane (DDT) and gamma-HCH results were subject to a quality control qualification and no longer held accredited status. Therefore, assessment conclusions are not dependent on these determinands and have been based on the wider sediment chemistry results.

Historic lead mining activity and natural lead mineralisation are known to occur within the wider Llŷn area and may contribute to elevated background lead concentrations in local sediments. However, the

source of the elevated lead concentrations recorded in the dredged material has not been specifically determined.

The proposed disposal activities would redistribute sediment within the same coastal system from which it originated. Therefore, any contaminants associated with the dredged material would be redistributed within the existing environment rather than introduced from an external source. The extent to which sediment-bound contaminants may be transported within the marine environment has been assessed using the sediment transport and dispersion modelling outputs. The modelling was undertaken using particle size data collected during the 2023 sediment characterisation survey and subsequently reviewed against the 2026 sediment data, with sediment characteristics considered sufficiently similar for the modelling outputs to remain representative of the proposed disposal activities. As contaminant transport would occur via the resuspension, dispersion and deposition of sediment particles, any associated exposure pathways are considered to be encompassed by the SSC and Sediment Deposition ZOIs defined for the assessment.

4.6.5 Introduction or Spread of Invasive Non-Native Species

Introduction or spread of INIS is defined as the direct or indirect introduction of non-native species and their subsequent spread within the receiving environment, potentially resulting in competition with, displacement of, or adverse effects on native species and habitats (JNCC, 2022).

The introduction or spread of INIS may occur as a result of vessel movements, equipment transfers and disposal activities. Vessels operating between different locations may facilitate the transport of invasive species through hull fouling, contaminated equipment and other biological vectors. In addition, viable propagules may be transported within sediment and suspended material generated during disposal activities. This could result in the introduction of new INIS to the receiving environment or facilitate the spread of existing populations within the wider area.

A separate BRA has been completed in support of the MLA. The assessment identified vessel biofouling as the primary potential pathway for INIS introduction. However, the dredger will be transported to the Project area by road and assembled on site, reducing the potential for transfer from other marine locations via retained ballast, bilge or hopper water. The assessment concluded that the proposed works do not provide a credible mechanism for the introduction or spread of INIS via sediment transfer, although a vessel register and Project Biosecurity Plan will be maintained to document inspections, maintenance and any required decontamination measures prior to mobilisation.

4.6.6 Barrier to Species Movement

Barrier to species movement is defined as the physical obstruction of species movements, including local movements between feeding, breeding, spawning, resting or roosting areas, and wider migratory movements undertaken at regional or international scales (JNCC, 2022).

Barrier to species movement may occur as a result of vessel activity, disposal operations and the generation of sediment plumes associated with the proposed works. Whilst the proposed works would not create a permanent physical obstruction, mobile species may avoid areas affected by increased turbidity, sediment plumes or vessel presence. This may affect the movement of migratory or foraging species within the study area.

4.6.7 Underwater Noise Changes

Underwater noise changes are defined as increases above existing background underwater noise levels, including both natural ambient noise and anthropogenic sources, which may affect marine species through disturbance, displacement or changes in behaviour (JNCC, 2022).

Underwater noise changes may occur as a result of vessel movements and disposal operations associated with the proposed works. The operation of disposal and support vessels may generate

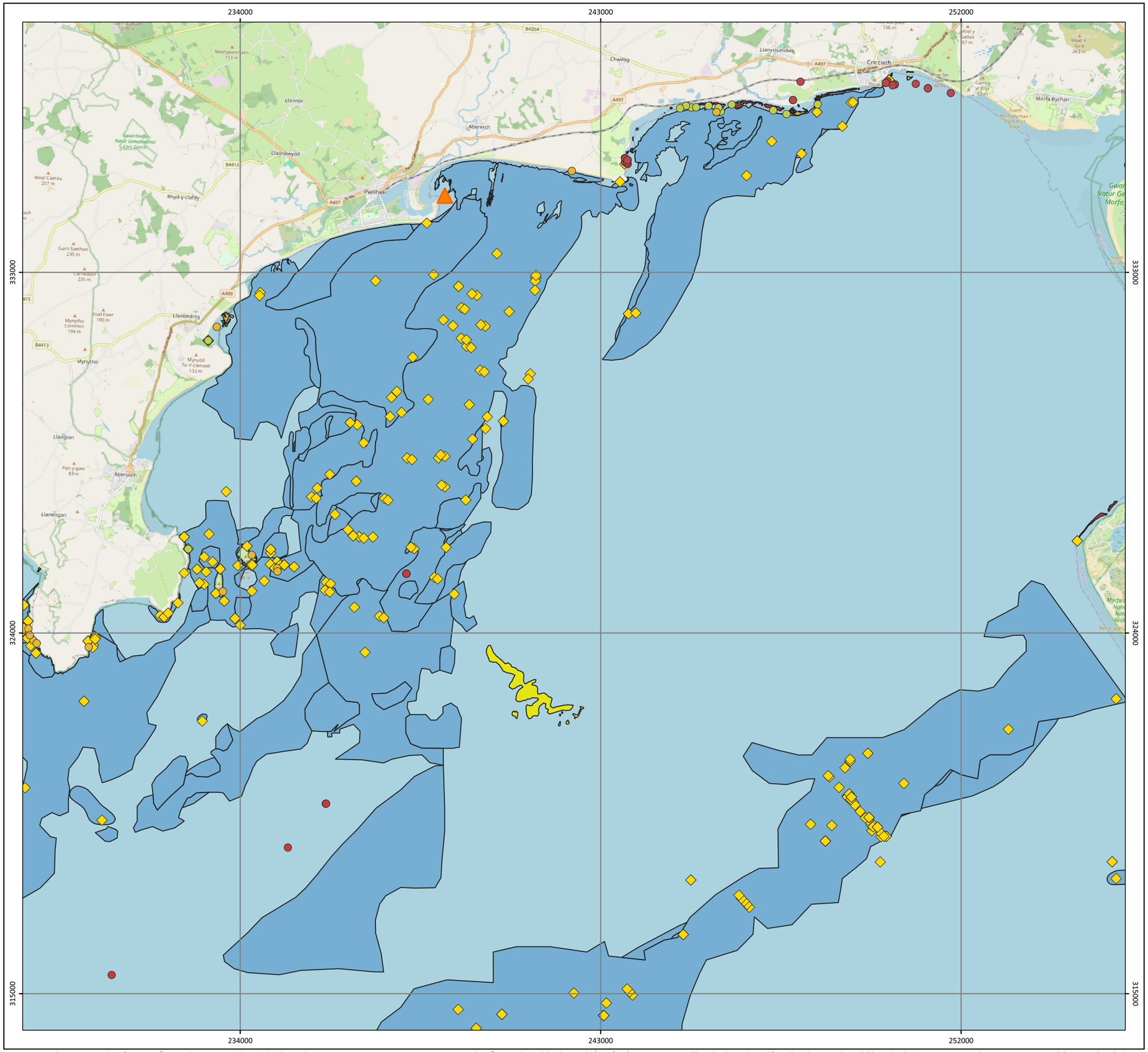
underwater sound that propagates through the surrounding marine environment. Elevated underwater noise levels may affect marine species through disturbance, displacement or changes in movement and foraging behaviour.

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DREDGE & DISPOSAL OPERATION

Sensitive Receptors

Drawing No: P2843_ENV_006	A



Legend

- Indicative Proposed Disposal Location

Sensitive Receptors

- Seagrass
- Seal Pupping Sites
- Intertidal Underboulder
- Reef
- Deep Mud
- Intertidal Mudflat
- Sabellaria Alevolata
- Common Mussel
- Bedrock Reef
- Bedrock and/or Stony Reef
- Stony Reef

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Created By	Isabelle Harrington
Reviewed By	Adam Johns
Approved By	Eloïse Boblin

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4.7 Defined Zones of Influence and Areas of Search

The ZOIs and AoS applied to each receptor group and pressure pathway, together with the justification for their application, are discussed below and summarised in Table 3-2.

4.7.1 Subtidal and Intertidal Benthic Habitats

European sites designated for Annex I habitat features were considered where qualifying habitats occur within the AoS defined by the relevant project ZOIs.

The intertidal and subtidal environment surrounding Pwllheli Harbour comprises a diverse range of rocky, sedimentary and biogenic habitats. Intertidal habitats include rocky shores, mudflats, sandflats, gravel and shingle habitats supporting a range of fucoid algae, barnacles, limpets, polychaetes, amphipods and bivalves. The area also supports intertidal underboulder communities and biogenic habitats associated with honeycomb worm (*Sabellaria alveolata*) reefs. Subtidal habitats comprise mixed sediment, sand and rocky reef habitats supporting a range of benthic invertebrate communities, kelp-dominated assemblages and other epifaunal communities. These habitats occur within a dynamic environment characterised by variable wave exposure, sediment transport and tidal processes.

Sensitive benthic habitats identified within the vicinity of the Project include honeycomb worm (*Sabellaria alveolata*) reefs, blue mussel (*Mytilus edulis*) beds and seagrass (*Zostera marina*) beds (Figure 4-4; P284_ENV_006). These habitats are recognised as habitats and species of principal importance under Section 7 of the Environment (Wales) Act 2016. Whilst they are not qualifying features of the Pen Llŷn a'r Sarnau SAC, they contribute to the ecological character of the receiving environment and occur within, or are associated with, qualifying Annex I habitats, including Reefs (1170), Large Shallow Inlets and Bays (1160) and Mudflats and Sandflats Not Covered by Seawater at Low Tide (1140). Therefore, these habitats have been considered as supporting evidence when assessing potential effects on the qualifying Annex I habitat features of the SAC.

As described in Section 4.3.2, information from nearby SSSIs, including component SSSIs underpinning European site designations, has been reviewed to inform the baseline understanding of habitat distribution and ecological sensitivities. Morfa Abererch SSSI (1.5 km) supports dune, saltmarsh and intertidal habitats, whilst GlanLlŷnnau a Glannau Pen-ychain i Gricieth SSSI (4.7 km) supports a range of coastal and intertidal habitats, including dune systems, saltmarsh and estuarine environments.

The proposed activities have the potential to affect benthic habitats through smothering and siltation rate changes, physical change (to another sediment type), changes in suspended solids (water clarity), transition element and organo-metal contamination and introduction or spread of INIS. The ZOIs for these pressures have been defined using the outputs of the sediment transport and dispersion modelling study, as outlined in Section 4.4.

Sediment deposition represents the primary pathway for smothering and siltation effects and physical change to another sediment type. Therefore, the ZOI for these pressures has been defined by the maximum extent of the modelled sediment deposition footprint (53.8 km^2). Elevated SSC represents the primary pathway for changes in suspended solids (water clarity), transition element and organo-metal contamination and introduction of INIS. Therefore, the ZOI for these pressures is defined by the maximum extent of the modelled SSC footprint (225.3 km^2). These ZOIs were subsequently used to define the AoS and identify European sites and qualifying features with potential connectivity to the Project. The modelled footprints therefore form the basis of the site selection process and the assessment of habitat-related impact pathways (Figure 4-3; P284_ENV_006).

4.7.2 Fish and Shellfish

European sites designated for Annex II fish species and other qualifying fish features were considered where qualifying features occur within the relevant AoS or were identified through the regional migratory fish screening approach.

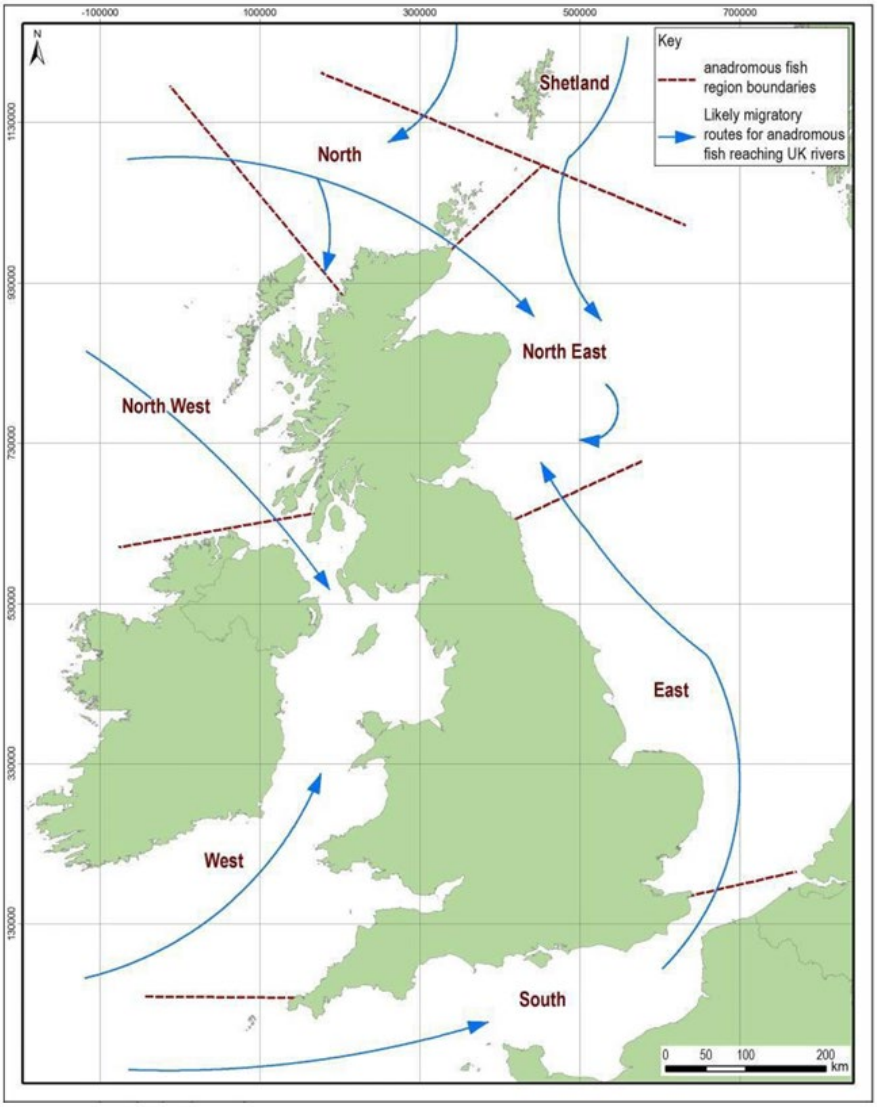
Fish and shellfish receptors have the potential to be affected by barriers to species movement, changes in suspended solids (water clarity), transition element and organo-metal contamination, and underwater noise. The SSC ZOI, informed by the outputs of the sediment transport and dispersion modelling study, was applied to assess changes in suspended solids (water clarity) and transition element and organo-metal contamination. However, given the mobile nature of migratory fish species and their potential ecological connectivity beyond the immediate project area, a precautionary AoS of 100 km was applied to identify European sites designated for migratory fish species that may utilise coastal waters within the wider study area. This AoS was used when considering barriers to species movement, underwater noise and other pressures affecting mobile fish receptors.

