

Project Biosecurity Plan

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PROJECT NUMBER: P005281

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Prepared By:	Ricky Chester	Role: Superintendent
Review By:	Vishay Hardwarsing	Role: Project Engineer
Interdisciplinary Check:	Neil Martin	Role: SHE-Q Manager
Approved By:	Gert-Jan Peters	Role: Project Manager

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Revision	Section	Change
Rev. 1.0	All	First issue
Rev. 2.0	All	Updated after comments from Mott Mac/Client

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1. INTRODUCTION

1.1. Project information

Colwyn Bay is located along the north coast of Wales. It is a popular tourist destination that has been attracting visitors since the Victorian era.

The beach is backed by a 3 mile long promenade and until recently there was a pier that had been in place since the Victorian era. This has now been replaced by a shorter pier that allows good views of the surrounding bay, at any state of the tide.

In 2013 Boskalis Westminster Ltd (BWL) carried out a beach replenishment campaign in Colwyn Bay.



Figure 1 North Welsh Coastline

BWL has been awarded the contract to recharge the beach with 485,000m³ of sand. This sand will be dredged from area 457, located north east of the Colwyn Bay, with an approx. cycle time of 6-7hrs. As part of the works, BWL will undertake the following activities[Ref. 3]:

- Welding and assembling of 1000m sinker line on Colwyn Bay Beach
- Float out and installation of the sinker line
- Connection of 400m floating line (marine activity only)
- Connection of shoreline [bolted]
- Re-profile of the east section of the beach
- Top-up and profile of middle section (approx. 150,000m³)
- Recharge and profile west section (approx. 335,000m³)

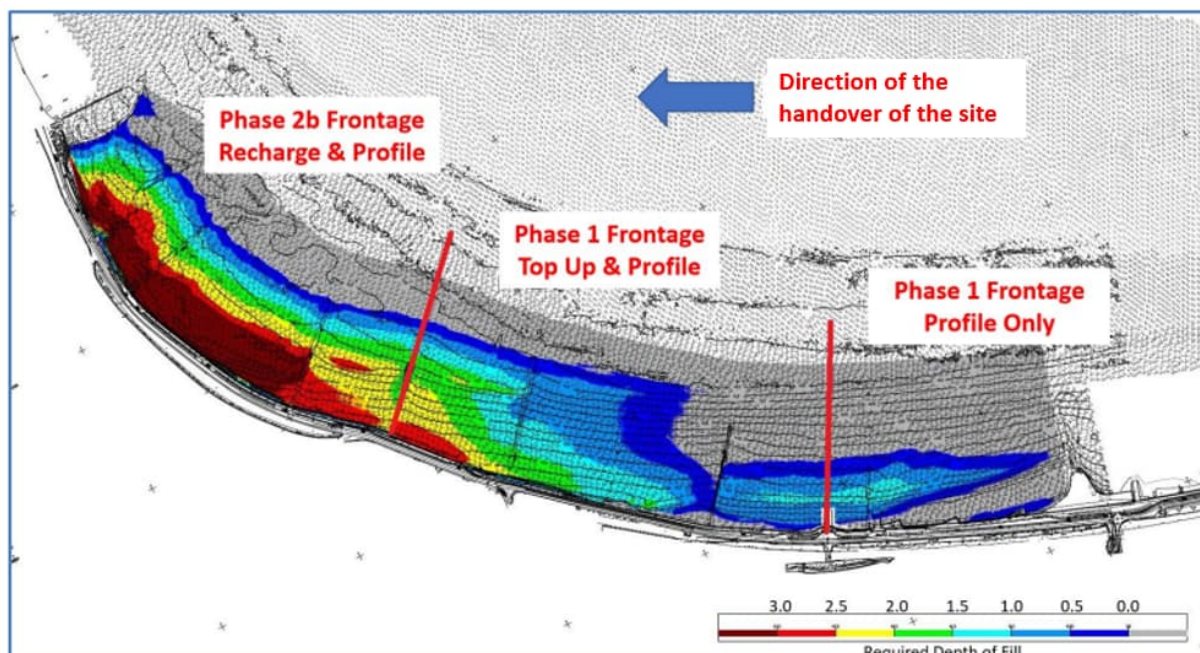


Figure 2 Work Sequence

1.2. Access / exit routes

Colwyn Bay can be accessed easily from the A55 North Wales Express Way, and then by the West Promenade Road. The temporary (mobilisation) site office facilities, will be set-up directly on the West Promenade, in a fenced off section on the Pedestrian Promenade.

Plant access onto the beach will be via the existing ramp, on the EAST side of the beach.

Once the pipeline is fully installed and the beach nourishment pumping activity have started, the temporary site office facilities will be dismantled. The remaining scope of the Boskalis activities will be managed from the main project facilities area near Alun Griffiths Ltd facilities.



Figure 3 Proposed (mobilization) site office location

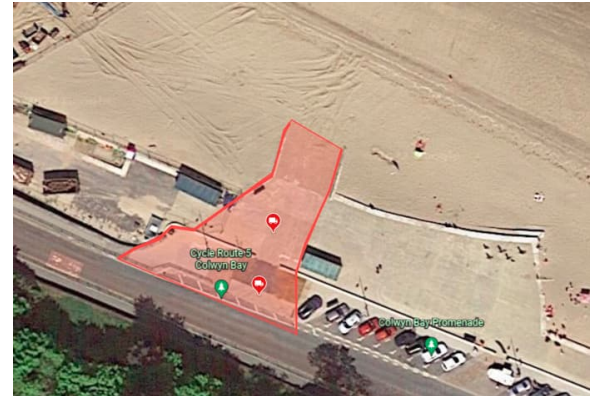


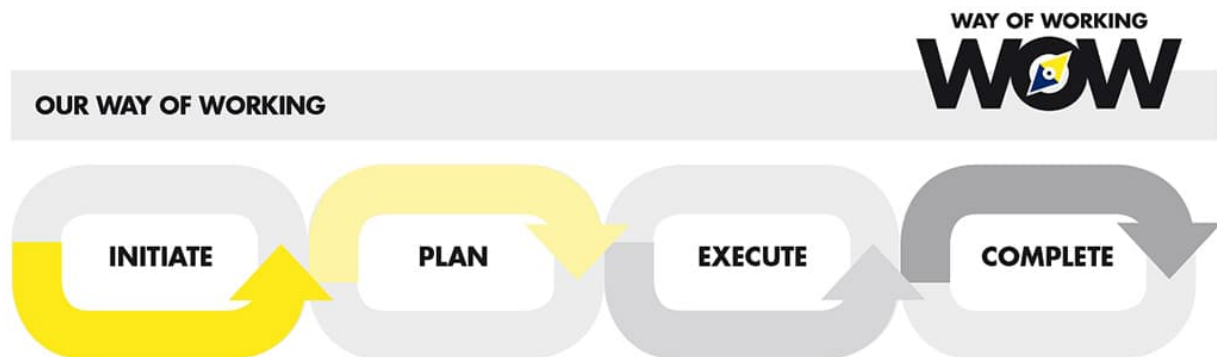
Figure 4 Proposed plant access to the beach

1.3. Document scope

The Project Biosecurity Plan covers the planning and implementation for biosecurity for the execution of the project. Boskalis, subcontractors, suppliers, employees and all others involved are required to adhere to this plan.

The plan sets out the specific policies, practices, resources and activities relevant to the project; to ensure that the Client's requirements as well as Boskalis requirements are met, and to encourage high standards of safety, health and environmental standards amongst all employees.

This document forms part of the Boskalis Way of Working, the integrated quality management system applicable to all operations in Boskalis. The Boskalis Way of Working is structured around four Phases as pictured below. This Project Plan is typically prepared in the PLAN Phase, where the main implementation is taking place in the EXECUTION Phase.



More detailed information about the Boskalis Way of Working can be found in the Group Manual and the User Guide. A dedicated website with all supporting materials is available at www.boskalis.com.

1.4. Plan ownership, change management, approval and distribution

The Project Manager is the document owner and is responsible for the contents of the Biosecurity Plan, ensuring the content is up to date and that only authorised and updated versions are in circulation. The Project SHE Plan [Ref. 2], which this Biosecurity Plan will be a part of, will be a dynamic document and reviews may take place and updates prepared as and when required.

Revision to the Project SHE Plan can be initiated by the following processes:

- Changes in legislation
- Changes in design and / or work methods
- Major scope and schedule changes
- Results from risk assessments
- Results from audits (external & internal)
- Results from management reviews
- Results from Client inspections / reviews
- Changes in the Boskalis Way of Working

Any resultant changes will be issued, and agreed upon, by all parties concerned.



SAFETY STATEMENT

Our people are our most valuable assets, making safety a core value. Our goal is: No Injuries
No Accidents. This is embedded in our company's culture and supported through Values and Rules.
All employees, including our sub-contractors, are expected to take these values and rules to heart.

