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CYNGOR GWYNEDD COUNCIL

Dredge and Disposal Operation

Biosecurity Risk Assessment (BRA)

P2843_R7013_Rev1 | 3 November 2026

DOCUMENT RELEASE FORM

CYNGOR GWYNEDD COUNCIL

P2843_R7013_Rev1

Dredge and Disposal Operation

Biosecurity Risk Assessment (BRA)

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SUMMARY

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 annual maintenance dredging campaigns of approximately 10,000 m^3 to 20,000 m^3 to maintain navigable depths within the harbour. The corrective maintenance dredging campaign is anticipated to require approximately 98 days to complete, whilst future annual maintenance dredging campaigns are anticipated to require approximately 17 to 34 days, depending on dredge volume. This Biosecurity Risk Assessment (BRA) has been prepared by Intertek Metoc (Intertek) to identify and assess potential pathways for the introduction and spread of invasive non-native species (INNS) associated with the proposed dredging and disposal activities and to define appropriate management measures to minimise biosecurity risks.

The assessment has been undertaken in accordance with Natural Resources Wales (NRW) guidance and adopts a precautionary approach. Although the candidate dredgers have been identified, the final vessel selection, previous operating locations and vessel-specific inspection and cleaning records will not be confirmed until closer to mobilisation. A review of publicly available datasets identified records of several marine INNS within Pwllheli Harbour and the wider receiving environment, including Darwin's barnacle (*Austrominius modestus*), leathery sea squirt (*Styela clava*), orange-tipped sea squirt (*Corella eumyota*), hook weed (*Bonnemaisonia hamifera*), soft-shell clam (*Mya arenaria*), American lobster (*Homarus americanus*), American slipper limpet (*Crepidula fornicata*), Pacific oyster (*Magallana gigas*) and wireweed (*Sargassum muticum*).

In accordance with OSPAR guidance, dredged material will be retained within the local marine environment where environmentally acceptable. Therefore, the principal biosecurity risk relates to the redistribution of marine INNS already present within Pwllheli Harbour and the wider Pen Llŷn and Cardigan Bay area, rather than the introduction of novel species from outside the region. The assessment identified the following potential biosecurity pathways:

- Vessel movements and associated biofouling;
- Transfer of sediments and water attached to equipment;
- Discharge of vessel water (e.g. ballast, bilge or hopper water);
- Disturbance and relocation of seabed sediments;
- Disturbance and relocation of benthic organisms associated with dredged sediments; and
- Deployment of immersible equipment.

Initial risk ratings were assigned on a precautionary basis. Risks associated with vessel movements, biofouling and equipment-related pathways were assessed as high due to the absence of confirmed vessel information, maintenance records and cleaning histories. Risks associated with the redistribution of sediments and benthic organisms were assessed as medium, reflecting the movement of material and organisms already present within the local marine environment.

Mitigation measures will be implemented through a project-specific Biosecurity Plan, including vessel inspections, biofouling management, equipment cleaning and decontamination, and best-practice dredging techniques. These measures are expected to reduce residual risks to medium for vessel- and equipment-related pathways and low for sediment- and benthic organism-related pathways. Overall, implementation of the proposed management measures would reduce the identified biosecurity risks to low or medium levels. Residual medium risks are retained on a precautionary basis pending confirmation of vessel-specific and equipment-specific information. On this basis, the residual biosecurity risk associated with the Project is considered acceptable and can be effectively managed through implementation of the proposed measures.

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GLOSSARY

BRA
Biosecurity Risk Assessment

CCW
Countryside Council for Wales

Cefas
Centre for Environment, Fisheries and Aquaculture Science

CGC
Cyngor Gwynedd Council

EIA
Environmental Impact Assessment

EMODnet
European Marine Observation and Data Network

EMP
Environmental Management Plan

GB
Great Britain

GIS
Geographic Information System

IMO
International Maritime Organisation

INNS
Invasive non-native species

m
Metres

MCAA
Marine and Coastal Access Act 2009

MLA
Marine Licence Application

NRW
Natural Resources Wales

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

PLAS
Pen Llŷn a'r Sarnau

SAC
Special Area of Conservation

SSC
Suspended sediment concentration

1. INTRODUCTION

This Biosecurity Risk Assessment (BRA) 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 BRA 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 BRA. 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.

Marine operations must be planned and undertaken in a manner that prevents the introduction and spread of invasive non-native species (INNS), which can cause significant ecological and economic harm. Biosecurity measures are a key requirement under relevant legislation, including the Wildlife and Countryside Act 1981 and the Invasive Alien Species (Enforcement & Permitting) Order 2019, both of which place controls on the release, movement, and management of high-risk species. In addition, marine planning policy and regulatory guidance require developers to demonstrate that biosecurity risks have been appropriately identified, avoided, and minimised.

This BRA identifies potential pathways for INNS transfer associated with the Project and sets out management measures to reduce the risk of introduction and spread. The BRA applies a precautionary approach and identifies embedded mitigation and additional control measures to ensure that all vessels, equipment, and materials arrive on site and depart in a clean condition. At the time of preparation, three candidate dredgers have been identified however, the final vessel selection, its previous operating location and vessel-specific inspection and cleaning records will be confirmed prior to mobilisation. Therefore, this BRA adopts a precautionary, worst-case approach. The assessment identifies risk pathways associated with vessel movements, submerged and intertidal equipment, and any construction materials. As project details are confirmed, this BRA will be updated.