Whilst species such as sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*) and twaite shad (*Alosa fallax*) are typically associated with coastal migrations, Atlantic salmon (*Salmo salar*) may undertake extensive migrations and may exhibit ecological connectivity beyond the 100 km AoS applied to other migratory fish species. Therefore, whilst the 100 km AoS was considered appropriate for the identification of sites designated for most migratory fish species, an additional regional screening approach was applied for Atlantic salmon in line with The Crown Estate Round 4 HRA principles (The Crown Estate, 2020). Under this approach, the regional areas defined by ABPmer (2014) and presented in Figure 4-5 were used to identify SACs designated for Atlantic salmon that may have ecological connectivity to the Project beyond the 100 km AoS.

Where multiple SACs designated for Atlantic salmon were identified through the regional screening process beyond the 100 km AoS, a proportionate approach to site selection was applied. Closer SACs were taken forward for assessment in the first instance. More distant SACs were subsequently screened out where no additional source-pathway-receptor relationship was identified and there was no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance. This approach ensured that the assessment remained proportionate whilst maintaining a precautionary consideration of Atlantic salmon connectivity.

Freshwater pearl mussel (*Margaritifera margaritifera*) was considered alongside Atlantic salmon due to its reliance on salmonid host fish during a critical stage of its life cycle. Therefore, for the purposes of site selection, European sites designated for freshwater pearl mussel were included where the corresponding Atlantic salmon feature was identified as having potential connectivity to the Project.

Figure 4-5 Regional Boundaries and Indicative Migration Routes for Atlantic Salmon Within UK Waters (ABPmer, 2014, cited in ABPmer, 2018)



The wider Cardigan Bay area supports records of angel shark (*Squatina squatina*), a Critically Endangered species protected under Schedule 5 of the Wildlife and Countryside Act 1981 and listed as a Section 7 Priority Species in Wales (Lawson *et al.,* 2022). Whilst angel shark is not a qualifying feature of any European site considered within this assessment, its presence has been noted as part of the wider ecological baseline and understanding of local marine sensitivities within the study area.

4.7.3 Birds

European sites designated for Annex I bird species, migratory bird species and their supporting habitats were considered where qualifying features occur within the relevant AoS or are considered to have ecological connectivity to the Project.

Bird species have the potential to be affected by changes in suspended solids (water clarity). While the SSC ZOI was informed by sediment transport and dispersion modelling, birds are highly mobile receptors and may utilise habitats over a considerably wider area than the extent of the predicted plume. Accordingly, a precautionary AoS of 100 km was applied as an initial search area to identify

European sites designated for qualifying bird features that may have ecological connectivity to the Project.

This initial search area was supplemented by a review of published mean-maximum foraging ranges for qualifying marine bird species to ensure that European sites located beyond 100 km were also considered where species-specific evidence indicated potential connectivity (Woodward *et al.,* 2019). Mean-maximum foraging ranges provide an indication of the distances over which breeding seabirds may forage from designated sites and were used to inform the identification of European sites and qualifying features with potential connectivity to the Project (Table 4-1). This approach recognises that some qualifying species may forage over distances greater than the initial search area and ensures that ecological connectivity is considered on a species-specific basis. The identification of European sites for screening was therefore informed by both proximity and species ecology, ensuring that all qualifying bird features with a realistic potential to utilise the wider Project area were considered.

Although all European sites identified within the bird AoS were reviewed, qualifying features were assessed on a feature-specific basis. Marine and coastal foraging species were screened into the assessment where published foraging ranges and species ecology indicated potential ecological connectivity with the Project and a credible source-pathway-receptor relationship existed. Sites located beyond the initial 100 km search area were also considered where qualifying species had foraging ranges capable of extending to the Project area. This approach ensures that the assessment is both precautionary and proportionate, reflecting the mobility of seabird receptors whilst focusing on qualifying features for which a realistic pathway for effect exists. However, qualifying features dependent on terrestrial habitats, and for which no credible source-pathway-receptor relationship to the Project existed, were screened out from further consideration.

Table 4-1 presents the qualifying bird species associated with European sites identified within the AoS and the ecological information used to inform the assessment of potential connectivity.

Table 4-1 Mean-Maximum Foraging Distances of Qualifying Bird Species

Species	Mean-maximum foraging range (km)
Manx shearwater (*Puffinus puffinus*)	1,346.8
Little tern (*Sternula albifrons*)	5.0
Common tern (*Sterna hirundo*)	18.0
Red-throated diver (*Gavia stellata*)	40.0
Common scoter (*Melanitta nigra*)	2.0
Red-breasted merganser (*Mergus serrator*)	0.85
Great cormorant (*Phalacrocorax carbo*)	25.6
Arctic tern (*Sterna paradisaea*)	25.7
Roseate tern (*Sterna dougallii*)	12.6
Sandwich tern (*Thalasseus sandvicensis*)	34.3

Sources: Woodward *et al.* (2019); Hudson & Furness (1989); BirdLife International (2010); Craik *et al.* (2011); Burton & Armitage (2008).

4.7.4 Marine Mammals

European sites designated for Annex II marine mammal species and European otter (*Lutra lutra*) were considered where qualifying features occur within the relevant AoS or are considered to have ecological connectivity to the Project.

Marine mammals have the potential to be affected by underwater noise, transition elements and organo-metal contamination, barriers to species movement and changes in suspended solids (water

clarity). The SSC ZOI, informed by the outputs of the sediment transport and dispersion modelling study, was applied to assess changes in suspended solids (water clarity) and transition elements and organo-metal contamination. However, given the highly mobile nature of marine mammal receptors, species-specific AoS were also applied for pressures relating to underwater noise, barriers to species movement and wider ecological connectivity.

In accordance with NRW's marine mammal HRA screening guidance (NRW, 2025), Marine Mammal Management Units (MMMUs) were used as the primary framework for identifying European sites with potential ecological connectivity to the Project. MMMUs represent biologically meaningful management units that are underpinned by evidence on the distribution and management of marine mammal populations and are NRW's preferred approach to HRA screening for marine mammal features. The location of the Project in relation to the relevant MMMUs is shown in Figure 4-6 (P2843-LOC-006).

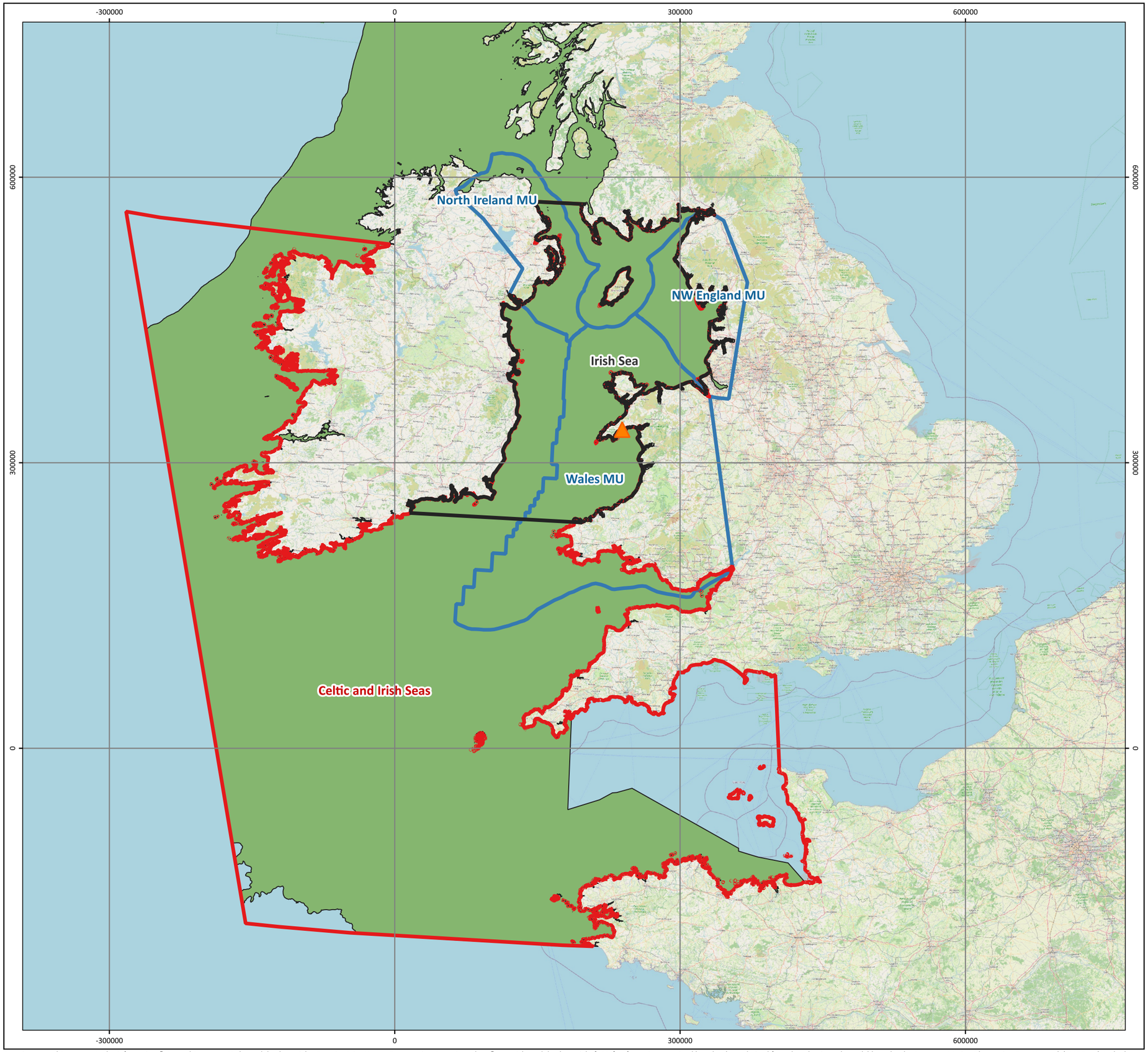
The following criteria were used to identify European sites requiring consideration within the HRA screening assessment:

- Any cetacean qualifying feature designated within the same MMMU as the proposed activities;
- Harbour seal (*Phoca vitulina*) qualifying features within 50 km of haul-out sites, based on the maximum foraging range reported by NatureScot (2024), or within the same or neighbouring MMMUs to the Project (i.e. the Wales, northwest England and northern Ireland MMMUs) (SCOS, 2020);
- Grey seal (*Halichoerus grypus*) qualifying features within 448 km of haul-out sites, based on the maximum foraging range reported by Carter *et al.* (2022), or designated within the The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Region III MMMU, which encompasses the Southwest Scotland, West Scotland, Western Isles, Southwest England, Wales, Northwest England and Northern Ireland seal MMMUs (SCOS, 2020); and
- European otter (*Lutra lutra*) qualifying features within 32 km of the proposed activities, based on the average home range size reported by Kruuk (1995).

For underwater noise and barriers to species movement, a precautionary AoS of 50 km was applied. This is based on the maximum effective deterrence range (EDR) identified for marine mammal receptors and encompasses published disturbance distances for bottlenose dolphin (50 km), grey seal (45 km), harbour seal (25 km) and harbour porpoise (5 km).

In accordance with NRW's guidance, a sequential approach to HRA screening was applied where appropriate (NRW, 2025). NRW recognises that application of MMMUs can result in assessment of a large number of European sites and that, for smaller-scale projects with localised and temporary effects, a sequential assessment approach may provide a proportionate basis for screening. Under this approach, sites with the strongest ecological connectivity to the Project, typically the closest designated sites for a given qualifying feature, were taken forward for assessment in the first instance. More distant sites designated for the same feature were subsequently screened out where equivalent designated sites occurred closer to the Project and no credible mechanism existed by which the localised and temporary Project-related effects would affect more distant sites in preference to those located closer to the source.

The sequential approach was applied separately to each qualifying marine mammal feature, consistent with NRW guidance. For bottlenose dolphin, both Pen Llŷn a'r Sarnau SAC and Cardigan Bay SAC were retained for assessment, reflecting NRW's advice that a single bottlenose dolphin population utilises both SACs and that both sites should therefore be considered during HRA screening and assessment.



