The Great Grid Upgrade

Sea Link

Sea Link

Volume 7: Other Documents

Document 7.5.12: Outline Offshore Invasive Non-Native Species Management Plan

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Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(q)

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Version History

Date	Version	Status	Description / Changes
March 2025	A	Final	For DCO submission
November 2025	B	Final	Updated in response to Natural England Relevant Representations for Deadline 1

Executive Summary

Ex1.1.1 The invasive non-native species (INNS) management plan presents the potential risks of the introduction of marine INNS associated with The Sea Link Project (hereafter referred to as the 'Proposed Project'). The purpose of this document is to provide a framework for preventing the potential introduction and spread of INNS during the Construction, Operation and Maintenance, and Decommissioning phases. It includes relevant biosecurity control and best practice measures to reduce the risk of INNS introduction from the Proposed Project.

Ex1.1.2 The report uses existing data sources, such as regional INNS management plans, as well as observations from project-specific surveys to identify marine INNS already known to be present. This report identified several marine INNS within the vicinity of the Proposed Project, including two INNS that were observed during the survey within the Offshore Scheme.

Ex1.1.3 The document highlights specific activities within each phase of the Proposed Project that carry a significant risk of introducing and spreading INNS in the marine environment. This information, combined with consideration of marine INNS present from both desktop studies and site specific surveys, and the equipment/vessels associated with the Proposed Project, provides a comprehensive overview of potential pathways for INNS introduction, as well as a risk rating for each component. Several key pathways of INNS introduction were identified including the movement of vessels (which have the potential to carry marine INNS in ballast water or attached to the hull), as well as the introduction of anthropogenic structures into the marine environment, such as cable protection measures.

Ex1.1.4 Following the assessment of the risk of INNS introduction, the document outlines biosecurity control measures for the Proposed Project and a framework for preventing the spread of INNS. It is recommended to conduct annual monitoring of the Offshore Scheme to identify any occurrence of marine INNS. If observed, relevant regulators must be informed to guide the operator in eradicating or containing the species.

1. Outline Offshore Invasive Non-Native Species Management Plan

1.1 Introduction

1.1.1 The Sea Link Project (hereafter referred to as the ‘Proposed Project’) is a proposal by National Grid Electricity Transmission plc (hereafter referred to as National Grid) to reinforce the transmission network in the South East and East Anglia. The Proposed Project is required to accommodate additional power flows generated from renewable and low carbon generation, as well as accommodating additional new interconnection with mainland Europe.

1.1.2 National Grid owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, National Grid holds a transmission licence under which it is required to develop and maintain an efficient, coordinated, and economic electricity transmission system.

1.1.3 This would be achieved by reinforcing the network with a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400 kV overhead line close to Richborough in Kent.

1.1.4 National Grid is also required, under Section 38 of the Electricity Act 1989, to comply with the provisions of Schedule 9 of the Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

- ~~1.1.5~~ Schedule 9(1)(a) “*…have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest*”; and
- ~~1.1.6~~ Schedule 9(1)(b) “*…do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects*.”

~~1.1.7~~1.1.5 This Outline Marine INNS Management Plan forms part of the Environmental Statement prepared on behalf of National Grid to support the Application for a Development Consent Order (DCO).

~~1.1.8~~1.1.6 The purpose of this document is to describe the potential risks of marine INNS introduction associated with the Proposed Project and provides a framework for preventing their introduction and spread during the Construction, Operation and Maintenance and Decommissioning Phases. It includes relevant biosecurity control measures and best practice measures to reduce the risk of INNS introduction from the Proposed Project. At the request of Natural England, reference is also made to invasive species known to be present at the former hoverport in the Kent Onshore Scheme. Specifically, wall cotoneaster (*Cotoneaster horizontalis*) and Japanese rose (*Kerria japonica*), both species on Schedule 9 of the Wildlife & Countryside Act 1981, have been observed in the former hoverport site.

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~~1.1.9~~1.1.7 This Outline Marine INNS Management Plan is a 'living' document that will be updated as required post submission of the DCO application, during the Examination Period and during the detailed design process as necessary prior to implementation.

~~1.1.10~~1.1.8 On confirmation of a Principal Contractor (the organisation that will manage the construction of the Proposed Project), this Outline Marine INNS Management Plan will be updated to reflect specific proposed construction methods and approved by the relevant authorities (in this case the MMO and Natural England).

~~1.1.11~~1.1.9 The Final Marine INNS Management Plan will be approved by the relevant licencing authority and will be periodically reviewed and updated by National Grid as required, to ensure environmental risks are managed and mitigated throughout

~~1.1.12~~1.1.10 The Order Limits, which illustrate the boundary of the Proposed Project, are illustrated on **Application Document 2.2.1 Overall Location Plan**.

~~1.1.13~~1.1.11 This chapter should be read in conjunction with:

- **Application Document 2.2.1 Overall Location Plan**;
- **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**;
- **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**;
- **Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**;
- **Application Document 6.2.4.6 Part 4 Marine Chapter 6 Marine Archaeology**;
- **Application Document 7.5.2 CEMP Outline Offshore Construction Environmental Management Plan**;
- **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**;
- **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**; and
- **Application Document 7.7 Marine Biosecurity Plan**.

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~~1.1.14~~1.1.12 This chapter is supported by the following figure, located in **Appendix A Figures**:

- **Figure 1 Study Area and predicted benthic habitats**.

~~1.1.15~~1.1.13 This chapter is supported by the following appendices:

- **Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**.

1.2 The Proposed Project

1.2.1 The Proposed Project would comprise the following elements:

The Suffolk Onshore Scheme

- A connection from the existing transmission network via Friston Substation, including the substation itself. Friston Substation already has development consent as part of other third-party projects. If Friston Substation has already been constructed under another consent, only a connection into the substation would be constructed as part of the Proposed Project.

- A high voltage alternating current (HVAC) underground cable of approximately 1.9 -km in length between the proposed Friston Substation and a proposed converter station (below).
- A 2 GW high voltage direct current (HVDC) converter station (including permanent access from the B1121 and a new bridge over the River Fromus) up to 26 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, similar small scale operational plant, or other roof treatment) near Saxmundham.
- A HVDC underground cable connection of approximately 10 km in length between the proposed converter station near Saxmundham, and a Transition Joint Bay (TJB) approximately 900 m inshore from a landfall point (below) where the cable transitions from onshore to offshore technology.
- A landfall on the Suffolk coast (between Aldeburgh and Thorpeness).

The Offshore Scheme:

- Approximately 122 km of subsea HVDC cable, running between the Suffolk landfall location (between Aldeburgh and Thorpeness), and the Kent landfall location at Pegwell Bay.

The Kent Onshore Scheme:

- A landfall point on the Kent coast at Pegwell Bay.
- A TJB approximately 800 m inshore to transition from offshore HVDC cable to onshore HVDC cable, before continuing underground for approximately 1.7 km to a new converter station (below).
- A 2 GW HVDC converter station (including a new permanent access off the A256), up to 28 m high (2 m allowance for ground level rise plus 26 m converter station) plus external equipment such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, and similar small scale operational plant near Minster. A new substation would be located immediately adjacent.
- Removal of approximately 2.2 km of existing HVAC overhead line, and installation of two sections of new HVAC overhead line, together totalling approximately 3.5 km, each connecting from the substation near Minster and the existing Richborough to Canterbury overhead line.

1.2.2 The Proposed Project also includes modifications to sections of existing overhead lines in Suffolk (only if Friston Substation is not built pursuant to another consent) and Kent, diversions of third-party assets, and land drainage from the construction and operational footprint. It also includes opportunities for environmental mitigation and compensation. The construction phase will involve various temporary construction activities including overhead line diversions, use of temporary towers or masts, working areas for construction equipment and machinery, site offices, parking spaces, storage, accesses, bellmouths, and haul roads, as well as watercourse crossings and the diversion of public rights of way (PROWs) and other ancillary operations.

1.3 Legislation, Policy and Guidance

Legislation

1.3.1 The below legislation is considered applicable to the Proposed Project and relevant to the purpose of this document.

The Wildlife and Countryside Act 1981

1.3.2 The Wildlife and Countryside Act (1981) (as amended) includes provisions relating to nature conservation, including marine habitats and species.