VALUES I AM RESPONSIBLE FOR MY OWN SAFETY I APPROACH OTHERS ABOUT WORKING SAFELY I TAKE ACTION IN CASE OF UNSAFE OPERATIONS IF NECESSARY, I WILL STOP THE WORK I ACCEPT FEEDBACK ABOUT MY SAFETY BEHAVIOUR REGARDLESS OF RANK AND POSITION I REPORT ALL INCIDENTS, INCLUDING NEAR-MISSES, TO INFORM OTHERS AND BUILD ON LESSONS LEARNED	RULES PREPARE A RISK ASSESSMENT FOR EACH PROJECT, VESSEL OR LOCATION OBTAIN A PERMIT TO WORK FOR DEFINED HIGH-RISK ACTIVITIES MAKE A JOB HAZARD ANALYSIS FOR HAZARDOUS NON-ROUTINE ACTIVITIES BE INFORMED ABOUT RISK & CONTROL MEASURES BE FIT FOR DUTY AND WEAR THE PPE REQUIRED
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2. OUTLINE INFORMATION

Marine Licence Information

Details	Description
Licence Holder	Conwy County Borough Council
Address	Environment Roads and Facilities

Marine Licence Information	
Details	Description
	Mochdre Office Conway Road LL28 5AB
Marine Licence Number (Pump Ashore)	CML2149
Marine License number (Reprofiling existing beach)	DEML2217v1

Dredge Site	
Site	Description
Dredge site	Crown Estate licensed winning Area 457
Recharge Area site	Colwyn Bay
Disposal site	N/A

Vessel(s)	
Vessel Name	Description
Freeway, or similar	Trailing Suction Hopper Dredger, owned by Boskalis International, to be decided
TBD	Multicat, local third party owned, to be decided
Neyland, or similar	Survey vessel, owned by Smit / Boskalis Westminster, operating in UK and Irish water, to be decided
TBD	Crew boat, local third party owned, to be decided
In addition, equipment such as pipelines, will be used.	

Preliminary planning [Ref. 5]		
Activity	Start	Completion
Construction / Welding of 1000m sinker line on Colwyn Bay Beach	12/05/2022	19/06/2022
Float out and installation of sinker line	20/06/2022	20/06/2022
Connection of 400m floating line	24/06/2022	28/06/2022
Construction of shoreline [bolted]	14/06/2022	29/06/2022
Profile of east section	20/06/022	01/07/22
Top-up and profile of middle section (approx. 125,000m ³)	Around 01/07/022	03/09/2022
Recharge and profile west section (approx. 325,000m ³)	Around 01/07/22	03/09/2022

Biosecurity Manager	
Details	Description
Name	Gert-Jan Peters
Contact details	+31 6 21 10 22 22, gert-jan.peters@boskalis.com

3. ENVIRONMENTAL CONDITIONS AFFECTING BIOSECURITY

Although no external report has been commissioned for the Colwyn Bay Recharge, a report by APEM Ltd [Ref. 6] for a recent BWL Project Biosecurity plan, completed for a project that used the same licenced borrow area, states the following:

"A non-native species (NNS) (also known as alien, non-indigenous, foreign or exotic) is a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce (Cook et al. 2015).

The number of marine non-native species in the UK and Ireland is increasing each year, with their spread primarily due to shipping (ballast water, biofouling of hulls) and imported consignments of cultured species (Nall et al. 2016, Cook et al. 2015). Current estimates suggest that approximately 10–12 new non-native species are established annually in both the terrestrial and aquatic environments (GB NNSS 2015, Kakkonen et al. 2019). It is estimated that there are currently over 100 marine non-native species in the UK (Payne et al. 2014, Kakkonen et al. 2019).

According to the Convention on Biological Diversity, 'invasive' NNS (INNS) are one of the greatest threats to biodiversity as they can rapidly colonise a wide range of habitats and exclude native flora and fauna. It is important to understand, however, that the majority of NNS are not 'invasive' (i.e. they are not defined as INNS which is a NNS that has the ability to spread causing damage to the environment, the economy and our health (GB NNSS 2019))."

The APEM Ltd report [Ref.6] has been referenced as it covers many of aspects of the Colwyn Bay Waterfront Project Phase 2b . Liverpool is also the closet major port and any vessels may have the need to enter the port.

No assessment of Marine Invasive Non-Native Species (MINNS) has been done at the Dredge Area 457. However, it is a licensed, previously used area, located approx. 23 nautical miles from Colwyn Bay. Therefore, the risk of MINNS being present at the dredge area, that aren't also already present at Colwyn Bay and its surrounding environment, is considered low. The same area has been used for the Colwyn Bay recharge carried out by BWL in 2013.

4. RISK ASSESSMENT AND MITIGATION MEASURES

In order to get a better understanding of the potential risks associated to the proposed operation it is important to outline a brief history of vessel / equipment movements. The last 10 ports of call for the TSHD are attached in Appendix 1 – Ports of Call [Vessel]. Boskalis will submit, to the necessary port authority(s), the update Port -Calls list 14 days prior to the arrival of the vessel, vessel allocated to the project have all been working in Europe of the past 4 months.

Because vessels will most likely be from the UK / Dutch market, the general risk with regard to environmental conditions affecting biosecurity is considered low. However, attention needs to be paid regardless, to prevent spread of Marine Invasive Non-Native Species (MINNS). Therefore, the activities with potential to increase risk of spreading MINNS are described below.

#	Activities with potential to increase risk of spreading MINNS
RISK-01	Movement of vessel or equipment from one port or water body to another
RISK-02	Movement of vessel between dredge area and disposal area
#	Main vectors by which spread can potentially occur
RISK-03	Attachment to hull or other parts of the vessel when visiting a location where MINNS are present (biofouling).
RISK-04	Within ballast water, used when vessel is moving between operational areas.
RISK-05	When dredged material containing MINNS is deposited in a location where the species is not present.

In order to mitigate the risk of spreading MINNS during the above-mentioned activities, the biosecurity measures, as proposed by APEM Ltd, included in the table below will be implemented.

#	Controls to mitigate biofouling risk (RISK-03)
CTRL-01	Apply the biofouling rapid visual inspection criteria indicated in Cook <i>et al.</i> 2015 [Ref. 10] (see Appendix 3 of this document) on vessel arrival, and to any materials / structures to be introduced to the water column at the Project site. If the level of biofouling is ranked at level 3 or higher the vessel will likely be refused entry until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the Colwyn Bay environment. An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and / or use of appropriate chemicals to accelerate eradication of organisms. Follow the same procedure before vessel departure from the project site after cessation of associated construction activities.
CTRL-02	Anti-fouling treatment record (if applicable) and bio-fouling removal records to be kept. All Boskalis TSHD's have International Anti-Fouling System Certificates, issued under the International Convention on the control of Harmful Anti-Fouling Systems on Ships [Ref. 7], to certify that: 1. The ship has been surveyed in accordance with Regulation 1 of Annex 4 of the Convention; and 2. The survey shows that the anti-fouling system on the ship complies with the applicable requirements of Annex 1 of the Convention.
CTRL-03	Follow IMO's Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species, 2011 [Ref. 8], where relevant.
#	Controls to mitigate ballast water risk (RISK-04)

CTRL-04	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols / standards (e.g. IMO's International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM), [Ref. 9]).
#	Controls to mitigate vessel and equipment movements (RISK-01 and RISK-02)
CTRL-05	Check all equipment and clothing for live organisms, particularly in areas that are damp and hard to inspect, clean and wash all equipment, footwear and clothing thoroughly, dry all equipment and clothing, some species can live for many days in moist conditions.
CTRL-06	Be sure not to transfer water from inside BMD elsewhere, after BMD has been closed off.
#	General controls
CTRL-07	Induction will be given to key staff at the Project site in the identification of key INNS from the region (see Appendix 2 of this document) and using the visual inspection scheme (see Appendix 3 of this document). These reference materials should be printed off and placed in the Biosecurity Plan folder. Staff are encouraged to report any unusual sightings or suspected INNS to the Biosecurity Manager.
#	Controls to mitigate for Chinese mitten crab
CTRL-08	Workers on site should be familiar with identifying the Chinese mitten crab. The Chinese mitten crab will be discussed during project inductions and the North Western Inshore Fisheries and Conservation Authority (NWIFCA) poster (Appendix 4) will be displayed at the vessel(s) and project site.
CTRL-09	If a Chinese mitten crab is found, it will be removed, isolated and reported to the NWIFCA with photographs. Care must be taken to dispose of them properly (Appendix 5) and to not reintroduce specimens back into the estuary. If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the estuary.

5. CONTINGENCY PLAN

In the event of any control measures being breached or the detection of a new INNS, all necessary steps should be taken to control the spread and dispersal of the INNS. The contingency plan provided is in Table 5.1.

Table 5.1 - Biosecurity Contingency Plan [Ref. 1]

Issue	Action	Responsibility	Equipment
Fragmentation or dispersal of conspicuous NNS into the water column – most likely source is during cleaning / removal of biofouling	Remove NNS from the water column and dispose to landfill.	The Biosecurity Manager shall inform Project staff of any observed fragmentation / dispersal into the water column.	Hand nets

Vessel biofouling is ranked at class 3 or above in the visual inspection (Appendix 3).	The vessel will likely not be allowed entry to the Project site. Remove vessel from water at home port or appropriate designated alternative port, clean and antifoul (if appropriate). Biofouling removal must be in a controlled manner with all removed material contained and not released to the marine environment.	Biosecurity Manager / Project staff to carry out visual inspection of vessels prior to entry to the Project site.	Laminated copy of visual inspection Table to be readily available.
During construction: Vessel leaves site without visual biofouling inspection (i.e. breach of protocol)	Recommended visual inspection at next port of call to minimise risk of spread of NNS to other areas.	Vessel owner	N/A
New records of NNS at Project site during construction or identified by project team in wider area.	The GB Non-native Species Secretariat should also be informed so they can update species distribution and abundance databases for NNS. Relevant details are located on their website: http://www.nonnativespecies.org	Workforce to inform the Biosecurity Manager.	N/A

6. REFERENCES AND ABBREVIATIONS

6.1. References

Client Documents		
No.	Document No.	Document Title
[Ref. 1]	100374-MMD-00-XX-RP-N-0016	Colwyn Bay Waterfront Project - Phase 2b Environmental Management Plan

BWL Documents		
No.	Document No.	Document Title
[Ref. 2]	GT-270	SHE Plan
[Ref. 3]	TBC	Work Method Statement – Mobilisation & Installation of beach nourishment pipelines
[Ref. 4]	TBC	Work Method Statement – Dredging and beach nourishment of Colwyn Bay beach
[Ref. 5]	N/A	Preliminary Planning