All contractors and vessels associated with the Project will be required to comply with the biosecurity principles and management measures set out in this BRA (and any subsequent updates), including the implementation of appropriate inspection, cleaning, and verification procedures prior to mobilisation and between works in different locations. A summary of the Project is provided in Table 1-1. It should be noted that the programme is indicative and will continue to evolve as the Project progresses.

Table 1-1 Activity Overview

Applicant name	Cyngor Gwynedd Council (CGC)
Short description of activity	The Project relates to disposal of maintenance dredging material from Pwllheli Harbour to restore and maintain safe navigational depths for marina users. Pwllheli Harbour is an operational marina where dredging is permitted under the Pwllheli Harbour Act 1983. However, existing on-site disposal options are now at capacity. As a result, it is proposed that dredged material is disposed of offshore within the outer bay, approximately 200 metres outside the harbour (Figure 1-1; Drawing Ref: P2843_LOC_005). The works comprise a one-off corrective dredge of up to 60,000 m^3, anticipated in Spring 2027, followed by annual maintenance dredging campaigns of approximately 10,000 m^3 to 20,000 m^3. The corrective campaign is anticipated to require 98 days, whilst annual maintenance dredging campaigns are anticipated to require approximately 17 days for a 10,000 m^3 campaign and up to approximately 34 days for a 20,000 m^3 campaign. Dredging will be undertaken using a cutter suction dredger, producing a slurry that will be transported via pipeline for direct disposal into the marine environment.
Estimated timings of activity	**Corrective dredge:** Spring 2027. The campaign is anticipated to require approximately 98 days. Exact timings will be confirmed as the Project progresses and will be dependent on weather conditions and operational constraints.

	Ongoing annual maintenance dredges: between October 1st to May 1st. Annual maintenance dredging campaigns of approximately 10,000 m^3 to 20,000 m^3 are anticipated to require approximately 17 to 34 days, depending on annual dredge volumes.

1.1 Project Background

Pwllheli Harbour is an operational marina that requires regular maintenance dredging to maintain navigational channels and berth 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. The stilling basin has now reached capacity, and a substantial maintenance dredging campaign is required to restore the Harbour to its design depths and maintain safe navigation for marina users.

The proposed dredging programme comprises an initial corrective dredging campaign and subsequent annual maintenance dredging. Corrective dredging is planned for Spring 2027 and will involve dredging up to 60,000 m^3 of sediment (Figure 1-1; Drawing Ref: P2843_LOC_005). Exact timings will be confirmed as the Project progresses and will be dependent on weather conditions and operational constraints. Based on current contractor production estimates, the corrective dredging campaign is anticipated to require approximately 98 days, equating to an average dredging and disposal rate of approximately 600 m^3/day.

Thereafter, annual maintenance dredging campaigns are expected to take place between 1st October and 1st May. Annual dredging volumes are anticipated to range from 10,000 m^3 to 20,000 m^3, depending on sediment accumulation rates within the Harbour. Based on current production estimates, maintenance dredging campaigns are anticipated to require approximately 17 days for a 10,000 m^3 campaign and up to approximately 34 days for a 20,000 m^3 campaign, although durations will depend on weather conditions and operational constraints.

While the Pwllheli Harbour Act 1983 provides powers for dredging within the Harbour, the disposal of dredged material outside the Harbour limits within the marine environment requires an MLA. This BRA considers dredging and disposal together as a single, connected operational activity, noting that the harbour authority has statutory powers to undertake maintenance dredging for navigational safety.

1.2 Invasive Non-Native Species Baseline

In accordance with the OSPAR Guidelines for the Management of Dredged Material at Sea (2024), dredged material will be retained within the local environment and sedimentary system where environmentally acceptable. Therefore, for the purposes of this assessment, the focus is on the potential redistribution of INNS already present within the local marine environment, rather than the introduction of species from outside the sedimentary system.

The conservation advice for the Pen Llŷn a'r Sarnau (PLAS) Special Area of Conservation (SAC) identifies INNS as a potential pressure on qualifying habitats and species, particularly where activities facilitate their introduction or spread (NRW, 2025). The *All Wales Non-Native Marine Species* spatial dataset identified records of several marine non-native species within and around the Project area (DataMapWales, 2026). Additional review of publicly available marine biodiversity datasets, including European Marine Observation and Data Network (EMODnet) and OneBenthic, was undertaken to inform the baseline where relevant (EMODnet, 2026; Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2026). A Geographic Information System (GIS) was used to analyse the data and identify INNS records within the source location and receiving environment (Table 1-2).

For the purpose of this assessment, the following definitions were applied:

- **Source location:** the dredge area within Pwllheli Harbour (Figure 1-1; Drawing Ref: P2843_LOC_005).
- **Receiving location:** the area potentially influenced by the disposal of dredged material, as defined by the sediment dispersion modelling study (Intertek, 2026). The modelled Suspended Sediment Concentration (SSC) footprint has been adopted as the receiving environment for this assessment and represents a precautionary maximum extent of 225.3 km² (Figure 1-2; Drawing Ref: P2843_ENV_005). While dredged material will be deposited within a defined disposal area, suspended sediments may subsequently disperse beyond the disposal footprint. Accordingly, the SSC footprint has been used as a worst-case receiving extent for assessing the potential redistribution of marine INNS.

