Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 4, appendix T: Invasive Non-Native Species Management Plan

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Liverpool Bay CCS Limited
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Offshore ES
Invasive Non-Native
Species Management Plan

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Glossary

Term	Meaning
INNS	Any non-native animal or plant that can spread causing damage to the environment, the economy and human health.
Non-native Species	The equivalent of 'alien species' (as used by the Convention on Biological Diversity (CBD)) and 'non-indigenous species' (as used by the OSPAR Commission and the UK Marine Strategy); it refers to a species intentionally or unintentionally introduced outside its native range by human actions.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Chapter 3: Proposed Development Description.

Acronyms and Initialisations

Acronym/ Initialisation	Description
CBD	Convention on Biological Diversity
CCS	Carbon Capture Storage
CMS	Construction Method Statement
CO_2	Carbon Dioxide
EIA	Environmental Impact Assessment
ES	Environmental Statement
EMP	Environmental Management Plan
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
INNSMP	Invasive Non-Native Species Management Plan
LAT	Lowest Astronomical Tide
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MMMP	Marine Mammals Mitigation Plan
MMV	Monitoring, Measurement and Verification
PDE	Project Design Envelope
PWA	Pipeline Works Authorisation
SAC	Special Area of Conservation
UK	United Kingdom
WFD	Water Framework Directive

Units

Unit	Description
m	Metre (distance)
km	Kilometre (distance)
kV	Kilovolt (electrical potential)

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1 INVASIVE NON-NATIVE SPECIES MANAGEMENT PLAN

1.1 Introduction

1.1.1 Background

This Invasive Non-Native Species Management Plan (INNSMP) has been prepared by RPS on behalf of Liverpool Bay CCS Ltd (the Applicant) to support the Environmental Statement (ES) for the HyNet Carbon Dioxide Transportation and Storage Project - Offshore (hereinafter referred to as the 'Proposed Development'). This INNSMP considers the installation, operation and maintenance and decommissioning of the Proposed Development within the waters of Liverpool Bay (Figure 1.1).

Several invasive non-native species (INNS), including the high – medium risk American lobster *Homarus americanus*, Chinese mitten crab *Eriocheir sinensis*, the kelp wakame *Undaria pinnatifida*, Japanese skeleton shrimp *Caprella mutica*, wireweed *Sargassum muticum* and Pacific oyster *Crassostrea gigas* have been recorded within Liverpool Bay (Hurst, 2016; Solway Firth Partnership, 2015) although the majority of records were only single or a few individuals found within ports and harbours.

This management plan has been drawn up using the Precautionary Principle to assess the risk of the introduction and spread of INNS associated with the Proposed Development and to present appropriate measures to minimise these risks as much as possible following best guidance (GB INNS, 2023; Cook *et al.,* 2014; Payne *et al*., 2015). Furthermore, the INNSMP addresses a comment made within the Scoping Opinion by The Offshore Petroleum Regulator for Environment and Decommissioning whereby:

'*Section 7.2.7: Potential Mitigation, where it states 'Compliance with available guidance on mitigating the introduction and spread of INNS', we advise that a full Biosecurity Risk Assessment and Invasive Non-Native Species (INNS) Management Plan is completed in relation to all marine operation activities associated with the Project. The risk assessment and management plan should include consideration of all activities, vehicles and equipment used as well as how the risk will be minimised through appropriate mitigation and adherence to best-practice guidance and management measures. The risk assessment should include a review of all the available data in relation to the presence of marine INNS where applicable to the Project, and the potential risks associated with each species identified.'*

1.1.2 Scope

The scope of the INNSMP is for the activities taking place within the Proposed Development seaward of Mean High Water Springs (MHWS). This INNSMP considers the installation, operation and maintenance and decommissioning of the Proposed Development within the waters of Liverpool Bay (Figure 1.1).

1.1.3 Purpose

This document provides an outline INNSMP aimed at providing an overview of the aspects that will form the basis of the INNSMP. The INNSMP will be further developed post-application in advance of the construction phase of the Proposed Development.

The purpose of the INNSMP is to set out the approach to INNS management and mitigation in respect of the Proposed Development. The management plan will provide an outline of the measures proposed to be implemented to facilitate biosecurity control and to minimise potential impacts on the local and wider environment.

The INNSMP will ensure all procedures pertaining to marine works (including construction, operation and maintenance and decommissioning of subsea structures) and vessel operations follow best practice guidance,

preventing and reducing the risk of the possible spread or introduction of INNS into the waters of the Proposed Development.

The method employed follows the principles of the 'Great Britain (GB) INNS Strategy' (GB NNSS, 2023). The INNS Strategy follows a hierarchical approach which emphasises prevention, followed by early detection and rapid response, and finally long-term management and control. The key outcomes of the GB INNS Strategy are that by 2030 it will have achieved:

- **Prevention:** reduce establishments of INNS by at least 50% compared to 2000 levels.
- **Surveillance, early detection and monitoring:** significantly improve our detection and monitoring capability, including increasing inspections and investigations.
- **Management:** eradicate, control or contain INNS – prioritised by greatest impact and the likelihood of success.
- **Prioritisation and risk analysis:** set out an agreed approach to the prioritisation of species based on risk and likelihood of success to ensure our efforts are focused on where they can achieve the greatest benefit.
- **Evidence:** commission the research priorities outlined in the Evidence Strategic Plan, to ensure that the strategy is based on the best available evidence and identify gaps and priority areas for further development.
- **Awareness raising:** increase awareness of INNS issues and promote appropriate changes in behaviour or attitudes throughout all relevant sectors and among the general public.
- **Coordination:** improve coordination of actions within governments, government-associated bodies, and key actors outside government.

This INNSMP will be finalised prior to construction and will remain a 'live' document throughout the lifetime of the Proposed Development, with periodic updates by the Applicant during the construction, operational and maintenance, and decommissioning phase, as outlined within Section 1.4.7 (Evaluation and Review).

1.1.4 Document structure

The INNSMP is structured as follows:

- Section 1.2: Project Description;
- Section 3: Legislative Context and Consenting Process
- Section 4: Invasive Non-Native Species Management Plan Methodology; and
- Section 5: Invasive Non-Native Species Management Plan.

1.2 Project Description

This section provides the project characteristics, policies and consents relevant to the Proposed Development for the management of INNS, and how this INNSMP links with other management plans.

1.2.1 Proposed Development location

The Proposed Development is located in the Irish Sea, within Liverpool Bay, approximately 12 km to the north of the Welsh coastline and 2 km west of the English coastline. It covers an area of approximately 576.82 km^2. The application for a marine licence for the Proposed Development is shown as a red line boundary which encompasses all the planned and modified infrastructure (Figure 1.1). This includes the pipeline and cables corridor (up to Mean High Water Springs (MHWS)). The pipeline and cables corridor shore approach are located to the north of Talacre in Flintshire, Wales based at the mouth of the Dee Estuary (Figure 1.1).

