

Belfast Harbour

Maintenance Dredging

Information to Inform a Habitats Regulations Assessment - Stage 1 Screening Assessment

April 2026



Project Nr

755

The Bates Partnership
7 Hen Parc Lane
Upper Killay
Swansea
SA27EY

info@batespartnership.com
www.batespartnership.com



Belfast Harbour - Maintenance Dredging HRA Stage 1 Screening Information

Client: Belfast Harbour Commissioners
Project: Belfast Harbour Maintenance Dredging
Title: Information to Inform a Habitats Regulations
Assessment – Stage 1 Screening Assessment

Date	Revision	Prepared by	Reviewed by
13/04/2026	Internal Draft		
14/04/2026	Final Draft		
15/04/2026	Final Draft R1		

The Bates Partnership is the Trading Name of Anthony D Bates Partnership LLP. This report, and information or advice which it contains, is provided by Anthony Bates Partnership solely for internal use and reliance by its Client in performance of Anthony Bates Partnership's duties and liabilities under its contract with the Client. Any advice, opinions, or recommendations within this report should be read and relied upon only in the context of the report as a whole. The advice and opinions in this report are based upon the information made available to Anthony Bates Partnership at the date of this report and on current UK standards, codes, technology and construction practices as at the date of this report. This report has been prepared by Anthony Bates Partnership in their professional capacity as Consulting Engineers. The contents of the report do not, in any way, purport to include any manner of legal advice or opinion. This report is prepared in accordance with the terms and conditions of Anthony Bates Partnership's contract with the Client. Regard should be had to those terms and conditions when considering and/or placing any reliance on this report.

This document is copyright © Anthony D Bates Partnership LLP, trading as The Bates Partnership.



1 Introduction

1.1 Proposed Maintenance Dredging at Belfast Harbour and Transport and Deposit of Dredged Material at Sea

- 1.1.1 Belfast Harbour Commissioners (BHC) are the statutory harbour authority responsible for operating and maintaining Belfast Harbour, a role that includes dredging of the harbour to maintain safe navigation and berthing, and the depositing of dredged material at sea.
- 1.1.2 A bathymetric survey undertaken in May 2025 showed that water depths in various channel areas and berths within Belfast Harbour are being reduced by sediment accretion. Accordingly, BHC are proposing to conduct a new series of maintenance dredging campaigns to remove the accreted sediment from the affected channels and berths and to restore the required water depths for safe navigation and berthing.
- 1.1.3 As for BHC's previous and ongoing maintenance dredging campaigns, most maintenance dredging will be undertaken using a trailer suction hopper dredger (TSHD) assisted by a plough dredger to move sediment to a location where it can be dredged by the TSHD, while some maintenance dredging will be undertaken using a plough dredger to move sediment over short distances, to level an irregular bed or to move sediment from a location where it causes a restriction or obstruction.
- 1.1.4 As for BHC's previous and ongoing maintenance dredging campaigns, the dredged material removed by the TSHD will be transported to and deposited at the Belfast Dredgings C (Live) disposal site (site reference IS591).
- 1.1.5 BHC have statutory powers to undertake maintenance dredging under the Belfast Harbour Acts and Orders 1847 to 2002. However, BHC will need a new marine licence from the Department of Agriculture, Environment and Rural Affairs (DAERA) for the deposit of dredged material at sea under the Marine & Coastal Access Act 2009, because the current marine licence (licence number: ML2023020) expires on 26 July 2026. As for BHC's previous and ongoing maintenance dredging campaigns, BHC anticipate that a new marine licence will last for a minimum of 3 years following expiration of the current marine licence (i.e., July 2026 to July 2029), and anticipate the amount of dredged material to be deposited at sea during that period to be approximately 676,000m³ / 980,000 tonnes (based on a sediment density of 1.45t/m³), with most of this amount being dredged and deposited in one campaign lasting 8 to 10 weeks.

1.2 Habitats Regulations Assessment

Assessment Process

- 1.2.1 The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended) require a competent authority, before deciding to undertake, or give any consent, permission or other authorisation for a plan or project, which, (a) is likely to have a significant effect on a European site in Northern Ireland (either alone or in combination with other plans or projects) and (b) is not directly connected with or necessary to the management of the site, to make an appropriate assessment of the implications for the site in view of that site's conservation objectives.
- 1.2.2 The assessment process is referred to as Habitats Regulations Assessment (HRA). HRA comprises a process with up to three stages depending on the decision made at each



stage, as follows:

1. Screening – a test of likely significant effects to check if a plan or project, either alone or in combination with other plans or projects, is likely to have significant adverse effects on a European site's conservation objectives based on objective information. A plan or project can proceed if objective information excludes its potential for likely significant effects. A plan or project must be subject to appropriate assessment if objective information cannot exclude its potential for likely significant effects.
2. Appropriate assessment – a detailed assessment of the likely significant effects of a plan or project, either alone or in combination with other plans or projects, and the measures to avoid or minimise (mitigate) any significant adverse effect on a European site's integrity. A plan or project can proceed if it will not have any significant adverse effect on the integrity of the site.
3. Derogation – a detailed assessment to consider if a plan or project that would have any significant adverse effect on a European site can qualify for an exemption if, after mitigation, it can be shown that (a) there are no alternative solutions to the plan or project, (b) that the plan or project is required for imperative reasons of overriding public interest (IROPI) and (c) compensatory measures can be secured.