Marine Strategy Framework Directive 2008

1.3.3 Directive 2008/56/EC of the European Parliament and of the Council (2008) establishing a framework for community action in the field of marine environmental policy.

Marine and Coastal Access Act 2009

1.3.4 The Marine and Coastal Access Act (2009) is the legal mechanism to help ensure clean, healthy, safe, and productive and biologically diverse oceans and seas.

The Marine Strategy Regulations 2010

1.3.5 The Marine Strategy Regulations (2010) transposes the Marine Strategy Framework Directive (2008/56/EC) into UK legislation as retained law from the European Union (EU).

The Water Environment (Water Framework Directive (England and Wales)) Regulations 2017

1.3.6 The Water Environment (Water Framework Directive (England and Wales)) Regulations (2017) transposes the EU Water Framework Directive (2000/60/EC) into UK legislation as retained law from the EU.

European Union (Withdrawal) Act 2018

1.3.7 The Invasive Alien Species EU Regulation 1143/2014 was transposed into UK legislation as retained law from the EU under the EU (Withdrawal) Act-. (2018).

The Invasive Alien Species (Enforcement and Permitting) Order 2019

1.3.8 The Invasive Alien Species (Enforcement and Permitting) Order (2019) gives effect to EU regulations on the prevention and management of the spread of invasive alien species.

The Conservation of Habitats and Species Regulations 2017 (amended 2019)

1.3.9 The Conservation of Habitats and Species Regulations (2017) (amended 2019[1]) transposes the Habitats Directive (92/43/EEC) and implements provisions from the

[1] Amended in response to the UK's exit from the European Union (EU), making the Habitats (92/43/EEC) and Wild Birds (2009/147/EC) Directives, operable from 1 January 2021, and creating a UK natural site network in place of the EU Natura 2000 ecological network.

Birds Directive (2009/147/EC), into UK legislation. These regulations cover the requirements to protect sites that are internationally important for threatened habitats and species out to the 12 nautical mile (NM) limit.

Policy

UK Marine Policy Statement 2011

1.3.10 UK Marine Policy Statement (2011) aims to achieve sustainable development in the UK marine area.

The Great Britain Invasive Non-native Species Strategy

1.3.11 The Great Britain Invasive Non-native Species Strategy, sets out aims and actions for addressing threats posed by INNS.

Guidance

1.3.12 In addition to the legislation and policies outlined above, the following guidance was also applicable for the preparation of this INNS management plan:

- Marine Biosecurity Planning Guidance for producing site and operation-based plans for preventing the introduction and spread of invasive non-native species in England and Wales (Cook, Macleod, Payne, & Brown, 2015).
- Reducing and Preventing Invasive Alien Species (RAPID) Life Project Marine biosecurity toolkit and guidance documents.
- Great British Non-Native Species Secretariat (GB-NNSS) marine biosecurity guidance.

1.4 The Study Area

1.4.1 The determination of the Study Area takes a precautionary approach to ensure the assessment incorporates all areas which could contribute to INNS introduction and spread throughout the life cycle of the Proposed Project. This area includes the potential maximum dispersion of suspended particles in one tidal cycle which is considered to represent the greatest distance travelled of any INNS larvae or vegetative bodies carried in suspension. Based on project-specific modelling, this distance is considered to be 17 km (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). As discussed earlier, it also includes the former hoverport in the Kent Onshore Scheme, at the request of Natural England.

1.4.2 The location of the Study Area in relation to the Offshore Scheme, with predicted benthic habitats (EMODnet, 2021) is provided in **Figure 1 Study Area and P~~p~~redicted B~~b~~enthic H~~h~~abitats**.

1.5 Environmental Conditions

1.5.1 Local environmental conditions are an important factor in the spread of marine INNS. They are the key to whether introduced species can survive and establish themselves. Ideal conditions vary by species and as such, understanding the local environmental conditions relevant to the Proposed Project and available habitats will provide a better indication of which species are likely to establish if introduced.

1.5.2 The subtidal benthic habitats identified along the Offshore Scheme are generally dominated by mud, sand, and coarse sediments. Along the Offshore Scheme, the benthos is primarily characterised by areas of fine sediment with patches of soft circalittoral rock habitat in the nearshore by the Suffolk Landfall location, before transitioning to areas of mud and sand along the Offshore Scheme. As the Offshore Scheme moves southwards, the sediment becomes more mixed with the presence of soft rock in nearshore areas at the Kent Landfall (see **Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**).

1.5.3 Tidal movements may also serve as an important vector for transporting marine INNS, as local water currents may carry pelagic species and/or larvae to new sites. Potential distances that INNS may travel can be represented by the potential maximum dispersion of suspended particles in one tidal cycle on which the S~~s~~tudy A~~a~~rea is based on (section 1.4). Project-specific modelling indicates this distance may be up to 17 km (see **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**).

1.5.4 At the Suffolk Landfall, current speeds on a spring flood tide are approximately 0.4 to 0.6 m/s. At the Kent Landfall, current speeds are greater on an ebb tide due to the strong flow from the English Channel into the southern North Sea, with current speeds of approximately 0.0 to 0.6 m/s in nearshore areas. Peak current speeds gradually increase to approximately 1.0 to 1.4 m/s on a spring flood tide in the Offshore Scheme (see **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**).

1.5.5 In the nearshore areas of the Offshore Scheme, spring tidal currents are directed towards the north at the peak of the ebb tide and reverse at the peak of the flood; at times of less than peak current speed, the direction of currents rotates continuously throughout the tidal cycle, resulting in limited to no slack water condition. Elsewhere along the Offshore Scheme, the axis of peak tidal currents is closer to north – northeast to southwest offshore (see **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**).

Anthropogenic Structures

1.5.6 Anthropogenic activities are a major component in the introduction of marine INNS. Artificial structures introduced into the marine environment (e.g. breakwaters, artificial reefs, mooring blocks, cable protection measures) are known to exhibit significantly different community compositions compared to natural substrates (Mineur, et al., 2012). In some instances, these structures are known to favour colonisation by range-shifting species and have been suggested to act as either a stepping stone, or as a direct vector for their dispersal and spread (Mineur, et al., 2012).

1.5.7 Infrastructure associated with cable routes, including cable protection, are usually restricted to a narrow strip along parts of the cable route. Although, the potential for the introduction of INNS by the placement of artificial hard substrate exists, the available field studies of cables indicate the colonisation of the new introduced hard habitat is by endemic, rather than invasive fauna (OSPAR, 2023). Some studies indicate that the risk of the establishment of non-native species on hard substrates in subtidal areas does exist, but it is much lower compared to the intertidal zone (Kuhnz, Buck, Lovera, Whaling, & Barry, 2015; Sherwood, et al., 2016). Potential areas for INNS colonisation in the intertidal zone include structures sitting in the upper part of the water column and any structures placed on the area of the coast between the tides. Therefore, as subsea cables, and associated protection structures, are almost exclusively laid in the subtidal, they are much less prone to colonisation by non-native species (OSPAR, 2023).

1.5.8 The offshore export cable will be buried wherever possible, however where the minimum depth of cover is not achievable, or there are cable crossings, cable protection may be required. It is anticipated that the Offshore Scheme will require a total area of 0.15 km^2 of external cable protection, such as remedial rock berms, rock backfill, and concrete mattresses. This will lead to the introduction of additional structures which may serve as suitable habitat for marine INNS (see **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**).

1.5.9 Several existing anthropogenic structures are also present within the Study Area. There are currently ten marine in-service power and fiber-optic cables that cross the Offshore Scheme and an additional nine potential crossings for known future developments (summarised in Table 1.1 and **Application Document 6.4.4.2 Benthic Ecology, Figure 6.4.4.2.3 Marine cable crossings and areas of rock backfill within the Offshore Scheme Boundary**). Furthermore, there are records of fourteen shipwrecks overlapping the Offshore Scheme, (see **Application Document 6.2.4.6 Part 4 Marine Chapter 6 Marine Archaeology**).

1.5.10 Further details on the components of the Proposed Project including the number of components and submerged surface area are provided in **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**.