External Documents		
No.	Document No.	Document Title
[Ref. 6]	APEM Ref P00005019	Bramley-Moore Dock Infill Works Biosecurity Plan

Standards, guidelines, literature	
No.	Document Reference
[Ref. 7]	The International Convention on the Control of Harmful Antifouling Systems on Ships, 2001.
[Ref. 8]	IMO (2011). Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species
[Ref. 9]	IMO (2004). International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention)
[Ref. 10]	Cook, E. J., Macleod, A. Payne, R. D. and Brown, S. 2014. Ed. by Natural England and Natural Resources Wales (2015). Marine Biosecurity Planning – Identification of best practice: A Literature Review. Report by SRS Ltd. in conjunction with Robin Payne to the Firth of Clyde Forum and Scottish Natural Heritage Commissioned Report No. 748 - 45 pp."
[Ref. 11]	Nall, C, Guerin, A. J. & Cook, E. J. 2015. Rapid assessment of marine non-native species in northern Scotland and a synthesis of existing Scottish records. Aquatic Invasions, 10(1): 107-121.
[Ref. 12]	GB NNSS (The Great Britain Non-native Species Secretariat). 2015. The Great Britain Invasive Non-native Species Strategy. PB 14324: 42 pp
[Ref. 13]	Kakkonen, J. E., Worsfold, T. M., Ashelby, C. W., Taylor, A. and Beaton, K. 2019. The value of regular monitoring and diverse sampling techniques to assess aquatic non-native species: a case study from Orkney. Management of Biological Invasions, 10(1): 46-79.

Standards, guidelines, literature	
No.	Document Reference
[Ref. 14]	Payne, R. D., Cook, E. J. and Macleod, A. 2014. Marine Biosecurity Planning - Guidance for producing site and operation-based plans for preventing the introduction of non-native species. Report by SRS Ltd. in conjunction with Robin Payne to the Firth of Clyde Forum and Scottish Natural Heritage 39 pp.
[Ref. 15]	GB NNSS. 2019. Accessed on 03-11-2020 from http://www.nonnativespecies.org/index.cfm?pageid=64
[Ref. 16]	Cefas. n.d. Non-Indigenous Species Quick Reference Survey Guide. Accessed on 03-11-2020 from http://www.nonnativespecies.org/index.cfm?pageid=597

6.2. Abbreviations

Abbreviation	Full meaning
BWL	Boskalis Westminster Ltd
EA	Environmental Agency
HSE	Health, Safety and Environment
INNS	Invasive Non-Native Species
IMO	International Maritime Organization
MINNS	Marine Invasive Non-Native Species
NA	Not Applicable
NNS	Non-Native Species
NWIFCA	North Western Inshore Fisheries and Conservation Authority
TSHD	Trailing Suction Hopper Dredger
UK	United Kingdom
WOW	Way Of Working

7. APPENDICES

7.1. Appendix 1 - Ports of Call list [Vessel] (example)

			Ports of Call List			
						Page No.
						1
	1. Name of ship			2. Callsign		
	3. Nationality of ship					
	4. No.	5. Port of Call		6. Date of Arrival	7. Date of Departure	8. Security level
	The 10 previous ports:			Arr :	Dep:	Security level :
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	9. Date and signature by master, authorized agent or officer					

7.2. Appendix 2 – High risk INNS to be discussed during Project Induction and given to Site personnel as leaflets, from MSFD UK Priority Species ID Guides [Ref. 16]

Eriocheir sinensis (Chinese mitten crab)

Crustacea

Description

A relatively large crab with a maximum body length of 56 mm. The carapace is relatively square in shape, narrowing towards the head where there are 4 spines on each side and a notch between the eyes. This species is olive-green in colour with paler legs which are twice the length of the body, with white tips on the claws. There is a dense mat of hair present on the claws which is the species' most distinguishing feature. The leading edges of the legs are also hairy. **Synonyms** - *Eriocheir sinensis* f. *acutifrons*, *E. sinensis* f. *rostratus*, *E. sinensis* f. *rotundifrons*, *E. sinensis* f. *trilobata*, *Grapsus nankin*.

Key features



Habitat and distribution

Juveniles live in lower estuaries and marine habitats but as they develop into adults, they migrate upstream into more freshwater / brackish environments. Adults live in burrows in muddy river banks, but aquatic vegetation and marshes could provide an alternative habitat. They migrate to higher salinity environments to reproduce. *E. sinensis* is established in the Thames, Medway and Ouse and has been observed in several other estuaries in England and Wales.

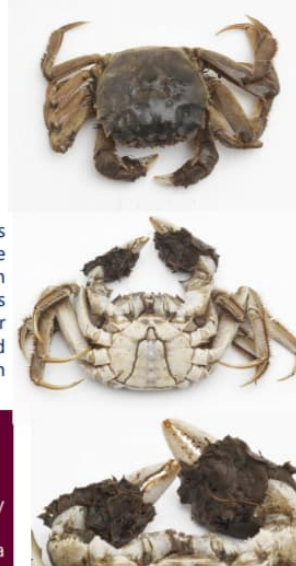
Quick Facts

Native range: Eastern Asia (China, Japan and Taiwan).

First discovered in: Thames Estuary (1935).

Pathway: Ballast water, fouling on ships' hulls and possibly transported with mariculture.

Observed in: Visual observations; walk over and camera surveys.



Hemigrapsus sanguineus (Asian/Japanese shore crab)

Crustacea

Description

A small crab with a square carapace up to 4.5 cm in width varying in colour from orange-brown to greenish-black with banded legs. It has three distinct 'teeth' on each side of the carapace and banding on the walking legs. Large males have a fleshy bulb at the pincer base. Teeth on the carapace are more acute than those of the closely-related species *H. takanoi*. Both species have a crest below each eye, which looks like a horizontal ridge under the eyes. In *H. sanguineus* this is undivided, while in *H. takanoi* this is divided into three unequal parts.

Synonyms - *Grapsus* (*Grapsus*) *sanguineus*, *Heterograpsus maculatus*.

Key features



Habitat and distribution

The species inhabits estuarine and marine habitats within the intertidal or shallow subtidal zones. It is typically found on more exposed rocky shores but also occurs in soft sediments under the shelter of rocks or shells, artificial structures, mussel beds and oyster reefs. Specimens have been reported from rockpools in Jersey and Guernsey since 2009. First recorded in South Wales and Kent in 2014.

Quick Facts

Native range: North West Pacific.

First discovered in: Barry, South Wales (2014), NW coast of Guernsey (2009).

Pathway: Larva carried in ship ballast water, adults on hulls and via aquaculture.

Observed in: Visual observations; walk over and camera surveys.



Hemigrapsus takanoi (Brush clawed shore crab) and *Hemigrapsus penicillatus* (Japanese shore crab)

Crustacea

Description

Two virtually indistinguishable small crabs only recognised as separate species in 2005. Square carapace up to 5 cm wide, varying in colour from dark grey-green to brown-orange and with banded legs. They have three distinct 'teeth' on either side of the carapace, and males have a yellow-brown furry growth at the base of the pincers (which is slightly larger in *H. takanoi*). Both may have small black spots on the body and limbs, which are generally smaller on *H. takanoi*, and on these species they are absent from the abdominal segments. Both species are similar in appearance to the closely related non-native *H. sanguineus*. All three species have a crest below each eye, but in *H. sanguineus* this is undivided, while in *H. takanoi* and *H. penicillatus* it is divided into three unequal parts.

Synonyms – *Hemigrapsus tanakoi*; *Brachynotus brevidigitatus*, *Grapsus* (*Eriocheir*) *penicillatus*

Key features



© Arjan Gittenberger/GiMaRIS-2009

Habitat and distribution

Both species inhabit shallow coastal waters and estuaries. *H. takanoi* was originally identified as *H. penicillatus* in Europe and is widespread from Biscay to Germany, and has recently been found in Kent, Essex and Glamorgan. Previous European records of *H. penicillatus* are likely *H. takanoi*.

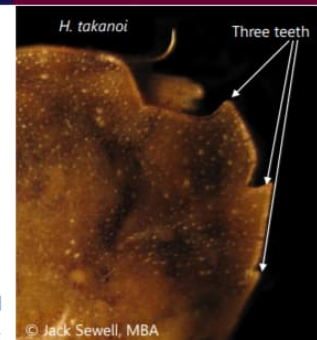
Quick Facts

Native range: North West Pacific.

First discovered in: Medway and Colne estuaries in 2014 (*H. takanoi*). *Hemigrapsus penicillatus* yet to be observed in the UK.

Pathway: Ballast water, hull fouling, aquaculture.

Observed in: Trawl, camera and walk over surveys.



© Jack Sewell, MBA



© Christine Wood, MBA

Crepidula fornicata (Slipper limpet)

Mollusca

Description

Shell is oval with an elongate cap-shape and up to 5 cm in length. The large shell opening on the ventral side has a flat white shelf, extending for half its length. Apex is curled around and tucked in on one side. Shell is smooth, white, cream, yellow or pinkish in colour with streaks or blotches of red or brown. Commonly found in curved chains or stacks made up of several individuals.

Synonyms - *Crepidula riisei*, *C. virginica*, *C. densata*, *Crypta nauturum*, *Patella fornicata*.

Key features



© RPS Group PLC

Habitat and distribution

Adults live on the seabed, reaching highest densities in wave-protected muddy areas. Often attach to shells of hard-shelled invertebrates (alive or dead) including scallops, crabs, mussels. Established on the southern coasts of England and Wales and spreading northward. Present on the east coast (up to Spurn Head) and west coast (up to Cardigan Bay) of England and in Scotland.

Quick Facts

Native range: From Point Escuminac, Canada along the eastern coast of America down to the Caribbean.