Table 1-2 Invasive Non-Native Species Records Identified Within the Source Location and Modelled Receiving Environment

Source location	Receiving location
▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*)	▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*) ▪ Hook weed (*Bonnemaisonia hamifera*) ▪ Soft-shell clam (*Mya arenaria*) ▪ American lobster (*Homarus americanus*) ▪ American slipper limpet (*Crepidula fornicata*) ▪ Pacific oyster (*Magallana gigas*) ▪ Wireweed / Japanese wireweed (*Sargassum muticum*)

Source: DataMapWales (2026); EMODnet (2026); Cefas (2026)
Note: Species listed for the receiving location represent marine INNS records identified within the modelled SSC footprint (225.3 km²) and are based on point-record data. The records do not indicate that these species are present throughout the entire receiving area. The SSC footprint has been adopted as a precautionary worst-case extent for assessing the potential redistribution of marine INNS via suspended sediment transport.

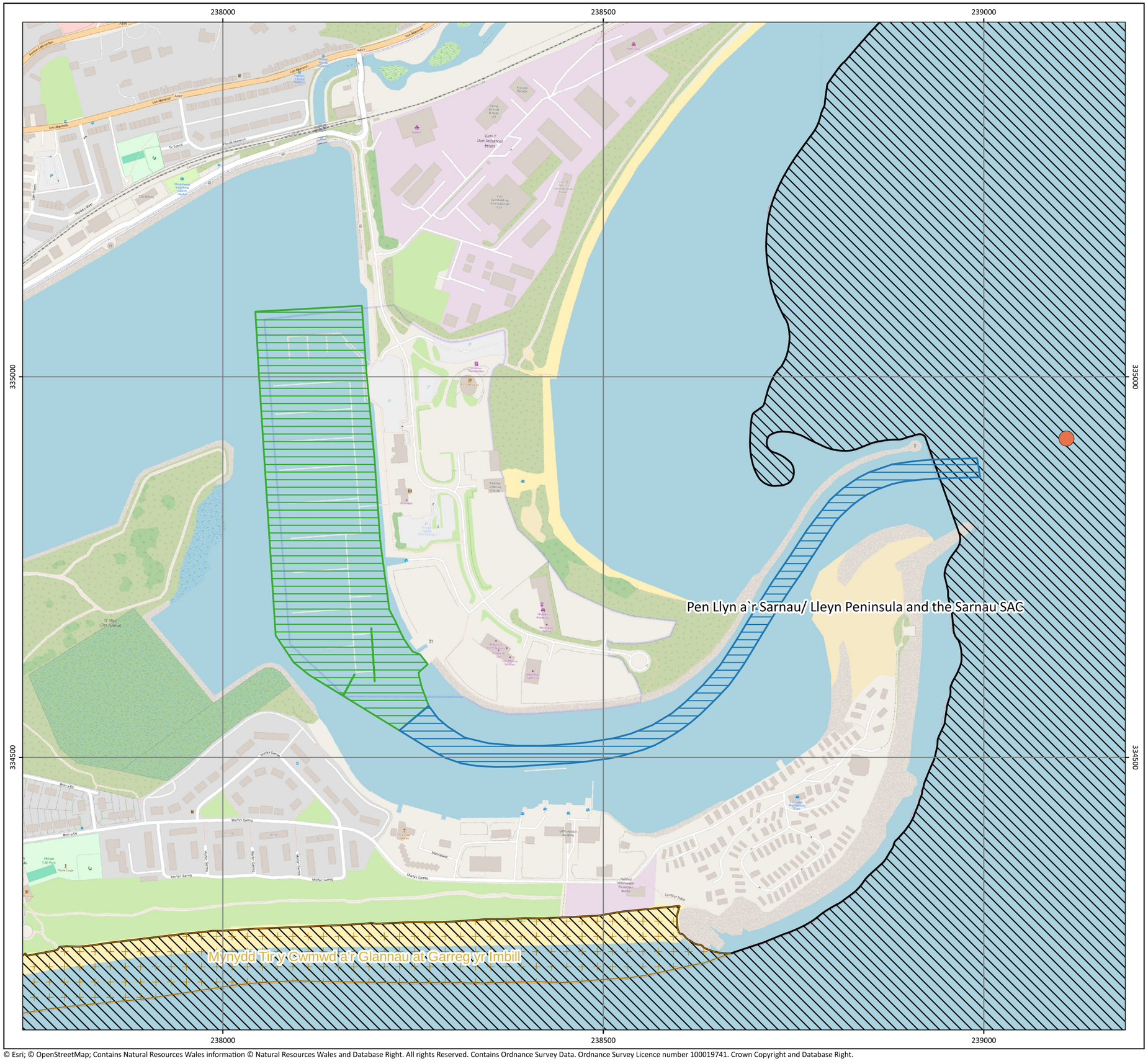
A key biosecurity risk associated with the Project relates to the local redistribution of INNS already present within Pwllheli Harbour and the wider Pen Llŷn and Cardigan Bay area through the disturbance, movement and disposal of dredged material. As dredged material will be retained within the local environment and sedimentary system, the Project is unlikely to create a significant pathway for the introduction of new marine INNS. However, as the final dredger and its previous operating location will not be confirmed until closer to mobilisation, the assessment will be reviewed and updated, where necessary, to consider any additional biosecurity risks associated with vessels, equipment or materials originating from outside the local area.