Approach to Providing Information to Inform a HRA Screening Assessment

- 1.2.3 This report provides the information required for a public authority to undertake a HRA screening assessment.
- 1.2.4 For the purposes of consenting the proposed activities, the competent authorities under the Habitats Regulations are:
 - BHC for authorising the maintenance dredging within Belfast Harbour.
 - DAERA for licensing the deposition of dredged material at the Belfast Dredgings C (Live) disposal site.
- 1.2.5 The information contained within this report is based on a source-pathway-receptor approach as a test of whether the proposed activities have the potential (i.e., likelihood) for a significant effect on a European site. This approach uses objective information to identify whether there is a sufficient physical, chemical and/or biological pathway that connects a source of an impact (i.e., the proposed activities) to a receptor (i.e., the habitats and species that are the qualifying features of European sites), as follows:
 - If there is not a sufficient source and/or a sufficient pathway between a source and a receptor, then a receptor is unlikely to be exposed to an impact and, therefore, there is unlikely to be significant effect on a European site, and there is no need for an appropriate assessment.
 - If there is a sufficient source and a sufficient pathway between a source and a receptor, then a receptor is likely to be exposed to an impact and, therefore, there is likely to be a significant effect on a European site, and there is a need for an appropriate assessment.



2 Information to Inform a HRA Screening Assessment

2.1 Name of Project or Plan

- 2.1.1 Belfast Harbour Maintenance Dredging 2026-2029.

2.2 Brief Description of the Project or Plan

- 2.2.1 Belfast Harbour is situated at the southwest end of Belfast Lough. It is the premier port serving Northern Ireland and is an essential component in the local economy. Maintenance dredging has been undertaken at Belfast Harbour for many years. It is required to facilitate the safe navigation and berthing of vessels in the berth pockets and channels within the confines of the harbour, and in the approach channel to the harbour. The dredged material has been deposited at a designated offshore disposal site located approximately 14 nautical miles from the harbour (location 54° 45.3' North and 5° 26.6' West) for many years.
- 2.2.2 The proposed maintenance dredging and associated transport and deposit of dredged material continues the previous maintenance dredging activity at Belfast Harbour: It is expected to involve the same or similar dredged material volumes, maintenance dredging areas, dredged material transport route, dredged material deposition location, and dredging, transport and deposition methodologies.

Dredged Material Volumes

- 2.2.3 Based on bathymetric survey results and previous maintenance dredging campaigns, the volume of dredged material to be removed by maintenance dredging and deposited at sea, between 2026 and 2029, is estimated to be approximately 676,000m³, which equates to approximately 980,000 tonnes (based on a sediment density of 1.45t/m³).

Maintenance Dredging Areas

- 2.2.4 The maintenance dredging areas extend over the channels and berths within Belfast Harbour (Figure A1 in **Appendix A**) and will be focussed on those areas where sediment has accumulated over the required design depths (Figures A2 to A5 in **Appendix A**).

Dredged Material Transport Route

- 2.2.5 The dredged material will be transported approximately 14 nautical miles from the maintenance dredging areas within Belfast Harbour to the dredged material deposit location at the disposal site. Based on TSHD vessel tracks during the previous maintenance dredging campaign in 2023, the transport route will pass along the harbour's approach channel and Belfast Lough, and out into the North Channel to the Belfast Dredgings C (Live) disposal site (Figure A6 in **Appendix A** showing transport and return route of TSHD in 2023).

Dredged Material Deposit Location

- 2.2.6 As for the previous maintenance dredging campaigns, the dredged material will be deposited at the Belfast Dredgings C (Live) disposal site (Figure A6 in **Appendix A**). The disposal site is located within the Irish Sea, approximately 28km from Belfast Harbour, approximately 13.4km east of the coastline at Whitehead, approximately 6.3km north-north-east of the nearest of the Copeland Islands, and is defined by a location within a 0.25 nautical mile radius of the following coordinates 54° 45.300' N, 05° 29.600' W. The disposal site has been receiving dredged material since 1998.



Dredging, Transport and Deposition Methods

- 2.2.7 The dredging, transport and deposition methods described below have been used for many years, and were being used prior to and at the time when many of the European sites in and around Belfast Lough were designated and established.
- 2.2.8 The majority of maintenance dredging activity and all the deposition activity will be undertaken using a Trailer Suction Hopper Dredger (TSHD). The TSHD's dredging activity will be supported by a plough dredger.
- 2.2.9 A TSHD is a self-propelled vessel that is equipped with hydraulic suction system comprising pumps, pipes and a drag-head, and an in-built hopper. It operates independently of other plant or equipment and can sail over long distances to transport and dispose of dredged material.
- 2.2.10 To commence the dredging process, the TSHD will sail under its own propulsion to the dredging area within Belfast Harbour. Once in position over the dredging area, the TSHD will lower its trailer arm (with the drag-head and suction pipes) to the bed and sail in a straight line at a very slow speed, typically less than 2 knots. The drag-head will collect a mixture of the bed sediment and surrounding water and pump it through the pipes and into the hopper. As it progresses over the dredging area, the drag-head will produce a trench in the sediment: successive passes will result in the removal of all sediment above the design depth. Dredging will continue until the hopper's capacity is achieved. When the hopper is filled, the TSHD will raise the trailer arm and sail to the Belfast Dredgings C (Live) disposal site where it will deposit the dredged material by releasing it through hatches in its hull. The TSHD will then sail back to the dredging area within Belfast Harbour, lower the trailer arm, and recommence dredging.
- 2.2.11 A plough dredger – also known as a bed leveller – is not a dredger *per se* but is a bottomless, rectangular box-shaped fabricated steel implement that is towed behind a small workboat or tug using a deck-mounted hoist winch. It is used to move accumulated sediment over a short distance to an accessible location so that it can be removed by the TSHD, or to move sediment to level an irregular bed, and/or to move sediment where it causes a restriction or obstruction.
- 2.2.12 To commence the dredging process, the workboat will sail under its own propulsion to the dredging area within Belfast Harbour. Once in position over the dredging area, the plough will be lowered and suspended at the required bed level, and then towed behind the workboat. The surface sediment will be sliced by the cutting blade at the plough's leading edge and contained within the rest of the plough's structure until the plough reaches an area where the bed level is lower than the suspended plough level, whereupon the contained sediment will drop through the bottom of the plough. At this point, the plough will be raised above the bed and the workboat will sail back to the dredging area, lower the plough and recommence dredging.