First discovered in: Liverpool Bay (1872) but this population has since died out.

Pathway: Most likely to have been imported with American oysters (*Crassostrea virginica*).

Observed in: Trawls, grabs and video tows.



© GB NIES



© Chris Wood

Didemnum vexillum (Carpet sea squirt)

Chordata

Description

Pale orange or cream colonies forming extensive, thin (2-5 mm) sheets or long pendulous outgrowths. Firm, leathery texture, with a marbled appearance. Numerous small pores in the surface close when colony is disturbed, revealing tiny whitish spots.

Synonyms - *Didemnum vestitum*, *D. vestum*.

Key features



Habitat and distribution

Mainly recorded in marinas and adjacent shallow artificial structures in the UK. It can inhabit cobble / gravel seabed down to 80 m depth. Found in tide pools, in seagrass beds and on bivalve aquaculture installations. *D. vexillum* has so far been recorded in a total of ten marinas in the UK: North Wales (1), Devon (2), Solent (5), Clyde (1) and Whitstable (1).

Quick Facts

Native range: Probably North West Pacific and likely to have spread from Japan.

First discovered in: Autumn 2008 from a marina in North Wales and one in Plymouth.

Pathway: Hulls of leisure craft, ballast water and movement of aquaculture stock.

Observed in: Video tows, intertidal surveys, maintenance of structures.



Undaria pinnatifida (Japanese kelp, Wakame)

Brown algae

Description

A large golden-brown kelp reaching 1-3 metres in length. It has a branched holdfast just above which there is a ribbonlike reproductive frill with wavy edges. The blade is broad, flattened and lance-like in shape with a distinctive flattened midrib. The margins of the blade are wavy and ribbon-like at the base. There are similar species in UK waters but none has the combination of the branched (rather than knobby) holdfast, reproductive frills and flattened midrib.

Synonyms – Too numerous to list.

Key features



Habitat and distribution

Grows on hard surfaces (natural or man-made) from the low intertidal to a depth of 18 m. It can be found on sheltered or exposed coasts. It was introduced to France in 1971 and has since spread to the south coast of the UK and the Channel Islands.

Quick Facts

Native range: Temperate regions of Japan, China and Korea.

First discovered in: The Solent (1994).

Pathway: Aquaculture, ballast water, hull fouling.

Observed in: Macroalgae surveys and other visual surveys.



Sargassum muticum (Wireweed)

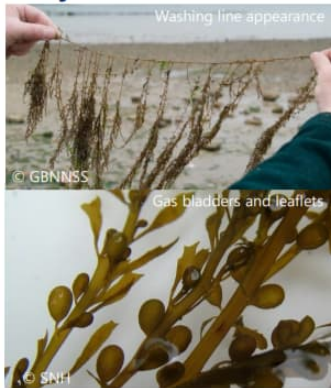
Brown algae

Description

Sargassum muticum is a large olive-brown seaweed with fronds normally 1 metre in length, but in favourable conditions can grow to 8.5 metres long. A tough, wiry main stem about 2 mm in diameter bears a series of secondary branches, giving it a characteristic 'washing line' appearance when held out of water. The branches have small, flattened, toothed oval leaflets and spherical gas bladders.

Synonyms – *Sargassum (Bactrophyucus) muticum*, *Sargassum kjellmanianum* f. *muticum*

Key features



Habitat and distribution

Grows intertidally and subtidally, particularly in rockpools and in shallow water, on hard surfaces in shallow coastal waters and in estuaries. Originally from the North West Pacific, it is now established around the coast of continental Europe, from the Mediterranean to the Baltic as well as the Atlantic coast of North America. In the UK it is distributed widely along the coasts of south and west England, Wales, Northern Ireland and western Scotland.

Quick Facts

Native range: North West Pacific: Japan, Russia, Korea and China.

First discovered in: Isle of Wight (1971).

Pathway: Aquaculture, hull fouling.

Observed in: Macroalgae surveys.



7.3. Appendix 3 - Criteria for visual assessment of the extent of biofouling (Cook *et al.* 2015).

Rank	Description	Visual estimate of biofouling cover
0	No visible fouling. Hull entirely clean, no biofilm on visible submerged parts of the hull.	Nil
1	Slime fouling only. Submerged hull areas partially or entirely covered in biofilm, but the absence of any plants or animals.	Nil
2	Light fouling. Hull covered in biofilm and one to two very small patches of one type of plant or animal.	1–5 % of visible submerged surfaces
3	Considerable fouling. Presence of biofilm, and fouling still patchy, but clearly visible and comprised of either one or more types of plant and / or animal.	6–15 % of visible submerged surfaces
4	Extensive fouling. Presence of biofilm and abundant fouling assemblages consisting of more than one type of plant or animal.	16–40 % of visible submerged surfaces
5	Very heavy fouling. Many different types of plant and / or animal covering most of visible hull surfaces.	41–100 % of visible submerged surfaces

7.4. Appendix 4 – NWIFCA Chinese Mitten Crab Poster

STOP THE SPREAD

Are you unknowingly spreading invasive species on your water sports equipment and clothing?

STOP THE SPREAD

INVASIVE
AQUATIC
SPECIES

CHECK-CLEAN-DRY

CHECK

Check your equipment and clothing for live organisms - particularly in areas that are damp or hard to inspect.

CLEAN

Clean and wash all equipment, footwear and clothing thoroughly.
If you do come across any organisms, leave them at the water body where you found them.

DRY

Dry all equipment and clothing - some species can live for many days in moist conditions.
Make sure you don't transfer water elsewhere.

www.nonnativespecies.org



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Have you seen a Chinese mitten crab?



© Crown Copyrights 2009 FERA

- Grey-green to dark brown in colour
- Long walking legs
- Square body, up to 8cm across
- Dense brown fur on white-tipped claws
- 4+4+4 pattern of teeth around the front of the shell with notch between eyes
- Juveniles may lack fur on claws



Please Report Sightings to:

science@nw-ifca.gov.uk

01524 727 970

Please take photos, log where found, and retain any crabs in a sealed container for further identification.

For more information on invasive non-native species and disease in the marine area you can find the **NWIFCA Biosecurity Plan** at www.nw-ifca.gov.uk or visit www.nonnativespecies.org/checkcleandry

Produced by the NWIFCA October 2018

Adult Chinese mitten crab-Non-native



Threat

It's crucial that we prevent the spread of Chinese mitten crab in the north-west. Chinese mitten crab threatens native animals by predation and disturbance. They burrow and large-scale invasions could result in the erosion of river banks. They can live in fresh water, can walk across land, and migrate over 700km upstream from the sea. They are most likely to be found along the banks of estuaries and rivers as well as along the coast.

Juvenile Chinese mitten crab-Non-native



Other Species

The Chinese mitten crab can be confused with the native shore crab or the broad-clawed porcelain crab (shown in the bottom two images). Look for the notch between the eyes to tell them apart (shown on the top two images). If you think you have found a Chinese mitten crab please take pictures of it and, if possible, keep it for further identification by NWIFCA staff, noting exactly where you found it.

Common shore crab

Native



Broad-clawed porcelain crab-Native



Produced by the NWIFCA October 2018

7.5. Appendix 5 – Chinese Mitten Crab Find Procedure

Any Project worker who finds a Chinese Mitten Crab (refer to Appendix 4) is required to follow below protocol.

#	Action
1	Inform Biosecurity Manager by radio or telephone (+44 7795 821 902) of crab finding
2	Collect appropriate equipment (e.g. hand net, sealable container) to catch and contain crab, from vessel / project site / storage. If possible, request someone on site to maintain visual contact in case crab hides away.
3	Catch and contain crab in sealable container. <i>Note: If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the estuary.</i>
4	Hand over crab inside container to Biosecurity Manager
5	Biosecurity Manager to report crab finding to NWIFCA: https://www.nw-ifca.gov.uk/cmc/
6	Biosecurity Manager to request instructions from NWIFCA (contact number: 01524 727 970) regarding retention for further identification.

7.6. Appendix 6 – APEM Ltd. Bramley-Moore Dock Infill Works Biosecurity Plan



The People's Project

Bramley-Moore Dock Infill Works Biosecurity Plan

WYG

APEM Ref P00005019

August 2020

Jennifer Gibson and Ashley Cordingley

Client: WYG Ltd
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Date of issue: August 2020

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Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
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1. **PROJECT BACKGROUND**

A non-native species (NNS) (also known as alien, non-indigenous, foreign or exotic) is a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce (Cook *et al.* 2015).