PWLLEHLI MARINA

LOCATION OVERVIEW

Harbour Oveview

Drawing No: P2843_LOC_004 | A



Legend

- Indicative Proposed Disposal Location

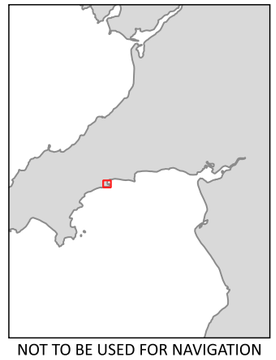
Dredge Areas

- Approach
- Basin

Protected Sites

- SAC
- SSSI

N



NOT TO BE USED FOR NAVIGATION

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

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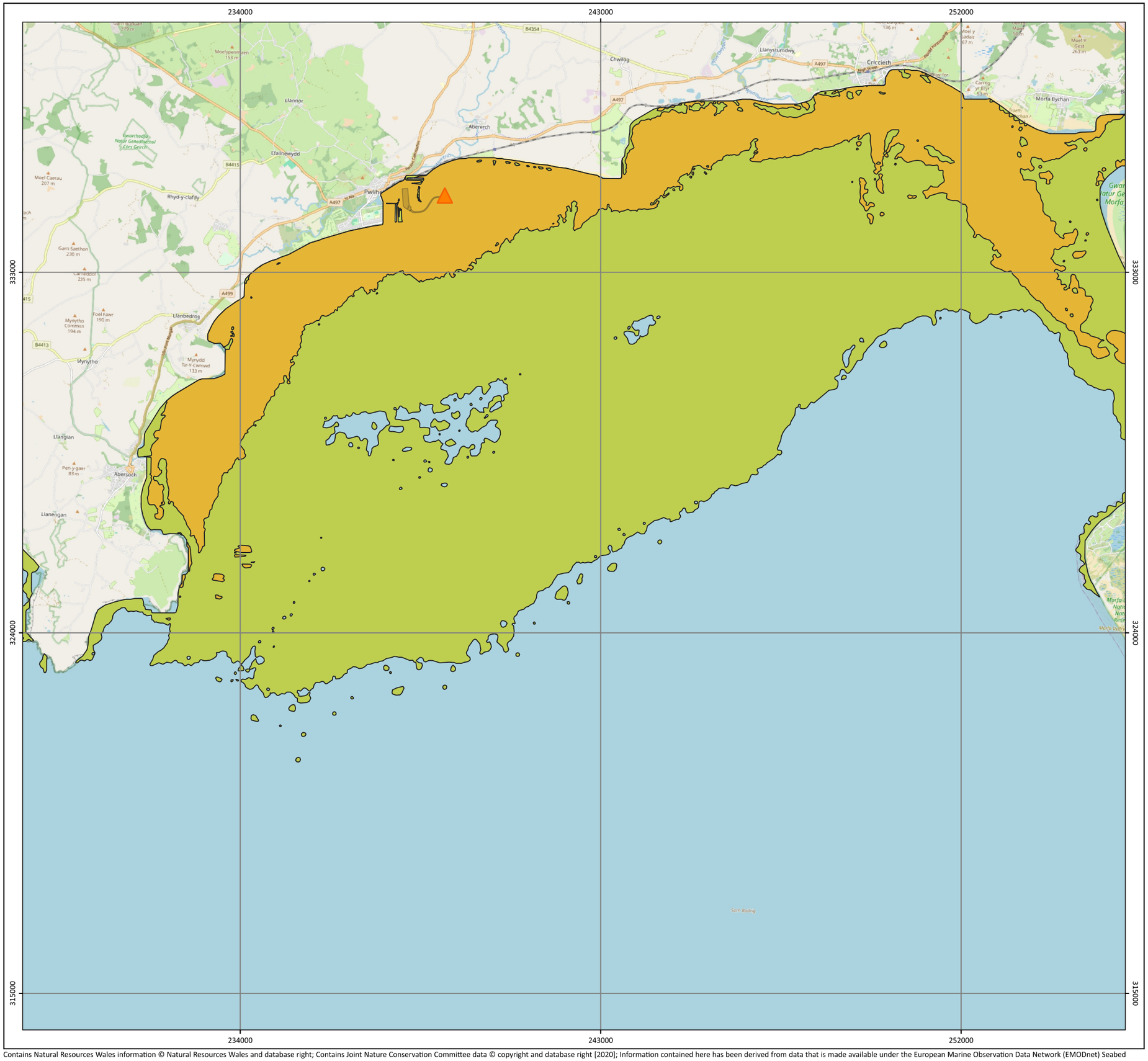
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DREDGE & DISPOSAL OPERATION

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



NOT TO BE USED FOR NAVIGATION

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File Reference	J:\P2843\Mxd_QGZ\07_HRA \P2843_HRA_Data.qgs
Created By	Isabelle Harrington
Reviewed By	Adam Johns
Approved By	Eloïse Boblin

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2. RISK ASSESSMENT

2.1 Assessing the Pathway Risks Associated with Vessels

It is important to understand where vessels have operated prior to arriving at the worksite, as they may act as vectors for INNS transfer. Key pathways include biofouling on hulls and submerged structures, as well as the discharge of water (e.g. bilge or hopper water) that may contain viable organisms. Table 2-1 provides a summary of vessels that may be used during the Project, including their known or potential previous operating locations and antifouling status, where available.

It is noted that the dredger will be transported to the Project area by road and assembled on site, rather than arriving directly from another marine location. As a result, the risk of INNS transfer via retained water from previous ports or harbours (e.g. bilge, ballast or hopper water) is considered low. A key vessel-related pathway for INNS introduction is considered to be biofouling associated with the dredger and any ancillary equipment.