2.3 Screening of European Sites

European Sites within 2km of Proposed Maintenance Dredging and Dredged Material Transport and Deposition

- 2.3.1 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 02-02-2026) identifies the boundaries of the following European sites to be situated within 2km of the proposed maintenance dredging and dredged material transport and deposition activities:



- Belfast Lough SPA / Ramsar site.
- Belfast Lough Open Water SPA.
- Proposed East Coast (Northern Ireland) Marine SPA.
- Outer Ards SPA.
- North Channel SAC.

2.3.2 The European site boundaries are shown in Figures A7 to A11 in **Appendix A**.

2.3.3 Maintenance dredging will take place within the boundaries of the Belfast Lough Open Water SPA and proposed East Coast (NI) Marine SPA. Maintenance dredging will take place almost adjacent to the boundaries of the Belfast Lough SPA and Belfast Lough Ramsar site. Neither maintenance dredging nor dredged material deposition will take place within 2km of the boundary of the Outer Ards SPA, but the TSHD may pass within 2km of the SPA's open water area adjoining the Cockle Island tern nesting site when it sails between the dredging area and disposal site. Neither maintenance dredging nor dredged material deposition will take place within 2km of the boundary of the Northern Channel SAC, but the TSHD will pass through the SAC when it sails between the dredging area and disposal site.

2.3.4 These European sites are considered in this information to inform a screening assessment because, according to their citations and supporting information, they are potentially threatened and/or at risk of impact by maintenance dredging and/or dredged material deposition, and/or dredged material transport (as commercial shipping activity).

2.3.5 Please note that:

- The boundary, qualifying features and conservation objectives of the Belfast Lough Ramsar site are generally aligned with the boundary, qualifying features and conservation objectives of the Belfast Lough SPA such that they are considered in the information provided about the potential for effects on the Belfast Lough SPA.
- The boundary, qualifying feature and conservation objectives of the Belfast Lough Open Water SPA are subsumed within the boundary, qualifying features and conservation objectives of the proposed East Coast (NI) Marine SPA such that they in the information provided about the potential for effects on the proposed East Coast (NI) Marine SPA.

European Sites within 15km of Proposed Maintenance Dredging and Dredged Material Transport and Deposition

2.3.6 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 02-02-2026) identifies the boundaries of the following European sites to be situated within to be within 15km of the proposed maintenance dredging and dredged material transport and deposition activities:

- Copeland Islands SPA.

2.3.7 The European site boundary is shown in Figure A12 in **Appendix A**.

2.3.8 Neither maintenance dredging nor dredged material transport and deposition will take place within 2km of the boundary of the Copeland Islands SPA.

2.3.9 This European site is considered in this information to inform a screening assessment because, according to its citation and supporting information, it is potentially threatened and/or at risk of impact by dredged material transport (as commercial shipping activity).



European Sites with Grey Seal as a Qualifying Feature within 100km of the proposed Maintenance Dredging and Dredged Material Transport and Deposition

2.3.10 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 02-02-2026) identifies the boundary of the following European site with grey seal as a qualifying feature to be situated within to be within 100km of the proposed maintenance dredging and dredged material transport and deposition activities:

- The Maidens SAC.

2.3.11 The European site boundary is shown in Figure A13 in **Appendix A**.

2.3.12 Neither maintenance dredging nor dredged material transport and deposition will take place within the boundary of The Maidens SAC, but the SAC's boundary is within 100km of the proposed maintenance dredging and dredged material transport and deposition.

2.3.13 This European site is considered in this information to inform a screening assessment because, according to its citation and supporting information, its grey seal qualifying feature is highly mobile and, therefore, may be potentially threatened and/or at risk of impact by maintenance dredging and dredged material deposition.

European Sites with Harbour Seal as a Qualifying Feature within 50km of the proposed Maintenance Dredging and Dredged Material Transport and Deposition

2.3.14 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 02-02-2026) identifies the boundary of the following European site with harbour seal as a qualifying feature to be situated within 50km of the proposed maintenance dredging and dredged material transport and deposition activities.

- Strangford Lough SAC.

2.3.15 The European site boundary is shown in Figure A14 in **Appendix A**.

2.3.16 Neither maintenance dredging nor dredged material deposition will take place within the boundary of Strangford Lough SAC, but the SAC's boundary is within 50km of the proposed dredged material transport and deposition, but not the maintenance dredging.

2.3.17 This European site is considered in this information to inform a screening assessment because its harbour seal qualifying feature is highly mobile and, therefore, may be potentially threatened and/or at risk of impact by maintenance dredging and dredged material deposition.

European Sites with Harbour Porpoise as a Qualifying Feature within 100km of the proposed Maintenance Dredging and Dredged Material Transport and Deposition

2.3.18 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 02-02-2026) identifies the boundary of the following European site with harbour porpoise as a qualifying feature to be situated within 100km of the proposed maintenance dredging and dredged material transport and deposition activities.

- Skerries and Causeway SAC.

2.3.19 The European site boundary is shown in Figure A15 in **Appendix A**.



- 2.3.20 Neither maintenance dredging nor dredged material deposition will take place within the boundary of the Skerries and Causeway SAC, but the SAC's boundary is within 100km of the proposed dredged material transport and deposition, but not the maintenance dredging.
- 2.3.21 This European site is considered in this information to inform a screening assessment because its harbour porpoise qualifying feature is highly mobile and, therefore, may be potentially threatened and/or at risk of impact by maintenance dredging and dredged material deposition.