1.2.2 Proposed Development characteristics

The key offshore infrastructure of the Proposed Development will include both new and repurposed existing infrastructure. The new and re-purposed infrastructure will be located within the Proposed Development (Figure 1.1).

The key offshore infrastructure of the Proposed Development will include:

- New Infrastructure:
  - Installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive CO_2 from the onshore Point of Ayr (PoA) Terminal and distribute CO_2 to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating to the CO_2 stream. Installation of the new Douglas CCS platform will include up to eight driven piles.
  - Installation of new sections of pipeline to connect the new Douglas CCS platform and the existing subsea natural gas pipelines.
  - Installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms to receive and inject CO_2 into the depleted hydrocarbon reservoirs.
  - Implementation of a programme of Monitoring, Measurement and Verification (MMV) activities - This includes the drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main.
  - Installation of two submarine 33 kilovolt (kV) power cables, with integrated fibre-optic cable connections (35 kilometres (km) from PoA Terminal onshore to the modified Douglas platform, including within the intertidal/foreshore area up to MHWS, within Welsh waters only).
  - Installation of new submarine 33 kV power cables with integrated fibre-optic connecting the modified Douglas platform with the Hamilton Main (12 km; 33 kV), Hamilton North (15 km; 33 kV) and Lennox (35 km; 33 kV) platforms.
  - Installation of cable and/or pipeline protection, at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved.
- Repurposing infrastructure:
  - Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to CO_2 service.
  - Development of the Hamilton Main, Hamilton North and Lennox reservoirs for CO_2 storage through the drilling and re-completion of injection wells by side-tracking existing production wells. This includes drilling and recompletion operations, all of which will be within the existing footprint (template) of each platform.
  - Implementation of a programme of MMV activities - Additional monitoring wells will be created from the recompletion of existing wells within the existing footprint (template) of each platform: one monitoring well created by side-tracking an existing well in Lennox; and two sentinel wells, one in Hamilton North and one in Lennox.

To facilitate the construction, operation and maintenance, and decommissioning of the Proposed Development, vessels will be used.

For further information on the Project Description, see volume 1, chapter 3 of the ES.

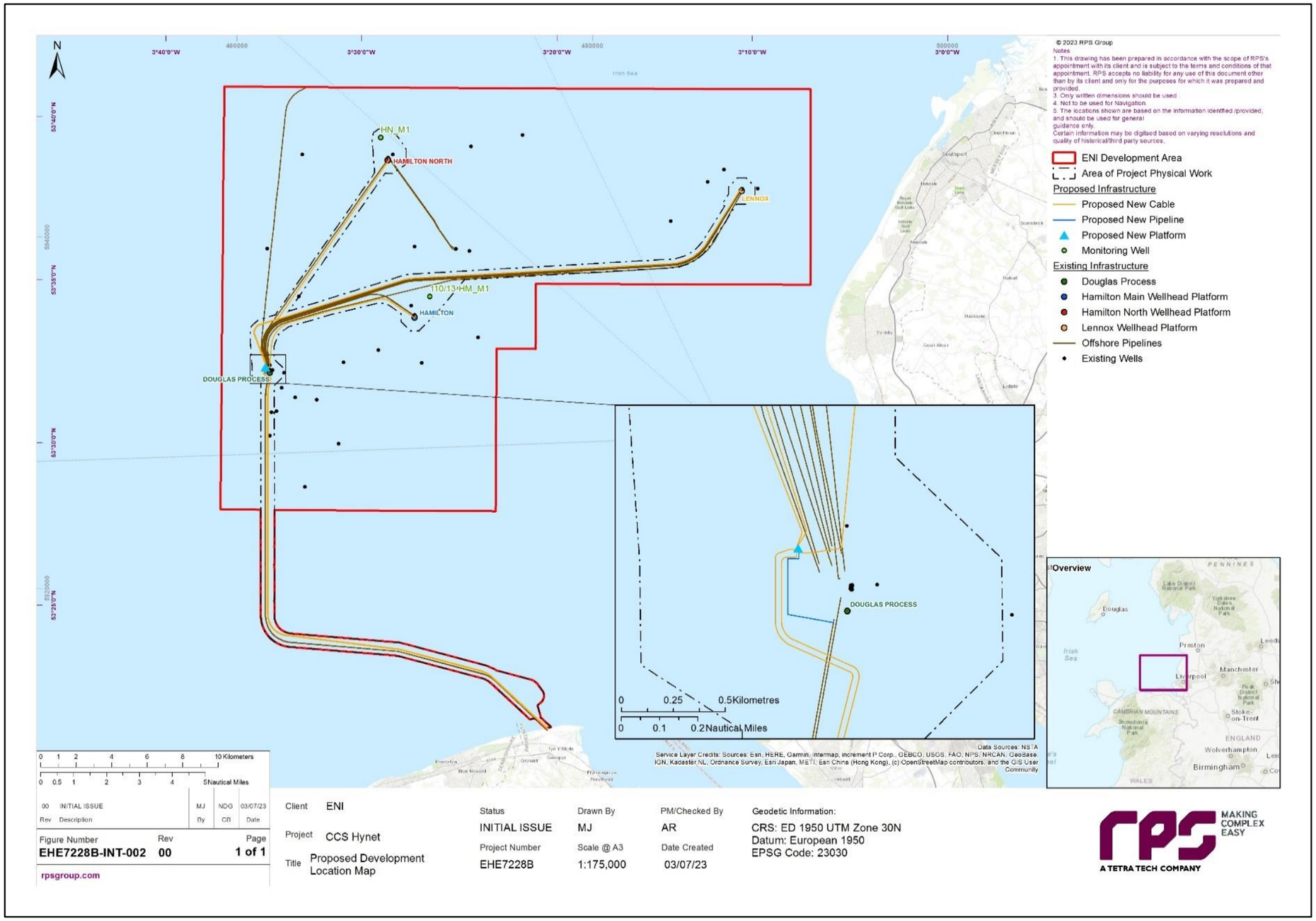

Figure 1.1: Location Overview Of The Proposed Development

1.3 Legislative context and consenting process

1.3.1 Policy

1.3.1.1 International

Convention on Biological Diversity (CBD)

This convention arose from the United Nations Conference on Environment and Development held in Rio in 1992. Within the framework of the convention, there are 15 Guiding Principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species. These principles provide an international framework for governments and other organisations to develop effective strategies to prevent the introduction, control and eradicate invasive non-native species. Article 8(h) states that each Contracting Party shall prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

Acknowledging the growing threat from INNS, the CBD has provided a major driver for international action. One of its guiding principles calls for national strategies on INNS. In response to this, devolved governments across the UK have produced the 'GB INNS Strategy' (GB NNSS, 2023) as described in Section 1.1.3. This Strategy provides the framework to support the coordination of policy and action across GB and aligns these efforts with national and international biosecurity and environmental strategies.