Table 1.1 Summary of cable crossings and future developments likely to cross the Offshore Scheme

Name	Owner	Type	Kilometre Point (KP)
In-service crossings			
Farland (North)	BT	FO Cable	8.4
EA1_N	Scottish Power Renewables	Power	13.4
EA1_S	Scottish Power Renewables	Power	13.8
Britned	BritNed	Power	87.3
Mercator	BT	FO Cable	90.7
PEC	Lumen	FO Cable	104.6
Tangerine	Lumen	FO Cable	106.7
Thanet_N	Balfour Beatty	Power	107.6
Thanet_S	Balfour Beatty	Power	107.6
Nemo_Offshore	Nemo Link	Power	113.1
Nemo_Onshore_1	Nemo Link	Power	120.7

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Name	Owner	Type	Kilometre Point (KP)
Nemo_Onshore_2	Nemo Link	Power	120.9
Thanet Onshore	Balfour Beatty	Power	120.9
Future developments			
EA3_N_Corr	Scottish Power Renewables	Power	11.4
EA3_S_Corr	Scottish Power Renewables	Power	14.5
FiveEstuaries_N_Corr	RWE	Power	50.2
NeuConnectRPLRev6	Neuconnect	Power	50.7
NorthFalls_N_Corr	SSE/RWE	Power	52.0
FiveEstuaries_S_Corr	RWE	Power	52.7
NorthFalls_S_Corr	SSE/RWE	Power	53.0
Nautilus_Opt1	NGV	Power	88.6
Q&E North	Consortium	FO Cable	100.2
Grid Link	Icon	Power	101.3
Cronos Interconnector	Cronos Energy Ltd	Power	Unknown
Tarchon Interconnector	Tarchon Energy Ltd	Power	Unknown

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INNS Already Present in the Region

1.5.11 To identify INNS present within the Study Area, occurrence records of marine INNS from the National Biodiversity Network (NBN) Atlas (NBN Trust, 2024) and the OneBenthic Non-Native Species Tool (CEFAS, 2024) have been reviewed[2]. These species are also presented in Table 1.2, alongside the likelihood of presence within the Study Area. For the former hoverport at Kent, records collected from direct observation and desk-study were also included.

1.5.12 Furthermore, regional invasive species management plans have been developed by RAPID Life to prioritise management of INNS. This included management plans for the East of England Region (RAPID Life, 2020c) and the South East Region (RAPID Life, 2018). These plans use species sightings data to categorise INNS species noted in the region into the following categories:

- **Red** – High priority species that are of EU, national or regional concern;
- **Amber** – High priority species that already currently widespread; and

[2] Only records licenced for commercial use (CC0, OGL, and CC-BY) have been reviewed and considered (NBN Trust, 2024).

- **Green** – Low priority species that have minimal impact, are already well established, or may have impacts that are currently unknown.

1.5.13 These INNS are also presented in Table 1.2 alongside their respective RAPID Life category and likelihood of presence within the Study Area.

1.5.14 In addition, four non-native species, two of which are invasive to the UK, were recorded within the Offshore Scheme Boundary (**Application Document 2.2.1 Overall Location Plan**) during the benthic survey (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**). These species were:

- Acorn barnacle (*Austrominius modestus)* is an invasive species to the UK and has a well-established presence around the coast of England and Wales and in a few locations in Scotland and Ireland (O'Riordan, Culloty, McAllen, & Gallagher, 2020). This species is found at all levels of the shore but is more common mid-shore and may extend to shallow sublittoral. Six individuals were found across two grab sample stations (MMT sample sites S036 and S037) between KP111.7 and KP114.8, in shallow nearshore areas in the S~~s~~tudy A~~a~~rea.
- *Eusarsiella zostericola* is a benthic ostracod with a known distribution throughout the east of England, including the Thames Estuary (Bamber, 1987). Fifty-four individuals were found across three grab sample stations: MMT sample sites S005, S032, and S033 within the S~~s~~tudy A~~a~~rea.
- Slipper limpet *(Crepidula fornicate)* is an invasive species first seen in the UK in 1872. Slipper limpet outcompetes other filter-feeding invertebrates and is now well established along much of the English coast (Blanchard, 1997). Four individuals were found across three grab sample stations (MMT sample sites S015, S017, and S019) between KP47.4 and KP75.7 within the S~~s~~tudy A~~a~~rea.
- *American piddock (Petricolaria pholadiformis)* originates from North America and has been present in UK waters no later than 1890. There is no evidence that the species has displaced native piddocks and they are most commonly found off the coast of Essex and the Thames estuary (Bamber, 1985). A single individual was recorded at KP4.0 (MMT sample site S004) within the S~~s~~tudy A~~a~~rea.

1.5.15 The above species are also included in Table 1.2, alongside the likelihood of presence within the Study Area.

Table 1.2 INNS species already present in the region and associated risk

Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Ammothea hilgendorfi	Sea spider	This species may be introduced attached to ships hulls, establishing in shallow subtidal waters. The species has been observed on the Essex coast (RAPID Life, 2020c).	Green		Unlikely
Amphibalanus improvisus	Bay barnacle	This barnacle is most commonly found in the subtidal environment from the lower shore in estuaries on stony, rocky, and hard bottom substrates to depths of around 50 m (GB-NNSS, 2011). The species is transported via ships hulls and in ballast water and can form dense layers on hard surfaces (Wrange, et al., 2016) competing for space with other species. There are records of this species on the Suffolk coast (RAPID Life, 2020c;	Amber	✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		Porcupine Marine Natural History Society, 2020).			
Antithamnionella spirographidis	Red alga spp.	The full impact of this species is currently unknown. However, one occurrence has been recorded on the Kent coast (Natural History Museum, 2023).		✓	Unlikely
Asterocarpa humilis	Compass sea squirt	This species is transported attached to ships hulls and in ballast water, typically establishing in harbours and marinas, fouling hulls, pontoons, and buoys (Morrow, 2020). The species has been documented on the Essex coast (RAPID Life, 2020c).	Amber		Possible
Austrominius modestus	Darwin's barnacle	This barnacle is transported attached to ships hulls and in ballast water and is now well established in the UK (Avant, 2007; O'Riordan, Culloty, McAllen, & Gallagher, 2020) on intertidal and shallow subtidal hard surfaces,	Green	✓	Likely

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		including on rocks and shells and fouling other organisms (Morrow, 2020). The species spread rapidly due to pelagic larval dispersal. Several records of this species have been recorded in the Study Area (e.g. (JNCC, 1992; Natural England, 2014)), and the species has been documented as widespread on the Essex coast (RAPID Life, 2020c), and north Kent coasts (RAPID Life, 2018). Six individuals were found across two grab sample stations at KP111.7 and KP114.8, in shallow nearshore areas (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**).			
Biddulphia sinensis	Marine diatom spp.	This species of diatom was introduced to the UK at the beginning of the 20th century		✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		via the ballast water of ships (WoRMS, 2020). During blooms of this species, the success of native diatom populations is reduced. Several records of this diatom have been recorded in the Study Area (Johns & Broughton, 2019).			
Botrylloides diegensis	San Diego sea squirt	This sea squirt is introduced via the hulls of ships and by aquaculture practices, establishing in harbours and marinas attached to artificial structures (GB-NNSS, 2011). Large colonies can impact negatively on existing sessile communities. There are records of this species on the Thanet coast (RAPID Life, 2018; Natural England, 2014).	Amber	✓	Possible
Botrylloides violaceus	Orange cloak sea squirt	This type of sea squirt may be introduced via ship hulls and ballast water, as well as via aquaculture practices, primarily found in harbours	Amber	✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		and marinas and sheltered natural shores, growing on artificial and solid natural substrata, as well as on algae, mussels and other sea squirts (GB-NNSS, 2011; Morrow, 2020). The species my form large colonies, smothering and competing with other sessile invertebrates. Observed on the Essex (RAPID Life, 2020c) and Thanet coasts (RAPID Life, 2018; Natural England, 2014) in limited numbers.			
Bugula neritina	Ruby bryozoan	This species may be transported via ballast water or attached to ships hulls, establishing on artificial and natural surfaces in marine waters (GB-NNSS, 2011; Morrow, 2020). The bryozoan grows into dense concentrations overgrowing native species. This bryozoan has been documented on the Essex (RAPID Life, 2020c), north	Amber	✓	Possible