Three candidate dredgers have been identified. However, the final dredger will be selected closer to mobilisation to align with the works programme, and its previous operating location will therefore not be known until that time. In line with NRW guidance, a precautionary approach has therefore been adopted, and risks associated with vessel-related INNS transfer pathways have been assigned as high where relevant information is unknown (Table 2-2). A vessel register documenting previous operating locations, inspections, cleaning activities and maintenance records will be maintained as part of the Biosecurity Plan. As vessels may be used across multiple campaigns, appropriate inspection and decontamination measures will be undertaken prior to launch and, where required, prior to demobilisation from the Project area. This assessment will be reviewed and updated once vessel details are confirmed prior to mobilisation.

For the purposes of this assessment, the Biosecurity Plan refers to a project-specific management plan that sets out measures to prevent the introduction and spread of INNS. This is distinct from an Environmental Management Plan (EMP), which addresses the wider range of environmental risks associated with the Project.

Table 2-1 Vessel Summary

Vessel name	**Port / location visited over last 12 months *(listed chronologically with dates if known)***	**Which marine INNS known to be present at this port(s) / location(s)?**	**Has the vessel had antifouling?** ***(12 months prior to activity for biocidal coatings, 24 months for biocide-free coatings)***
Royal Smals 250 mm “PIONIER”	Unknown at this stage. The selected dredger will be transported to the Project area by road rather than arriving directly from a previous marine operating location. Once the operational schedule has been confirmed, Royal Smals will provide details of the vessel's previous operating locations within the preceding 12 months.	Unknown at this stage. This information will be reviewed once the vessel's previous operating locations have been confirmed.	No. Antifouling coatings have not been applied to Royal Smals dredgers for several years, as the vessels routinely undertake dredging activities within protected nature conservation areas (e.g. Natura 2000 sites).
Royal Smals 250 mm “PHOENIX”			
Royal Smals 250 mm “PHANTOM”			

Table 2-2 Associated Risk Level

Vessel name / type	Risk level	Justification of risk level
Royal Smals 250 mm "PIONIER"	High	A precautionary high-risk level has been assigned in line with NRW guidance, as the specific dredger has not yet been selected and its previous operating location and pre-mobilisation biofouling condition are therefore not currently known. The dredger will be transported to the Project area by road, meaning transfer of retained water from previous ports or operating locations is considered unlikely. However, biofouling on submerged surfaces and equipment remains a potential pathway for the introduction and spread of INNS. Until vessel-specific information is confirmed, the presence of biofouling communities acquired during previous operations cannot be ruled out. The selected dredger, its previous operating location and appropriate inspection and cleaning/decontamination requirements will therefore be confirmed prior to mobilisation and recorded within the Biosecurity Plan.
Royal Smals 250 mm "PHOENIX"		
Royal Smals 250 mm "PHANTOM"		

2.1.2 Alternative Antifouling Regimes

Where standard antifouling coatings have not been applied or are not effective, alternative treatments or biofouling management practices may be implemented to reduce the risk of INNS transfer. These may include measures such as in-water inspection, hull cleaning, or vessel storage practices that minimise biofouling accumulation. Table 2-3 summarises the available information on alternative biofouling management measures and their contribution to reducing overall risk.

Although the candidate dredgers have been identified, the final dredger selection and vessel-specific inspection, cleaning and biofouling management records are not yet available. In accordance with NRW guidance, a precautionary high risk has therefore been assigned. Although the dredger will be transported to the Project area by road and assembled on site, thereby reducing the potential for transfer via retained water from previous ports or harbours, biofouling on submerged surfaces and equipment remains a potential pathway for the introduction and spread of INNS. This assessment will be reviewed and updated once vessel details and biofouling management measures are confirmed prior to mobilisation.

Table 2-3 Alternative Antifouling Regimes

Vessel name	Risk level	Alternative biofouling management regime (e.g. different timeframes for antifouling treatment, vessel storage on land etc.)
Royal Smals 250 mm "PIONIER"	High	To be confirmed. Antifouling coatings are not routinely applied to Royal Smals dredgers, as the vessels routinely undertake dredging activities within protected nature conservation areas (e.g. Natura 2000 sites). A vessel register documenting previous operating locations, inspections, cleaning activities and maintenance records will be maintained as part of the Biosecurity Plan. Appropriate inspection and decontamination measures will be undertaken prior to launch and, where required, prior to demobilisation from the Project area.
Royal Smals 250 mm "PHOENIX"		
Royal Smals 250 mm "PHANTOM"		

2.2 Assessing Pathway Risks Associated with the Transfer of Non-Biological Materials and Water

The transfer of sediments, water, and other non-biological materials can act as a pathway for the introduction and spread of INNS. This is particularly relevant for marine construction activities such as dredging and landfall works, where materials and water may be moved between locations. Table 2-4 summarises the potential pathways associated with the movement of materials and water between locations, alongside relevant environmental factors that may influence INNS survival (e.g. salinity,

temperature, and substrate type), and any known records of INNS at source and receiving locations where available.

For this assessment, the source location is defined as the dredge area within Pwllheli Harbour, while the receiving location is defined as the worst-case area potentially affected by dredged material disposal based on the sediment dispersion modelling (Intertek, 2026). Similar environmental conditions between the source and receiving locations, including salinity and temperature, may increase the likelihood of species survival if transferred.