1.3.1.2 National

EU Regulation (1143/2014) on the prevention and management of the introduction and spread of invasive alien species.

EU Regulation 1143/2014 was retained in domestic law under the European Union (Withdrawal) Act 2018. It was amended through several statutory instruments to ensure operability following the UK's exit from the EU but applies to Great Britain only.

This Regulation sets out rules to prevent, minimise and mitigate the adverse impact on the biodiversity of the introduction and spread within the Union, both intentional and unintentional, of invasive alien species.

The Invasive Alien Species (Enforcement and Permitting) Order 2019

The Invasive Alien Species (Enforcement and Permitting) Order 2019 came into force on 1 December 2019 and pertains to England and Wales. It contains provisions relating to offences, penalties, enforcement, licensing and permitting to meet the requirements of the Regulation.

1.3.2 Consents

This section provides a summary of the consenting process and associated legislative requirements being followed for the Proposed Development.

Table 1.1 sets out the permits and licences pertinent to the Proposed Development and to which the following legislation applies. The applications will be supported by an ES, as well as a Water Framework Directive (WFD) assessment, and a Report to Inform Appropriate Assessment (RIAA).

Should additional pre-construction licences be required, these will be discussed and agreed upon with the relevant consent authority during the pre-construction phase of the Proposed Development.

Table 1.1: Consents Applicable To The Proposed Development

Activity	Permit / Licence / Requirement	Key Legislation
Benthic Ecology Baseline Surveys: – Intertidal Benthic Survey – Subtidal Benthic Survey	• Marine Licence (Band 1) from Natural Resources Wales-Marine Licensing Team (Marine Management Organisation exemption) • OPRED Survey Notification • Crown Estate seabed survey licence	• Marine and Coastal Access Act (MCAA) 2009
Pipeline repurposing / Installation of new pipeline spools to new platform	• Pipeline Works Authorisation updates/renewals for the repurposed pipeline • Marine Licence Band 3	• The Pipeline Safety Regulations 1996 • The Offshore Chemicals Regulations 2002 (as amended) • MCAA
New Platform Installation	• Marine Licence Band 3 • Consent to Locate for fixed installation	• MCAA 2009 • Energy Act 2008
Drilling	• Master Application Templates and Subsidiary Application Templates for new wells, side-track drilling and well intervention	• Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020 • The Offshore Chemicals Regulations 2002 (as amended) • Part 4A of The Energy Act 2008 (as amended) • The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended) • Consent for a Marine Geological Survey or Investigation under The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended)
Environmental Impact Assessment	• Scoping • ES Production • Screening and appropriate assessment • WFD assessment • Submission and Public Notice	• The Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020; • The Offshore Environmental Impact Assessment (The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)); • Habitat Regulations Assessment (Conservation of Habitats and Species Regulations 2017 (as amended); Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)); • EU (Withdrawal) Act 2018 • The Habitats and Birds Directive • Water Framework Directive;
Carbon Storage	• Carbon Dioxide Appraisal and Storage Licence already awarded by Oil and Gas Authority (now North Sea Transition Authority) • Crown Estate Lease • Carbon Storage Permit	• Energy Act 2008

Activity	Permit / Licence / Requirement	Key Legislation
Cable Laying and associated activities	• Marine Licence Band 3 in Welsh Waters • Pipeline Works Authorisation for inter-platform cables in English Waters	• MCAA 2009 • The Pipeline Safety Regulations 1996 • The Offshore Chemicals Regulations 2002 (as amended)

1.3.3 Linkages with other consents management plans

The INNSMP is consistent as far as possible with other relevant consent management plans prepared to inform the implementation of the Proposed Development. Additionally, management plans will be added as and when available. These are set out in Table 1.2 below with details of the linkages presented.

Table 1.2: Linkages With Other Consent Management Plans

Consents Management Plan	Linkage with the INNSMP
Environmental Management Plan (EMP)	The EMP provides the overarching framework for environmental management during the construction, operational and maintenance, and decommissioning phases of the Proposed Development. This can include proposed monitoring, methodologies and timings, along with a range of management plans including stakeholder engagement, traffic, waste, emergency response, invasive non-native species management and decommissioning and restoration.

1.4 Invasive Non-native Species Management Plan Methodology

This section outlines the process of creating an INNSMP using the best available evidence and following best practice guidance (Cook *et al.,* 2014, Payne *et al*., 2015). To make an accurate risk assessment of the Proposed Development, and derive a suitable INNSMP, a stepwise approach was taken as outlined in Figure 1.2 and described in detail below.