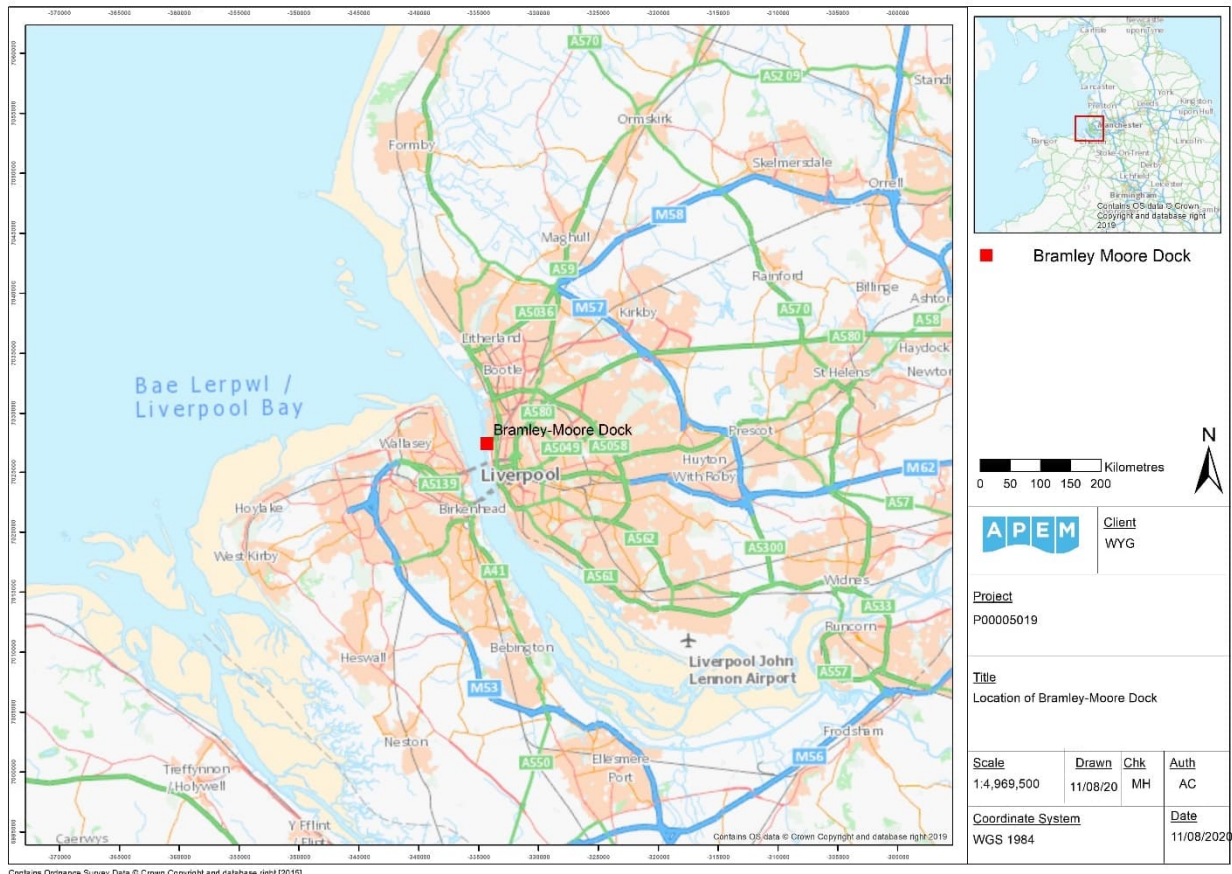
The number of marine non-native species in the UK and Ireland is increasing each year, with their spread primarily due to shipping (ballast water, biofouling of hulls) and imported consignments of cultured species (Nall *et al.* 2016, Cook *et al.* 2015). Current estimates suggest that approximately 10–12 new non-native species are established annually in both the terrestrial and aquatic environments (GB NNSS 2015, Kakkonen *et al.* 2019). It is estimated that there are currently over 100 marine non-native species in the UK (Payne *et al.* 2014, Kakkonen *et al.* 2019).

According to the Convention on Biological Diversity, 'invasive' NNS (INNS) are one of the greatest threats to biodiversity as they can rapidly colonise a wide range of habitats and exclude native flora and fauna. It is important to understand, however, that the majority of NNS are not 'invasive' (i.e. they are not defined as INNS which is a NNS that has the ability to spread causing damage to the environment, the economy and our health (GB NNSS 2019)).

Bramley-Moore Dock in Liverpool is being redeveloped as a new football stadium for Everton Football Club. A range of works have been proposed including isolating and infilling of Bramley-Moore Dock. Bramley-Moore Dock is part of Liverpool Docks adjacent to the Mersey Estuary (Figure 5).

This Biosecurity Plan was produced in response to the Environment Agency response received on May 4th 2020 to the application submission for full planning permission. It has been produced to indicate the potential risks of introduction of INNS during the Construction Phase of the project and measures to reduce these risks which will be implemented during construction. This Biosecurity Plan will be part of the Construction Environmental Management Plan (CEMP).

The main aim of the plan is to minimise the risk of introduction and establishment of INNS at the Project location during the construction phase and to help prevent the spread of INNS already present at the site to new locations.



1.1 Relevant Policy/Legislation

National and international policy/legislation sets out requirements for compliance with the implementation of biosecurity¹ measures and the control of NNS. In the UK at present the primary drivers include:

- **EC Marine Strategy Framework Directive (2008/56/EC)** - Requires 'Good Environmental Status' (GES) of marine waters by 2020. Requires that Non-Native species introduction is at levels that do not adversely alter ecosystems.
- **EU Water Framework Directive (2000) (2000/60/EC)** – achieve 'Good Ecological Status' by 2020, no deterioration in ecological status is permitted.
- **The Wildlife and Countryside Act: Section 14 (1981)** – it is illegal to allow any animal which is not ordinarily resident in Great Britain, or that is listed on Schedule 9 to the Act, to escape into the wild, or to release it into the wild. It is also illegal to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 of the Act.
- **The EU invasive alien species regulation** - came into force in January 2015. The list of species to which the regulation applies is still being developed. However, a requirement of the legislation is to have in place pathways action plans to control the introduction and spread of listed species. Pathways action plans for marine species may include future requirements for biosecurity plans.

¹ The term biosecurity, in relation to INNS, is defined by Cook *et al.* 2014 as "taking action in order to minimise the introduction, spread and establishment of invasive non-native species"

2. **METHODOLOGY**

This plan has been prepared following guidance in Cook *et al.* (2015) which indicates there are two types of biosecurity plans which are 'Site' and 'Operations' plans:

- A 'Site' Biosecurity Plan covers the long-term, on-going activities at a single location such as a marina (e.g. vessel activity or routine dredging activities).
- The 'Operations' Biosecurity Plan is for a particular activity or set of activities which are time-limited (e.g. construction of marine infrastructure or one-off dredging activities) (Cook *et al.* 2015).

This assessment has been conducted following this guidance, primarily taking account of the 'Operations' Biosecurity Plan requirements.

The preparation of the Biosecurity Plan involved the following aspects:

- Defining the construction works to be undertaken – methods, frequency, size of operation, location etc.
- Site description – including environmental information (water flow, salinity etc.).
- Review of NNS recorded in the vicinity of the Project site.
- Assigning a risk level for each activity (High, Medium, Low).
- Proposing biosecurity control measures for the medium and high-risk tasks associated with the construction works, along with instructions for staff and contractors.
- Proposing a contingency plan, e.g. rapid response and containment measures if there is any evidence of high-risk incidents or if new NNS are detected.

3. **MARINE BIOSECURITY PLAN**

3.1 **Description of construction activities**

The following activities will take place in the following order:

1. Bubble screen installation
2. Fish removal and relocation – stage 1
3. Rake dock bed & remove debris
4. Install silt curtain
5. Construct temporary isolation structure
6. Undertake 2nd stage fish removal
7. Undertake dock filling
8. Undertake compaction operations

Summary information for each is provided below with further detail provided in the Construction Management Plan (Laing O'Rourke 2019).

3.1.1 **Bubble screen installation**

Prior to the first stage fish removal and raking operation, a bubble screen will be installed across the northern mouth of the entrance channel between Sandon Half-Tide Dock and Bramley-Moore Dock. The bubble screen will prevent fish from Sandon Half-Tide Dock entering Bramley-Moore Dock.

7.7.

3.1.2 **Fish removal and relocation – stage 1**

Fish removal and relocation will take place prior to the dock bed raking process. Fish will be collected by deploying four fyke nets and transferred to an adjacent body of water, either Sandon Half-Tide Dock or Nelson Dock. The equipment used for fish removal and relocation will include a work boat, sanitised fyke/hand nets, mooring buoys and ropes, PPE, water quality meter (temperature), sanitised aerators

and sanitised fish holding/transportation equipment. There is protocol in place to have all equipment sanitised at the end of the exercise.

3.1.3 Rake dock bed and remove debris

The dock bed will be systematically raked by a purpose-built plough vessel, 'Norma', pulling debris to an agreed location where it will be lifted out of the water by a hydraulic excavator equipped with a grab attachment and placed into a skip ready to be taken by road to a licensed disposal area.

The rake is attached to 'Norma' via a fixed-arm lifting assembly linked to a winch which is used to control the rake in the vertical plane.

The 'Norma' will operate 12 hours a day, 7 days a week (nominally 0700–1900) and will systematically track across Bramley-Moore Dock. The size, volume and extent of the debris within Bramley-Moore Dock is currently unclear and as such the duration of the raking programme is unquantifiable. It has been assumed there will be a minimum two to three-month period post raking to allow the material to settle prior to filling.

3.1.4 Installation of silt curtain

Following completion of the raking operation, a silt curtain will be installed slightly inboard of the bubble screen. Once installed, the bubble screen will be decommissioned and removed from site. The silt curtain will serve to prevent fish from re-entering Bramley-Moore Dock and will also prevent the migration of disturbed dock bed deposits into the neighbouring Sandon Half-Tide Dock.

3.1.5 Construction of temporary isolation structure

Prior to dock filling, a temporary bund will be constructed at the entrance to Bramley-Moore Dock from Sandon Half-Tide Dock. It is understood that the bund will be created by using dump trucks to deposit 6F2 material and/or aggregate in gabion baskets and/or sandbags.

A permanent northern isolation structure between Bramley-Moore Dock and Sandon Half-Tide Dock will then be constructed which will be a secant piled wall, bored into the underlying sandstone once the dock is infilled. It will be possible to adopt dry construction methods for this aspect of the work.

3.1.6 Fish removal and relocation – stage 2

Following the bund work a second fish removal and relocation exercise will be conducted in line with the information provided above for the stage 1 removal/relocation.

3.1.7 Dock filling

A Trailer Suction Hopper Dredger (TSHD) will dredge suitable material from Crown Estate-licensed Area 457, which is located approximately 23 nautical miles from Bramley-Moore Dock (Figure 2). Approximately 480,000 m³ of 'as dredged' sand will be taken from area 457 and relocated at Bramley-Moore Dock.