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		Kent and Thanet coasts (RAPID Life, 2018; Natural England, 2014)			
Bugula simplex	Erect bryozoan	The species is transported via ballast water or attached to ships hulls, and typically establishes on artificial and natural surfaces (Morrow, 2020). The bryozoan grows into dense concentrations overgrowing native species. This bryozoan has been observed on the Essex coast (RAPID Life, 2020c; Natural England, 2014).	Amber	✓	Possible
Bugula stolonifera	Erect bryozoan	The species is transported via ballast water or attached to ships hulls, and typically observed on artificial structures in harbours and marinas (Fofonoff, Ruiz, Steves, Simakanin, & Carlton, 2018). The bryozoan grows into dense concentrations overgrowing native species.	Amber		Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		This bryozoan has been noted on the Essex coast (RAPID Life, 2020c).			
Caulacanthus okamurae	Pom-pom weed	This species occupies the mid-low shore and is fast spreading. The species is introduced via hull fouling and can lead to habitat alteration. There is a notable population on the Thanet coast (RAPID Life, 2018), and three records of this species have been noted on the Thanet coast (Natural History Museum, 2023).	Green	✓	Possible
Colpomenia peregrina	Oyster thief	This brown algae is widespread throughout the UK (GBIF, 2023) and is found in intertidal rock pools and the shallow subtidal, usually growing on other algae as well as shells (Morrow, 2020). The species prefers hard structures, and due to the fast-growing nature of the species, there is potential for smothering impacts. Initially this species	Green		Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		was introduced via aquaculture practices. This species has been documented at Thanet coast (RAPID Life, 2018).			

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Corella eumyota	Orange-tipped sea squirt	This sea squirt may be introduced via hull fouling and aquaculture practices, typically establishing on hard structures. It is often found on artificial substrata in marinas and harbours or attached to cobbles, boulders, shells and stones on the low shore in sheltered areas (Morrow, 2020; Bilewitch, 2009). The species may have a negative effect on the abundance and habitat occupancy of other shallow water suspension feeding sessile invertebrates. The sea squirt has been observed on the Suffolk, Essex (RAPID Life, 2020c), and Thanet coasts (RAPID Life, 2018; Natural England, 2014).	**Amber** (Suffolk and Essex) **Green** (Thanet)	✓	Possible
Coscinodiscus wailesii	Marine diatom spp.	This species of diatom was introduced to the UK during the 1970s via the ballast water of ships and are dispersed by tidal currents.		✓	Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		During blooms of this species, the success of native diatom populations is reduced (GB-NNSS, 2019). Only one record of this species is noted in the Study Area, in the southern North Sea (Johns & Broughton, 2019).			
Crepidula fornicata	American slipper limpet	The species is predominantly found on sandy and gravelly bottoms of sheltered intertidal areas (Tillin, Kessel, Sewell, Wood, & Bishop, 2020). When found in high distributions, the species may alter sediment distribution, biodiversity and suspended sediment concentrations (Rayment, 2008). The species is transported in the aquaculture industry and can be found in ballast water and ship's hull fouling. This species is widespread and well established along much of the English coast	Amber	✓	Likely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		(Blanchard, 1997), and throughout the Study Area (CEFAS, 2024; Natural England, 2014; Conchological Society of Great Britain & Ireland, 2006; Marine Biological Association, 2007). Documented on the Essex (RAPID Life, 2020c), north Kent and Thanet coasts (RAPID Life, 2018). Five individuals were found across four grab sample stations between KP47.4 and KP75.7 (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**).			
Echinogammarus marinus	Sand hopper	Only one record of this species is noted in the Study Area, on the Suffolk coast (Porcupine Marine Natural History Society, 2020).		✓	Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Ensis directus (americanus)	American razor clam	This species is transported in ballast water and establishes in sand sediments in the intertidal and shallow subtidal. Observations of the species have been noted on the north Kent and Thanet coasts (RAPID Life, 2018).	Green		Possible
Ensis leei	Atlantic jackknife clam	Burrows in a range of soft sediments from coarse sediments to muddy sediments and silt (Tillin, Kessel, Sewell, Wood, & Bishop, 2020). Seemingly prefers estuarine conditions in the lower shore and shallow subtidal, with a preference for areas with moderately high bed shear stress (Tillin, Kessel, Sewell, Wood, & Bishop, 2020). However, only one record of this species is noted within the Study Area (CEFAS, 2024), and five records of the shells of this species are noted in Sandwich Bay, Kent (Conchological Society		✓	Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		of Great Britain & Ireland, 2006)			
Eriocheir sinensis	Chinese mitten crab	Juveniles occur within the marine environment, with a preference for sheltered bays and estuaries (Tillin, Kessel, Sewell, Wood, & Bishop, 2020), before moving into brackish and freshwater (Morrow, 2020). This crab is typically transported via shipping and aquaculture. The species usually establishes within muddy estuaries and bays. These crabs impact native populations through predation and competition. Individuals have been documented on the Essex (RAPID Life, 2020c) and Thanet coasts (RAPID Life, 2018).	Amber	✓	Possible
Eusarsiella zostericola	Ostracod	This benthic ostracod has a known distribution throughout the east of England, including the Thames Estuary (Bamber,		✓	Likely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		Some aspects of the biology of the North American ostracod Sarsiella zostericola Cushman in the vicinity of a British power station, 1987). Two records of this species exist on the Suffolk coast near the Suffolk Landfall (Natural England, 2014), and as part of the benthic survey 54 individuals were found across three grab sample stations: KP1.4; KP2.5; and KP5.3 (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**).			
Ficopomatus enigmaticus	Trumpet tube worm	This species is primarily found in brackish waters in ports, estuaries and lagoons, attached to rocks, shells, and other hard substrata in the lower intertidal and shallow subtidal (GB-NNSS, 2011), and is transported via hull	Amber		Unlikely

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		fouling, settling on artificial structures. There are limited records in the south east, although it has been noted on the Thanet coast (RAPID Life, 2018).			
Grateloupia turuturu	Devil's tongue weed	This species of red algae primarily occurs in sheltered areas such as harbours and bays, attached to artificial substrates, lower shore pools, and subtidally to 7 m (GB-NNSS, 2011). The alga may be introduced attached to ships hulls and aquaculture practices establishing on the lower shore in sheltered areas. This can lead to competition for space with native algae species. This species is documented at Thanet coast (RAPID Life, 2018), with two records specifically in Ramsgate Harbour (Natural History Museum, 2023).	Green	✓	Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Hemigrapsus sanguineus	Asian shore crab	This crab typically inhabits intertidal areas of estuarine and marine shores, on artificial structures, mussel beds and oyster reefs (NNSS, 2024). This species is transported via ballast water and hull fouling. It can reduce numbers of native shore crabs and reduce mussel densities which could conflict with multiple bivalve aquaculture species. The crab has been noted on the Suffolk (RAPID Life, 2020c) and Thanet coast (RAPID Life, 2018).	**Amber**		Possible
Hemigrapsus takanoi	Brush clawed shore crab	The species is introduced in larval form via discharge of ballast water. Adults typically establish on intertidal areas of estuarine bays, usually on sheltered muddy sediment in low energy areas. This species can displace native shore crabs. The crab has been noted on the Suffolk, Essex coast	**Red** (Thanet) **Amber** (Suffolk and Essex)	✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		(RAPID Life, 2020c), and north Thanet coasts (RAPID Life, 2018).			
Magellana gigas	Pacific oyster	This oyster species establishes in the lower shore and shallow sublittoral to 80 m depth (Morrow, 2020) on rock, concrete artificial structures, shells or stones, as well as within intertidal mudflats, sandflats, intertidal biogenic reef and intertidal rock (Tillin, Kessel, Sewell, Wood, & Bishop, 2020). These aggregations may form reefs, changing habitats and ecosystem processes. This species is documented throughout the Study Area (Conchological Society of Great Britain & Ireland, 2006), and is specifically noted on the Suffolk, Essex (RAPID Life, 2020c), north Kent and Thanet coasts (RAPID Life, 2018).	Amber	✓	Possible