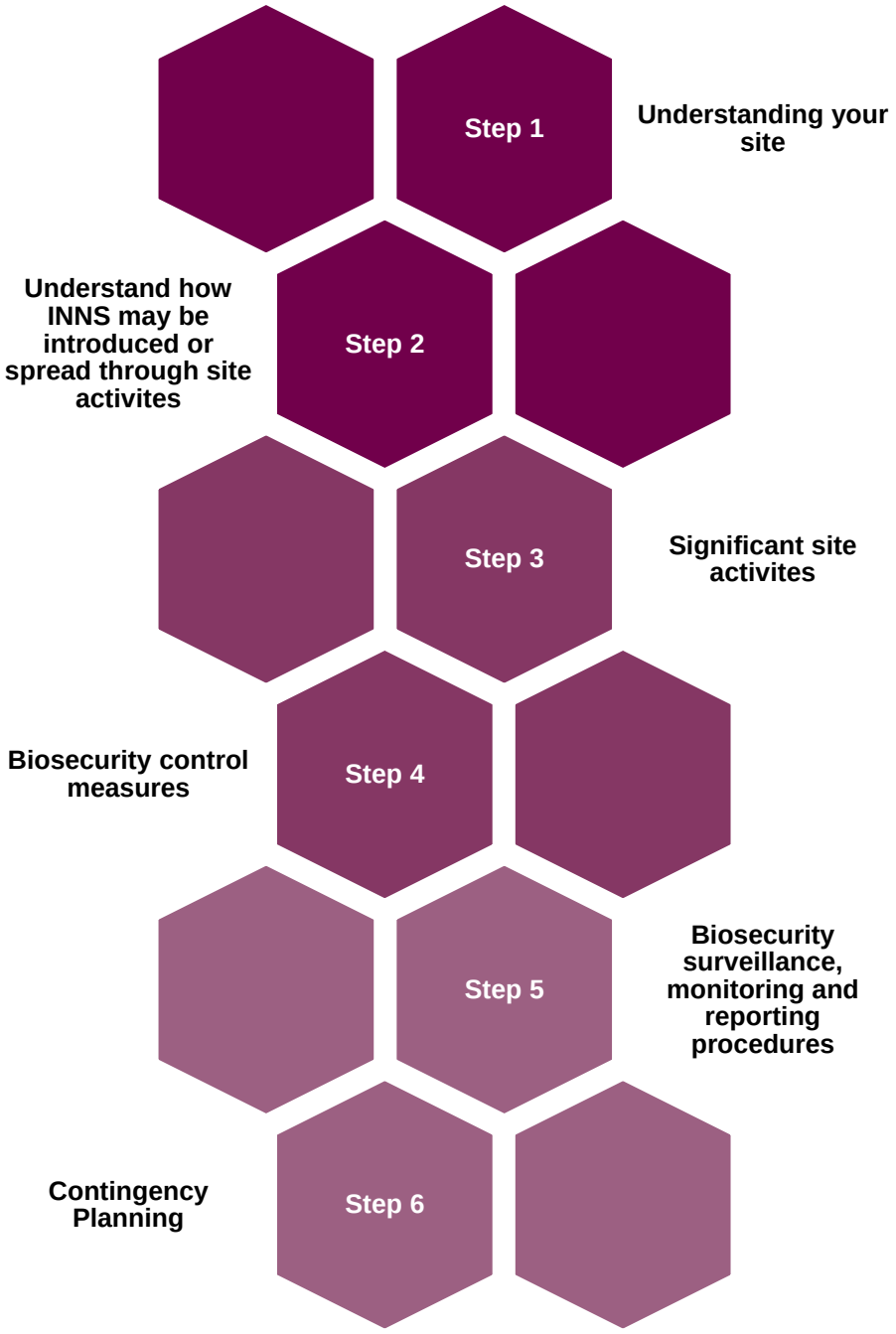

Figure 1.2: Six Steps Used To Produce The INNSMP For The Proposed Development

1.4.1 Step 1: Understanding your site

The first step in creating an INNSMP is to provide a detailed description of the site. This information should include the environmental conditions of the site, such as salinity, depth and the availability of hard substrate (Zaiko, 2007), details of any man-made structures, and if INNS are present within the site.

Understanding the salinity of the site will determine if INNS are present. The majority of marine flora and fauna are unable to tolerate freshwater due to osmoregulatory effects leading to death (Evans, 1980). An increased volume of freshwater flowing into a site will likely result in less hospitable conditions, decreasing the risk of INNS on-site; conversely, a fully marine site tends to represent a greater risk of INNS introduction to communities of native species (Tang *et al*., 2022).

The depth profile of a site can influence the ability of a species to colonise a site. Species live within an ecological range of tolerances, should a site be too deep for a species to live there, then it won't establish. Equally, within shallow environments, periods of tidal inundation and air exposure may decrease the likeliness of a species to establish.

The establishment of a species can also be influenced by the presence of a suitable hard substrate, for more sessile-encrusting organisms (Zaiko, 2007). Should a site only have gravel or sand present, then the likeliness of an INNS that requires a hard substrate to establish is reduced. Therefore, the presence of artificial structures increases the risk of INNS establishment, even if the structure has only been present for just a few weeks as INNS are quick to establish populations (Bax *et al*., 2003). Information related to any slow or stationary periods of work or climatic conditions that may increase biosecurity risk should be included.

If INNS have been found on-site, then the INNSMP should focus on reducing the risk of introducing new INNS and consider how to prevent the spread of existing INNS to other sites. Throughout the whole process, the precautionary principle should be followed, even if no INNS are present on site.

Using this information, a site can be assessed as having a low or significant risk of introducing or spreading INNS. Table 1.3 provides an example of this.

Table 1.3: Example Of Low And Significant-Risk Sites (Payne *et al*., 2015)

Low-Risk Site	Significant Risk Site
• Supply of fresh water from a local river. • Isolated from surrounding environments by walls or breakwaters (i.e. closed or semi-enclosed areas with little to no flow of water). • Anti-fouling is used on artificial structures with periodic removal for air drying.	• Full salinity with no freshwater inflow. • Artificial structures have no antifouling coating with no management in place for maintenance. • The site has connectivity to similar environments.

1.4.2 Step 2: Understand how INNS may be introduced or spread through site activities

In addition to understanding the site, consideration of pathways by which INNS may be introduced or spread is needed. This step should be iterative and revisited when the INNSMP is due for review. The questions and associated risks included in Table 1.4 have been adapted from Payne *et al*. (2015) and provide the type of questions to consider when creating an INNSMP.

Table 1.4: Example Of Questions And Risks To Consider Whilst Creating An INNSMP (Payne *et al*., 2015)

Question	Yes = High	Yes = Medium	Yes = Low
1. Has the vessel/ equipment just arrived from the local area?			
2. Has the vessel/ equipment had an anti-fouling coating applied to submerged structures within the last 12 months (or the time recommended by the manufacturer)?			
3. Are all the visible submerged surfaces of vessels or equipment to be deployed free of biofouling (a green 'slime' is OK)?			
4. Do the visible submerged surfaces of vessels or equipment to be deployed have more than a green 'slime' coating?			
5. Does the vessel or equipment to be deployed have noticeable clumps of algae and/ or animals clinging to the visible parts?			
6. Has the vessel/ equipment just arrived from another country or region with similar environmental conditions (e.g. seawater temperature)?			
7. Has the vessel/ equipment just arrived from a water body known to have INNS present?			
8. Does the vessel/ equipment spend long periods of time stationary at sites in between anti-fouling treatments?			
9. Is the vessel 'slow moving', such as a construction barge or drilling rig?			

For example, a recreational vessel showing no signs of biofouling on the hull or below the waterline would be considered a low risk for introduction of INNS; conversely, a work vessel/barge that moves from site to site and is present on site for long periods may have a medium–high risk, and therefore a significant risk of introducing INNS to site. For this step, information on the vessels and equipment to be used will be obtained from the Project Description, see volume 1, chapter 3 of the ES. A condition assessment of all vessel/equipment to be used will be performed based on the questions in table 3.2. Any results from this assessment that fall within the 'Low' category will be assessed as 'Low' Risk. Any results that fall within the 'Medium' or 'High' category will be assessed as a 'Significant' Risk. This is considered to present a conservative approach to assessing the risk of introducing INNS.

1.4.3 Step 3: Identify significant site activities

The outputs from Step 2 will be used to compile a list of all the significant risks of introducing INNS as a result of the Proposed Development. This will include all vessels and equipment and the associated activities which have been assessed as being of significant risk of introducing INNS and their associated activities within the different phases of the Proposed development. Once this list has been created, the next step is to develop relevant and proportionate control measures.