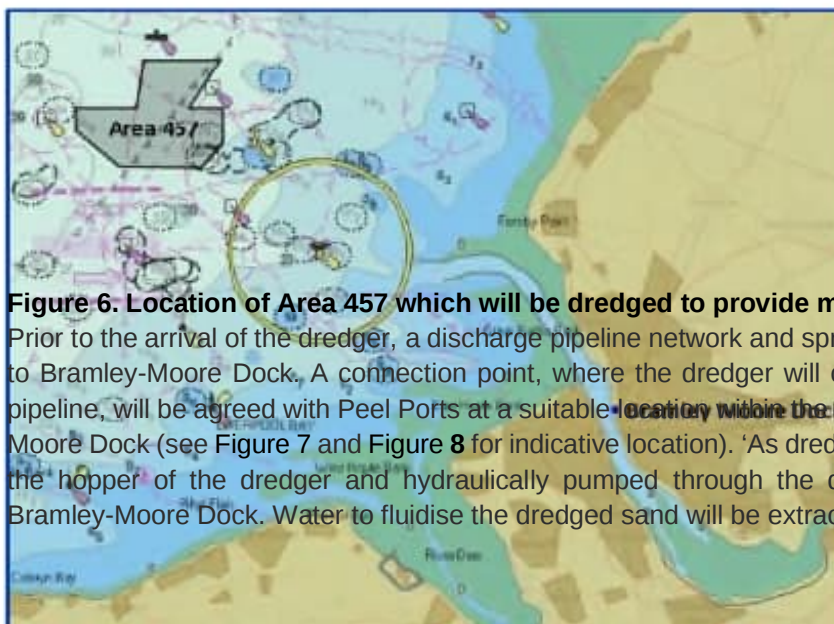


Figure 6. Location of Area 457 which will be dredged to provide materials for the dock filling.

Prior to the arrival of the dredger, a discharge pipeline network and spreader pontoon will be mobilised to Bramley-Moore Dock. A connection point, where the dredger will couple to the floating discharge pipeline, will be agreed with Peel Ports at a suitable location within the River Mersey, close to Bramley-Moore Dock (see Figure 7 and Figure 8 for indicative location). 'As dredged' sand will be fluidised within the hopper of the dredger and hydraulically pumped through the discharge pipeline network into Bramley-Moore Dock. Water to fluidise the dredged sand will be extracted from the River Mersey.

The discharge pipeline will follow a mutually agreed route from the dredger's connection point to Bramley-Moore Dock, using a 300 m section of floating pipeline to the dock wall. From here it will be linked to steel shoreline, which will continue into the Bramley-Moore Dock site.

The steel shore pipeline, which is transported in 12 m flanged sections, will be stockpiled in agreed locations during the installation process. This will be placed around the side of the existing dock and we will require a 10 m access strip to allow installation and maintenance. Once ready, the floating pipeline will be towed to a predetermined connection point position and connected to the shoreline.

For the lower layers, floating spreader pontoons will be used to ensure accurate placement of materials during the dredging process (Figure 7). The upper layer will be placed directly using the discharge pipeline network.

Allowing for 24/7 non-tidal working, it is anticipated the TSHD will deliver one load every seven hours from Area 457, in the order of 46,500 m³ per week.

3.2 Description of operation activities

Following the infilling, a channel will be created to the west of the infill area connecting Nelson and Sandon Half-Tide Dock. However, it is understood that the isolation structures on the north and south of the channel will prevent boat access. Any boats that do enter the dock (e.g. if they are lifted in) would not form any part of the site operation.

Overall, it is considered that there are no pathways for the spread or introduction of aquatic INNS associated with project operation.

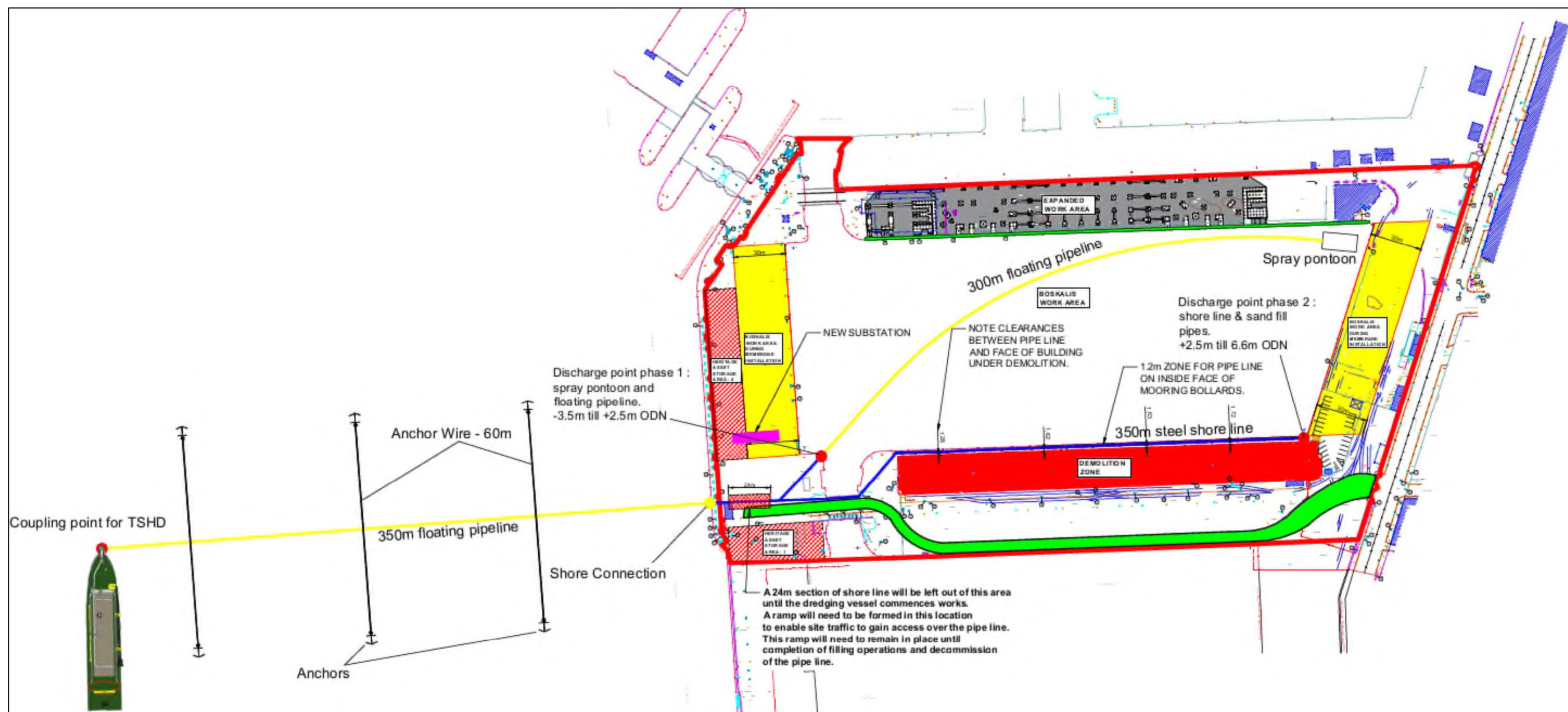


Figure 7. Schematic of the Bramley-Moore Dock construction site depicting where the floating pipeline for the dredging operation will be located.



Figure 8. A wide area view showing the Trailing Suction Hopper Dredger in its temporary mooring location on the River Mersey, coupled up to the floating pipeline.

7.8.

3.3 Plan period

The raking exercise is expected to move through the upper layer of unconsolidated material within the dock bed. This process will cause agitation of the materials within this layer, and it can be assumed there will be a minimum two to three-month period post raking to allow the material to settle prior to filling.

Overall, the dock filling activities are anticipated to have a duration of 25 weeks, with dredging from Area 457 taking an estimated 10 weeks.

The time of year of the works is yet to be finalised.

3.4 Environment information

3.4.1 Site Description

Bramley-Moore Dock forms a small part of a larger dock and canal network along the Mersey Estuary. The outlet to the Leeds and Liverpool canal is approximately 0.5 km south of the site into Stanley Dock via Collingwood Dock. The retained water level within the dock system is isolated from the Mersey Estuary via a system of lock gates at Langdon Dock, approximately 1.8 km to the north (Carcinus 2020). The site is 8.67 hectares and is bordered to the north by the United Utilities wastewater treatment plant and Sandon Half-Tide Dock (which is currently directly connected), to the east by Regent Road, to the south by Nelson Dock and the western boundary of the site is restricted to the foot of the concrete crown wall, built on top of the Mersey Estuary wall. There is an existing isolation structure located between

Bramley-Moore Dock and Nelson Dock, which is of sheet pile construction. There are eight 600 mm diameter pipes with sluice gates within the isolation structure, which provide hydraulic connectivity between north and south when the gates are open (Carcinus 2020).

3.4.2 Salinity and temperature

Ecological surveys were conducted at Bramley-Moore Dock in 2017 by APEM during which salinity and water temperature were recorded.

Salinity was less than fully marine ranging from 22.84 to 29.22² with an average of 27.13. In addition, the salinity concentrations were slightly lower in the surface waters compared to deeper water, with a maximum depth measured at 8.4 m. Salinity toward the surface had an average of 26.2 while salinity in deeper water had a salinity of 27.3 (APEM 2017).

Water temperature ranged from 15.0 to 15.7°C across all depths with an average of 15.1°C. The water temperature was slightly lower in deeper waters compared to the surface water although the difference wasn't considerable (<1.0°C) and generally the water was not considered to be stratified at the time of sampling (APEM 2017).