2.4 European Site Features

Belfast Lough SPA / Belfast Lough Ramsar Site

- 2.4.1 Belfast Lough is a large intertidal sea lough situated at the mouth of the River Lagan on the east coast of Northern Ireland. The inner part of the lough comprises a series of mudflats and lagoons. The outer lough is restricted to mainly rocky shores with some small sandy bays.
- 2.4.2 The SPA boundary is entirely coincident with that of the Belfast Lough Ramsar site. In the outer lough, the SPA boundary is entirely coincident with that of Outer Belfast Lough Area of Special Scientific Interest (ASSI). However, within the immediate harbour area, the boundary has been redrawn to take into account permitted port related development and landfill, which has taken place since the Inner Belfast Lough ASSI was declared in 1987. Marine areas below mean low water are not included.
- 2.4.3 The site qualifies under Article 4.2 of EC Directive 79/409 regarding regularly occurring migratory species by regularly supporting internationally important wintering population of the following species:
- Redshank (*Tringa totanus*) – non-breeding.
- 2.4.4 Since the site's classification in 1998, reassessment of the bird populations occurring within Belfast Lough SPA identified that the following species also meet the qualifying criteria.
- 2.4.5 The site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting internationally important population of the following particularly threatened species:
- Common tern (*Sterna hirundo*) – breeding.
 - Arctic tern (*Sterna paradisaea*) – breeding.
 - Bar-tailed godwit (*Limosa lapponica*) – non-breeding.
- 2.4.6 The site qualifies under Article 4.2 of the Birds Directive (79/409/EEC) regarding regularly occurring migratory species by regularly supporting internationally important wintering population of the following species:
- Black-tailed godwit (*Limosa limosa*) – non-breeding.
- 2.4.7 The site also regularly supports nationally important numbers of shelduck, oystercatcher, purple sandpiper, dunlin, black-tailed godwit, bar-tailed godwit, curlew and turnstone. Belfast Lough, as a whole, is also used by several other waterfowl species including great crested grebe, scaup, eider, goldeneye and red-breasted merganser.
- 2.4.8 Low water counts for redshank, bar-tailed godwit and black-tailed godwit in Belfast Lough



are presented in Figures A16, A17 and A18 respectively in **Appendix A**.

2.4.9 The conservation objectives for this site are:

- To maintain each feature in favourable condition.

2.4.10 In relation to dredging, the main threats, pressures, activities with impacts on the site or site features are:

- Threat / comments: Generally, only an issue in relation to commercial shipping channels. Issues include disturbance, remobilisation of contaminated sediment and spoil dumping zones.
- Local considerations: Ongoing dredging programme maintains shipping channel. Established ongoing maintenance programme.
- Action: Liaise with Port Authority and Environmental Protection as required with regard to water quality issues and pollution incidents.

Proposed East Coast (NI) Marine SPA / Belfast Lough Open Water SPA

2.4.11 The proposed East Coast (NI) Marine Special Protection Area includes coastal and near shore waters from Ringfad near Carnlough, County Antrim in the north, the marine area of Larne Lough, the marine area of Belfast Lough, waters around the Copeland Islands and offshore of the Ards Peninsula to Cloghan Head, near Ardglass in the south. The boundary adjoins the existing Larne Lough SPA, Belfast Lough SPA, Outer Ards SPA, Copeland Islands SPA and Strangford Lough SPA, and subsumes the existing Belfast Lough Open Water SPA.

2.4.12 The SPA covers a diverse range of seabed habitats, from extensive coastal fringing reefs of various lithologies to the fine silt of inner Belfast Lough. Within Belfast Lough muds grade into muddy sands toward the outer Lough, with extensive areas of cobbles and shell debris overlying the muddy sand. Part of the muddy sand in the outer lough is bioturbated by Dublin Bay prawn (*Nephrops norvegicus*), and harbours the seapen (*Virgularia mirabilis*). Topographically complex reef areas surround the Copeland Islands.

2.4.13 Given that the SPA subsumes the Belfast Lough Open Water SPA, the site qualifies under Article 4.2 of the Birds Directive (79/409/EEC) as it supports an internationally important population of the following regularly occurring migratory species:

- Great crested grebe (*Podiceps cristatus*) – non-breeding.

2.4.14 In addition to the qualifying feature associated with the Belfast Lough Open Water SPA, the site also qualifies under Article 4.1 and Article 4.2 of the Birds Directive (79/409/EEC), as follows.

2.4.15 The site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) as it supports an internationally important wintering population of the following regularly occurring migratory species:

- Red-throated diver (*Gavia stellata*) – non-breeding.

2.4.16 The site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) as it supports an internationally important population of the following regularly occurring species:



- Sandwich tern (*Thalasseus sandvicensis*) – breeding.
 - Common tern (*Sterna hirundo*) – breeding.
 - Arctic tern (*Sterna paradisaea*) – breeding.
- 2.4.17 The site qualifies under Article 4.2 of the Birds Directive (79/409/EEC) as it supports an internationally important population of the following regularly occurring species:
- Manx shearwater (*Puffinus puffinus*) – breeding.
- 2.4.18 The site qualifies under Article 4.2 of the Birds Directive (79/409/EEC) as it supports an internationally important wintering population of the following regularly occurring species:
- Eider (*Somateria mollissima*) – non-breeding.
- 2.4.19 Low water counts for great-crested grebe, red-throated diver and eider in Belfast Lough are presented in Figures A19, A20 and A21 respectively in **Appendix A**.
- 2.4.20 The conservation objectives for this site are:
- To maintain each feature in favourable condition.
- 2.4.21 In relation to dredging, the main threats, pressures, activities with impacts on the site or site features are:
- Threat / comments: Generally only an issue in relation to commercial shipping channels. Issues include disturbance, remobilisation of contaminated sediment and spoil dumping zones.
 - Local considerations: Ongoing dredging programme maintains shipping channel. Established ongoing maintenance programme.
 - Action: Liaise with Port Authority and Environmental Protection as required with regard to water quality issues and pollution incidents.