1.4.4 Step 4: Biosecurity control measures

The outcomes of Steps 1 – 3 will be used to guide the biosecurity measures which should be implemented. Measures to control the introduction or spread of INNS must be effective, clear, realistic and easy to communicate to others. These measures must also consider how much control is enforceable over the site. A list of example control measures can be found within Cook *et al*. (2014), and Payne *et al*. (2015), many of which are included in the INNSMP (see section 1.5.4). Where possible, biosecurity measures should be included in the in-design stage of a new development and aim to 'design out' any possible significant risk of introducing or spreading INNS.

1.4.5 Step 5: Biosecurity surveillance, monitoring and reporting procedures

This step will outline what procedures should be followed in the event of discovering and positively identifying an INNS on-site. All staff and other site users should be encouraged to report any unusual sightings to the biosecurity officer.

1.4.6 Step 6: Contingency plan

In the event of the failure of the 'prevention', 'early detection' and 'rapid response' methods to effectively manage INNS introduction (section 1.5.6), a contingency plan will be created. This document should be short, provide a step-by-step approach to action and be accessible to all staff. This plan will review the identified listed activities, identify potential biosecurity control failures and recommend actions for effective management. For example, if a vessel had been wrongly assessed as low risk and introduced an INNS to the site, the introduced species would be sampled and identified, with the relevant authorities notified, followed by further containment and management measures being sought.

1.4.7 Evaluation and review

Following completion of the INNSMP, a clear recording system and review cycle date will be put in place to refine and update the INNSMP as required in line with relevant regulations and legislation.

1.5 Invasive Non-Native Species Management Plan

1.5.1 Step 1: Understanding your site

1.5.1.1 Site description

The Proposed Development is located in Liverpool Bay in the Irish Sea, covering an area of about 576.82 km^2. It is positioned 12 km north of the Welsh coast and 2 km west of the English coast. The marine licence application area for the Proposed Development is shown as a red line boundary which encompasses all the planned and modified infrastructure including the pipeline and cables corridor up to MHWS, near the mouth of the Dee Estuary. The cable and pipeline make landfall within the Dee Estuary SAC. For further information see Section 1.2.1.

1.5.1.2 Environmental conditions affecting biosecurity

Liverpool Bay is a region of freshwater influence with strong horizontal density gradients. The bay is also strongly tidally dominated, with a high tidal range and extensive intertidal areas. Freshwater enters Liverpool Bay from several rivers, including the Mersey, Dee, Ribble, Conwy and Clwyd, which collectively maintain a strong salinity gradient and freshwater plumes (Bricheno *et al.* 2014; Polton *et al.*, 2011; Howarth and Palmer, 2011).

The Proposed Development is located in water depths that range from 0.72 m Lowest Astronomical Tide (LAT) to 35 m LAT, with average water depths across the development area being approximately 20 m LAT. Shallower water is generally present towards the southern and eastern boundaries of the Proposed Development, including the pipeline and cables, situated in inshore waters.

Tidal currents in the area are relatively weak, with spring tides indicating a current flow speed of up to 1m/s, flooding to the east, and ebbing to the west, at a current flow speed of circa 0.8 m/s, as determined through the desktop study for volume 2, chapter 6 of the ES.

The 2019 EUSea Map datasets, describe the Proposed Development area as being composed predominantly of EMODnet seabed substrate folk classification 311 gravelly Sand, 212 (gravelly) Sand, and 211 Sand (EMODnet, 2019). Fine and sandy sediments are dominant in inshore waters and particle sizes range from

260 to 420 µm in areas with stronger currents and from 190 to 250 µm in areas with contrasting, weaker currents (Eni, 2019). This has been corroborated through volume 2, chapter 6 of the ES.

Overall, the influx of freshwater into Liverpool Bay and through the Proposed Development is likely to reduce the presence of INNS. Furthermore, tidal currents and a higher proportion of sand fractions, with no rock, found throughout the Proposed Development are likely to reduce the likeliness of INNS being present within the area. Therefore, the environmental conditions of the site can be assessed as **Low-Risk.**

1.5.1.3 Man-made structures

Section 1.2.2 listed the existing hard structures present within the Proposed Development area. These hard structures include the platforms, injection, monitoring and sentinel wells and pipelines. It is important to note that some of these structures may be buried, such as the power and fibre optic cables and pipelines. Furthermore, Gwynt y Mor offshore wind farm is located within the south-western most corner of the Proposed Development. These structures are likely to increase the potential for INNS to establish. Therefore, the presence of man-made structures are likely to increase the risk of INNS to the site and is assessed as a **Significant-Risk**.

1.5.1.4 INNS within the Proposed Development

The Proposed Development is located within the Dee Estuary Special Area of Conservation (SAC), which is primarily tidal rivers, estuaries, mud flats, sand flats and lagoons (including saltwork basins) (81% coverage). The SAC is designated for a range of Annex I habitats including mudflats and sandflats not covered by seawater at low tide, as well as Annex II species, such as sea and river lamprey (*Petromyzon marinus* and *Lampetra fluviatilis*, respectively). The Natura 2000 - Standard Data Form (JNCC, 2015) for the SAC identifies INNS as a high ranked negative impact pressure. However, it should be noted that this pressure is attributed to the terrestrial invasive saltmarsh species, common cord grass *Spartina anglica*. No marine INNS have, as of yet, been identified as a negative pressure on the Dee Estuary SAC.

National Biodiversity Network (NBN) data (2023) indicated no INNS are present within the Proposed Development area. However, within the wider area of the Proposed Development, Liverpool Bay is known to have INNS present within ports and harbours. As the Proposed Development will require the use of vessels during the construction, operational and maintenance, and decommissioning phases, INNS that have been identified within ports and harbours have been listed on a precautionary basis (Table 1.5).

Table 1.5: Non-Native Species Known To Be Present Throughout Liverpool Bay

	Non-native Species[1]	Environmental risk to native Great Britain species[2]
Present throughout Liverpool Bay:	• American lobster *Homarus americanus* • Chinese mitten crab *Eriocheir sinensis* • Wakame *Undaria pinnatifida*	High Risk
	• Slipper limpet *Crepidula fornicata* • Japanese skeleton shrimp *Caprella mutica* • Wireweed *Sargassum muticum* • Pacific oyster *Crassostrea gigas*	Medium Risk
	• Acorn Barnacle *Elminius modestus*	Risk not assessed / available

[1] Sources: Hurst (2016); Solway Firth Partnership (2015); NBN Gateway (2023).

[2] According to assessment by GB Non-Native Species Secretariat (Risk assessment » NNSS (nonnativespecies.org)).