CYNGOR GWYNEDD COUNCIL

DREDGE & DISPOSAL OPERATION

Marine Mammal Management Units (MMMUs)

Drawing No: P2843-LOC-006	A

Legend

- Indicative Proposed Disposal Location

Marine Mammal Management Units (MMMUs)

- Harbour Seal MMMU

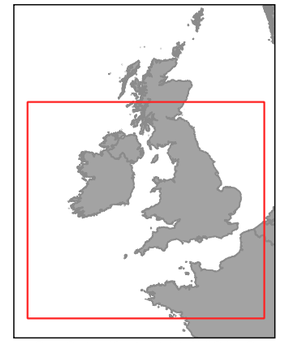
Cetacean MMMUs

- Bottlenose Dolphin
- Harbour Porpoise

Grey Seal MMMU

- OSPAR Region III

N



NOT TO BE USED FOR NAVIGATION

Date	2026-10-13 12:53:25
Coordinate System	OSGB36 / British National Grid
WKID	EPSG:27700
Scale @A3	1:4,000,000
Data Sources	JNCC; OpenStreetMap; EMODnet; NRW
File Reference	J:\P2843\Mxd_QGZ\07_HRA \P2843_HRA_Data.qgs
Created By	Adam Johns
Reviewed By	Emma Langley
Approved By	Eloïse Boblin

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Table 4-2 Potential Pressures, Zones of Influence and Justifications for the Areas of Search Applied to Identify Relevant European Sites

Receptor	Potential pressure	Aspect of proposed development	ZOI	Justification
Subtidal and Intertidal Benthic Habitats	Smothering and siltation rate changes	Dredged material disposal and associated sediment deposition	53.8 km^2 modelled footprint (Section 4.4)	Based on the maximum predicted sediment deposition footprint derived from sediment transport and dispersion modelling.
	Physical change (to another sediment type)			Based on the maximum predicted sediment deposition footprint within which deposited material may alter the characteristics of the existing seabed sediment.
	Changes in suspended solids (water clarity)	Dredged material disposal and associated sediment plume	225.3 km^2 modelled footprint (Section 4.4)	Based on the maximum predicted SSC footprint derived from sediment transport and dispersion modelling.
	Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Remobilisation of sediment-bound contaminants during dredged material disposal		Based on the maximum predicted SSC footprint within which sediment-bound contaminants may be transported and dispersed.
	Introduction or spread of INIS	Dredged material disposal and vessel movements		Based on the maximum predicted SSC footprint and the potential for INIS spread via suspended sediments and vessel movements.
Fish and Shellfish	Barrier to species movement	Vessel movements and dredged material disposal	100 km radius around disposal location (regional screening approach applied for Atlantic salmon, *Salmo salar*)	Precautionary AoS applied to identify migratory fish species and other qualifying fish features with potential connectivity to the Project. A regional screening approach was additionally applied for Atlantic salmon, with sequential screening used where appropriate.
	Changes in suspended solids (water clarity)		225.3 km^2 modelled footprint (Section 4.4)	Based on the maximum predicted SSC footprint derived from sediment transport and dispersion modelling.
	Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Remobilisation of sediment-bound contaminants during dredged material disposal		Based on the maximum predicted SSC footprint within which sediment-bound contaminants may be transported and dispersed.
	Underwater noise changes	Vessel movements and dredged material disposal	100 km radius around disposal location (regional screening approach applied for Atlantic salmon, *Salmo salar*)	Precautionary AoS applied to identify migratory fish species and other qualifying fish features with potential connectivity to the Project. A regional screening approach was additionally applied for Atlantic salmon, with sequential screening used where appropriate.

Receptor	Potential pressure	Aspect of proposed development	ZOI	Justification
Birds	Changes in suspended solids (water clarity)	Dredged material disposal and associated sediment plume	100 km radius around disposal location	Precautionary AoS applied to encompass qualifying bird species with potential ecological connectivity to the Project that may be indirectly affected through changes in prey distribution, prey availability and foraging conditions.
Marine mammals	Underwater noise changes	Vessel movements and dredged material disposal	50 km radius around disposal location	Based on the following maximum EDRs : Harbour porpoise – 5 km (JNCC, 2025b) Bottlenose dolphin – 50 km (Fernandez-Batelu *et al.*, 2021) Grey seal – 45 km (Sinclair *et al.,* 2023) Harbour seal – 25 km (Sinclair *et al.,* 2023)
	Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Remobilisation of sediment-bound contaminants during dredged material disposal	225.3 km^2 modelled footprint (Section 4.4)	Based on the maximum predicted SSC footprint within which remobilised contaminants may affect prey resources utilised by marine mammals.
	Barrier to species movement	Vessel movements and dredged material disposal	Species-specific	Relevant MMMUs were used to identify European sites supporting mobile marine mammal species with potential ecological connectivity to the Project (Section 4.7.5). Harbour seal, grey seal and European otter sites were screened using maximum foraging/home-range distances of 50 km, 448 km and 32 km, respectively.
	Changes in suspended solids (water clarity)	Dredged material disposal and associated sediment plume	225.3 km^2 modelled footprint (Section 4.4)	Based on the maximum predicted SSC footprint and the potential for indirect effects on prey availability and foraging behaviour.

Source: JNCC (2022)

Note: Where a receptor group comprised multiple qualifying species with different ZOI or AoS, the largest area was applied as a precautionary worst-case approach to identify European sites requiring consideration within the screening assessment.

Table 4-3 Potential Pressures Scoped Out of the Assessment and Justification for Exclusion

Pressure scoped out	Definition	Receptor	Justification
Abrasion/disturbance of the substrate on the surface of the seabed	Physical disturbance or abrasion of the seabed surface resulting from activities that cause direct contact with the substrate. This pressure may affect intertidal and subtidal habitats, including benthic flora and fauna, through disturbance, displacement, damage or removal of surface-dwelling species and habitats.	Subtidal and intertidal benthic habitats	Potential effects associated with sediment deposition are assessed under Smothering and siltation rate changes (Section 4.6.1). The Project does not involve seabed excavation, anchoring or placement of infrastructure that would result in direct physical disturbance of the seabed.
Hydrocarbon & PAH contamination	Hydrocarbon and polycyclic aromatic hydrocarbon (PAH) contamination resulting from accidental releases, spills or discharges. This pressure relates to increases in hydrocarbon concentrations above background levels and may affect water and sediment quality, potentially resulting in toxic effects on ecological receptors. Sources may include petroleum, pyrogenic and biogenic hydrocarbons.	All receptors	Potential hydrocarbon contamination could only arise from an accidental release from vessels. Such events are considered highly unlikely and are controlled through standard pollution prevention and emergency response procedures. Potential effects associated with sediment-bound contaminants are assessed separately under Transition elements & organo-metal contamination (Section 4.6.4).
Water flow (tidal current) changes, including sediment transport considerations	Changes in water movement associated with tidal currents, wave action, river flows and other hydrodynamic processes. This pressure relates to activities that may alter flow velocities, flow directions, sediment transport processes or hydrological energy regimes, potentially resulting in changes to erosion, deposition, sediment distribution and habitat characteristics.	All receptors	No structures or activities capable of altering tidal currents, sediment pathways or hydrodynamic processes are proposed.
Above water noise	Noise generated by onshore or offshore activities, including construction works, vehicle movements, vessels, aircraft, tourism and other anthropogenic activities, which may disturb qualifying features and alter normal behaviours such as feeding, resting, breeding, foraging or haul-out activities.	Birds / Marine mammals	The Project does not involve impact piling, blasting, drilling or other activities likely to generate airborne noise capable of causing disturbance to qualifying bird or marine mammal features.
Visual disturbance (from vessel presence)	The disturbance of qualifying features arising from anthropogenic activity, including vessel presence and movement, increased personnel activity, tourism, vehicular movements, and other visual stimuli that may cause displacement, avoidance behaviour or interruption of normal activities such as feeding, resting, breeding or haul-out behaviour.	Birds / Marine mammals	The Project will be undertaken using a single dredging vessel operating within Pwllheli Harbour and its approaches. Pwllheli Harbour is an established marina and harbour facility with over 400 berths that accommodates a wide range of recreational and commercial vessels (Hafan Pwllheli Marina, 2026). Therefore, the temporary presence of a single dredging vessel would not materially alter existing levels of vessel activity within the area. Given the temporary nature of the works and the existing vessel activity within the harbour environment, no pathway for significant visual disturbance to qualifying bird or marine mammal features has been identified. Potential indirect effects on qualifying bird species through changes in water clarity, prey availability and foraging conditions are assessed separately under Changes in Suspended Solids (Water Clarity) (Section 4.6.3).

Source: JNCC (2022)

4.8 In-Combination Effects

The Habitats Regulations require the effects of a project to be considered both alone and in-combination with other plans and projects that may affect the same European site(s). The purpose of the in-combination assessment is to determine whether the proposed activities could contribute to an LSE on a European site when considered alongside other relevant activities.

The assessment has focused on plans and projects with the potential to overlap spatially and/or temporally with the proposed activities and which may result in similar impact pathways affecting the qualifying features of the European sites considered within this HRA.

Information on relevant plans and projects was obtained through a review of publicly available information sources, including the NRW Public Register (NRW, 2026), Marine Management Organisation (MMO) Public Register (MMO, 2026), Maritime Area Regulatory Authority (MARA) Geoportal (MARA, 2026) and Kingfisher Bulletin (Kingfisher, 2026). Notices to Mariners are typically issued a few weeks prior to the commencement of works. Therefore, it is difficult to determine which activities will be underway at the same time as the proposed activities. The assessment has been based on the best available information at the time of writing.

A review of publicly available information identified a number of marine licences and coastal projects within the wider study area (Table 4-4). These projects were screened for potential in-combination effects based on their location, timing, scale and potential impact pathways. Most projects were screened out from further consideration due to the absence of a credible spatial or pathway relationship with the proposed activities. However, the Traeth Crugan Dune Nourishment Scheme (DEML2502) was taken forward for further consideration due to its location within the same coastal system and its potential to generate similar impact pathways relating to sediment redistribution, SSC and sediment deposition (Section 4.8.1).

Table 4-4 Plans and Projects Considered for In-Combination Assessment

Project	Marine Licence Number	Description	Licence Period	Screened into Assessment?
Barmouth North Promenade Flood Alleviation Scheme	CML2619	Construction of approximately 950 m of new rock armour revetment, refurbishment of existing flood defence walls, construction of a secondary flood wall, replacement/refurbishment of sheet piles, installation of flood gates, removal of existing groynes, provision of new access ramps and steps, and associated public realm improvements to reduce coastal flood risk along the promenade.	May 2027 – August 2029	No
Gimblet Rock Outer Harbour Slipway	CML2530	Installation of a new 60 m × 6 m concrete slipway at Gimblet Rock Outer Harbour, Pwllheli, including geotechnical investigations, temporary sheet piling, excavation of beach sediments, placement of rock foundation material, construction of a temporary cofferdam, concrete works, and installation of precast concrete blocks and navigation buoy anchor points.	4th November 2025 – 31st December 2028	No
Gimblet Rock Outer Harbour Floating Jetty	CML2531	Installation of a new 36 m floating jetty at Gimblet Rock Outer Harbour, Pwllheli, including up to 10 geotechnical boreholes, installation of up to six reinforced concrete-filled steel piles, floating pontoon modules	4th November 2025 – 31st December 2028	No

Project	Marine Licence Number	Description	Licence Period	Screened into Assessment?
		and an access gangway connected to the existing quayside.		
Hafan y Môr Holiday Park Coastal Protection Scheme	CML1962	Construction of approximately 320 m of rock armour coastal defences and associated beach nourishment works, including deposition of approximately 18,000 m³ of rock, gravel and sand along approximately 310 m of shoreline to provide coastal erosion protection and support the holiday park expansion.	1st January 2021 – 31st March 2046	No
Traeth Crugan Dune Nourishment Scheme	DEML2502	Beach and dune nourishment at Traeth Crugan, Pwllheli involving transport and deposition of up to 24,855 m³ (approximately 43,000 tonnes) of dredged sand and gravel from Carreg yr Imbyll to two nourishment areas to replenish the beach and dune system.	21st May 2025 – 31st December 2035	Yes

4.8.2 Assessment of Potential In-Combination Effects with DEML2502

The Traeth Crugan Dune Nourishment Scheme (DEML2502) was identified as the only project with potential for overlap in impact pathways with the proposed activities (Table 4-4). The scheme involves the transport and deposition of up to 24,855 m³ (approximately 43,000 tonnes) of dredged sand and gravel at Traeth Crugan. The material originates from previous dredging undertaken at the mouth of Pwllheli Harbour and has been stockpiled at Carreg yr Imbyll prior to transport to the nourishment areas by vehicle. The marine licence is valid from 21st May 2025 to 31st December 2035.

Both projects involve the redistribution of sediment within the same local coastal system and therefore share potential impact pathways relating to sediment deposition, SSC and water clarity. The Traeth Crugan Dune Nourishment Scheme is located approximately 3.5 km from the proposed disposal site and falls within the area influenced by the predicted SSC and sediment deposition footprints associated with the proposed disposal activities. Therefore, a potential in-combination pathway exists. Although the licence period for the nourishment scheme overlaps with the proposed activities, the licence covers a broad window and does not indicate that works would necessarily be undertaken concurrently.

The nourishment scheme comprises the beneficial reuse of beach-compatible sediment within the beach and dune system at Traeth Crugan, using material previously dredged from the mouth of Pwllheli Harbour. The works do not involve offshore dredging or disposal operations and are intended to replenish the beach and dune system rather than alter the wider marine environment. Furthermore, both projects involve the redistribution of existing sediment from the local coastal system rather than the introduction of material from an external source.