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Melanothamnus harveyi	Harvey's siphon weed	This non-native red alga is now considered fully established in the UK. There are three records of this species on the Kent coast (Natural History Museum, 2023).		✓	Unlikely
Mercenaria mercenaria	Hard-shelled clam	This species is introduced with oysters and has since spread naturally throughout sheltered waters (Carter M. C., 2005). Noted on the Essex coast (RAPID Life, 2020c).	Green		Unlikely
Molgula manhattensis	Sea grapes	This species is native to the east coast of the United States and is commonly found as a fouling species on ship hulls. Several records of this species exist within the Study Area (Marine Biological Association, 2023; JNCC, 2022; Natural History Museum, 2023; Natural England, 2014)		✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
Monocorophium sextonae	Marine amphipod spp.	This species of amphipod is found in subtidal habitats up to 50 m attached to rocks, artificial substrata, and other benthic invertebrates (GB-NNSS, 2011). Only six records of this species exist from the Kent coast (Marine Biological Association, 2007; Natural England, 2012)		✓	Unlikely
Mya arenaria	Sand gaper	Widespread throughout the UK on all coasts (Tyler-Walters, 2003). Inhabits gravelly to muddy bottoms, from the mid-intertidal to about 100 m depth, although they rarely occur below 9-10 m (Fofonoff, Ruiz, Steves, Simakanin, & Carlton, 2018). This species has been observed within the Study Area (Conchological Society of Great Britain & Ireland, 2006; Natural England, 2014), and has been noted on the Essex coast (RAPID Life, 2020c), north Kent and	Green	✓	Possible

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		Thanet coasts (RAPID Life, 2018).			
Oncorhynchus mykiss	Rainbow trout	The rainbow trout often escapes from fish farms to freshwater and marine waters, with the potential to displace native trout (Burtle, 2014). This species has been documented on the Essex coast (RAPID Life, 2020c).	Green		Unlikely
Petricolaria pholadiformis	American piddock	This species bores into hard clay, chalk, solid mud, peat-moss and limestone from the mid-tide level to low water (Budd, 2005). The American piddock may be introduced via accidental introduction from aquaculture. There are several records of this species within the Study Area (Conchological Society of Great Britain & Ireland, 2006), and is most common off the coast of Essex (RAPID Life, 2020c) and the	Green	✓	Likely

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		Thames estuary (RAPID Life, 2018; Bamber, 1985). A single individual was recorded at KP4.0 (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**).			
Ruditapes philippinarum	Manila clam	Observed on the Essex coast (RAPID Life, 2020c), north Kent and Thanet coasts (RAPID Life, 2018). This species is found in sediments and is well established in bivalve fisheries (Carter M. , 2003).	Amber (north Kent and Thanet) Green (Essex)		Likely
Sargassum muticum	Wireweed	Occurs widely on the coast across a range of exposures but is most successful in sheltered areas. It grows on hard surfaces both intertidally and subtidally, although it can also detach and float freely out at sea. This algae may be introduced attached to ships hulls and via fisheries,	Amber	✓	Possible

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		establishing intertidally and subtidally on hard surfaces. This algae is fast growing and can outgrow native species, blocking light and increasing sedimentation in rock pools (NNSS, 2019). This species has been recorded within the Study Area (Natural England, 2014), and is specifically documented on the Essex (RAPID Life, 2020c), north Kent and Thanet coasts (RAPID Life, 2018), and is already widespread around the south east coast.			
Styela clava	Leathery sea squirt	This sea squirt is typically found attached to hard substrata in shallow water, primarily in harbours and marinas, but also on natural rock bottoms (GB-NNSS, 2011). It is transport on ships hulls through fouling and in ballast water. Several observations are noted within the Study Area (Natural England, 2014;	Amber	✓	Possible

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		CEFAS, 2024), specifically on the Suffolk and Essex coast (RAPID Life, 2020c), north Kent and Thanet coasts (RAPID Life, 2018).			
Tricellaria inopinata	Tufty-buff bryozoan	This species is found in marinas and harbours on artificial substrata (Morrow, 2020) and may be transported via ballast water or attached to ships hulls, establishing on artificial and natural surfaces in marine waters. The bryozoan grows into dense concentrations overgrowing native species. This bryozoan species has been observed on the Essex (RAPID Life, 2020c), and Thanet coasts (RAPID Life, 2018; Natural England, 2014).	Amber	✓	Possible
Undaria pinnatifida	Wakame	This species is found in the low intertidal and subtidal areas on manmade structures but may also occur on lose cobbles and shells (GB-NNSS, 2011). It	Amber	✓	Possible

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Scientific Name	Common Name	Description	**RAPID Life Category** (RAPID Life, 2018; RAPID Life, 2020c)*	**NBN occurrence record** (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		may be introduced attached to ships hulls, establishing on subtidal marine areas and artificial structures. This can lead to competition for space with native kelp species. There are several records of this species in the Study Area (NBN Trust, 2024), specifically on the Suffolk, Essex (RAPID Life, 2020c), and Thanet coasts (RAPID Life, 2018), and is found throughout the south east coast.			
Urosalpinx cinerea	American oyster drill	The gastropod species prefers muddy sediments and is understood to predate oysters and may compete with native dogwhelk. The current distribution of this species is limited to Essex (RAPID Life, 2020c) and north Kent coasts (RAPID Life, 2018). As the species lacks a free-swimming larval phase, natural dispersal can occur	Amber		Unlikely

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Scientific Name	Common Name	Description	RAPID Life Category (RAPID Life, 2018; RAPID Life, 2020c)*	NBN occurrence record (NBN Trust, 2024)†	Likelihood of Presence within Study Area
		but at a slow rate on a local scale.			

** Blank boxes indicate that the species was not noted with the RAPID Life reports.*

† Blank boxes indicate that a species occurrence was not recorded on the NBN Atlas.

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1.5.16 Regarding species at the former hoverport at Kent, wall cotoneaster (Cotoneaster horizontalis) and Japanese rose (Kerria japonica) are both species on Schedule 9 of the Wildlife & Countryside Act 1981 and have both been observed in the former hoverport site. Both species spread rapidly through bird-dispersed seeds and can develop into dense thickets, forcing out native species. They can also potentially be spread through soil contaminated with root fragments. Neither species can survive in the marine environment, but they can potentially be tracked off-site into the terrestrial environment, and thus dispersed, if equipment and vehicles encounter seeds and are not adequately cleaned (although the seeds would have to remain undamaged and viable). Soils containing the two species are classified as controlled waste and should be disposed of at licensed landfill.

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1.6 Risk of INNS Introduction

1.6.1 The risk of transferring non-native invasive species from the hoverport site as a result of construction works is low. The former hoverport site is only to be used as an access route. There will be no earthworks, storage of materials or equipment, or compounds within the former hoverport site. There are various open routes across unvegetated hardstanding that can be used to access the ~~to reach the~~ intertidal ~~zone and these will be used for access~~area. As set out in **Application Document 7.5.3.2 (B) Appendix B Register of Environmental Actions and Commitments (REAC)** Commitment B67 a pre-construction botanical survey will be completed pre-construction to inform the identification of access routes that will avoid vegetation stands of particular significance and other dense stands of vegetation. This is in addition to commitment B04 also included in **Application Document 7.5.3.2 (B) Appendix B Register of Environmental Actions and Commitments (REAC)** ~~Therefore, no vegetation removal will be required and there will be no tracking over vegetated areas. Nonetheless, as a precaution and in line with application document APP-342, Register of Environmental Actions and Commitments measure B04,~~ which requies ~~-~~any plant or machinery that has been used in the former hoverport, and which has potentially come into contact with invasive species or their seeds, to ~~will~~ be thoroughly cleaned before driving off-site. Water used to clean vehicles will also be controlled to prevent the spread of the plant.

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~~1.6.1~~1.6.2 The introduction of artificial structures and the use of vessels during the different phases of the Offshore Scheme pose the risk of marine INNS introduction through the colonisation of hard substrate by locally present marine INNS, and through the spread in extent of INNS which may be present on vessel hulls or in ballast water. These can contribute to an increased rate of spread of these species, acting as ‘stepping stones’ for introduced species to further establish or expand their range to additional sites (Mineur, et al., 2012).