Non-native Species[1]	Environmental risk to native Great Britain species[2]
• Bay barnacle *Amphibalanus improvisus* • Bryozoan *Bugulina simplex* • Bryozoan *Bugulina stolonifera* • Carpet sea squirt *Didemnu vexillum* • Colonial sea squirt *Aplidium cf. glabrum* • Compass sea squirt *Asterocarpa humilis* • Chain Tunicate *Botrylloides violaceus* • Darwin's barnacle *Austrominius modestus* • Devil's tongue weed *Grateloupia turuturu* • Green sea fingers *Codium fragile fragile* • Polychaete *Goniadella gracilis* • Orange-striped anemone *Diadumene lineata* • Orange-tipped sea squirt *Corella eumyota* • Red ribbon bryozoan *Watersipora subatra* • Tufty buff byozoan *Tricellaria inopinata* • Trumpet tubeworm *Ficopotamus enigmaticus* • Leathery sea squirt *Styela clava*	

A species account has been provided for those with a high to medium risk:

- High Risk:
  - American Lobster: A large crustacean from the north-west Atlantic. Slightly larger than (but very similar to) the native lobster (GB NNSS, 2015). The species has been recorded in Solway, at Workington (Solway Firth Partnership, 2015).
  - Chinese mitten crab: The Chinese mitten crab measures up to 56 mm in carapace length. Its carapace has a square outline, tapering towards the front, and features four teeth on each side. The most prominent characteristic of this crab is the thick layer of hair covering its claws and legs. The species have been found to be distributed within the River Dee, Mersey, Ribble and at the mouth of the River Duddon (NBN Gateway, 2023).
  - Wakame*:* A large species of kelp native to Japan, which has a broad frond with fingered edges and a conspicuous midrib. The holdfast is compact and root-like, and the stipe above it bears many folded reproductive frills. Grows on hard substrates from low intertidal to approximately 18 m, tolerant of salinities as low as 20 (GB NNSS, 2019a). The species has been recorded in Liverpool Bay and is currently contained within Fleetwood Marina, located near Blackpool, however, it has increased in abundance in recent years (Hurst, 2016).
- Medium Risk:
  - Slipper Limpet: Shell is oval and up to 5 cm in length. The large shell opening has a shelf, extending half its length. Shell is smooth and white, cream, yellow or pinkish in colour with streaks or blotches of red or brown. The species is now distributed in Europe from Norway to the Mediterranean, with population explosions on the south and south-west England. Within Liverpool Bay, the species has been recorded along the north-west of Wales around Anglesey and at the mouth of the River Mersey (NBN Gateway, 2023).

- Japanese skeleton shrimp: An aggressive skeleton shrimp originally from northeast Asia, which is rapidly invading and has established populations in the North Sea, the West coast of Scotland and the Irish Sea (GB NNSS, 2012). The species has been recorded in Loch Ryan and can be found in harbours and marinas amongst fouling growth on boat hulls, ropes and nets where it can clog equipment and nets as well as outcompete native species (Hurst, 2016).
- Wireweed: A highly distinctive large olive-brown seaweed, often over 1m long. Its lateral branches hang like washing from a line when held out of the water. Wireweed competes with native seaweeds and sea grasses through rapid growth, shading and abrasion. It is a nuisance in harbours and shallow waters where it is a hazard to boating due to the entanglement of propellers (GB NNSS, 2019b). The species is distributed widely along the coasts of south and west England, Wales and West Scotland. It was first recorded in Scotland in Loch Ryan in 2004 and has since populated various areas further north up the west coast (Hurst, 2016).
- Pacific oyster: There are extensive beds of naturally recruited Pacific oysters in some southern estuaries of England and sparse settlements are known from the north coast of Wales near Conwy. Mature individuals were first recorded on the Galloway coast at Ravenshall in October 2012, Ross Bay in December 2012 and Balcary Bay in January 2013. A survey published in 2015 confirmed the Solway Firth to be an ideal habitat for the species although densities were low (Solway Firth Partnership, 2015).

Volume 3, Marine Biodiversity Technical Report (RPS Group, 2024) appendix I of the ES highlights the discovery of an INNS, the polychaete worm *Goniadella gracilis*, at the partially decommissioned station GS28 by Hamilton North (Figure 1.1).

The presence of INNS within and near to the Proposed Development area is considered to be of **Significant-Risk**.

Should any further INNS be recorded in the area prior to finalising the plan, these should be highlighted here, identifying the risk that each species represents to the UK's native species. Table 1.6 presents a summary of the results of Step 1.

Table 1.6: Summary Of The Site Risk Of The Introduction And Spread Of INNS

Site factor effecting risk of INNS	Assessment Result	Risk of INNS
Environmental conditions affecting biosecurity	The influx of freshwater into Liverpool Bay, tidal currents and a higher proportion of sand fractions, with no rock, found throughout the Proposed Development are likely to reduce the likeliness of INNS being present within the area. Therefore, the environmental conditions of the site can be assessed as Low-Risk.	Low
Man-made Structures	The presence of existing hard structures within the Proposed Development, as well as the presence of Gwynt y Mor offshore wind farm located within the south-westernmost corner of the Proposed Development are likely to increase the potential for INNS to establish. Therefore, the presence of man-made structures is assessed as a Significant-Risk.	Significant
INNS within the Proposed Development	NBN data (2023) indicated no INNS are present within the Proposed Development area. However, within the wider area of the Proposed Development, Liverpool Bay is known to have INNS present within ports and harbours. Additionally, volume 3, Marine Biodiversity Technical Report (RPS Group, 2024) appendix I of the ES highlights the discovery of an INNS, the polychaete worm *Goniadella gracilis*, at the partially decommissioned station GS28 by Hamilton North within the Proposed Development area. Therefore, the presence of this INNS is considered to be of Significant-Risk.	Significant

Given the results of Step 1 indicate two areas where the risk of INNS is significant, the INNSMP should focus on reducing the risk of further introducing new INNS and consider how to prevent the spread of existing INNS to other sites.

1.5.2 Step 2: Understand how INNS may be introduced or spread through site activities

1.5.2.1 Vessels and equipment to be used in the Proposed Development

Table 1.7 lists the vessels and equipment to be used for the Proposed Development with a 'risk' indicator for the potential to introduce or spread INNS. This risk assessment will be updated once the final project parameters have been confirmed and will be based on professional judgement, the final Proposed Development design, INNS present within the area (see Section 1.5.1), and available guidance.

The ES is based on the Proposed Development design parameters, which include the use of several vessels, planned infrastructure, such as cables and CO_2 injection, sentinel and monitoring wells, and the modification of existing installations (Figure 1.1). Additionally, there may be a requirement to use concrete mattresses and rock armour. These will be refined post-consent, such that the risk can be accurately assessed. As stated previously, this is a 'live' document and as such, if specific details of the Proposed Development undergo review or are changed, this document will be updated accordingly.