Taking account of the nature, scale and location of the nourishment works, and the absence of any mechanism by which the combined effects of the two projects would result in materially greater effects on qualifying features than those assessed for the proposed Project alone, no likely significant in-combination effects on any European site are predicted.

Therefore, it can be concluded that the proposed activities would not result in LSEs in-combination with the Traeth Crugan Dune Nourishment Scheme.

4.9 Test of Likely Significant Effects

Stage 1 considers whether the proposed project, either alone or in-combination with other plans and projects, is likely to have a significant effect on a European site. An LSE is one that cannot be excluded on the basis of objective information. The test is based on the possibility of a significant effect occurring, rather than requiring certainty that an effect will occur. An effect is considered significant where it has the potential to undermine the conservation objectives of a European site, either directly or indirectly. Where an LSE cannot be ruled out, the project must be taken forward to AA.

In accordance with established case law and relevant guidance, this screening has been undertaken without regard to any measures intended to avoid, reduce or prevent adverse effects on European sites. Such measures are considered, where necessary, at the AA stage.

5. STAGE 1 - SCREENING

5.1 Screening of European Sites

5.1.1 Introduction

GIS mapping was used to identify European sites within the AoS defined in Section 4.7 and to determine the spatial relationship between the proposed activities and designated sites. European sites identified within the relevant AoS for each receptor group are presented in Table 5-1.

For each European site and qualifying feature, the potential for interaction with the Project was assessed by determining whether a credible source-pathway-receptor relationship exists. This assessment was informed by the identified Project pressures, the relevant ZOI, and the ecology, distribution and sensitivity of the qualifying feature. Factors considered included habitat extent and distribution, species mobility, foraging range, ecological connectivity, and the nature, extent and duration of the identified pressures.

Where appropriate, a sequential approach to site selection and screening was applied, as described for the relevant receptor groups. Where multiple European sites designated for the same qualifying feature were identified, more distant sites were screened out where no additional source-pathway-receptor relationship was identified and there was no credible mechanism by which Project-related pressures would increase with distance (NRW, 2025).

Qualifying features were assigned one of the following screening outcomes:

- Screened in – a credible source-pathway-receptor relationship has been identified and, on the basis of objective information, the potential for an LSE cannot be excluded.
- Screened out – no credible source-pathway-receptor relationship has been identified, or sufficient evidence is available to conclude that the Project would not affect the qualifying feature.

Qualifying features screened in were taken forward for LSE assessment, both alone and in-combination with other relevant plans and projects, having regard to the conservation objectives of the relevant European site. Where an LSE could not be excluded on the basis of objective information, the feature was progressed to Stage 2 AA.

In accordance with relevant HRA guidance and established case law, the screening assessment was undertaken without consideration of measures intended to avoid or reduce effects on European sites.

5.1.2 Screening Table

The results of the Stage 1 screening assessment are presented in Table 5-1. For each European site and qualifying feature, the table summarises the qualifying features, identifies the relevant pressure-pathway-receptor relationships, and presents the screening conclusion. Qualifying features for which an LSE cannot be excluded have been screened in and taken forward to Stage 2 AA.

Table 5-1 Screening of European Sites

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Pen Llŷn a'r Sarnau / Lleyn Pensinsula and the Sarnau (PLAS) SAC *(component SSSIs include e.g. Morfa Nefyn SSSI, Ynysoedd Sant Tudwal SSSI and Aber Dyfi SSSI)*	**Annex I habitats (primary):** Sandbanks (1110); Estuaries (1130); Coastal lagoons (1150); Large shallow inlets and bays (1160); Reefs (1170). **Annex I habitats (not primary):** Mudflats and sandflats (1140); Salicornia habitats (1310); Atlantic salt meadows (1330); Sea caves (8330). **Annex II species (not primary):** Bottlenose dolphin (*Tursiops truncatus*); Grey seal (*Halichoerus grypus*); Otter (*Lutra lutra*).	Within	Smothering and siltation rate changes; Physical change (to another sediment type); Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Introduction or spread of INIS; Underwater noise changes; Barrier to species movement	Yes. The Project is located within the SAC, and the modelled sediment deposition and SSC footprints overlap qualifying Annex I habitat features. Bottlenose dolphin and grey seal were identified through the relevant marine mammal screening areas, and otter occurs within the 32 km home range AoS.	No	Yes
Clogwyni Pen Llŷn/ Seacliffs of Lleyn SAC *(component SSSIs include e.g. Gallt y Bwlch SSSI, Porth Dinllaen i Borth Pistyll SSSI and Glannau Aberdaron SSSI*	**Annex I habitats (primary):** (1230) Vegetated sea cliffs of the Atlantic and Baltic Coasts.	9.67	No source-pathway-receptor relationship identified	No. Vegetated sea cliff habitat is located above the marine environment on coastal cliff faces and cliff tops. The Project is limited to increases in SSC and the deposition of dredged material within the marine environment. These impact pathways would not affect the extent, distribution, structure, function or supporting processes of the terrestrial cliff habitat for which the SAC is designated. Therefore, no credible source-pathway-receptor relationship exists between the Project and the qualifying feature of the SAC.	No	No
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA *(component SSSIs include e.g. Pen Llyn ar Sarnau SSSI and*	**Features:** Red-throated diver (*Gavia stellata*).	4.50	Changes in suspended solids (water clarity)	Yes. The modelled SSC footprint overlaps the SPA. Red-throated diver is a marine-foraging species that may utilise waters affected by temporary increases in suspended sediment concentrations.	No	Yes

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Glannau Aberporth SSSI)						
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal SPA *(component SSSIs include e.g. Mynydd Cilan SSSI and Ynysoedd Sant Tudwal SSSI)*	**Features:** Chough (*Pyrrhocorax pyrrhocorax*).	10.05	No source-pathway-receptor relationship identified	No. Chough is a terrestrial qualifying feature that relies on coastal grassland, heathland and cliff-top habitats. The Project would not affect supporting habitats utilised by the feature and no credible source-pathway-relationship relationship has been identified.	No	No
West Wales Marine / Gorllewin Cymru Forol SAC	**Annex II species (primary):** Harbour porpoise (*Phocoena phocoena*).	13.70	Barrier to species movement; Underwater noise changes; Changes in suspended solids (water clarity); Transition elements & organo-metal contamination	Yes. Harbour porpoise was identified through the relevant marine mammal screening area and may have ecological connectivity to the Project.	No	Yes
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA *(component SSSIs include e.g. Glannau Aberdaron ac Ynys Enlli SSSI, Ynys Enlli SSSI and Ynysoedd y Gwylanod SSSI)*	**Features:** Manx shearwater (*Puffinus puffinus*); Chough (*Pyrrhocorax pyrrhocorax*).	19.46	Changes in suspended solids (water clarity)	Yes. Manx shearwater was identified through the 100 km bird AoS and may have ecological connectivity to the Project. No. Chough is a terrestrial qualifying feature, and no credible source-pathway-receptor relationship has been identified.	No	Yes
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC *(component SSSIs include e.g. Glannau Menai SSSI, Puffin Island SSSI and Lavan Sands SSSI)*	**Annex I habitats (primary):** Sandbanks (1110); Mudflats and sandflats (1140); Reefs (1170). **Annex I habitats (not primary):** Large shallow inlets and bays (1160); Sea caves (8330).	24.02	No source-pathway-receptor relationship identified	No. The qualifying habitat features do not overlap the modelled sediment deposition or SSC footprints, and no other ecological connectivity has been identified. No credible source-pathway-receptor relationship exists.	No	No

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Afon Gwyrfai a Llyn Cwellyn SAC *(component SSSIs include e.g. Afon Gwyrfai SSSI and Llyn Cwellyn SSSI)*	**Annex I habitats (primary):** Oligotrophic to mesotrophic standing waters (3130); Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). **Annex II species (primary):** Atlantic salmon.(*Salmo salar*); Floating water-plantain (*Luronium natans*). **Annex II species (primary):** Otter (*Lutra lutra*).	24.83	Barrier to species movement; Underwater noise changes; Changes in suspended solids (water clarity); Transition elements & organo-metal contamination	Yes. Atlantic salmon was identified through the fish screening process and may have ecological connectivity to the Project. Freshwater pearl mussel was considered due to its ecological dependency on Atlantic salmon, and otter was identified within the 32 km home-range AoS. No credible source-pathway-receptor relationship was identified for the remaining qualifying features.	No	Yes
Anglesey Terns / Morwenoliaid Ynys Môn SPA *(component SSSIs include e.g. Ynys Feurig SSSI, Cemlyn Bay SSSI and The Skerries SSSI)*	**Features:** Arctic tern (*Sterna paradisaea*); Common tern (*Sterna hirundo*); Roseate tern (*Sterna dougallii*); Sandwich tern (*Thalasseus sandvicensis*).	25.32	Changes in suspended solids (water clarity)	Yes. Arctic tern, common tern, roseate tern and sandwich tern were identified through the 100 km bird AoS and may have ecological connectivity to the Project.	No	Yes
Afon Eden - Cors Goch Trawsfynydd SAC *(component SSSIs include e.g. Afon Eden SSSI and Cors Goch Trawsfynydd SSSI)*	**Annex I habitats (not primary):** Active raised bogs (7110). **Annex II species (primary):** Freshwater pearl mussel (*Margaritifera margaritifera*); Floating water-plantain (*Luronium natans*). **Annex II species (not primary):** Atlantic salmon (*Salmo salar*); Otter (*Lutra lutra*).	30.04	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Atlantic salmon was identified through the fish screening process and regional Atlantic salmon screening approach. Freshwater pearl mussel was considered due to its ecological dependency on Atlantic salmon, and otter was identified within the 32 km home-range AoS. No. No credible source-pathway-receptor relationship has been identified for active raised bogs or floating water-plantain.	No	Yes
North Anglesey Marine / Gogledd Môn Forol SAC	**Annex II species (primary):** Harbour porpoise (*Phocoena phocoena*).	41.31	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Harbour porpoise was identified through the relevant marine mammal screening area and may have ecological connectivity to the Project.	No	Yes

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Traeth Lafan/ Lavan Sands, Conway Bay SPA *(component SSSIs include e.g. Traeth Lafan SSSI)*	**Features:** Common redshank (*Tringa totanus*); Eurasian oystercatcher (*Haematopus ostralegus*); Red-breasted merganser (*Mergus serrator*); Eurasian curlew (*Numenius arquata*); Great crested grebe (*Podiceps cristatus*).	42.88	Changes in suspended solids (water clarity)	Yes. Red-breasted merganser and great crested grebe were identified through the 100 km bird AoS and may have ecological connectivity to the Project. No. Common redshank, Eurasian oystercatcher and Eurasian curlew are primarily associated with intertidal and coastal supporting habitats that would not be affected by the Project, and no credible source-pathway-receptor relationship has been identified.	No	Yes
Dyfi Estuary / Aber Dyfi SPA *(component SSSIs include e.g. Aber Dyfi SSSI and Ynyslas SSSI)*	**Features:** Greenland white-fronted goose (*Anser albifrons flavirostris*).	44.84	No source-pathway-receptor relationship identified	No. Greenland white-fronted goose is a terrestrial and freshwater-associated qualifying feature. The Project would not affect supporting habitats utilised by the species and no credible source-pathway-receptor relationship has been identified.	No	No
Liverpool Bay SPA	**Features:** Little tern (*Sternula albifrons*); Common tern (*Sterna hirundo*); Red-throated diver (*Gavia stellata*); Little gull (*Hydrocoloeus minutus*); Common scoter (*Melanitta nigra*); Waterbird Assemblage.	49.07	Changes in suspended solids (water clarity)	Yes. Little tern, common tern, red-throated diver, little gull and common scoter were identified through the 100 km bird AoS and may have ecological connectivity to the Project. No. The waterbird assemblage feature has not been taken forward separately as any potential source-pathway-receptor relationship are represented by the individual qualifying species screened into the assessment.	No	Yes
River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC *(component SSSIs include e.g. Afon*	**Annex I habitats (primary):** Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). **Annex II species (primary)**: Atlantic salmon (*Salmo salar*); Floating water-plantain (*Luronium natans*).	49.43	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Atlantic salmon, sea lamprey and river lamprey were identified through the fish screening process and may have ecological connectivity to the Project. No. No credible source-pathway-receptor relationship has been identified for water	No	Yes

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Dyfrdwy SSSI and Llyn Tegid SSSI)	**Annex II species (not primary):** Sea lamprey (*Petromyzon marinus*); Brook lamprey (*Lampetra planeri*); River lamprey (*Lampetra fluviatilis*); Bullhead (*Cottus gobio*); Otter (*Lutra lutra*).			courses with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, floating water-plantain, brook lamprey or bullhead.		
Cardigan Bay / Bae Ceredigion SAC *(component SSSIs include e.g. Ceibwr Bay SSSI, Glannau Aberporth SSSI and Pen Llyn ar Sarnau SSSI)*	**Annex I habitats (not primary):** Sandbanks (1110); Reefs (1170); Sea caves (8330). **Annex II species (primary):** Bottlenose dolphin (*Tursiops truncatus*). **Annex II species (not primary):** Grey seal (*Halichoerus grypus*); River lamprey (*Lampetra fluviatilis*); Sea lamprey (*Petromyzon marinus*).	52.21	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Bottlenose dolphin and grey seal were identified through the relevant marine mammal screening areas and may have ecological connectivity to the Project. Sea lamprey and river lamprey were identified through the fish screening process. No credible source-pathway-receptor relationship was identified for the qualifying Annex I habitat features.	No	Yes
Ynys Seiriol / Puffin Island SPA *(component SSSIs include e.g. Puffin Island SSSI)*	**Features:** Great cormorant (*Phalacrocorax carbo*).	53.00	Changes in suspended solids (water clarity)	Yes. Great cormorant was identified through the 100 km bird AoS and may have ecological connectivity to the Project.	No	Yes
River Wye/ Afon Gwy SAC *(component SSSIs include e.g. River Wye SSSI, Upper Wye Gorge SSSI and Lower Wye Gorge SSSI)*	**Annex I habitats (primary):** Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). **Annex I habitats (not primary):** Transition mires and quaking bogs (7140). **Annex II species (primary):** Atlantic salmon (*Salmo salar*); Sea lamprey (*Petromyzon marinus*); River lamprey (*Lampetra fluviatilis*); Brook lamprey (*Lampetra planeri*); Twaite shad (*Alosa fallax*); White-clawed crayfish (*Austropotamobius pallipes*); Bullhead (*Cottus gobio*); Otter (*Lutra lutra*). **Annex II species (not primary):** Allis shad (*Alosa alosa*).	68.98	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Atlantic salmon, sea lamprey, river lamprey, twaite shad and allis shad were identified through the fish screening process and may have ecological connectivity to the Project. No. No credible source-pathway-receptor relationship has been identified for water courses with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, transition mires and quaking bogs, brook lamprey, white-clawed crayfish or bullhead.	No	Yes