~~1.6.2~~1.6.3 As such, vessels and equipment involved in each phase of the Proposed Project may present a pathway for the introduction of marine invasive INNS. To assess the associated risk, each project component has been evaluated for its potential to introduce or facilitate the spread of INNS within the site.~~As such, vessels and equipment associated with each phase of the Proposed Project may be associated with the introduction of marine INNS. To determine the risk of marine INNS introduction, each component has been reviewed for its potential to introduce or spread INNS to the site.~~ The risk of each component has been rated as high, medium, low, or negligible risk, and has been adapted from guidance provided by Natural England and Natural Resources Wales (NRW) (Cook, Macleod, Payne, & Brown, 2015). This assessment is based on publicly available data and literature, as well as professional judgement to complete a site-specific assessment. The risk assessment is provided in Table 1.3.

Table 1.3 Risk assessment for INNS introduction of vessels and equipment associated with the Proposed Project

Component	Location	Type	Details	Risk
Vessels	Offshore Scheme	Anticipated vessel types include: • Cable lay vessel (CLV) (simultaneous cable lay and trenching); • CLV (cable lay without simultaneous trenching); • Cable barges; • Trenching vessels; • Guard vessels; • Support vessels; and • Rock placement vessels.	Vessel size will differ according to phase (e.g. construction, operation and maintenance, decommissioning) and/or task. Some vessels may originate from outside UK waters or from local waters known to host high concentrations of INNS. In this instance, measures for marine INNS risk mitigation will be applied, complying with the International Maritime Organization (IMO) Ballast Water Management Convention. Additionally, vessels will be required to adhere to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62). These measures lower the probability of INNS transmission from vessels.	At this stage, vessel origin is unknown. As such, a worst-case scenario has been assumed to include the use of vessels originating from non-UK waters or waters with known INNS colonisation. Although this risk would be no higher than for any other vessel transiting UK waters, should vessels or project infrastructure originate from the areas with knowingly established populations of marine INNS, the risk of local INNS introduction may be high.
Export cable	Offshore Scheme	The worst-case scenario assessed for the Offshore Scheme is one	The total length of cable on the seabed is expected to be 122 km, with cable	As cabling will be buried within the

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Component	Location	Type	Details	Risk
		bundled HVDC (x2) and one fibre optic cable in one trench.	diameters of 100 – 150 mm. Minimum burial depth is 0.5 m, and where burial depth cannot be achieved, remedial rock berms will be used, indicating no exposure of the cable to the water column.	sediment, no cable area will be exposed to the water column. As such, there is no pathway for introduction of marine INNS associated with this component. The risk of marine INNS introduction has therefore been appraised as negligible.
Cable protection	Offshore Scheme	Cable protection will comprise remedial rock berm, rock backfill, and concrete mattresses.	The maximum area within the Offshore Scheme subject to protection is 0.15 km^2. This includes: • 12 km of remedial rock berm (total area of 0.08 km^2); • 38 km of rock backfill between KP35 to KP58, and KP81.5 to KP96.5 (total area of 0.017 km^2); and • 0.05 km^2 of loss from concrete mattresses/rock berm protection at cable crossings. There are ten in-service cable crossings that will require protection (maximum footprint of 0.005 km^2 per crossing) (**Figure**	Areas of exposed substrate may provide ideal conditions for the settlement of marine INNS. However, studies of artificial substrate placement associated with subsea cables have indicated that colonisation largely occurs by endemic species (OSPAR, 2023). When considering this in conjunction with the fact that most local INNS are found in

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Component	Location	Type	Details	Risk
			6.4.4.2.3 Marine cable crossings and areas of rock backfill within the Offshore Scheme Boundary, Application Document 6.4.4.2 Benthic Ecology).	the intertidal zone, the risk of marine INNS introduction has been assessed as low.
Landfall	Suffolk Landfall	Up to four horizonal directional drilled (HDD) ducts will exit in the subtidal zone between Aldeburgh and Thorpeness. Each of these will be stabilised by up to five concrete mattresses.	During construction, a jack up barge (JUB) will be used at each HDD entry/exit point, temporarily disturbing a total area of 0.0002 km^2. Post-installation protection would then be added to stabilize the HDD exits, with up to five concrete mattresses per HDD exit point, with a total area of 0.00036 km^2 .	Areas of exposed substrate such as cable protection may offer favourable conditions for the settlement of INNS. Notably, many of the marine INNS recorded within the Study Area are nearshore or intertidal in nature. Considering the anticipated surface area of cable protection measures, the risk of marine INNS introduction has been assessed as medium given that much of offshore marine scheme is located beyond the nearshore /intertidal area. There will
	Kent Landfall	Up to four HDD ducts that will exit in the intertidal zone at Pegwell Bay. Each of these will be stabilised by up to five concrete mattresses.	During construction, several structures will temporarily be used at the Kent Landfall, temporarily disturbing 0.-02 km^2 from the following: • 0.02 km^2 maximum area of excavator footprint in the upper intertidal; • 0.0002 km^2 of disturbance from use of JUB or backhoe dredger at 4 HDD entry/exit point locations; • 0.000032 km^2 of disturbance from the use of a cable lay barge;	

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Component	Location	Type	Details	Risk
			• 0.0003 km² of disturbance from the use of a temporary cofferdam at four~~4~~ HDD entry/exit point locations; and • 0.00036 km^2 from the temporary placement of concrete mattresses/rock bags at HDD entry/exit points. Assumed to be five per HDD exit (worst-case scenario measuring 0.45 m x 3.0 m x 6.0 m). These will be removed approximately ~~1~~ one week before cable pull-in, before permanent protection will be buried at the same location, leading to the same area of temporary disturbance.	also be no permanent cable protection installed within the Pegwell Bay Intertidal Area as set out in **Application Document 9.13 Pegwell Bay Construction Method Technical Note**.~~Areas of exposed substrate~~

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1.7 Pathways for INNS Introduction

1.7.1 To understand the potential pathways for the introduction of INNS, an understanding of the Proposed Project activities is essential, as each activity presents varying degrees of risk. For example, Proposed Project vessels travelling from international ports are more likely to carry an increased risk of marine INNS introduction compared to vessels originating from local ports.

1.7.2 A list of activities associated with each phase of the Proposed Project (Construction, Operation and Maintenance, and Decommissioning) that is considered to carry a significant risk of marine INNS introduction is provided in Table 1.4. These have been collated with consideration given to marine INNS anticipated to be present in the Study Area (section 1.5~~1.5~~) and equipment and vessels to likely be associated with the Proposed Project (section 0~~0~~).

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Table 1.4 Activities associated with the Proposed Project phases with the potential to introduce marine INNS

Project Phase	Activity	Pathway
Construction	Use of vessels	Presence of INNS in any released ballast water or on vessel hull
	Temporary structures associated with construction at Kent Landfall	Introduction of anthropogenic structures
Operation and maintenance	Cable and HDD entry/exit point protection	Introduction of anthropogenic structures
	Maintenance of cables	Long-term presence of anthropogenic structures
	Use of vessels	Presence of INNS in any released ballast water or on vessel hull
Decommissioning	Use of vessels during cable removal	Presence of INNS in any released ballast water or on vessel hull

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1.8 Biosecurity Control Measures

1.8.1 Biosecurity control measures are essential for preventing and/or mitigating the spread of INNS during Proposed Project activities (Cook, Macleod, Payne, & Brown, 2015). For these methods to be effective, they must be clear, realistic, and easy to communicate (Cook, Macleod, Payne, & Brown, 2015). It is important that consideration is given to the identification of who is responsible for relevant actions, what measures will reduce the risk of introducing marine INNS, and where and when these control measures will be applied (Cook, Macleod, Payne, & Brown, 2015).

1.8.2 Guidance produced by Natural England and NRW on marine biosecurity planning recommend a ranking system to help prioritise biodiversity risks during visual inspections of equipment or vessels, with a Risk Rank 3 or above (see Table 1.5) recommended to be carried forward for biosecurity measures (Cook, Macleod, Payne, & Brown, 2015). Where significant risks are identified, it is essential that surfaces are mechanically cleaned or chemically treated to remove all potential marine INNS, with fouling disposed of in line with relevant guidelines to prevent further spread of these organisms to the local environment.