3.4.3 Site habitat

During the 2017 APEM survey, the benthic habitat at Bramley-Moore Dock was determined to primarily consist of the stone dock walls and dark silt on the bed of the dock.

The Site is immediately adjacent to the Liverpool Bay Special Protection Area (SPA). Other Natura 2000 sites located within approximately 5 km of the Site are:

- Mersey Narrows and North Wirral Foreshore SPA / Ramsar;
- Ribble & Alt Estuaries SPA / Ramsar
- Mersey Estuary SPA / Ramsar;

3.5 Non-native species at the site

In 2017 the following benthic samples were collected at Bramley-Moore Dock:

- 12 grab samples of sediment (0.0225 m² Eckman grab)
- 12 wall scrape samples at or above the waterline
- underwater video survey conducted by divers.
- Six baited traps to quantitatively sample mobile invertebrates.

During this survey, five non-native species (NNS) were recorded: the spionid polychaete *Pseudopolydora paucibranchiata*, the sea spider *Ammothea hilgendorfi*, the barnacle *Austrominius modestus*, the skeleton shrimp *Caprella mutica* and the sea-squirt *Styela clava*.

In the grab samples *P. paucibranchiata* was the most abundant, recorded in 11 of the 12 samples with 1 to 45 individuals in each of these samples. Only one individual of *A. hilgendorfi*, three of *A. modestus* and one specimen of *S. clava* were recorded in the grab samples and no *C. mutica* were present.

A. modestus was present in all 12 of the wall scrape samples collected with a total of 5,238 individuals recorded. The only other INNS recorded in the wall scrape samples was *C. mutica* (two individuals).

No additional INNS were recorded during the diver survey or in the baited trap samples.

The record of *P. paucibranchiata* was interesting as the species most commonly recorded as *P. paucibranchiata* from U.K. waters is actually a closely related undescribed species (V. Radashevsky, pers. comm.) whereas the true *P. paucibranchiata* is native to Japan and has recently been recorded from the Netherlands (Faasse 2016). The specimens recorded during the 2017 survey matched the true *P. paucibranchiata*. As far as we know this species has not yet been formally reported from the UK and the records from the 2017 survey are likely the first confirmed occurrence of the species in UK waters.

² salinity values are unitless.

Several other taxa which were identified to higher taxonomic levels in this study, due to known taxonomic issues or the condition of the specimens, may contain INNS. These were *Streblospio*, Sessilia (juvenile) and *Amathia*. The majority of the individuals recorded as Sessilia (juvenile) are likely to be *A. modestus* which is a known INNS as indicated above.

As well as the INNS recorded, a further seven taxa were recorded as cryptogenic, these species include the polychaetes *Polydora cornuta*, *Tharyx* 'species A', *Cossura pygodactylata*, *Euchone cf. limnicola*, the amphipods *Monocorophium acherusicum*, *Monocorophium insidiosum*, and the bryozoan *Bugulina fulva*. A cryptogenic species is one that cannot be proven to be either native nor non-native, but whose distribution would suggest that it is non-native. Of these *Tharyx* 'species A' was the most abundant. This species may be identical to the recently described *T. robustus* but at this time this cannot be confirmed since the description of *T. robustus* does not include some characters that are evident in specimens from the UK.

Table 2. Summary of non-native and cryptogenic species identified during the 2017 survey (APEM 2017).

Classification	Scientific Name
Non-native in the UK	<i>Pseudopolydora paucibranchiata</i>
	<i>Ammothea hilgendorfi</i>
	<i>Austrominius modestus</i>
	<i>Caprella mutica</i>
	<i>Styela clava</i>
Cryptogenic	<i>Polydora cornuta</i>
	<i>Tharyx</i> species A
	<i>Cossura pygodactylata</i>
	<i>Euchone cf. limnicola</i>
	<i>Monocorophium acherusicum</i>
	<i>Monocorophium insidiosum</i>
	<i>Bugulina fulva</i>
May include invasive non-native species	<i>Streblospio</i>
	<i>Sessilia</i> spp
	<i>Amathia</i> spp

8.

4. RISK ASSESSMENT

4.1 Risk of introduction or spreading non-native species

The construction works at Bramley-Moore Dock has been broken down into four main activities, although they will be occurring simultaneously at times:

- Vessel arrival and introduction of various equipment
- Fish removal
- Dredging
- Vessel departure and removal of various equipment

For each of these activities the biosecurity risks have been identified and the level of risk has been assessed using the Marine Biosecurity Planning guidelines (Cook *et al.* 2015) and professional judgement (Table 3). The greatest risk of introducing an INNS is when a vessel (particularly slow moving barges for example), equipment or stock arrives at the site from another country region or water body with similar environmental conditions to the worksite (e.g. in terms of temperature) and is covered in biofouling or contains additional algae and animals within the equipment/stock.

In the event that an INNS is found on or in equipment used during the fish removal and relocation process, a protocol will be in place for the removal and disposal of the INNS, along with protocols to notify the relevant authority of the presence of the INNS (APEM 2020).

For any plant or materials coming into contact with the water column in the dock, the measures indicated in Biosecurity control measures have been proposed for the activities/tasks assessed to be Medium and High risk in **Error! Reference source not found..** These control measures (provided in Table 4) will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. This process will allow the identification of any breaches in control measures. If such a breach occurs it will be recorded in the biosecurity log and the contingency plan will be triggered as outlined in Sections 5 and 6.

Table 3 in relation to the assessment of the levels of biofouling of plant/materials should be applied. As a precautionary approach, the overall activity risk has been categorised at the highest risk level of any of the component tasks.

4.2 Biosecurity Control Measures

Biosecurity control measures have been proposed for the activities/tasks assessed to be Medium and High risk in **Error! Reference source not found..** These control measures (provided in Table 4) will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. This process will allow the identification of any breaches in control measures. If such a breach occurs it will be recorded in the biosecurity log and the contingency plan will be triggered as outlined in Sections 5 and 6.

Table 3. Risk assessment of introduction and spread of NNS during construction at Bramley-Moore Dock. Risk categories were assigned using guidelines in Cook et al. (2015) and professional judgement.

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
CONSTRUCTION				
Arrival of vessels and introduction of equipment				
Arrival of vessels (e.g. dredger; raking vessel; fish removal vessels; supply vessels; support craft)	Introduction of new INNS	Vessel with no notable biofouling (just green slime (see Appendix 1))	Low	High
		Vessel with notable biofouling (more than green slime (see Appendix 1))	High	
		Vessel will remain stationary for prolonged periods of time	High	
		Vessel will be mobilised regularly	Medium	
Exchange of ballast or bilge water of vessels on site during construction	Introduction of new INNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low
Introduction of new construction equipment/ materials to the aquatic environment (e.g. raking arm, silt curtain, discharge pipeline)	Introduction of new INNS	Submerged construction equipment	Low	Low
Fish Removal				

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/Medium /Low)	Overall activity risk (High/Medium/Low)
Fish removal	Introduction of new INNS	Equipment that has been checked, serialised and dried (APEM 2020)	Low	Low
Introduction of dredged material				
Infilling	Spreading of INNS from material dredged from Crown Estate-licensed Area 457 Dispersal of NNS from suspension of sediment	Material will be introduced to an empty dock environment completely sealed from other docks due to the bund in place at the entrance to Sandon Half-Tide Dock. Once sediment has been deposited there is no potential for transport of INNS to other docks or the Mersey Estuary.	Low	Low
Departure of vessels and removal of equipment				
Departure of vessels: dredger; raking vessel; fish removal vessels; supply vessels; support craft. Removal of any equipment that has been submerged	Spread of INNS from the Bramley-Moore Dock site due to biofouling of hulls of vessels leaving the site, or biofouling of equipment removed from the site	Vessel/equipment with no notable biofouling (just green slime)	Low	High
		Vessel/equipment with notable biofouling (more than green slime)	High	
Exchange of ballast or bilge water of vessels before departure	Introduction of new INNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low
Chinese mitten crab				

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
Dispersal of Chinese mitten crab	Spread of or dispersal of INNS through disruption of sediment	Chinese Mitten Crab <i>Eriocheir sinensis</i> is a highly invasive species of national concern and has been previously recorded in the Mersey at Warrington. In the vicinity of the Project site it was recorded about 5 km south in the Mersey Estuary near Brunswick dock in 2013, with two more records a short distance further south (in 2015 and 2012, respectively) (NBN Atlas, accessed August 2020). It has not been recorded over recent years in this part of the Estuary and is considered unlikely to be present in Bramley-Moore Dock.	Low	Low

Table 4: Biosecurity control measures proposed for Bramley-Moore Dock construction.