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
Afon Teifi / River Teifi SAC *(component SSSIs include e.g. Afon Teifi SSSI, Cors Caron SSSI and Teifi Marshes SSSI)*	**Annex I habitats (primary):** Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). **Annex I habitats (not primary):** Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea (3130). **Annex II species (primary):** Atlantic salmon (*Salmo salar*); Brook lamprey (*Lampetra planeri*); River lamprey (*Lampetra fluviatilis*); Bullhead (*Cottus gobio*); Otter (*Lutra lutra*); Floating water-plantain (*Luronium natans*). **Annex II species (not primary):** Sea lamprey (*Petromyzon marinus*).	75.40	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Atlantic salmon, sea lamprey and river lamprey were identified through the fish screening process and may have ecological connectivity to the Project. No. No credible source-pathway-receptor relationship has been identified for water courses with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, brook lamprey, bullhead or floating water-plantain.	No	Yes
Dee Estuary/ Aber Dyfrdwy SAC *(component SSSIs include e.g. Dee Estuary SSSI and Inner Marsh Farm SSSI)*	**Annex I habitats (primary):** Mudflats and sandflats (1140); Salicornia habitats (1310); Atlantic salt meadows (1330). **Annex I habitats (not primary):** Estuaries (1130); Annual vegetation of drift lines (1210); Vegetated sea cliffs (1230); Embryonic dunes (2110); White dunes (2120); Grey dunes (2130); Humid dune slacks (2190). **Annex II species (not primary):** Sea lamprey (*Petromyzon marinus*); River lamprey (*Lampetra fluviatilis*); Petalwort (*Petalophyllum ralfsii*).	83.58	Changes in suspended solids (water clarity); Transition elements & organo-metal contamination; Barrier to species movement; Underwater noise changes	Yes. Sea lamprey and river lamprey were identified through the fish screening process and may have ecological connectivity to the Project. No. The qualifying Annex I habitat features and petalwort do not overlap the modelled sediment deposition or SSC footprints, and no credible source-pathway-receptor relationship has been identified.	No	Yes
The Dee Estuary SPA *(component SSSIs include e.g. Dee Estuary SSSI and Inner Marsh Farm SSSI)*	**Features:** Common tern (*Sterna hirundo*); Sandwich tern (*Thalasseus sandvicensis*); Common redshank (*Tringa totanus*); Little tern (Sterna albifrons); Northern pintail (Anas acuta); Eurasian teal (Anas crecca); Dunlin (Calidris alpina alpina); Red knot (Calidris canutus); Eurasian oystercatcher (Haematopus ostralegus); Bar-tailed godwit (Limosa	83.80	Changes in suspended solids (water clarity)	Yes. Common tern, sandwich tern and little tern were identified through the 100 km bird AoS and may have ecological connectivity to the Project. No. Common redshank is primarily associated with intertidal and coastal supporting habitats that would not be affected by the Project, and no credible	No	Yes

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
	lapponica); Black-tailed godwit (Limosa limosa islandica); Eurasian curlew (Numenius arquata); Grey plover (Pluvialis squatarola); Common shelduck (Tadorna tadorna); Waterbird assemblage.			source-pathway-receptor relationship has been identified. No additional source-pathway-receptor relationship has been identified for the waterbird assemblage beyond that represented by the individual qualifying species screened into the assessment.		
Irish Sea Front SPA	**Features:** Manx shearwater (*Puffinus puffinus)*	90.50	Changes in suspended solids (water clarity)	No. Although the Project is located within the published mean-maximum foraging range, only a small area of nearshore habitat would be affected by temporary increases in SSC. Suitable foraging habitat within the affected area is limited and the species is considered unlikely to occur regularly within the Project footprint. Therefore, no meaningful source-pathway-receptor relationship is identified.	No	No
North-West Irish Sea SPA	**Features:** Red-throated Diver (*Gavia stellata);* Great Northern Diver (*Gavia immer*); Fulmar (Fulmarus *glacialis); Manx Shearwater (Puffinus puffinus*); Cormorant (*Phalacrocorax carbo*); Shag (*Phalacrocorax aristotelis*); Common Scoter (*Melanitta nigra*); Black-headed Gull (*Chroicocephalus ridibundus*); Common Gull (*Larus canus*); Lesser Black-backed Gull (*Larus fuscus*); Herring Gull (*Larus argentatus*); Great Black-backed Gull (*Larus marinus*); Kittiwake (*Rissa tridactyla*); Roseate Tern (*Sterna dougallii*); Common Tern (*Sterna hirundo*); Arctic Tern (*Sterna paradisaea*); Guillemot (*Uria aalge*); Razorbill (*Alca torda*); Puffin (*Fratercula arctica*); Little Gull (*Hydrocoloeus minutus*); Little Tern (*Sternula albifrons*)	91.49	Changes in suspended solids (water clarity)	No. Although the Project lies within the published mean-maximum foraging ranges of several qualifying species, the affected area comprises a small and temporary SSC footprint within nearshore waters. Given the limited extent of suitable foraging habitat affected and the highly localised nature of the impact, no meaningful source-pathway-receptor relationship has been identified.	No	No

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
River Usk / Afon Wysg SAC *(component SSSIs include e.g. River Usk SSSI, Sugar Loaf Woodlands SSSI and Clydach Gorge SSSI)*	**Annex I habitats (not primary):** Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). **Annex II species (primary):** Atlantic salmon (*Salmo salar*); Sea lamprey (*Petromyzon marinus*); Brook lamprey (*Lampetra planeri*); River lamprey (*Lampetra fluviatilis*); Twaite shad (*Alosa fallax*); Bullhead (*Cottus gobio*); Otter (*Lutra lutra*). **Annex II species (not primary):** Allis shad (*Alosa alosa*).	108.79	No source-pathway-receptor relationship identified	No. Although Atlantic salmon was identified through the regional migratory fish screening approach, closer SACs designated for Atlantic salmon and other migratory fish features have been taken forward for assessment. No additional source-pathway-receptor relationship has been identified and there is no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance.	No	No
Rockabill to Dalkey Island SAC	**Annex I habitats (not primary):** Reefs (1170) **Annex II species (primary)**: Harbour porpoise (*Phocoena phocoena*).	113.60	No source-pathway-receptor relationship identified	No. Although harbour porpoise occurs within the same Management Unit as the Project, closer SACs designated for harbour porpoise have been taken forward for assessment. No additional source-pathway-receptor relationship has been identified and there is no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance.	No	No
Pembrokeshire Marine / Sir Benfro Forol SAC *(component SSSIs include e.g. Skomer Island SSSI, Ramsey Island SSSI and Marloes Peninsula SSSI)*	**Annex I habitats (primary):** Estuaries (1130); Large shallow inlets and bays (1160); Reefs (1170). **Annex I habitats (not primary):** Sandbanks (1110); Mudflats and sandflats (1140); Atlantic salt meadows (1330); Coastal lagoons (1150); Sea caves (8330). **Annex II species (primary):** Grey seal (*Halichoerus grypus*); Shore duck (Rumex rupestris). **Annex II species (not primary):** River lamprey (*Lampetra fluviatilis*); Twaite shad (*Alosa*	118.23	No source-pathway-receptor relationship identified	No. Although grey seal occurs within the relevant screening area applied to the assessment, closer SACs designated for grey seal have been taken forward for assessment. No additional source-pathway-receptor relationship has been identified and there is no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance.	No	No

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
	fallax); Otter (*Lutra lutra*); Sea lamprey (*Petromyzon marinus*); Allis shad (*Alosa alosa*).					
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgwm a Moroedd Penfro SPA	**Features:** Manx shearwater (*Puffinus puffinus*); European storm-petrel (*Hydrobates pelagicus*); Lesser black-backed gull (*Larus fuscus*); Atlantic puffin (*Fratercula arctica*); Short-eared owl (*Asio flammeus*); Red-billed chough (*Pyrrhocorax pyrrhocorax*).	136.49	No source-pathway-receptor relationship identified		No	No
Murlough SAC *(component SSSIs include e.g. Murlough National Nature Reserve SSSI)*	**Annex I habitats (primary):** Fixed coastal dunes; Atlantic decalcified fixed dunes. **Annex I habitats (not primary):** Sandbanks (1110); Mudflats and sandflats (1140); Atlantic salt meadows (1330); Embryonic dunes; White dunes; Dunes with Salix repens. **Annex II species (primary):** Marsh fritillary (*Euphydryas Aurinia*). **Annex II species (not primary):** Harbour seal (*Phoca vitulina).*	169.21	No source-pathway-receptor relationship identified	No. Although harbour seal was considered during site selection, the SAC lies beyond the 50 km harbour seal screening AoS applied to the assessment. No credible source-pathway-receptor relationship has been identified.	No	No
Severn Estuary RAMSAR *(component SSSIs include e.g. Severn Estuary SSSI and Upper Severn Estuary SSSI)*	**Features:** Atlantic salmon (*Salmo salar*); Sea lamprey (*Petromyzon marinus*); River lamprey (*Lampetra fluviatilis*); Allis shad (*Alosa alosa*); Twaite shad (*Alosa fallax*); Waterbird assemblage.	176.71	No source-pathway-receptor relationship identified	No. Although Atlantic salmon and other migratory fish features were identified through the regional migratory fish screening approach, closer European sites designated for these features have been taken forward for assessment. No additional source-pathway-receptor relationship has been identified and there is no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance.	No	No
Hook head SAC	**Annex I habitats:** Large shallow inlets and bays (1160); Reefs (1170); Vegetated sea cliffs (1230).	179.27	No source-pathway-receptor relationship identified	No. Although bottlenose dolphin and harbour porpoise occur within the relevant marine mammal screening areas, closer SACs designated for these features have	No	No

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
	Annex II species: Bottlenose dolphin (*Tursiops truncatus*); Harbour porpoise (*Phocoena phocoena*).			been taken forward for assessment. No additional source-pathway-receptor relationship has been identified and there is no credible mechanism by which the localised and temporary pressures associated with the Project would increase with distance.		
Copeland Islands SPA *(component SSSIs include e.g. Copeland Islands SSSI)*	**Features:** Arctic tern (*Sterna paradisaea*); Manx shearwater (*Puffinus puffinus*).	211.97	No source-pathway-receptor relationship identified	No. Although the Project lies within the published mean-maximum foraging range of Manx shearwater, extensive alternative foraging habitat is available throughout the species' range and there is no evidence that the Project area is functionally linked to the SPA population. Given the localised and temporary nature of the predicted effects, no credible source-pathway-receptor relationship has been identified.	No	No
Cruagh Island SPA	**Features:** Barnacle goose (*Branta leucopsis*); Manx shearwater (*Puffinus puffinus*);	394.67				
Deenish Islands and Scariff Island SPA	**Features:** Northern fulmar (*Fulmarus glacialis*); European storm-petrel (*Hydrobates pelagicus*); Lesser black-backed gull (*Larus fuscus*); Manx shearwater (*Puffinus puffinus*); Arctic tern (*Sterna paradisaea*).	416.56				
Blasket Islands SPA	**Features:** Razorbill (*Alca torda*); Atlantic puffin (*Fratercula arctica*); Northern fulmar (*Fulmarus glacialis*); European storm-petrel (*Hydrobates pelagicus*); Herring gull (*Larus argentatus*); Lesser black-backed gull (*Larus fuscus*); European shag (*Phalacrocorax aristotelis*); Manx shearwater (*Puffinus puffinus*); Red-billed chough (*Pyrrhocorax pyrrhocorax*); Black-legged kittiwake (*Rissa tridactyla*); Arctic tern (*Sterna paradisaea*).	422.98				
Skelligs SPA	**Features:** Atlantic puffin (*Fratercula arctica*); Northern fulmar (*Fulmarus glacialis*); European storm-petrel (*Hydrobates pelagicus*); Northern gannet (*Morus*	433.77				

Site Name	Qualifying interests (all designated features)	Distance (km)	Relevant project-related pressure(s)	Likelihood of interaction with designated feature(s)	In-combination effects?	Screened into LSE Assessment?
	bassanus); Manx shearwater (*Puffinus puffinus*); Black-legged kittiwake (*Rissa tridactyla*); Common guillemot (*Uria aalge*).					
Rum SPA *(component SSSIs include e.g. Rum SSSI)*	**Features:** Red-throated diver (*Gavia stellata*); Manx shearwater (*Puffinus puffinus*); Golden eagle (*Aquila chrysaetos*); Black-legged kittiwake (*Rissa tridactyla*); Common guillemot (*Uria aalge*).	461.64				
St Kilda SPA *(component SSSIs include e.g. St Kilda SSSI)*	**Features:** Northern fulmar (*Fulmarus glacialis*); Manx shearwater (*Puffinus puffinus*); European storm-petrel (*Hydrobates pelagicus*); Leach's storm-petrel (*Oceanodroma leucorhoa*); Northern gannet (*Morus bassanus*); Great skua (*Catharacta skua*); Black-legged kittiwake (*Rissa tridactyla*); Common guillemot (*Uria aalge*); Razorbill (*Alca torda*); Atlantic puffin (*Fratercula arctica*).	599.41				

5.2 Test of Likely Significant Effects

5.2.1 Introduction

The initial screening process identified 36 European sites within the search areas defined in Section 4.7. Of these, 17 sites were screened into the test of LSE and are assessed in Sections 5.2.2 to 5.2.5. The remaining 19 sites were screened out as no plausible pressure-pathway-receptor relationship was identified between the Project and their qualifying features. In these cases, no credible mechanism exists by which the Project could affect the sites' qualifying features or undermine their conservation objectives, either alone or in-combination with other plans and projects.