Table 1.5 Biosecurity risk ranking for visual inspections of project equipment and materials (Cook, Macleod, Payne, & Brown, 2015)

Rank	Description	Visual Estimate of Biofouling Cover
0	No visible fouling	0%
1	Surfaces partially or fully covered in biofilm, but absence of any plants or animals	0%
2	Light fouling; surface fully covered in biofilm; 1-2 small patches of one type of animal or plant are present	1-5% of visual submerged surfaces
3	Considerable fouling; presence of biofilm; fouling still patchy but visible with one or more type of plant or animal	6-15% of visual submerged surfaces
4	Extensive fouling; presence of biofilm; abundant fouling assemblages consisting of more than one type of plant or animal	16-40% of visual submerged surfaces
5	Very heavy fouling; fouling assemblage comprising many different types of plants and/or animals	41-100% of visual submerged surfaces

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1.8.3 Additionally, the GB Non-Native Species Secretariat and RAPID Life project have outlined important biosecurity control measures for reducing the spread of INNS in the marine environment (RAPID Life, 2020b). Based on the pathways described in section 1.1~~1.1~~, relevant biosecurity measures are provided in Table 1.6. It is important to note that the understanding of INNS, activities that contribute to their dispersal, and preventative technologies is continually under development. As such, measures to prevent the spread of INNS are likely to adapt over time. Therefore, the measures recommended in this document should be subject to periodic review against publicly available data and scientific literature to ensure control measure are up to date.

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Table 1.6 Biosecurity control measures for the Proposed Project

Project Phase	Pathway	Associated Risk	Biosecurity Measure
Construction	Installation of Proposed Project infrastructure (e.g. cable protection, etc.)	Introduction of Proposed Project marine infrastructure pose the risk of marine INNS introduction through the colonisation of hard substrate by locally present marine INNS. This can contribute to an increased rate of spread of these species or act as 'stepping stones' for introduced species to further establish or expand their range to additional sites (Mineur, et al., 2012).	Where possible the rock protection will be locally sourced or environmentally benign (control measure BE04 in **Application Document 7.5.3.1 Appendix A Outline Code of Construction Practice**).
	Use of vessels originating from outside UK waters	Vessels serve as one of the primary vectors for the spread of INNS around the world. Vessels originating from other areas can carry INNS in their ballast water or attached to the hull. This can result in the introduction of INNS to the Proposed Project area or contribute to the spread of existing INNS.	All Proposed Project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine INNS (IMO, 2017) and the IMO Guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011).

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Project Phase	Pathway	Associated Risk	Biosecurity Measure
Operation and maintenance	Cable maintenance and repair	Maintenance and cable repair activities during instances of cable failure, excavation and disturbance from movement of catenary chains, where required, will be carried out using the same or similar methods as the Construction Phase activities, and therefore the potential pathways for introduction of marine INNS are expected to be the same as those identified for the Construction Phase of the Proposed Project.	Same as Construction phase.
Decommissioning	Decommissioning activities	At the end of the operational life of the Proposed Project, the options for decommissioning will be evaluated. Other Proposed Project constraints will also be taken into consideration (e.g. safety and liability), with the least environmentally damaging option chosen if possible.	Future requirements and associated timescales for decommissioning of the Proposed Project are not currently known. The current predicted operational life of the marine cables is between 40 and 60 years. At this stage it is not known whether the Proposed Project will be decommissioned or extended. An Initial Decommissioning Plan will be prepared post consent in accordance with all legislation, best practice guidance and policy applicable at the time of compilation. Dependent on requirements at end of asset life, the offshore cables could either be recovered for recycling (in their entirety, or in parts), or left in-situ, if that has less environmental impact. Biosecurity measures implemented during decommissioning will be

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Project Phase	Pathway	Associated Risk	Biosecurity Measure
			influenced by the requirements for decommissioning determined at the time. However, where assets are removed, it is expected that the biosecurity measures will be similar to those implemented during construction. Where assets are left in-situ biosecurity measures are likely to be similar to those implemented during operation.

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1.9 Surveillance, Monitoring, and Reporting

1.9.1 Early detection of marine INNS is key, as it will increase the likelihood of successful containment and eradication (Cook, Macleod, Payne, & Brown, 2015). An essential first step in this process is prevention, which can be implemented though visual monitoring of all equipment, materials, and vessels involved in Proposed Project activities for the presence of any potential marine INNS.

1.9.2 Relevant staff should be trained in common marine INNS identification[3] and encouraged to report suspicious plant or animal species. If deemed necessary, immediate action should be taken to remove fouling communities and control the spread of present marine INNS. Operations managers should oversee checks regarding marine INNS presence and any cleaning/biofouling disposal. When considering the recommended biosecurity measures and embedded mitigation, it is unlikely that the Proposed Project will contribute to the introduction and spread of INNS.

1.9.3 Table 1.7 outlines proposed biosecurity responsibilities for personnel operating in the Study Area.

Table 1.7 Biosecurity and monitoring responsibilities for personnel

Personnel	Task	Location	Project Phase
Environmental Advisor / Manager	Oversee installation of equipment, checking for marine INNS, and assurance of any biofouling disposal in line with relevant guidelines (IMO, 2011). Liaise with local authorities regarding marine INNS awareness and management.	Port	Construction

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[3] Example identification guides include: the identification guide for selected marine non-native species (Marine Biological Association, 2020); and non-indigenous species quick reference survey guide (CEFAS, 2020).

Personnel	Task	Location	Project Phase
Principal Contractor	Confirm lack of marine INNS on equipment and materials and application of any anti-fouling measures.	Port	Construction
Principal Contractor	Regular monitor of installation for presence of marine INNS.	Offshore Scheme	Operation and Maintenance
Environmental Advisor / Manager	Consultation with regulators to develop and adapt project-specific measures as Proposed Project progresses throughout lifecycle.	N/A	Construction, Operation and Maintenance, Decommissioning
All	Awareness of common marine INNS and ability to report any observations.	N/A	Construction, Operation and Maintenance, Decommissioning

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1.10 Contingency Plan

1.10.1 Even with the most effective preventative and containment measures in place, introduction of marine INNS can still occur. Additionally, introduction may occur as a result of external activities or processes. This section outlines the appropriate measures which should be taken if biosecurity measures fail to prevent the introduction of marine INNS to the Study Area, as recommended by the NNSS and RAPID Life project. A flow diagram of relevant steps and associated responsibilities is provided in Plate 1.1.

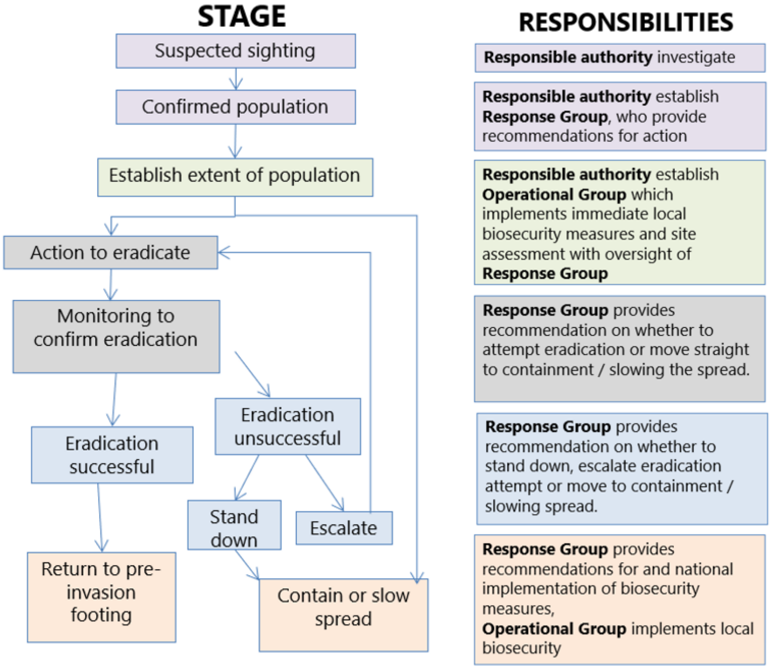

Plate 1.1 Flow diagram of contingency plan steps and related responsibilities (RAPID Life, 2020a)

1.10.2 Should marine INNS be reported within the Study Area, **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice** should be referred to and the following steps should be taken (Cook, Macleod, Payne, & Brown, 2015):

1. **Determine the extent –** conduct a survey to determine the extent and distribution of marine INNS on Proposed Project infrastructure.
2. **Inform relevant authorities –** contact authorities to report the observation and obtain guidance on whether action is required.
3. **Action to eradicate –** should the identified species be deemed a high risk and necessary to eradicate, a Response Group will be formed led by the Responsible Authority which will act as advisors, guiding operators (Operational Group) and liaising between senior officials and ministers as necessary. The Operational Group will be responsible for the following (RAPID Life, 2020a).