The results of Step 2 as presented in Table 4.2 indicate that the use of vessels in all phases of the Proposed Development presents a significant risk for the introduction of INNS. However, operational speeds of the vessels combined with the implementation of standard control measures to comply with relevant regulations such as MARPOL and those to manage ballast water will reduce the risk to low.

Man-made structures also present a significant risk to the introduction of INNS and given the identified presence of an INNS within the Proposed Development. Additional project specific control measures will be required to manage this risk.

Table 1.7: Vessel, Foundation Types, And Substrates To Be Used In The Proposed Development

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
Vessels (Construction phase)	Various	• Vessel types and sizes to be used in the construction phase for the: – Oil Platform and wells include: Main installation and support vessels, tug/anchor handlers, cargo barges, support vessels, survey vessels, pre-comm vessels, seabed preparation vessels and crew transfer vessels; and – Cables and pipe include: cable lay installation & support, vessels, jack-up, multicat, working boat, support vessel (for trenching), dsv/lcv (for cable pull-in), survey vessel, seabed preparation vessel, crew transfer vessel, cable protection installation vessel and cable burial installation vessel. • Indicative construction port: – Port of Belfast Shipyard, Belfast, N.Ireland, UK (150 nm from the Proposed Development), and – Arnish Point Yard, Isle of Lewis, Scotland, UK (380 nm from the Proposed Development), with the final decision still to be made.	Significant	Vessels will be slow moving during construction and are expected to come from the Port of Belfast, approximately 150 nm from the Proposed Development. Vessels will be required to have an anti-fouling coating, inspection history complying with relevant regulations (MARPOL Regulations) and to manage ballast water. Anti-fouling coating and adherence to the MARPOL regulations and ballast standards will reduce the risk of INNS being present on the hulls of vessels.	Low
Vessels (operation and maintenance)	Various	• Vessel types and sizes to be used in the operation and maintenance phase include a jack-up barge and a multi-purpose support vessel. • The indicative operation and maintenance port is yet to be confirmed.	To be confirmed	Vessels will be required to have an anti-fouling coating and inspection history complying with relevant regulations (MARPOL Regulations).	To be confirmed

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
Vessels (Decommissioning phase)	Various	• Vessel types and sizes to be used in the decommissioning phase include decommissioning and support vessels, tug/anchor handlers, cargo barges, cable decommissioning and support vessels, survey vessels, and crew transfer vessels. • Indicative decommissioning port: – Port of Belfast Shipyard, Belfast, N.Ireland, UK (150 nm from the Proposed Development), and	Significant	Vessels will be slow moving when removing structures during decommissioning and are expected to come from the Port of Belfast, approximately 150 nm from the Proposed Development. Vessels will be required to have an anti-fouling coating, inspection history complying with relevant regulations (MARPOL Regulations) and to manage ballast water. Anti-fouling coating and adherence to the MARPOL regulations and ballast standards will reduce the risk of INNS being present on the hulls of vessels.	Low
New Infrastructure	• CCS platforms • Topsides	• Infrastructure, pile jacket and topsides will be delivered via heavy lift vessel, crane or transport barge.	Low	The piles will be prefabricated at an onshore facility and delivered offshore by means of a transportation barge and are unlikely to come into contact with the water, (and therefore INNS), until installation.	Low
	• Pipeline	• A 595 m length of the pipeline is to be installed and laid on the seabed. This is likely to be transported via barge.	Low	The pipeline will be delivered offshore by means of a transportation barge and is unlikely to come into contact with the water, (and therefore INNS), until installation.	Low
	• Monitoring Wells	• Monitoring wells are to be drilled.	Low	INNS are unlikely to colonise the drilled wells.	Low
	• Cables	• Cables will be installed from onshore through to the connection point via the installation vessel.	Significant	Cables are to be installed throughout a wide range of environmental conditions and habitats, with vessels likely to have come from ports where INNNS may be present. There is therefore an increased risk of introducing an INNS along the cable.	Low

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
				However, according to the Project Description cables are expected to be burried thereby mitigating any colonisation of INNS on the cable	
	• Concrete Mattresses/ Other External Cable Protection	• Concrete mattresses and other external cable protection will be installed at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved	Low	Concrete mattresses/ other external cable protection are to be delivered to the site via barge and will not come into contact with the water, (and therefore INNS), until installation.	Low
Repurposed infrastructure	• Repurposing of existing pipelines • Redevelopment of reservoirs • Recompletion of monitoring wells	• Existing infrastructure is to be repurposed for the Proposed Development.	Significant	Volume 3, Marine Biodiversity Technical Report (RPS Group, 2024)appendix I of the ES has reported that one specimen, the polychaete worm *Goniadella gracilis* was recorded at the partially decommissioned station GS28.	Significant

1.5.3 Step 3: Significant site activities

Based on the results of Step 2, a list of the Proposed Development activities per phase, that may have a significant risk of introducing or spreading INNS is provided in Table 1.8. The assessment in Step 2 was derived from information provided in the Project Description and will be updated based on the final project design as explained in Step 2 (section 1.5.2), with these activities predicted to represent a significant risk of INNS introduction during the construction, operation and maintenance and decommissioning phases.

Table 1.8: Site Activities Which Have A Significant Risk Of Introducing Or Spreading INNS

Phase	Activity Description
Construction	• Presence of existing man-made structures that may have INNS present.
Operation and Maintenance	• Presence of man-made structures that may have INNS present. • Maintaining man-made structures and ancillary equipment that may have INNS present.
Decommissioning	• Removal of man-made structures and ancillary equipment that may have INNS present. • Cleaning and disposal of biofouling from man-made structures and ancillary equipment.

1.5.4 Step 4: Biosecurity control measures

This section provides information on site-specific risks and control measures associated with the Proposed Development.

1.5.4.1 Presence/maintenance/ removal of existing man-made structures that may have INNS present

Risk

This may pose one of the greatest risks of INNS spreading associated with the Proposed Development. New or clean surfaces, such as vessels and infrastructure are typically the first colonisation sites for INNS due to their ability to settle and rapidly proliferate, replacing native populations (Huxel, 1999). Newly available hard surfaces (e.g. new platforms and auxiliary infrastructure) associated with the Proposed Development may be susceptible to colonisation by INNS found at the partially decommissioned station GS28 (near Hamilton North and Hamilton) in the first few weeks/months after installation (Bax *et al.*, 2003).

Control measures

Any man-made structure to be used for the Proposed Development should be of terrestrial origin (i.e. not coming from another marine environment) and inspected for INNS prior to placement in the marine environment. During maintenance, the structure should be inspected for any INNS present, and if detected, then actions should be followed as presented in Section 1.5.6.