Seven Project-related pressures were identified as having the potential to affect the qualifying features of European sites:

- Smothering and siltation rate changes;
- Physical change (to another sediment type);
- Changes in suspended solids (water clarity);
- Transition elements and organo-metal (e.g. TBT) contamination;
- Introduction or spread of INIS;
- Barrier to species movement; and
- Underwater noise changes.

The following sections assess whether these pressures could result in LSEs on the qualifying features of European sites screened into the assessment, either alone or in-combination with other relevant plans and projects, taking account of the conservation objectives of each site.

5.2.2 Assessment of LSE for Annex I Habitats

PLAS SAC was the only European site identified for further consideration in relation to Annex I habitat features. The site was screened into the assessment due to the overlap between the modelled sediment deposition and SSC footprints and qualifying Annex I habitats within the SAC .

The SAC is underpinned by a number of component SSSIs, including Morfa Nefyn SSSI, Ynysoedd Sant Tudwal SSSI and Glannau Aberdaron ac Ynys Enlli SSSI. Of particular relevance to this assessment is Morfa Nefyn SSSI, which includes the Porthdinllaen seagrass meadow, one of the largest seagrass meadows in North Wales. This habitat forms part of the Mudflats and sandflats not covered by seawater at low tide (1140) Annex I feature for which PLAS SAC is designated and is therefore considered within the assessment.

Table 5-2 summarises the relevant qualifying features and conservation objectives considered in the assessment. The qualifying habitats comprise a range of intertidal and subtidal marine habitats that occur within the modelled sediment deposition and SSC footprints associated with the Project.

Table 5-2 Pen Llŷn a'r Sarnau / Lleyn Pensinsula and the Sarnau SAC Qualifying Annex I Habitats and Conservation Objectives

Site name	Qualifying Annex I habitats screened into the assessment	Conservation objectives
PLAS SAC	▪ Reefs (1170) ▪ Large shallow inlets and bays (1160) ▪ Estuaries (1130)	Ensure that the integrity of the site is maintained or restored, as appropriate, and that the site contributes to achieving the favourable conservation status of its qualifying features by maintaining or restoring:

Site name	Qualifying Annex I habitats screened into the assessment	Conservation objectives
	▪ Mudflats and sandflats not covered by seawater at low tide (1140)	▪ The overall distribution and extent of the qualifying habitats within the site; ▪ The structure and function of the qualifying habitats and their typical species; ▪ The physical, biological and chemical processes that support the qualifying habitats; ▪ The presence, abundance, condition and diversity of typical species associated with the qualifying habitats; and ▪ The ability of the qualifying habitats to sustain themselves in the long term as functioning components of the marine ecosystem.

Source: JNCC (2025a)

The screening assessment below considers whether each impact pathway has the potential to affect one or more of the conservation objective attributes identified above, including habitat extent and distribution, habitat structure and function, supporting physical, biological and chemical processes, and associated typical species.

5.2.2.2 Smothering and siltation rate changes

The proposed disposal site is located within PLAS SAC and dredge plume modelling predicts a maximum sediment deposition footprint of approximately 53.8 km^2 (Figure 4-3; P284_ENV_006). The modelled footprint overlaps qualifying Annex I habitat features of the SAC, including reefs (1170), estuaries (1130), large shallow inlets and bays (1160), and mudflats and sandflats not covered by seawater at low tide (1140). The footprint also overlaps seagrass communities associated with the Mudflats and sandflats not covered by seawater at low tide (1140) qualifying feature. Whilst deposition is generally predicted to be low across sensitive habitat receptors, deposition exceeding 2 mm is predicted at a small number of receptors, with a maximum predicted deposition of 18 mm at one seagrass receptor (Intertek, 2026b).

As sediment deposition is predicted within the SAC and overlaps qualifying habitat features, a credible pressure-pathway-receptor relationship exists. Therefore, the potential for smothering and siltation to adversely affect the distribution, extent, structure and function of qualifying habitats, or the physical, biological and chemical processes that support them, cannot be excluded.

An LSE cannot be excluded, and this pressure is therefore taken forward to Stage 2 AA.

5.2.2.3 Physical change (to another sediment type)

The proposed disposal site is located within PLAS SAC and dredge plume modelling predicts a maximum deposition footprint of approximately 53.8 km^2 (Figure 4-3; P284_ENV_006). The modelled footprint overlaps qualifying habitat features of the SAC, including mudflats and sandflats not covered by seawater at low tide (1140), as well as associated seagrass communities.

The proposed activities involve the deposition of predominantly fine-grained silts and clays. Where deposited material accumulates, there is potential for localised changes in sediment composition and seabed characteristics. Such changes could alter habitat suitability for benthic species and communities associated with existing sediment conditions and may affect the structure and function of qualifying habitats and the ecological communities they support.

As the disposal activities occur within PLAS SAC and the modelled deposition footprint overlaps qualifying habitat features, a credible pressure-pathway-receptor relationship exists. Therefore, the potential for physical change to another sediment type to affect the distribution, extent, structure and

function of qualifying habitats, or the physical, biological and chemical processes that support them, cannot be excluded.

An LSE cannot be excluded, and this pressure is therefore taken forward to Stage 2 AA.

5.2.2.4 Changes in suspended solids (water clarity)

Fine sediment discharged at the disposal location may remain suspended within the water column before settling, resulting in temporary increases in SSC and turbidity. This has the potential to affect qualifying Annex I habitats through reduced light penetration, changes in water quality and alterations to supporting ecological processes.

Sediment dispersion modelling predicts a maximum SSC footprint of approximately 225.3 km^2 (Figure 4-3; P284_ENV_006). The modelled footprint overlaps qualifying habitat features of PLAS SAC, including Reefs (1170), Estuaries (1130), Large shallow inlets and bays (1160), and Mudflats and sandflats not covered by seawater at low tide (1140). The footprint also overlaps seagrass communities associated with the Mudflats and sandflats not covered by seawater at low tide (1140) qualifying feature. As the Project has the potential to affect qualifying habitats and the physical, biological and chemical processes upon which they depend, a credible pressure-pathway-receptor relationship exists.

Therefore, the potential for increased SSC and turbidity to affect the extent, distribution, structure, function or supporting processes of qualifying habitats cannot be excluded at the screening stage.

An LSE cannot be excluded, and this pressure is therefore taken forward to Stage 2 AA.

5.2.2.5 Transition elements and organo-metal contamination

Sediment chemistry analysis identified contaminants within the dredged material, including elevated concentrations of nickel, lead and zinc in some samples (SOCOTEC & Ocean Ecology, 2026). Dredge plume modelling predicts an SSC footprint of approximately 225.3 km^2, which overlaps qualifying habitat features of PLAS SAC, including Reefs (1170), Estuaries (1130), Large shallow inlets and bays (1160), and Mudflats and sandflats not covered by seawater at low tide (1140) (Figure 4-3; P284_ENV_006). The footprint also overlaps seagrass communities associated with the Mudflats and sandflats not covered by seawater at low tide (1140) qualifying feature. During disposal activities, contaminants associated with fine sediment particles may be mobilised and dispersed through the water column, resulting in a potential exposure pathway to qualifying habitats and the species and ecological processes that support them.

As contaminants associated with the dredged material may be transported within the modelled SSC footprint and qualifying Annex I habitat features occur within this area, a credible pressure-pathway-receptor relationship exists. Therefore, the potential for transition element and organo-metal contamination to affect the structure and function of qualifying habitats, or the physical, biological and chemical processes that support them, cannot be excluded at the screening stage.

An LSE cannot be excluded, and this pressure is therefore taken forward to Stage 2 AA.

5.2.2.6 Introduction or spread of Invasive Non-Native Species

The establishment of INIS within PLAS SAC could affect qualifying habitats through changes in community composition, habitat structure and ecosystem functioning.

The proposed works comprise maintenance dredging within Pwllheli Harbour and the disposal of dredged material approximately 200 m offshore within the same local coastal environment. The Project involves the redistribution of sediment within the same local coastal system from which it originated and therefore does not provide a credible mechanism for the introduction or spread of INIS via sediment transfer.

A BRA identified biofouling of vessels and equipment as the principal potential pathway for INIS introduction. The dredger will be transported to the Project area by road and assembled on site, reducing the potential for INIS transfer via retained ballast, bilge or hopper water from other ports. Whilst the final dredger has not yet been selected, vessel inspections, maintenance records and any required cleaning or decontamination measures will be documented through a Project Biosecurity Plan and vessel register.

Taking account of the nature of the works, the local redistribution of sediment, and the limited potential pathways for INIS introduction, no credible pressure-pathway receptor relationship has been identified between the Project and the qualifying Annex I habitat features of PLAS SAC.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.3 Assessment of LSE for Annex II Diadromous Fish and Associated Freshwater Features

A total of seven European sites were identified for further consideration of LSEs on Annex II diadromous fish and associated freshwater features. Sites were identified using the 100 km AoS described in Section 4.7 and in accordance with the sequential screening approach outlined in Section 4.7.3. Under this approach, where European sites designated for the same qualifying features were identified closer to the Project and taken forward for assessment, more distant sites were screened out where no additional pressure-pathway-receptor relationship was identified.

Several of the SACs considered are underpinned by riverine SSSIs that support the freshwater habitats upon which the qualifying species depend. Particular consideration is given to freshwater pearl mussel within the Afon Eden - Cors Goch Trawsfynydd SAC, as successful completion of its life cycle depends on salmonid host fish during the parasitic glochidial stage (Marwaha *et al.,* 2021). The conservation status of freshwater pearl mussel is therefore closely linked to that of Atlantic salmon within the catchment.

The sites identified for further consideration comprise:

- Afon Eden - Cors Goch Trawsfynydd SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Afon Teifi SAC
- Cardigan Bay / Bae Ceredigion SAC
- Dee Estuary / Aber Dyfrdwy SAC
- River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC
- River Wye/ Afon Gwy SAC

Table 5-3 provides a summary of the European sites, qualifying features and relevant conservation objectives considered in the LSE assessment. The sites comprise a range of qualifying diadromous fish and associated freshwater features that utilise freshwater, estuarine and coastal environments during different stages of their life cycles.

Table 5-3 European Sites Designated for Annex II Diadromous Fish and Associated Freshwater Features Screened into the Assessment

Site name	Qualifying Annex II diadromous fish and associated freshwater features screened into the assessment	Conservation objectives
Afon Eden - Cors Goch Trawsfynydd SAC	▪ Atlantic salmon (*Salmo salar*)	Ensure that the integrity of the SAC is maintained or restored, as appropriate,

Site name	Qualifying Annex II diadromous fish and associated freshwater features screened into the assessment	Conservation objectives
	▪ Freshwater pearl mussel (*Margaritifera margaritifera*)	and that the site contributes to achieving the favourable conservation status of its qualifying species and associated freshwater features by maintaining or restoring: ▪ The population of the qualifying species; ▪ The distribution of the qualifying species within the site; ▪ The extent, distribution, structure and function of habitats supporting the qualifying species; and ▪ The supporting processes on which the qualifying species and their habitats rely.
Afon Gwyrfai a Llyn Cwellyn SAC	▪ Atlantic salmon (*Salmo salar*)	
Afon Teifi / River Teifi SAC	▪ Atlantic salmon (*Salmo salar*) ▪ River lamprey (*Lampetra fluviatilis*) ▪ Sea lamprey (*Petromyzon marinus*)	
Cardigan Bay / Bae Ceredigion SAC	▪ River lamprey (*Lampetra fluviatilis*) ▪ Sea lamprey (*Petromyzon marinus*)	
Dee Estuary / Aber Dyfrdwy SAC	▪ River lamprey (*Lampetra fluviatilis*) ▪ Sea lamprey (*Petromyzon marinus*)	
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC	▪ Atlantic salmon (*Salmo salar*) ▪ River lamprey (*Lampetra fluviatilis*) ▪ Sea lamprey (*Petromyzon marinus*)	
River Wye / Afon Gwy SAC	▪ Atlantic salmon (*Salmo salar*) ▪ River lamprey (*Lampetra fluviatilis*) ▪ Sea lamprey (*Petromyzon marinus*) ▪ Twaite shad (*Alosa fallax*) ▪ Allis shad (*Alosa alosa*)	

Source: JNCC (2025a)

The screening assessment below considers whether each impact pathway has the potential to affect one or more of the conservation objective attributes identified above, namely the population and distribution of qualifying species, the extent, distribution, structure and function of supporting habitats, and the processes upon which those species and habitats rely.