Activity and biosecurity risk	Risk	Control measure	Where	When
CONSTRUCTION				
Arrival of vessels and introduction of equipment/structures				
Arrival of vessels (e.g. dredger; raking vessel; fish removal vessels; supply vessels; support craft)	Commercial vessels with regular movement between unknown ports, biofouling removal regime is unknown	Vessels are expected to remain within Bramley-Moore Dock area during the Construction phase, as opposed to arriving at site, leaving to enter another water body and then returning to site	Project site	On arrival of vessel at the Project site
		Biosecurity assessments to be undertaken for all vessels		
		Request anti-fouling treatment record (if applicable) and bio-fouling removal record from all vessel operators		
		Apply the biofouling rapid visual inspection criteria indicated in Cook <i>et al.</i> 2015 (see Appendix 1 of this document) on vessel arrival If the level of biofouling is ranked at level 3 or higher the vessel should be refused entry until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the dock/Mersey estuary environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms		

Activity and biosecurity risk	Risk	Control measure	Where	When
Introduction of new construction materials/equipment to the aquatic environment (e.g. raking arm, silt curtain, discharge pipeline)	Assumed construction materials/equipment are all new with no previous exposure to biofouling	Apply the biofouling rapid visual inspection criteria indicated in Cook <i>et al.</i> 2015 (see Appendix 1 of this document) to any materials/structures to be introduced to the water column at the Project site. If the level of biofouling is ranked at level 3 or higher the materials/structure should not be introduced until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms	Project site	Before introduction of new materials/structures to the water column
Fish removal activity				
Introduction of equipment to the marine environment and fish population	Fish removal equipment which has had previous exposure to a water column and possible NNS.	Applying proper fish removal procedures as indicated in APEM 2020; Check all equipment and clothing for live organisms, particularly in areas that are damp and hard to inspect, clean and wash all equipment, footwear and clothing thoroughly, dry all equipment and clothing, some species can live for many days in moist conditions. Be sure not to transfer water elsewhere.	Project site	Before introduction of fish removal equipment to the water column
Departure of vessels and removal of equipment				

Activity and biosecurity risk	Risk	Control measure	Where	When
Departure of vessels (e.g. jack-up barge; other barges; supply vessels; support craft). Removal of any equipment that has been submerged	Some NNS species recorded within the estuary at the Project site are considered to be invasive	Apply the biofouling rapid visual inspection criteria indicated in Cook <i>et al.</i> 2015 (see Appendix 1 of this document) prior to vessel departure. If vessel/equipment is ranked at level 3 or higher the vessel/equipment should be refused departure until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms	Project site	After cessation of associated construction activities
Chinese mitten Crab				
Chinese mitten crab	This species is highly invasive and of national concern and steps should be taken to minimise its distribution. In the vicinity of the Project site it was recorded about 5 km south in the Mersey Estuary near Brunswick dock in 2013, with two more records a short distance further south (in 2015 and 2012, respectively) (NBN Atlas, accessed August 2020). It has not been recorded over recent years in this part of the Estuary and is considered unlikely to be present in Bramley-Moore Dock.	Workers on site should be familiar with identifying the crab and if one is found it should be removed, isolated and reported to either the EA or NWIFCA with photographs. Care must be taken to dispose of them properly and to not reintroduce specimens back into the estuary. If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the estuary	Project site	Ongoing during construction
Additional measures				

Activity and biosecurity risk	Risk	Control measure	Where	When
All	All	Training will be given to key staff at the Project site in the identification of key INNS from the region and using the visual inspection scheme (see Appendix 1 of this document). These reference materials should be printed off and placed in the Biosecurity Plan folder along with this plan Staff are encouraged to report any unusual sightings or suspected INNS to the Biosecurity Manager	Project site	Ongoing during construction

5. CONTINGENCY PLAN

In the event of any of any control measures being breached or the detection of a new INNS all necessary steps should be taken to control the spread and dispersal of the INNS. Contingency plans for specific scenarios are provided in Table 5.

Table 5. Bramley-Moore Dock Construction Contingency Plan.

Issue	Action	Responsibility	Equipment
Fragmentation or dispersal of conspicuous NNS into the water column – most likely source is during cleaning/removal of biofouling	Remove NNS from the water column and dispose to landfill.	The Biosecurity Manager should inform Project staff to inform them of any observed fragmentation/dispersal into the water column.	Hand nets
Vessel biofouling is ranked at class 3 or above in the visual inspection (Appendix 1).	The vessel is not allowed entry to the Project site. Remove vessel from water at home port or appropriate designated alternative port, clean and antifoul (if appropriate). Biofouling removal must be in a controlled manner with all removed material contained and not released to the marine environment.	Biosecurity Manager/Project staff to carry out visual inspection of vessels prior to entry to the Project site.	Laminated copy of visual inspection Table to be readily available.
During construction: Vessel leaves site without visual biofouling inspection (i.e. breach of protocol)	Recommended visual inspection at next port of call to minimise risk of spread of NNS to other areas.	Vessel owner	NA
Issue	Action	Responsibility	Equipment
New records of NNS at Project site during construction, or identified by project team in wider area.	The GB Non-native Species Secretariat should also be informed so they can update species distribution and abundance databases for NNS. Relevant details are located on their website: http://www.nonnativespecies.org	Workforce to inform the Biosecurity Manager.	NA

6. MONITORING, SITE SURVEILLANCE AND REPORTING PROCEDURE

The Marine Biosecurity Planning guidelines (Cook *et al.* 2015) require the use of a biosecurity logbook to record training, surveillance, control measures carried out and any other activities of concern regarding the biosecurity of the project. Formal steps should be put in place to quickly inform the Biosecurity Manager of any potential introduction of NNS, particularly invasive NNS.

Information to be recorded in the logbook includes:

- Any routine inspections of vessels, construction equipment, materials and structures in the water column;
- Inspections of 'high risk' vessels;
- Details of when the Biosecurity Manager was informed if any INNS were found;
- Any biosecurity measures that were taken if INNS were found;
- Which organisations were notified when INNS were found (e.g. GB NNSS (non-native species secretariat);
- The application of any antifouling or cleaning of vessels, equipment and materials/structures undertaken on site;
- Any events undertaken to raise NNS/INNS awareness.

All logbook entries should be dated and signed by the Biosecurity Manager.

A table template indicating the key information required in the Biosecurity Plan to be completed on site is provided in Section 6 of Cook *et al.* (2015).

7. KEY SOURCES OF ADVICE

The following sources provide additional information relating to NNS and the control of the spread of NNS.

- Guidance on Marine Biosecurity planning
 - England and Wales (Cooke *et al.* 2015) - www.nonnativespecies.org/downloadDocument.cfm?id=1401
- GB NNSS Website
 - Biosecurity in the field (including biosecurity for boat users, submerged structures and event biosecurity support pack) <http://www.nonnativespecies.org/index.cfm?pageid=174>
- National Biodiversity Network
 - Distribution maps and information about species: NBN Atlas www.nbnatlas.org
- European Commission
 - EC Alien Species Information http://ec.europa.eu/environment/nature/invasivealien/index_en.htm
- Royal Yachting Association (RYA)
 - www.rya.org.uk/go/alienspecies
- The Green Blue
 - Antifoul and Invasive Species <https://www.thegreenblue.org.uk/Boat-Users>
- Invasive Species Ireland

- o Marina Operators Code of Good Practice <http://invasivespeciesireland.com/cops/marina-operators/>
 - o Water Users Code of Good Practice <http://invasivespeciesireland.com/cops/water-users/>
- IMO (International Maritime Organization) Guidelines For The Control And Management Of Ships' Biofouling To Minimise The Transfer Of Invasive Aquatic Species
 - o [http://www.imo.org/blast/blastDataHelper.asp?data_id=30766&filename=207\(62\).pdf](http://www.imo.org/blast/blastDataHelper.asp?data_id=30766&filename=207(62).pdf)
- IMO Guidance For Minimizing The Transfer Of Invasive Aquatic Species As Biofouling (Hull Fouling) For Recreational Craft
 - o <http://www.imo.org/en/OurWork/Environment/Biofouling/Documents/MEPC.1-Circ.792.pdf>
- DEFRA – <http://jncc.defra.gov.uk/page-5150>
- DASSH - The Archive for Marine Species and Habitats Data - www.dassh.ac.uk/
- IOM Wildlife Trust NNS Guide
 - o http://www.manxwt.org.uk/sites/default/files/files/marine_InvasiveNon-NativeSpeciesList.pdf
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8. GLOSSARY

Biofouling: Biological growth which develops on manmade structures in the aquatic environment.

Biosecurity: Taking action in order to minimise the introduction or spread of invasive non-native species or disease.

Biosecurity Plan: A written document which details site / operation activities and actions that will be undertaken to minimise the introduction or spread of a specified threat (i.e. invasive non-native species).

Control Measures: Refers to actions which are undertaken in order to prevent the introduction or spread of an invasive non-native species.

Establishment: Refers to the process of a non-native species in a new location successfully producing viable offspring with the likelihood of continued survival.

EUNIS: The European Nature Information System (EUNIS) habitat classification is a pan-European system, which was developed between 1996 and 2001 by the European Environment Agency (EEA) in collaboration with experts from throughout Europe. It covers all types of natural and artificial habitats, both aquatic and terrestrial.

Introduction: Refers to the movement by human means, indirect or direct, of a species outside its natural range. This movement can be within a country or between countries.

Native Species: Also known as indigenous species, means a species occurring within its natural range (past or present) and dispersal potential, i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or intervention by humans.

Non-Native Species: Non-native species (also known as alien, non-indigenous, foreign or exotic) means a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce.

Invasive Non-Native Species: An invasive non-native species (INNS) is defined as a 'non-native species that threatens native biological diversity, human health or economic activity.

Prop Wash: An aviation and nautical term used to define a mass of air or water pushed aft or fore by the propeller of an aircraft or propeller-driven watercraft. This term is synonymous with any water disturbance created by a vessel's propulsion systems.

9. REFERENCES

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APPENDIX 1

Criteria for visual assessment of the extent of biofouling (Cook et al. 2015).

Rank	Description	Visual estimate of biofouling cover
0	No visible fouling. Hull entirely clean, no biofilm on visible submerged parts of the hull.	Nil
1	Slime fouling only. Submerged hull areas partially or entirely covered in biofilm, but the absence of any plants or animals.	Nil
2	Light fouling. Hull covered in biofilm and one to two very small patches of one type of plant or animal.	1–5 % of visible submerged surfaces
3	Considerable fouling. Presence of biofilm, and fouling still patchy, but clearly visible and comprised of either one or more types of plant and/or animal.	6–15 % of visible submerged surfaces
4	Extensive fouling. Presence of biofilm and abundant fouling assemblages consisting of more than one type of plant or animal.	16–40 % of visible submerged surfaces
5	Very heavy fouling. Many different types of plant and / or animal covering most of visible hull surfaces.	41–100 % of visible submerged surfaces