It should be noted that the INNS *Goniadella gracilis* is a species of polychaete worm, these worms are unlikely to adhere themselves to structures but will be inhabiting the surrounding sediments of the station GS28. As the species does not adhere to structures, this is likely to decrease the risk of spreading the INNS to other areas. However, caution should be advised if dredging within the vicinity of GS28 is required.

1.5.4.2 Cleaning and disposal of biofouling from structures during operation and maintenance activities and decommissioning

Risk

During routine operations and maintenance activities (e.g. jet washing of marine growth from the splash zone, or component replacement where required), there is potential for any established INNS to be detached from subsea structures. Where there is an identified risk that these activities may lead to the spread of INNS in the marine environment, additional control measures may be required.

Following the removal of marine structures during the decommissioning phase, INNS, if present, may still be attached to the surface. Should the INNS be removed without due care and washed back into the marine environment surrounding the Proposed Development, these INNS may represent a risk of spreading to areas previously unaffected.

Control measures

Where there is an identified risk that operation and maintenance activities (e.g. periodic cleaning of infrastructures) may lead to the spread of INNS (e.g. if there is a high risk that INNS are present on infrastructure), control measures may be required to minimise the amount of material entering the marine environment.

Large volumes of material detached or removed from decommissioned subsea infrastructure should be prevented from re-entering the marine environment. The material should be taken away and properly disposed of onshore. Control measures taken in relation to the disposal of biofouling will be aligned with the relevant Port Authority ‘Waste Management Plan’.

Biosecurity action

Prior to the installation of subsea structures or operation of new vessels to the Proposed Development, the Applicant and their contractors must include the following biosecurity clauses in any contract agreement:

- The contractor must submit a Biosecurity Risk Assessment to the Project Environmental Manager at least six weeks prior to installation/operations; and
- The contractor must ensure that all equipment, materials, machinery, Personal Protection Equipment (PPE) and vessels used are in a clean condition prior to their arrival on-site to minimise the risk of INNS introduction into the marine environment.

1.5.4.3 Additional biosecurity measures

The Proposed Development has been assessed as Significant in Step 1, therefore, using the precautionary approach, additional biosecurity measures have been presented.

1.5.4.4 Using vessels from outside of the Proposed Development

Risk

Using vessels from outside the Liverpool Bay area poses a significant risk of introducing INNS to the area (Minchin and Gollasch, 2010), especially vessels coming from areas of a similar marine environment. Information on the origin of the vessels to be used in all phases of the Proposed Development will be included within the INNSMP once the exact details and origins of vessels are specified following the appointment of construction contractors.

Control measures

All vessels to be used for construction, operation and maintenance and decommissioning activities must follow the guidelines as directed by the 'Guidelines for the Control and Management of Ships' biofouling to minimize the transfer of invasive aquatic species'[3], and where applicable, to comply with the 'International Convention for the Control and Management of Ships' Ballast Water and Sediments'[4].

1.5.5 Step 5: Biosecurity surveillance, monitoring and reporting procedures

Table 1.9 outlines who is responsible for carrying out certain checks of INNS, where these checks are to be carried out and when. Note that these positions are indicative, and roles and responsibilities will be confirmed upon contract award.

Table 1.9: Roles, Responsibilities, And Instructions For Staff, Contractors, And Site Users

Who	What	Where	When
Project Operations & Environment Manager - developers and contractors	• Oversee removal of flora and fauna from infrastructure, concrete mattress etc. and ancillary equipment, ensure material is properly disposed of and that no material is released into the water as per the relevant Port/Harbours 'Waste Management Plan'. • Awareness of INNS, including identification guidance on the key risk species. If uncertainty arises, follow the contingency plan.	At Port	Beginning of works
Project Operations & Environment Manager or appropriate contractor	• Oversee installation and removal of infrastructure, concrete mattress etc. and ancillary equipment, checking for INNS or unknown organisms. • For operations and maintenance, periodic checks should be carried out to ensure no growth/settlement of INNS, when possible. • Be aware of any slow-moving or inactive craft and take steps to assess risk. • Ensure a Check, Clean and Dry message is sent to any new developers or contractors. • Where possible, collaborate with the relevant port/Harbours and other users of Liverpool Bay to raise INNS awareness.	At Port	Beginning of works
Developers and contractors	• Confirm the origin of the material used in infrastructure, concrete mattress etc. and ancillary equipment (i.e. terrestrial origin, not previously submerged in marine water). • Encourage 'toolbox' talks on INNS prevention and monitoring.	N/A	Throughout works
Project Operations & Environment Manager - developers and contractors	• Through collaboration with the Regulators (including relevant stakeholders) will develop measures appropriate to the Proposed Development deployment specific to the site, nature, and duration of activities on a case-by-case basis.	N/A	Beginning of works

[3] For more information, see: Biofouling (imo.org)

[4] For more information, see: Ballast Water Management (imo.org)

1.5.6 Step 6: Contingency plan

Table 1.10: Contingency Plan In The Event Of Failure Of Prevention Of Inns Introduction

Action	Responsibility
Stage One – Suspected arrival of high-alert species	
Take photographs of the sample and collect the sample in a plastic bag.	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project), or any member of staff at the site of INNS discovery.
Check the organism against the identification sheet (see ID sheets » NNSS (nonnativespecies.org)) Report to Recording » NNSS (nonnativespecies.org)	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project), or any member of staff at the site of INNS discovery.
Stage Two – Presence of high-alert species confirmed	
Initiate immediate containment measures, including restricted vessel movements.	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project).
Carry out a wider survey of vessels and structures.	Designated biosecurity officer, and qualified ecologist.
Stage Three – Eradication/employ long-term control measures	
Seek advice from the GB Non-Native Species Secretariat on appropriate measures and actions for long-term control.	Designated biosecurity officer and Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project).

1.5.7 Evaluation and review

1.5.7.1 Location of biosecurity logbook

A biosecurity logbook will be kept (in electronic form) for the Proposed Development and will be made available for inspection and review as and when required.

1.5.7.2 Plan review date

This plan will be updated prior to construction to include the final project design and include an updated risk assessment based on that final design. This will include all measures to manage INNS during the construction, phase as agreed with the relevant regulatory authorities.

The plan will be updated following the completion of construction and at the beginning of the operational and maintenance phase to ensure the plan is appropriate for the next phase of the development and the risks and activities associated with it. The plan will be updated at regular intervals during the operational and maintenance phase and prior to the decommissioning phase to ensure all measures are appropriate and any changes in the environment and risk of INNS (e.g. records of INNS being present on site) are reflected in the INNSMP, as agreed with the relevant regulatory authorities.

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