5.2.3.2 Changes in suspended solids (water clarity)

Fine sediment discharged at the disposal location may remain suspended within the water column before settling, resulting in temporary increases in SSC and turbidity. This has the potential to affect qualifying Annex II diadromous fish features during migration through changes in water clarity and associated behavioural responses. Freshwater pearl mussel has also been considered due to its reliance on Atlantic salmon as a host during the parasitic glochidial stage of its life cycle.

Sediment dispersion modelling predicts a maximum SSC footprint of approximately 225.3 km² (Figure 4-3; P284_ENV_006). Atlantic salmon, river lamprey, sea lamprey, twaite shad and allis shad may pass through the modelled footprint during migration between freshwater and marine environments and may therefore be exposed to temporary increases in SSC and turbidity. However, elevated SSC is predicted to be localised to the vicinity of the disposal site and temporary in nature. The Project would not affect freshwater habitats, spawning grounds, migration routes, population abundance, species distribution, or habitats supporting the qualifying features of the assessed European sites. Extensive alternative migration routes and suitable habitat would remain available throughout the wider marine environment.

Given the limited spatial extent and temporary nature of the predicted SSC increases, and in the absence of any pathway to freshwater habitats supporting the qualifying features, no credible mechanism has been identified by which the Project could affect the population or distribution of

qualifying species, the extent, distribution, structure and function of supporting habitats, or the processes on which those species rely.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.3.3 Transition elements & organo-metal contamination

Atlantic salmon, river lamprey, sea lamprey, twaite shad and allis shad may be exposed to contaminants associated with suspended sediments whilst migrating through coastal waters. Freshwater pearl mussel has also been considered due to its reliance on Atlantic salmon as a host during the parasitic glochidial stage of its life cycle.

Sediment chemistry analysis identified concentrations of lead, nickel and zinc exceeding Cefas Action Level 1 thresholds in some samples. However, no determinands exceeded Cefas Action Level 2 thresholds (SOCOTEC & Ocean Ecology, 2026). Dredge plume modelling predicts an SSC footprint of approximately 225.3 km², within which sediment-bound contaminants may be temporarily redistributed through the mobilisation and dispersion of fine sediment particles (Figure 4-3; P284_ENV_006). The Project involves the redistribution of sediment within the same coastal sedimentary system and would not introduce contaminants from an external source. Furthermore, contaminant concentrations are considered representative of the local sedimentary environment and are not expected to result in a meaningful deterioration in sediment or water quality. The Project would not affect freshwater habitats, spawning grounds, migration routes, population abundance, species distribution, or habitats supporting the qualifying features of the assessed European sites.

Given the localised and temporary nature of any contaminant redistribution, and in the absence of any pathway to freshwater habitats supporting the qualifying features, no credible mechanism has been identified by which the Project could affect the population or distribution of qualifying species, supporting habitats, or the physical, biological and chemical processes upon which those features depend.

An LSE can be excluded – this pressure is screened out from further assessment.

5.2.3.4 Barrier to species movement

Atlantic salmon, river lamprey, sea lamprey, twaite shad and allis shad rely on access to migration routes between feeding, spawning and nursery habitats to complete their life cycles. Freshwater pearl mussel has also been considered due to its reliance on Atlantic salmon as a host during the parasitic glochidial stage of its life cycle.

Disposal activities may result in temporary increases in turbidity and vessel activity within the vicinity of the disposal site, which could give rise to localised behavioural responses. However, the Project would not create a physical barrier to movement, and any disturbance would be temporary, localised and confined to a small area of the wider coastal environment. The Project would not affect migration routes, access to spawning habitats, population abundance, species distribution, or the habitats supporting the qualifying features of the assessed European sites. Extensive alternative migration routes and suitable habitat would remain available throughout the wider marine environment.

Given the absence of any physical obstruction to movement and the temporary and localised nature of any disturbance, no credible mechanism has been identified by which the Project could act as a barrier to movement or undermine the conservation objectives of the qualifying fish and associated freshwater features of the assessed SACs.

An LSE can be excluded – this pressure is screened out from further assessment.

5.2.3.5 Underwater noise changes

Qualifying fish features may be exposed to underwater noise whilst migrating through coastal waters. The Project does not involve pile driving, impact hammering or other activities typically associated

with elevated underwater noise levels. Atlantic salmon, sea lamprey and river lamprey are generally considered less sensitive to underwater sound than specialist hearing fish species. Whilst allis shad and twaite shad may be more sensitive to underwater noise, any noise generated by the proposed disposal activities would be limited to routine vessel operations, would be temporary and localised in extent, and would be comparable to existing vessel traffic.

The Project would not affect migration routes, access to supporting habitats, population abundance, species distribution, or habitat availability within the assessed SACs. Given the temporary and localised nature of the predicted underwater noise and the absence of activities associated with significant underwater sound generation, no credible mechanism has been identified by which the Project could affect the population or distribution of qualifying species, access to supporting habitats, or the processes upon which those species depend.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.4 Assessment of LSE for Annex II Marine Mammals

A total of six European sites were identified for further consideration of LSEs on Annex II marine mammal features. Sites were identified using the species-specific AoS described in Section 4.7, informed by MMMUs, foraging ranges, home ranges and published disturbance distances for each qualifying species. Cetacean features were identified using the relevant MMMU framework, whilst seal and otter features were identified using species-specific foraging and home range information.

Application of the screening methodology described in Section 4.7.5, including the use of MMMUs and a sequential screening approach where appropriate, resulted in six European sites being taken forward for assessment (NRW, 2025). NRW's species-specific advice for bottlenose dolphins was also applied, with both PLAS SAC and Cardigan Bay SAC retained for assessment.

The sites identified for further consideration are grouped below by qualifying feature:

Harbour porpoise (*Phocoena phocoena*):

- North Anglesey Marine / Gogledd Môn Forol SAC
- West Wales Marine / Gorllewin Cymru Forol SAC

Bottlenose dolphin (*Tursiops truncatus*):

- PLAS SAC
- Cardigan Bay / Bae Ceredigion SAC

Grey seal (*Halichoerus grypus*):

- PLAS SAC
- Cardigan Bay / Bae Ceredigion SAC

Otter (*Lutra lutra*):

- PLAS SAC
- Afon Gwyrfai a Llyn Cwellyn SAC
- Afon Eden – Cors Goch Trawsfynydd SAC

The conservation objectives for the qualifying marine mammal features considered in the assessment require the maintenance or restoration of the population and distribution of the qualifying species within the site, the habitats supporting those species, and the processes on which the qualifying species rely. The assessment below considers whether each impact pathway has the potential to affect one or more of these conservation objective attributes.

5.2.4.1 Changes in suspended solids (water clarity)

Harbour porpoise, bottlenose dolphin, grey seal and otter may utilise coastal waters within the ZoI of the Project and could be exposed to temporary increases in SSC and turbidity. Elevated SSC and turbidity may affect these species indirectly through temporary changes in prey availability, prey behaviour or local foraging conditions.

Sediment dispersion modelling predicts a maximum SSC footprint of approximately 225.3 km² (Figure 4-3; P284_ENV_006). However, elevated SSC is predicted to be temporary and localised within the vicinity of the disposal site. Harbour porpoise, bottlenose dolphin, grey seal and otter are highly mobile species with access to extensive alternative foraging habitat throughout the relevant MMMUs, home ranges and wider marine environment. The Project would not affect population abundance, species distribution, breeding sites, supporting habitats, prey resources or the ecological processes on which the qualifying marine mammal features depend.

Given the limited spatial extent and temporary nature of the predicted SSC increases, no credible mechanism has been identified by which the Project could adversely affect the population, distribution, supporting habitats or ecological processes that underpin the conservation objectives of the qualifying marine mammal features.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.4.2 Transition elements & organo-metal contamination

Qualifying marine mammal features may be exposed indirectly through contaminants present within prey species or the wider food web.

Sediment chemistry analysis identified concentrations of lead, nickel and zinc exceeding Cefas Action Level 1 thresholds in some samples. However, no determinands exceeded Cefas Action Level 2 thresholds (SOCOTEC & Ocean Ecology, 2026). Dredge plume modelling predicts an SSC footprint of approximately 225.3 km², within which sediment-bound contaminants may be temporarily mobilised and dispersed through the water column (Figure 4-3; P284_ENV_006). The proposed activities involve the redistribution of sediments within the existing local sedimentary system rather than the introduction of contaminants from an external source. Therefore, any contaminant exposure pathway would be indirect, localised and temporary in nature.

Harbour porpoise, bottlenose dolphin, grey seal and otter are highly mobile species with access to extensive alternative foraging habitat throughout the relevant management units, home ranges and wider marine environment. The Project would not affect prey resources, population abundance, species distribution, breeding sites, supporting habitats or the ecological processes on which the qualifying features depend.

Given the localised and temporary nature of any contaminant redistribution, no credible mechanism has been identified by which the Project could adversely affect the population, distribution, supporting habitats or ecological processes that underpin the conservation objectives of the qualifying marine mammal features.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.4.3 Barrier to species movement

Harbour porpoise, bottlenose dolphin, grey seal and otter are highly mobile species that utilise extensive areas of coastal and marine habitat.

Whilst temporary increases in turbidity and vessel activity may occur during operations, the Project would not create a permanent barrier to movement. The area affected by the Project represents a very small proportion of the available habitat within the relevant SACs and wider marine environment. Extensive alternative foraging, commuting and resting habitat would remain available throughout the

duration of the works. The Project would not restrict access to supporting habitats or affect the movement of qualifying features between important feeding, resting or breeding areas.

Given the absence of any physical obstruction to movement and the temporary and localised nature of the proposed activities, no credible mechanism has been identified by which the Project could act as a barrier to movement or adversely affect the population, distribution, supporting habitats, or ecological processes on which the qualifying marine mammal features depend. Therefore, the Project would not adversely affect the population, distribution, supporting habitats or ecological processes underpinning the conservation objectives of the qualifying marine mammal features.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.4.4 Underwater noise changes

Harbour porpoise, bottlenose dolphin, grey seal and otter may be exposed to underwater noise whilst utilising coastal waters within the ZoI of the Project.

The proposed works do not include impact piling, percussive activities or other sources of high-intensity impulsive underwater noise. Any underwater noise generated by vessel movements would be temporary, localised and comparable to existing vessel activity within and around Pwllheli Harbour. Whilst temporary behavioural responses cannot be ruled out, any disturbance would be short-term and confined to a small area of the wider marine environment. Maximum EDRs of 5 km for harbour porpoise, 50 km for bottlenose dolphin and 45 km for grey seal were considered during the screening assessment, together with the relevant species Management Units. Harbour porpoise, bottlenose dolphin, grey seal and otter are highly mobile species with access to extensive alternative foraging, commuting and resting habitat throughout the wider marine environment.

The Project would not result in long-term displacement, restrict access to supporting habitats, or affect the population abundance, distribution, supporting habitats or ecological processes of the qualifying marine mammal features. Given the temporary and localised nature of the predicted underwater noise, and the absence of activities associated with significant underwater sound generation, no credible mechanism has been identified by which underwater noise associated with the Project could undermine the conservation objectives of the qualifying marine mammal features of the assessed SACs.

An LSE can be excluded, and this pressure is screened out from further assessment.

5.2.5 Assessment of LSE for Ornithological Features

A total of seven European sites were identified for further consideration of LSEs on qualifying ornithological features. Sites were identified using the 100 km AoS described in Section 4.7.4, which was applied to account for the mobility of SPA bird features and their potential ecological connectivity to the Project through the use of coastal and marine foraging habitats. Site selection was informed by the distribution of qualifying species, published foraging ranges and the potential for overlap with the identified impact pathways.

The sites identified for further consideration are listed below:

- Northern Cardigan Bay / Gogledd Bae Ceredigion SPA
- Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA
- Anglesey Terns / Morwenoliaid Ynys Môn SPA
- Traeth Lafan / Lavan Sands, Conway Bay SPA
- Liverpool Bay SPA
- Ynys Seiriol / Puffin Island SPA

- The Dee Estuary SPA

Table 5-4 provides a summary of the European sites, qualifying features and relevant conservation objectives considered in the LSE assessment. The sites comprise a range of qualifying seabird, waterbird and waterbird assemblage features that may utilise coastal and marine waters within the AoS for foraging, commuting and other ecological behaviours.

Table 5-4 European Sites and Qualifying Ornithological Features Screened into the Assessment

Site name	Qualifying ornithological features screened into the assessment	Conservation objectives
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA	▪ Red-throated diver (*Gavia stellata*)	Ensure that the integrity of the SPA is maintained or restored, as appropriate, and that the site contributes to achieving the favourable conservation status of its qualifying bird features by maintaining or restoring: ▪ The populations of qualifying species; ▪ The distribution of qualifying species within the site; ▪ The extent, distribution, structure and function of habitats supporting the qualifying species; ▪ The availability of supporting habitats and prey resources; and ▪ The supporting processes on which the qualifying species and their habitats rely.
Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA	▪ Manx shearwater (*Puffinus puffinus*)	
Anglesey Terns / Morwenoliaid Ynys Môn SPA	▪ Arctic tern (*Sterna paradisaea*) ▪ Common tern (*Sterna hirundo*) ▪ Roseate tern (*Sterna dougallii*) ▪ Sandwich tern (*Thalasseus sandvicensis*)	
Traeth Lafan / Lavan Sands, Conway Bay SPA	▪ Red-breasted merganser (*Mergus serrator*) ▪ Great crested grebe (*Podiceps cristatus*)	
Liverpool Bay SPA	▪ Little tern (*Sternula albifrons*) ▪ Common tern (*Sterna hirundo*) ▪ Common scoter (*Melanitta nigra*) ▪ Red-throated diver (*Gavia stellata*) ▪ Little gull (*Hydrocoloeus minutus*) ▪ Waterbird assemblage	
Ynys Seiriol / Puffin Island SPA	▪ Great cormorant (*Phalacrocorax carbo*)	
The Dee Estuary SPA	▪ Common tern (*Sterna hirundo*) ▪ Sandwich tern (*Thalasseus sandvicensis*) ▪ Common redshank (*Tringa totanus*) ▪ Little tern (*Sternula albifrons*) ▪ Waterbird assemblage	

Source: JNCC (2025a)

The screening assessment below considers whether each impact pathway has the potential to affect one or more of the conservation objective attributes identified above, namely the populations and distribution of qualifying species, the extent, distribution, structure and function of supporting habitats, the availability of prey resources, and the supporting ecological processes upon which the qualifying features depend.