A precautionary approach has been adopted in accordance with NRW guidance where information is limited or uncertain. The potential for INNS transfer associated with sediments and water cannot therefore be ruled out. This assessment will be reviewed and updated should any relevant project information change prior to the commencement of works.

Table 2-4 Transfer of Non-Biological Materials and Water

Pathway	Location		Environmental conditions for INNS species	INNS species known to be present	Risk level	Justification of risk level
Disturbance and relocation of seabed sediments (e.g. dredging and disposal of dredged material)	Source	Seabed sediment within Pwllheli Harbour dredging area (Figure 1-1; Drawing Ref: P2843_LOC_005)	Sediment sampling undertaken within Pwllheli Harbour in 2023 and 2026 indicates that sediments are generally dominated by fine-grained material (silts and clays), with only limited proportions of coarser material present (Ocean Ecology, 2023; SOCOTEC & Ocean Ecology, 2026). The 2026 sampling programme comprised ten sediment samples collected from across the Harbour and confirmed the predominance of fine-grained sediment fractions characteristic of the sheltered harbour environment. Water quality within the Harbour and nearshore waters is generally typical of a semi-enclosed coastal embayment, influenced by tidal exchange with Cardigan Bay and freshwater inputs from the Rivers Erch, Penrhos and Rhyd-hir. The sheltered nature of the Harbour promotes the accumulation of fine-grained sediments.	▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*)	Medium	Dredging and the disposal of dredged material may disturb, mobilise and redistribute seabed sediments within and surrounding the harbour. Any sediment movement would be limited to material already present within the Project area rather than the introduction of sediment from external sources. Therefore, the risk is associated with the relocation and redistribution of existing seabed sediments and any resulting changes to sediment distribution, deposition patterns, or physical seabed characteristics.
	Receiving	Indicative proposed disposal location and surrounding modelled SSC footprint (Figure 1-1; Drawing Ref: P2843_LOC_005)	Sediments within the Harbour approach are predominantly fine sand and sand, with only minor proportions of silt, clay and gravel (Ocean Ecology, 2023). The receiving area is characterised by a more dynamic coastal environment than the Harbour, with heterogeneous seabed conditions comprising coarse sediments and localised rock exposures. These physical conditions differ from the finer, more sheltered sediment environment present within the Harbour and may influence the distribution and deposition of dredged material following disposal.	▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*) ▪ Hook weed (*Bonnemaisonia hamifera*) ▪ Soft-shell clam (*Mya arenaria*)		

Pathway	Location		Environmental conditions for INNS species	INNS species known to be present	Risk level	Justification of risk level
				▪ American lobster (*Homarus americanus*) ▪ American slipper limpet (*Crepidula fornicata*) ▪ Pacific oyster (*Magallana gigas*) ▪ Wireweed / Japanese wireweed (*Sargassum muticum*)		
Transfer of sediments and water attached to equipment	Source	N/A	Similar salinity and temperature conditions between source and receiving locations (coastal marine waters). However, the dredger will be transported to site by road rather than operating directly between marine locations, reducing the likelihood of INNS transfer via retained water.	Unknown (dependent on previous operating locations).	High	Equipment specifications, source locations and cleaning histories have not yet been confirmed. As the dredger will be transported to the Project area by road, the likelihood of transferring retained water from previous operating locations is considered low. However, sediments, standing water and associated marine INNS may remain on submerged equipment if appropriate inspection, cleaning and decontamination measures are not undertaken prior to mobilisation. In the absence of vessel-specific information and cleaning records, a precautionary high-risk rating has been assigned in accordance with NRW guidance. This assessment will be reviewed and updated prior to mobilisation once vessel details and biofouling management measures have been confirmed.
	Receiving	N/A				

2.3 Assessing the Pathway Risks Associated with Biological Material

Biological material can act as a pathway for INNS transfer when introduced into or moved between marine environments. Table 2-5 summarises the potential pathways associated with the movement of biological material between locations, alongside relevant environmental factors that may influence INNS survival (e.g. salinity, temperature, and substrate type), and any known records of INNS at source and receiving locations where available.

A precautionary approach has been adopted in accordance with NRW guidance where information is limited or uncertain. The potential for INNS transfer associated with biological material cannot therefore be ruled out. Risk levels have been assigned based on the likelihood of species survival, transport and establishment, taking account of the available information on source and receiving environments. This assessment will be reviewed and updated should any relevant project information change prior to the commencement of works.