Outer Ards SPA

- 2.4.22 The Outer Ards extends from Grey Point on the County Down coast in the north, at the entrance to Belfast Lough, to Ballyquintin Point in the south. The site mainly encompasses the inter-tidal areas, but with some additional adjoining areas of notable habitat. It includes sand and mud dominated shores, cobble and boulder beaches together with rocky shores. Offshore islands are also present. The SPA boundary of the is entirely coincident with the Outer Ards ASSI and the Ballymacormick Point ASSI. It also includes an open marine area which has been included within the SPA because it adjoins the Cockle Island tern nesting site.
- 2.4.23 The site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) as it supports nationally important populations of the following regularly occurring species:
- Arctic tern (*Sterna paradisaea*) – breeding.
 - Golden plover (*Pluvialis apricaria*) - wintering.
- 2.4.24 The site also qualifies under Article 4.2 of the Birds Directive (79/409/EEC) as it supports internationally important populations of the following regularly occurring species:
- Light-bellied brent goose (*Branta bernicla hrota*) – wintering.
 - Ringed plover (*Charadrius hiaticula*) – wintering.
 - Turnstone (*Arenaria interpres*) – wintering.



North Channel SAC

- 2.4.25 Located along the eastern coast of Northern Ireland, the North Channel SAC has been identified as an important winter area for harbour porpoise *Phocoena phocoena*, supporting an estimated 1.2% of the UK Celtic and Irish Seas Management Unit (MU) population. Although small compared to most of the harbour porpoise SACs, this site, with an area of 1,604 km², supports areas where large groups of up to 100 harbour porpoise have been sighted and is considered to be the best porpoise watching location in Northern Ireland.
- 2.4.26 The site qualifies under Annex II of the Habitats Directive (92/43/EEC) for the following species whose conservation requires the designation of special areas of conservation:
- Harbour porpoise (*Phocoena phocoena*).
- 2.4.27 The conservation objective for this site is:
- To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining favourable conservation status for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that harbour porpoise is a viable component of the site, there is no significant disturbance of the species, and the condition of supporting habitats and processes, and the availability of prey is maintained.
- 2.4.28 In relation to dredging, the level of the impact risk from activities/operations on harbour porpoise in UK waters are:
- Medium risk of noise from dredging and disposal causing anthropogenic underwater sound and leading to potential impacts including mortality, internal injury, disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising), and habitat change/loss.
 - Low risk of waste disposal from navigational dredging causing physical change to the seabed type and leading to potential impacts including changes in availability of prey species, and habitat change/loss.

Copeland Islands SPA

- 2.4.29 The Copeland Islands SPA comprises three islands (Copeland Island, Light House Island and Mew Island), together with associated islets, off the north-east County Down coast and close to the entrance to Belfast Lough. The site encompasses the islands down to the low water mark and includes rocky shores together with limited areas of sand/mud and cobble/boulder beaches. Terrestrial habitats include saltmarsh, freshwater marsh, maritime grassland, limited extent of inland cliff and semi-improved agricultural grassland. The SPA boundary is entirely coincident with the Copeland Islands ASSI.
- 2.4.30 The site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) as it supports a nationally important population of the following regularly occurring species:
- Arctic tern (*Sterna paradisaea*) – breeding.
- 2.4.31 The site also qualifies under Article 4.2 of the Birds Directive (79/409/EEC) as it supports an internationally important population of the following regularly occurring species:
- Manx shearwater (*Puffinus puffinus*) – breeding.
- 2.4.32 The conservation objective for this site is:



- To maintain each feature in favourable condition.

The Maidens SAC

2.4.33 The Maidens SAC is a group of small rocky reefs detached from the coast, northeast of Larne. Most of the reef area of The Maidens is bedrock reef with a smaller proportion of stony reef. The SAC's designation relates primarily to its Annex I reef habitat, but it also includes Annex I sandbank habitat (i.e., sandbank slightly covered by seawater all of the time). The SAC is almost entirely subtidal and is remote from the coast. At the small islands of East Maiden and West Maiden and on the emergent outlying rocks the SAC's boundary extends up to mean high water. These intertidal areas include haul-outs for grey seal.

2.4.34 In addition to its reef and sandbank habitats, the site qualifies under Annex II of the Habitats Directive (92/43/EEC) for the following species whose conservation requires the designation of special areas of conservation:

- Grey seal (*Halichoerus grypus*).

2.4.35 The conservation objective for this site in relation to grey seal is:

- To maintain (or restore where appropriate) the species to favourable condition by maintaining and enhancing, as appropriate, the grey seal population, and by maintaining and enhancing, as appropriate, physical features used by grey seals within the site.

Strangford Lough SAC

2.4.36 Strangford Lough is a large (150km²) marine inlet on the east coast of County Down, of which about 50km² is in the intertidal area. It supports an impressive range of marine habitats and communities with over 2,000 recorded species, and is important for marine invertebrates, algae and saltmarsh plants, for wintering and breeding wetland birds, and marine mammals.

2.4.37 In addition to various intertidal and subtidal habitats, the site qualifies under Annex II of the Habitats Directive (92/43/EEC) for the following species whose conservation requires the designation of special areas of conservation:

- Harbour seal (*Phoca vitulina*).

2.4.38 The conservation objective for this site in relation to harbour seal is:

- To maintain (or restore where appropriate) the species to favourable condition by maintaining and enhancing, as appropriate, the harbour seal population, and by maintaining and enhancing, as appropriate, physical features used by harbour seals within the site.

Skerries and Causeway SAC

2.4.39 Skerries and Causeway SAC is sited on the north coast of Northern Ireland. It is the eastern part of a 30km wide embayment that has the Inishowen peninsular to its west and Benbane Head to its east.

2.4.40 In addition to its habitat features including reef, sandbanks which are slightly covered by seawater at all times and submerged or partially submerged sea caves, the site qualifies under Annex II of the Habitats Directive (92/43/EEC) for the following species whose conservation requires the designation of special areas of conservation:



- Harbour porpoise (*Phocoena phocoena*).