5.2.5.2 Changes in suspended solids (water clarity)

The qualifying bird features taken forward for assessment comprise marine and coastal foraging species that may utilise habitats within the wider marine environment surrounding the Project.

Elevated SSC and turbidity may temporarily affect supporting habitats and prey availability through reductions in prey detectability or short-term changes in local prey behaviour.

Sediment dispersion modelling predicts a maximum SSC footprint of approximately 225.3 km² (Figure 4-3; P284_ENV_006). However, elevated SSC is predicted to be temporary and localised. The qualifying bird features of the assessed SPAs are highly mobile species with access to extensive alternative supporting habitat and foraging opportunities throughout the wider coastal and marine environment. Any changes in habitat use, prey availability or foraging conditions would therefore be limited in spatial extent and duration.

The Project would not result in the loss or deterioration of supporting habitat, a reduction in prey resources, interruption of movement pathways, or changes to the population abundance or distribution of qualifying species. Given the limited spatial extent and temporary nature of the predicted SSC increases, no credible mechanism has been identified by which temporary increases in SSC and turbidity could affect the populations or distribution of qualifying species, the availability of supporting habitat and prey resources, or the ecological processes upon which those features depend.

An LSE can be excluded , and this pressure is screened out from further assessment.

5.2.6 Conclusion

The screening assessment identified that smothering and siltation rate changes, physical change (to another sediment type), changes in suspended solids (water clarity), and transition elements and organo-metal contamination have the potential to affect qualifying Annex I habitat features of PLAS SAC due to the direct overlap between the proposed activities, the associated sediment deposition and suspended sediment footprints, and the qualifying habitats of the SAC. Therefore, LSEs cannot be excluded for these features at the screening stage.

No LSEs were identified for Annex II diadromous fish and associated freshwater features, Annex II marine mammal features, or ornithological features. Whilst potential pressure-pathway-receptor relationships were identified in some cases, the assessment concluded that the Project would not affect the populations, distribution, supporting habitats, prey resources, migration routes or ecological processes upon which the qualifying features depend. Therefore, no credible mechanism was identified by which the Project could undermine the conservation objectives of the relevant sites.

The qualifying Annex I habitat features of PLAS SAC are therefore taken forward to Stage 2 AA. Table 5-5 summarises the qualifying features and impact pathways for which an LSE cannot be excluded.

Table 5-5 Summary of European Site, Qualifying Features and Impact Pathways Taken Forward to Appropriate Assessment

Site name	Qualifying Annex I habitats screened into the assessment	Impact
PLAS SAC	Reefs (1170)	▪ Smothering and siltation rate changes ▪ Physical change (to another sediment type) ▪ Changes in suspended solids ▪ Transition elements and organo-metal contamination
	Large shallow inlets and bays (1160)	
	Estuaries (1130)	
	Mudflats and sandflats not covered by seawater at low tide (1140)	

6. STAGE 2 – INFORMATION TO INFORM APPROPRIATE ASSESSMENT

6.1 Introduction

The Stage 1 screening assessment presented in Section 5 identified the potential for LSEs on qualifying Annex I habitat features of PLAS SAC through the following impact pathways:

- Smothering and siltation rate changes;
- Physical change (to another sediment type);
- Changes in suspended solids (water clarity); and
- Transition element and organo-metal contamination.

As LSEs could not be ruled out, the qualifying Annex I habitat features of PLAS SAC have been taken forward to Stage 2 AA.

This section provides the information required by NRW, as the competent authority, to determine whether the proposed maintenance dredging and disposal activities could adversely affect the integrity of PLAS SAC, alone or in-combination with other plans and projects, having regard to the site's conservation objectives. The assessment has been undertaken using the MDS described in Section 4.2.

6.2 Assessment of Potential Adverse Effects on Integrity

6.2.1 Qualifying Features Assessed

The screening assessment identified four qualifying Annex I habitat features of PLAS SAC for which LSEs could not be ruled out. Therefore, these features have been taken forward to AA and are considered further in relation to their conservation objectives and condition status (Table 6-1).

Table 6-1 Qualifying Annex I Habitat Features Requiring Appropriate Assessment and Condition Status

Qualifying Feature	Annex I Code	Condition Status	Confidence
Reefs	1170	Unfavourable	High
Large shallow inlets and bays	1160	Favourable	Medium
Estuaries	1130	Favourable	Medium
Mudflats and sandflats not covered by seawater at low tide	1140	Favourable	Low

Source: NRW Conservation Advice for PLAS SAC (2023); NRW Condition Assessment for PLAS SAC (2024).

The conservation objectives for these features require the maintenance or restoration of:

- The extent and distribution of qualifying habitats;
- The structure and function of qualifying habitats and their typical species;
- The supporting processes upon which the habitats rely; and
- The populations and distribution of typical species associated with those habitats.

6.2.2 Smothering and Siltation Rate Changes

Deposited material is predicted to be concentrated close to the disposal location, with deposition depths decreasing rapidly with distance from the source. The majority of habitat receptors are predicted to experience deposition of less than 2 mm. The highest predicted deposition levels are limited to a small number of receptors, including seagrass receptors (SGs) 3_SG (18 mm) and 1_SG (4.1 mm), and mudflat receptor (MF) 10_MF (3.3 mm). Deposition at reef receptors (RFs) is generally predicted to be less than 2 mm (Intertek, 2026b).

The qualifying habitats of PLAS SAC occur within a naturally dynamic environment characterised by ongoing sediment transport, tidal currents and periodic storm-driven sediment redistribution. The predicted deposition footprint is expected to be naturally reworked through existing coastal processes and does not represent a permanent modification of the receiving environment.

Taking account of the limited magnitude, spatial extent and duration of the predicted deposition, the conservation objectives of the qualifying Annex I habitat features would be maintained. The Project would not result in permanent habitat loss, fragmentation or deterioration, nor would it adversely affect the extent, distribution, structure, function or supporting processes of the qualifying Annex I habitat features, or the typical species they support.

Therefore, it can be concluded beyond reasonable scientific doubt that the Project would not adversely affect the integrity of PLAS SAC through smothering and siltation rate changes.

6.2.3 Physical Change (to Another Sediment Type)

As deposited material is predicted to be concentrated close to the disposal location, most habitat receptors are predicted to experience deposition of less than 2 mm, with only a small number of receptors predicted to receive higher levels of deposition. Any modification to sediment characteristics arising from the disposal of dredged material would be limited in extent, temporary in duration and subject to natural reworking processes. The predicted thickness of deposited material is insufficient to result in permanent habitat conversion or sustained alteration of seabed character. Any localised changes to sediment composition would be minor, short-term and reversible.

The qualifying habitats of PLAS SAC occur within a naturally dynamic sedimentary environment characterised by ongoing deposition, erosion and sediment redistribution. Any changes to sediment characteristics would be temporary and would not result in a permanent modification of the receiving environment.

Taking account of the limited thickness and spatial extent of deposited material, and the temporary and reversible nature of any changes to sediment characteristics, the conservation objectives of the qualifying Annex I habitat features would be maintained. The Project would not adversely affect the extent, distribution, structure, function or supporting processes of the qualifying Annex I habitat features.

Therefore, it can be concluded beyond reasonable scientific doubt that the Project would not adversely affect the integrity of PLAS SAC through physical change to another sediment type.

6.2.4 Changes in Suspended Solids (Water Clarity)

Disposal activities have the potential to generate temporary increases in SSC and turbidity within PLAS SAC. Sediment dispersion modelling predicts an SSC footprint of approximately 225.3 km² under the worst-case scenario (Figure 4-3; P284_ENV_006). Elevated SSC concentrations are predicted to be temporary and associated with natural tidal dispersion and sediment resuspension processes. Sediment not deposited within the local bay is progressively dispersed offshore, with concentrations reducing to very low levels within one to two weeks.

The highest predicted SSC concentrations occur at a limited number of reef and seagrass receptors. Under the worst-case scenario, 20_RF is predicted to experience a mean SSC concentration of 35 mg/L and a 97th percentile concentration of 355 mg/L, whilst 3_SG is predicted to experience a mean SSC concentration of 6 mg/L and a 97th percentile concentration of 67 mg/L (Intertek, 2026b). Elevated SSC concentrations are mainly associated with the resuspension of deposited sediment during periods of increased tidal energy. Measured background SSC concentrations within Abererch Bay range between approximately 5 and 78 mg/L, whilst average winter concentrations within Cardigan Bay are typically between 8 and 14 mg/L (Intertek, 2026b).

The receiving environment experiences naturally variable turbidity conditions. Although temporary increases in SSC and turbidity may locally reduce light penetration and alter water clarity, the predicted changes would occur within the range of natural variability experienced within the SAC. The rapid dispersion of suspended sediments means that the predicted effects would be temporary and would not result in permanent habitat loss, deterioration or modification.

Taking account of the temporary and intermittent nature of the predicted SSC increases, the natural variability in background turbidity conditions, and the rapid dispersion of suspended sediments following disposal activities, the conservation objectives of the qualifying Annex I habitat features would be maintained. The Project would not adversely affect the extent, distribution, structure, function or supporting processes of the qualifying Annex I habitat features, or the populations and distribution of their typical species.

Therefore, it can be concluded beyond reasonable scientific doubt that the Project would not adversely affect the integrity of PLAS SAC through changes in suspended solids (water clarity).

6.2.5 Transition Elements and Organo-Metal (e.g. TBT) Contamination

Sediment chemistry analysis identified concentrations of lead, nickel and zinc exceeding Cefas Action Level 1 thresholds in a limited number of samples. Maximum recorded concentrations were 182 mg/kg lead, 31.6 mg/kg nickel and 140 mg/kg zinc. However, no determinands exceeded Cefas Action Level 2 thresholds (SOCOTEC & Ocean Ecology, 2026).

The Project would redistribute sediment within the same coastal sedimentary system from which it originated and would not introduce contaminants from an external source. Elevated lead concentrations are considered representative of the wider receiving environment, where historic mining activity and natural mineralisation are known to contribute to elevated background concentrations within local catchments and sediments. Nickel and zinc concentrations, whilst exceeding Action Level 1 thresholds in some samples, remain substantially below Action Level 2 thresholds and are not indicative of contamination requiring additional management measures.

Any redistribution of sediment-bound contaminants would be limited to the modelled sediment deposition and suspended sediment footprints (Figure 4-3; P284_ENV_006). Deposition is predicted to remain largely within approximately 1 km of the disposal location, whilst elevated SSC concentrations are temporary and disperse rapidly following cessation of disposal activities (Intertek, 2026b). Therefore, any potential exposure pathway would be localised, temporary and reversible.

Taking account of the absence of any Action Level 2 exceedances, the localised and temporary nature of potential exposure pathways, and the fact that the Project would redistribute existing sediments within the receiving environment rather than introduce contaminants from a new source, the conservation objectives of the qualifying Annex I habitat features would be maintained. The Project would not result in deterioration of sediment quality, water quality, or the physical and chemical processes that support the qualifying Annex I habitat features of PLAS SAC. Nor would it adversely affect the extent, distribution, structure or function of those features.

Therefore, it can be concluded beyond reasonable scientific doubt that the Project would not adversely affect the integrity of PLAS SAC through transition elements and organo-metal contamination.

6.3 In-Combination Assessment

The potential for in-combination effects has been considered alongside other plans and projects operating within the wider area.

A review of relevant plans and projects has not identified any activities that, when considered alongside the Project, would be expected to result in a significant cumulative increase in sediment deposition, SSC or contaminant loading within PLAS SAC.

The Project comprises periodic maintenance dredging and disposal operations affecting a relatively small area of the SAC. Predicted effects are temporary, localised and reversible, and are not expected to interact with other plans or projects in a manner capable of undermining the conservation objectives of the site. Therefore, adverse effects on the integrity of PLAS SAC, either alone or in-combination with other plans and projects, can be excluded.

6.4 Conclusion

Having regard to the conservation objectives of Pen Llŷn a'r Sarnau / Lleyn Pensinsula and the Sarnau SAC and the predicted effects of the Project, it is concluded that:

- Smothering and siltation rate changes will be localised, temporary and reversible;
- Physical change to another sediment type will be limited in spatial extent, temporary and reversible, and will not result in permanent alteration of qualifying habitats;
- Changes in SSC will be temporary and will not result in permanent effects on qualifying habitats;
- Redistribution of sediment-bound contaminants will be limited and will not alter the supporting processes on which qualifying habitats depend; and
- No adverse in-combination effects are predicted.

The Project will not affect the extent or distribution of qualifying Annex I habitats and will not adversely affect their structure, function or the supporting processes upon which they depend.

Accordingly, it can be concluded beyond reasonable scientific doubt that the Project will not result in an adverse effect on the integrity of the Pen Llŷn a'r Sarnau SAC, either alone or in combination with other plans and projects, having regard to its conservation objectives.

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