Table 2-5 Transfer of Biological Material

Pathway	Location		Environmental conditions for INNS species	INNS species known to be present	Risk level	Justification of risk level
Disturbance and relocation of benthic organisms (i.e. those associated with dredged seabed sediments)	Source	Seabed sediment and associated benthic organisms within Pwllheli Harbour dredging area (Figure 1-1; Drawing Ref: P2843_LOC_005)	The Harbour supports benthic habitats associated with sheltered, fine-grained sediments, including intertidal mudflats (Countryside Council for Wales (CCW) Phase 1 Intertidal Survey, 2005). Sediment sampling undertaken in 2023 and 2026 indicates that sediments are generally dominated by fine-grained material (silts and clays), with limited gravel present (Ocean Ecology, 2023; SOCOTEC & Ocean Ecology, 2026). The 2026 sampling programme comprised ten sediment samples collected from across the Harbour and confirmed the predominance of fine-grained sediment fractions characteristic of the sheltered harbour environment. Water quality within the Harbour and nearshore waters is typical of a semi-enclosed coastal embayment, influenced by tidal exchange with Cardigan Bay and freshwater inputs from the Rivers Erch, Penrhos and Rhyd-hir.	▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*)	Medium	Dredging may disturb, remove and relocate benthic organisms associated with harbour sediments, including infaunal and epifaunal species. Organisms may be transported with dredged material during dredging and disposal activities. However, any transfer would be limited to species already present within the local marine environment and would not result in the introduction of new species from external sources. Whilst the source and receiving locations occur within the local coastal system, they differ in sediment composition and habitat characteristics and may therefore support different benthic assemblages. The key risk is therefore associated with the relocation of existing benthic organisms, including any marine non-native species present, within the Project area. Therefore, a medium risk rating has been assigned.
	Receiving	Indicative proposed disposal location and surrounding modelled SSC footprint (Figure 1-1; Drawing Ref: P2843_LOC_005)	The receiving area is characterised by a more dynamic coastal environment than the Harbour, with heterogeneous seabed habitats comprising coarse sediments and localised rock exposures. Benthic habitats include subtidal sands and mixed sediments, which are likely to support benthic assemblages that differ from those associated with the finer, more sheltered habitats present within the Harbour (CCW Phase 1 Intertidal Survey, 2005). Despite these differences, both	▪ Darwin's barnacle (*Austrominius modestus*) ▪ Leathery sea squirt (*Styela clava*) ▪ Orange-tipped sea squirt (*Corella eumyota*)		

Pathway	Location		Environmental conditions for INNS species	INNS species known to be present	Risk level	Justification of risk level
			locations comprise coastal marine habitats with comparable salinity regimes, meaning some transferred organisms may remain viable following relocation.	▪ Hook weed (*Bonnemaisonia hamifera*) ▪ Soft-shell clam (*Mya arenaria*) ▪ American lobster (*Homarus americanus*) ▪ American slipper limpet (*Crepidula fornicata*) ▪ Pacific oyster (*Magallana gigas*) ▪ Wireweed / Japanese wireweed (*Sargassum muticum*)		

2.4 Assessing the Pathway Risks Associated with Immersible Equipment

Immersible equipment includes items that are not integral to the vessel or fixed construction infrastructure. Equipment that is repeatedly deployed without appropriate cleaning and drying has the potential to act as a pathway for the transfer of INNS via retained sediments, biofouling, or trapped water. The equipment anticipated for use includes a cutter suction dredger for dredging and a pipeline for direct disposal into the marine environment. A cutter suction dredger operates using a rotating cutter head and pump system that creates suction at the cutter head, reducing sediment loss during dredging operations, although some sediment spillage may still occur (Boskalis, 2026). This equipment will be deployed within the water column and/or interact directly with the seabed during the activities.

Table 2-6 and Table 2-7 summarise the routine maintenance and biosecurity procedures that will be applied to immersible equipment. A vessel and equipment register documenting previous operating locations, inspections, cleaning activities and maintenance records will be maintained as part of the Biosecurity Plan. Prior to mobilisation from the port of origin, all immersible equipment will be inspected and, where necessary, cleaned, decontaminated and dried to remove biofouling, retained sediments and standing water. Equivalent procedures will be applied between deployments and prior to demobilisation from the Project area to minimise the risk of introducing or spreading INNS.

As specific equipment deployment and maintenance records are not yet available, a precautionary approach has been adopted. This assessment will be reviewed and updated once the final equipment details have been confirmed prior to mobilisation.

Table 2-6 Routine Maintenance Protocol

Will all immersible equipment used in this activity undergo washing, rinsing and/or drying as part of routine maintenance at the times described below?	**Yes**	**No**
Immediately prior to departing the port of origin to undertake the licensed activity	X	
Immediately prior to leaving the licensed activity area on completion of the licensed activity.	X	

Table 2-7 Maintenance Protocol Between Deployments

Will all the immersible equipment used in this licensed activity undergo washing, rinsing and/or drying between different deployments within the activity area of this licensed activity?	**Yes**	**No**
Immediately prior to departing the port of origin to undertake the licensed activity	X	

3. MANAGEMENT MEASURES

A range of embedded and additional mitigation measures will be implemented to prevent contamination of material by marine INNS, and introduction or spread of marine INNS. These measures include best practice techniques, control of sediment dispersion, vessel management, and environmental monitoring. Measures will be secured through an EMP and any relevant licence conditions. All personnel will receive site inductions and toolbox talks to ensure awareness of environmental sensitivities and required mitigation measures.

The management measures have been developed with reference to recognised marine biosecurity guidance, including *Marine Biosecurity Planning Guidance for Wales and England* (NRW, 2015), *Marine INNS Biosecurity Risk Assessment and Management Plan Guidance* (NRW, 2023), and relevant international guidance relating to vessel biofouling and INNS prevention (International Maritime Organisation (IMO), 2023).

The International Convention for the Control and Management of Ship's Ballast Water and Sediments (IMO, 2004) is recognised as an important measure for preventing the transfer of INNS. However, ballast water is not considered a significant pathway for the Project, as the dredger will be transported to site by road and is not expected to carry ballast water from previous operating locations. Consequently, this assessment focuses on biofouling, immersed equipment, and the transfer of dredged sediment and associated water.

The EMP will include:

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

Dredged material has been tested and classified in accordance with guidance from NRW prior to disposal to confirm suitability for reuse or disposal. 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 concentrations.