2.4.41 The conservation objective for this site in relation to harbour porpoise is:

- To maintain (or restore where appropriate) the species to favourable condition by ensuring the species is a viable component of the site, ensuring there is no significant disturbance of the species, and ensuring the supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

2.5 Description of the Proposed Maintenance Dredging and Dredged Material Transport and Deposition

2.5.1 In addition to the description provided at **Section 2.2**, the proposed maintenance dredging and dredged material deposition can be described in the following terms.

Size and Scale

2.5.2 The proposed maintenance dredging will take place within the berths and channels within Belfast Harbour (Figure A1 in **Appendix A**), and cover the areas of sediment accumulation over design depth (Figures A2, A3, A4 and A5 in **Appendix A**). The dredging areas are already subject to periodic maintenance dredging. Maintenance dredging is anticipated to remove approximately 676,000m³ / 980,000 tonnes of sediment. The proposed dredged material deposition will take place within the Belfast Dredgings C (Live) disposal site (Figure A6 in **Appendix A**). The disposal site has received dredged material since 1998.

Land-take

2.5.3 The proposed maintenance dredging will not involve any land take, and the areas to be dredged are subject to periodic maintenance dredging and disturbance from harbour activities (e.g., vessel movements). The proposed dredged material transport and deposition will not involve any land take, and the offshore disposal site is subject to periodic depositions of dredged material.

Distance from the European Sites or Key Features of the Sites

2.5.4 The following paragraphs identify the closest distances of maintenance dredging, dredged material transport and deposition activities to the European sites considered in this screening information.

2.5.5 Maintenance dredging will take place within the berths and channels within Belfast Harbour and, therefore, at its closest distance will take place:

- Immediately adjacent to the Belfast Lough SPA boundary.
- Within the Belfast Lough Open Water SPA and proposed East Coast (NI) Marine SPA boundaries.
- Approximately 16km distant from the North Channel SAC boundary.
- Approximately 17km distant from the Outer Ards SPA boundary.
- Approximately 20km distant from the Copeland Islands SPA boundary.
- Approximately 30km distant from The Maidens SAC boundary.
- Approximately 60km distant from Strangford Lough SAC boundary.
- Approximately 95km distant from the Skerries and Causeway SAC boundary.

2.5.6 The transport of dredged material within the TSHD will take place over approximately



28km between the dredging areas within Belfast Harbour and the Belfast Dredgings C (Live) disposal site and, therefore, at its closest distance will take place:

- Immediately adjacent to the Belfast Lough SPA boundary.
- Within the Belfast Lough Open Water SPA and proposed East Coast (NI) Marine SPA boundaries.
- Within the North Channel SAC boundary.
- Approximately 2km distant from the Outer Ards SPA boundary.
- Approximately 6km distant from the Copeland Islands SPA boundary.
- Approximately 20km distant from The Maidens SAC boundary.
- Approximately 50km distant from Strangford Lough SAC boundary.
- Approximately 85km distant from the Skerries and Causeway SAC boundary.

2.5.7 The deposit of dredged material will take place at the Belfast Dredgings C (Live) disposal site situated approximately 28km offshore from Belfast Harbour and, therefore, at its closest distance will take place:

- Approximately 17km distant from the Belfast Lough SPA boundary.
- Within the Belfast Lough Open Water SPA and proposed East Coast (NI) Marine SPA boundaries.
- Approximately 2km distant from the North Channel SAC boundary.
- Approximately 10km distant from the Outer Ards SPA boundary.
- Approximately 6km distant from the Copeland Islands SPA boundary.
- Approximately 20km distant from The Maidens SAC boundary.
- Approximately 50km distant from Strangford Lough SAC boundary.
- Approximately 85km distant from the Skerries and Causeway SAC boundary.

Resource Requirements

2.5.8 The proposed maintenance dredging and dredged material deposition will not require any resource requirements such as water, aggregate, etc.

Emissions

2.5.9 The proposed maintenance dredging will generate temporary exhaust emissions and noise emissions during the operating of the dredging plant; however, these emissions are not expected to be any greater than emissions associated with other vessels manoeuvring and passing through the harbour, Belfast Lough and the North Channel.

Excavation Requirements

2.5.10 The proposed maintenance dredging will remove accreted sediment from the bed within the harbour's berths and channels to reinstate the bed to the levels required design depths to provide safe navigation and berthing.

Transportation Requirements

2.5.11 The proposed maintenance dredging and dredged material deposition will involve transportation of dredged material by sea between the berth and channel dredging areas within Belfast Harbour and the deposit location at the Belfast Dredgings C (Live) disposal site.



Duration

- 2.5.12 The proposed maintenance dredging and dredged material deposition is expected to take place over one principal campaign taking place over approximately 8-10 weeks sometime during July 2026 and July 2029 and removing most of the sediment accreted within Belfast Harbour's berths and channel (i.e., most of approximately 676,000m³ / 980,000 tonnes). In addition, the proposed maintenance dredging and dredged material deposition may include occasional, small-scale campaigns if, for example, sediment accretion occurs at a higher rate than expected at a particular location.

Other

- 2.5.13 The proposed maintenance dredging will take place within the berths and channels within the statutory harbour limits, and will only remove sediment from sub-tidal areas. The proposed dredged material deposition will only deposit dredged material at the Belfast Dredgings C (Live) disposal site.

2.6 Potential for Likely Significant Effects

- 2.6.1 The following paragraphs consider the potential for the proposed maintenance dredging and dredged material transport and deposition activities to have direct or indirect effects on the favourable condition of the European site features, where the following threats and pressures could arise:
- Visual disturbance and/or airborne noise disturbance effects on bird features.
 - Underwater noise disturbance effects on marine mammal features.
 - Sediment effects on the supporting habitats of bird and/or marine mammal features.
 - Contaminated sediment effects on the supporting habitats of bird and/or marine mammal features.
 - In-combination effects with other plans and projects.