- Assess the affected area for the extent of the population of the marine INNS.
- Initiate the immediate implementation of biosecurity measures, as advised by the response group.
- Undertake a biosecurity risk assessment (**Application Document 7.10 Marine Biosecurity Plan**) of pathways in and out of the affected area.

- Informed by surveys, provide advice on management (eradication or containment), which will include any site-specific issues.
- Undertake surveillance of other water bodies that may be affected, dependent on risk analysis.
- Liaise with landowners and interested parties, to secure access and gather site-specific information.
- Implement additional biosecurity measures where appropriate.
- Identify and investigate outbreak source, to prevent further contamination, pursue appropriate legal action etc.

4. **Monitor –** should eradication successfully occur; long-term monitoring is essential to ensure the reintroduction does not occur.

1.11 Conclusion

~~1.11.1~~ This document forms part of an initial assessment of biosecurity risks associated with the Proposed Project and outlines relevant biosecurity measures that could be implemented to prevent and/or control the spread of any INNS throughout the lifecycle of the Proposed Project.

1.11.1

1.11.2 Activities associated with the Proposed Project pose the risk of marine INNS introduction and spread in the marine environment. The primary pathways for introduction from activities associated with the Proposed Project include the movement of vessels (which may carry marine INNS in ballast water or attached to the hull), and the introduction of anthropogenic structures such as rock protection measures into the marine environment, which may serve as substrate for colonisation.

1.11.3 Several marine INNS are known to occur within the Study Area, including two INNS that were observed during benthic surveys within the Offshore Scheme Boundary. As activities associated with the Proposed Project may contribute to the spread of these individuals locally, it is important that the appropriate biosecurity measures are enacted to reduce the risk of introduction and minimise further spreading.

1.11.4 During the lifetime of the link, scheduled monitoring of the HVDC cable would be secured in the **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice** and the **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)** and would be undertaken via:

- Electrical testing and monitoring of system.
- Depth of Lowering assessment by planned surveys comprising General Visual Inspection (GVI), bathymetric survey (MBES) and buried cable detection (cable tracker) to chart the cable depth of lowering over time.
- Surveys of crossings with 3rd Party subsea assets, as per requirements in separate crossing agreements per asset.
- Surveys of new asset crossings / proximity zones when new structures are installed crossing over the Sea Link route.

- DTAS (Digital Temperature and Acoustic Sensing) HVDC status monitoring via fibre optic cable (innovative in-situ monitoring of cable via near real-time temperature and acoustic monitoring which can inform of changes to the cable by intrusive contact as well as variations in depth of burial dependant on thermal changes on the baseline conditions).

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~~Appendix A~~ Appendix A Figures

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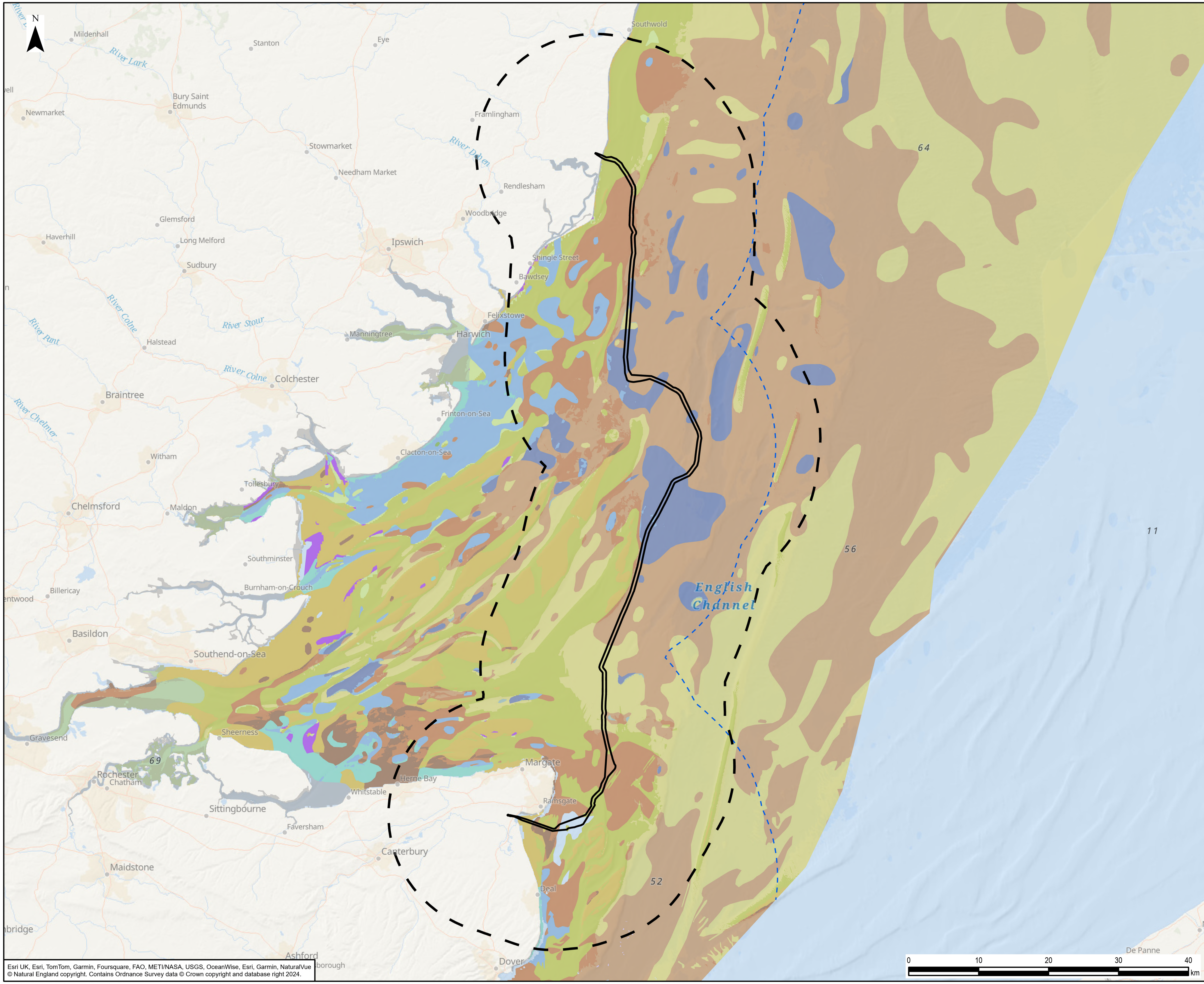

Legend

- Offshore Study Area
- Subtidal Study Area
- UK Territorial Sea Limit - 12 nm

Broadscale habitats (EMODnet, 2021)

- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.33 or A5.34: Infralittoral sandy mud or infralittoral fine mud
- A5.33: Infralittoral sandy mud
- A5.35 or A5.36: Circalittoral sandy mud or circalittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- No EUNIS habitat assigned

Rev	Date	Description	GIS	Chk	App
0	19/02/2025	OUTLINE INVASIVE NON-NATIVE SPECIES MANAGEMENT PLAN	EB	DF	EW

nationalgrid

Scheme: SEA LINK

Document Title: FIGURE 1 STUDY AREA AND PREDICTED BENTHIC HABITATS

Creator: EB	Date: 19/02/2025	Checker: DF	Date: 19/02/2025	Approver: EW	Date: 19/02/2025
Document Ref: FIGURE 1	Scale: 1:500,000	Format: A3	Sheets: 1	Rev: 0	

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