Table 3-1 summarises the risks identified in Sections 2.1 to 2.4 and outlines the proposed management measures to mitigate them. For each pathway, the table presents the initial risk level, the mitigation measures to be implemented to minimise the potential introduction and spread of INNS, and the resulting residual risk following their application.

As the final vessel selection, equipment specifications, operational histories, and maintenance regimes have not yet been confirmed, management measures have been defined on a precautionary basis. These measures reflect standard industry practice, including inspection, cleaning, and adherence to relevant guidance.

Following implementation of the proposed management measures, residual risk levels have been reduced (e.g. from high to medium) to reflect the expected effectiveness of standard biosecurity controls. These residual risk levels remain precautionary and may be subject to further refinement

where additional mitigation measures are identified, or once vessel- and equipment-specific information is confirmed.

Table 3-1 Management Measures

Pathway	Risk level	Risk management measure	Risk level after management
Vessels	High	Prior to mobilisation, contractors will provide vessel-specific information, including recent operational history, inspection records and biofouling management records. A vessel register documenting previous operating locations, inspections, cleaning activities and maintenance records will be maintained as part of the Biosecurity Plan. As the dredger will be transported to the Project area by road, the risk associated with the transfer of retained water from previous operating locations is considered low. However, all vessels and associated equipment will be subject to inspection and, where necessary, cleaning and decontamination prior to mobilisation to ensure they are free from excessive biofouling, retained sediments and standing water. Activities will be undertaken in accordance with relevant biosecurity guidance and best practice measures to minimise the risk of INNS introduction and spread.	Medium
Disturbance and relocation of seabed sediments (e.g. dredging and disposal of dredged material)	Medium	Dredging and disposal activities will be undertaken using best practice techniques to minimise sediment disturbance, dispersion and redistribution. Dredged material has been tested and classified in accordance with NRW requirements prior to disposal. Where practicable, dredging and disposal activities will be timed to favourable tidal conditions and undertaken using intermittent operations and controlled disposal volumes to reduce the potential transfer and spread of marine INNS associated with sediments.	Low
Transfer of sediments and water attached to equipment	High	All equipment will be subject to inspection, cleaning and, where necessary, decontamination prior to mobilisation and between deployments. Equipment will not be deployed unless confirmed to be free from visible biofouling, retained sediments and standing water. Records of inspections and cleaning activities will be maintained as part of the Biosecurity Plan. These measures will minimise the risk of transferring marine INNS associated with attached sediments or retained water.	Medium
Disturbance and relocation of benthic organisms (i.e. those associated with dredged seabed sediments)	Medium	Dredging and disposal activities will be managed to minimise unnecessary disturbance and relocation of benthic material. Best practice dredging techniques will be employed to limit the entrainment and redistribution of benthic organisms. Where practicable, works will be programmed to avoid sensitive ecological periods, and sediment handling and disposal operations will be controlled to minimise opportunities for the movement and establishment of marine INNS.	Low
Immersible equipment	High	A vessel and equipment register documenting previous operating locations, inspections, cleaning activities and maintenance records will be maintained as part of the Biosecurity Plan. All immersible equipment will be inspected prior to mobilisation and between deployments. Where required, cleaning, drying and decontamination procedures will be undertaken to remove biofouling, retained sediments and standing water. Equipment will not be deployed unless confirmed to be in a clean condition, thereby minimising the risk of INNS transfer between locations.	Medium

4. CONCLUSION

This BRA has identified several potential pathways for the introduction and spread of INNS associated with the proposed Project. At this stage, key information, including the final vessel selection, previous operating locations, equipment deployment arrangements and maintenance records, has not yet been confirmed.

In accordance with NRW guidance, a precautionary approach has been applied. Initial pathway risks have been assigned as high where key information is not yet available, and medium where risks relate primarily to the redistribution of locally established marine INNS. The assessment identified that the principal biosecurity risks associated with the Project relate to the transfer of INNS via biofouling on vessels and equipment, and the disturbance, movement and redistribution of organisms already present within Pwllheli Harbour and the wider Pen Llŷn and Cardigan Bay area through dredging and disposal activities.

As the dredger will be transported to the Project area by road and assembled on site, the risk of INNS transfer via retained water from previous operating locations is considered low. Furthermore, dredged material will be retained within the local marine environment and sedimentary system. Therefore, the Project is unlikely to create a significant pathway for the introduction of new marine INNS to the region.

Following implementation of the proposed biosecurity management measures, residual risk levels have been reduced by one category to reflect the effectiveness of standard biosecurity controls. These residual risk levels remain precautionary and will be reviewed once the selected vessel, previous operating locations, equipment details and maintenance arrangements have been confirmed prior to mobilisation.

A range of management measures has been identified to minimise the likelihood of INNS introduction and spread. These include maintaining a vessel and equipment register, implementing inspection, cleaning and decontamination procedures, ensuring vessels and equipment arrive and depart in a clean condition, adhering to relevant national and international biosecurity guidance, and applying best practice dredging and disposal techniques to minimise the redistribution of sediments and associated organisms.

Overall, implementation of the proposed management measures would reduce the identified biosecurity risks to low or medium levels. Residual medium risks are retained on a precautionary basis due to the current absence of vessel-specific and equipment-specific information and will be reviewed following contractor appointment and prior to mobilisation. On this basis, the residual biosecurity risk associated with the Project is considered acceptable and can be effectively managed through implementation of the proposed measures. Accordingly, the Project is not expected to result in a significant increase in the introduction or spread of marine INNS within the local area.

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