Potential for a Significant Effect due to Visual Disturbance and/or Airborne Noise Disturbance

- 2.6.2 The following paragraphs consider whether the proposed maintenance dredging and dredged material transport and deposition activities have the potential to cause visual and/or airborne noise disturbance and, if so, whether they could have a significant effect on maintaining the features in a favourable condition.

Sources, Pathways and Receptors of Effect

- 2.6.3 The TSHD will be the principal source of visual stimuli and/or airborne noise during the proposed maintenance dredging and dredged material transport and deposition.
- 2.6.4 Visual stimuli associated with the physical appearance of the TSHD during the proposed maintenance dredging and dredged material deposition will be the principal pathway for visual disturbance. Visual stimuli will exist in all directions from the source (where there are clear sight lines as far as the receptor). The transmission of sound pressure waves through air will be the principal pathway of airborne noise during the proposed maintenance dredging and dredged material deposition. Sound pressure waves will propagate through the air in all directions from the source.
- 2.6.5 Reference to the NI Marine Mapviewer (gis.daera-ni.gov.uk; accessed 10-02-2026) indicates that great crested grebe, redshank, eider, bar-tailed godwit and black-tailed



godwit are present within Belfast Harbour, Belfast Lough and, albeit to a lesser extent, in the North Channel. In addition, reference to the Wetland Bird Survey (Webs) Low Water Counts for Belfast Lough 2023-2024 (Calbrade et al., 2025) indicates that great crested grebe, red-throated diver, redshank, eider, bar-tailed godwit and black-tailed godwit are present within Belfast Harbour, Belfast Lough and, albeit to a lesser extent, in the North Channel (see Figures A16 to A21 in **Appendix A**). The RSPB reserve within Belfast Harbour is the principal location for breeding common tern and arctic tern. The open water marine area around Cockle Island is a feeding area for breeding arctic tern at this location. Accordingly, the following qualifying features will be the principal receptors of visual disturbance and airborne noise during the proposed maintenance dredging and dredged material deposition:

- Wintering redshank, bar-tailed godwit and black-tailed godwit, qualifying features of the Belfast Lough SPA.
- Breeding common tern and arctic tern, qualifying features of the Belfast Lough SPA.
- Wintering great crested grebe, a qualifying feature of the Belfast Lough Open Water SPA.
- Wintering great crested grebe, red-throated diver and eider, qualifying features of the proposed East Coast (NI) Marine SPA.
- Breeding sandwich tern, common tern, arctic tern and Manx shearwater, qualifying features of the proposed East Coast (NI) Marine SPA.
- Breeding arctic tern, a qualifying feature of the Outer Ards SPA
- Breeding arctic tern and Manx shearwater, qualifying features of the Copeland Islands SPA.

Test of Likely Significant Effect

- 2.6.6 The following objective information indicates that the proposed maintenance dredging and dredged material transport and deposition should not have a significant effect in relation to visual disturbance and/or airborne noise disturbance.
- 2.6.7 Birds are vulnerable to visual and/or airborne noise disturbances from a wide range of activities at or close to their breeding, foraging and/or roosting sites. Bird responses include alert behaviour (e.g., head up, alarm calling, etc on awareness of a perceived risk) and flight behaviour (e.g., walking, running, swimming, flying, diving, etc to escape a perceived risk). Bird responses vary depending on existing conditions; particularly if a change in disturbance represents a marked change to the conditions to which they are habituated (Scottish Government, 2024). All birds, to some degree, are habituated to their local conditions including disturbance and, therefore, are likely to vary in their response to disturbance. Notably, if birds are present in a highly disturbed area, then it is likely that these birds will show a high degree of habituation to disturbance and tolerate a shorter disturbance distance. For example, research on the distribution and behavioural responses of red-throated divers to vessel disturbance indicates that they are more abundant in areas with lower vessel movements and lower vessel speeds (Burger et al., 2019).
- 2.6.8 Over the anticipated dredging period of 6-8 weeks, the TSHD movements are anticipated to contribute approximately 10-12 vessel movements per day. BHC recorded approximately 5,600 vessel arrivals in 2023 and 2024 (BHC, 2025), which equates to approximately 11,200 vessel movements per annum (for arrivals and departure) within Belfast Harbour, Belfast Lough and the North Channel. On this basis, the total number of TSHD movements are likely to increase the total number of vessel movements by 5-6 per cent in one year. Reference to the NI Marine Mapviewer (gis.daera-ni.gov.uk; accessed 10-02-2026) indicates that vessel movements are concentrated along one



principal route within Belfast Harbour and Belfast Lough (heading to/from the Approach Channel) and along northerly and southerly routes along or across the North Channel. The distribution of birds relative to the distribution of vessel movements, as shown in Figure A22 in **Appendix A**, suggests that birds exhibit a degree of habituation to vessel movements and, by association, the visual stimuli and airborne noise generated by vessel movements.

- 2.6.9 Guidance on the effects of bird disturbance includes buffer zone distances to protect birds from anthropogenic activities based on the onset of alert responses and flight initiation responses (Goodship and Furness, 2022). Guidance relating to disturbances including disturbance from working vessels identifies buffer zone distances for the bird species that may be disturbed by the proposed maintenance dredging and dredged material transport and deposition, as shown in Table 1.
- 2.6.10 Based on this information, the proposed maintenance dredging, dredged material transport and dredged material deposition are unlikely to have a significant effect on the bird species. Most of the dredging, transport and deposition activities will take place well beyond the suggested buffer zone distances, and will not present visual stimuli and/or airborne noise disturbances that are readily discernible from baseline conditions given the number of vessel movements through Belfast Harbour, Belfast Lough and the North Channel. Although some of the maintenance dredging and dredged material transport within Belfast Harbour may take place within the suggested buffer zone distances, the birds in this location will have an elevated degree of habituation to the baseline conditions - which include large numbers of vessel movements (i.e., approximately 5,600 per annum) and restricted vessel speeds (i.e., maximum of 6 knots) - and, therefore, will have a lower perceived risk sensitivity to the TSHD's visual stimuli and airborne noise effects. The elevated degree of habituation is evidenced by the RSPB reserve within Belfast Harbour, which is situated adjacent to and opposite operational berths and access channel (including the busy ferry berths), and is a principal location for breeding common tern and arctic tern, and forms part of the Belfast Lough SPA and Ramsar site.

Table 1 Bird Sensitivities and Buffers Zones relating to Visual and Airborne Noise Effects
(source: Goodship and Furness, 2022)

Receptor Species	Sensitivity to Disturbance	Suggested Buffer Zone during the Breeding Season (m)	Suggested Buffer Zone during the Non-breeding Season (m)
Redshank	Medium	100-200	200-300
Bar-tailed godwit	Medium	100-200	100-200
Black-tailed godwit	Medium	No information	200-300
Great crested grebe	No information	No information	No information
Red-throated diver	High	500-750	≤1000m
Eider	Medium-high	200-500	100-200
Sandwich tern	High	≥200	No information
Common tern	Medium-high	200-400	No information
Arctic tern	Medium	≥200m	No information
Manx shearwater	No information	No information	No information

Conclusion

- 2.6.11 On the basis of the above, there is not a sufficient pathway for visual stimuli and/or airborne noise, so there is unlikely to be significant effect on the favourable condition of the European sites and their features.



Potential for a Significant Effect due to Underwater Noise Disturbance

- 2.6.12 Reference to the European sites' management considerations identifies that the sites' principal conservation objective - maintaining the features in a favourable condition - is potentially vulnerable to various threats associated with dredging activities, including underwater noise.
- 2.6.13 The following paragraphs consider whether the proposed maintenance dredging and dredged material transport and deposition activities have the potential to generate and propagate underwater noise and, if so, whether they could have a significant effect on maintaining the features in a favourable condition.

Sources, Pathways and Receptors of Effect

- 2.6.14 The TSHD will be the principal source of underwater noise during the proposed maintenance dredging and dredged material transport and deposition.
- 2.6.15 The transmission of sound pressure waves through the water column will be the principal pathway of underwater noise during the proposed maintenance dredging and dredged material transport and deposition. Sound pressure waves will propagate through the water column in all directions from the source.
- 2.6.16 Reference to the NI Marine Mapviewer (gis.daera-ni.gov.uk; accessed 10-02-2026) indicates that harbour porpoise, harbour seal and grey seal have been recorded within Belfast Harbour, Belfast Lough and, albeit to a lesser extent, in the North Channel, as shown in Figure A23 in **Appendix A**. Accordingly, the following qualifying features will be the principal receptors of underwater noise during the proposed maintenance dredging and dredged material transport and deposition:
- Harbour porpoise, a qualifying feature of the North Channel SAC and Skerries and Causeway SAC.
 - Harbour seal, a qualifying feature of the Strangford Lough SAC.
 - Grey seal, a qualifying feature of The Maidens SAC.

Test of Likely Significant Effect

- 2.6.17 The following objective information indicates that the proposed maintenance dredging and dredged material transport and deposition should not have a significant effect in relation to underwater noise.
- 2.6.18 Underwater noise associated with TSHDs is characterised by continuous (non-impulsive), low-frequency sound levels and is derived from propulsion, propeller cavitation, drag-head operation, dredged material transport along suction pipes, and onboard machinery (CEDA, 2013). Research has recorded the sound levels emitted by TSHDs at 172-185dB, 165-185dB and 154-175dB at one metre from the source for dredging, dredged material transport and dredged material deposition respectively (de Jong et al., 2010). These sound levels are generally in line with the sound levels emitted by cargo vessels travelling at a modest speed (Robinson et al., 2009), which have been recorded at 180-190dB at one metre from the source (OSPAR, 2009). Research has recorded the noise frequencies emitted by TSHDs at below 1kHz (Jones et al., 2015) and at 250Hz-500Hz, 500Hz and <1KHz during dredging, dredged material transport and dredged material deposition respectively (de Jong et al., 2010). These frequencies are generally in line with the noise frequencies emitted by cargo vessels, which have been recorded at 20Hz-1KHz (Ghezzi et al., 2024), particularly for the dominant noise source which is derived from propulsion and propeller cavitation.



- 2.6.19 Over the anticipated dredging period of 6-8 weeks, the TSHD movements are anticipated to contribute approximately 10-12 vessel movements per day. BHC recorded approximately 5,600 vessel arrivals in 2023 and 2024 (BHC, 2025), which equates to approximately 11,200 vessel movements per annum (for arrivals and departures) within Belfast Harbour, Belfast Lough and the North Channel. On this basis, the total number of TSHD movements are likely to increase the total number of vessel movements by 5-6 per cent in one year. Reference to the NI Marine Mapviewer (gis.daera-ni.gov.uk; accessed 10-02-2026) indicates that vessel movements are concentrated along one principal route within Belfast Harbour and Belfast Lough (heading to/from the Approach Channel) and along northerly and southerly routes along or across the North Channel. The distribution of harbour porpoise, harbour seal and grey seal relative to the distribution of vessel movements, as shown in Figure A23 in **Appendix A**, suggests that the marine mammals exhibit a degree of habituation to vessel movements and, by association, the underwater noise generated by vessel movements.
- 2.6.20 Guidance on the effects of underwater noise on marine mammal hearing includes sound exposure levels for the onset of auditory injury due to a permanent threshold shift (PTS, a permanent, irreversible increase in the threshold of audibility), or a temporary threshold shift (TTS, a temporary, reversible increase in the threshold of audibility). Guidance relating to continuous (non-impulsive) underwater noise sources - such as the underwater noise sources associated with the proposed maintenance dredging and dredged material transport and deposition - identifies sound exposure levels for PTS and TTS of 181dB and 161dB respectively for harbour porpoise, and 195dB and 175dB respectively for harbour seal and grey seal (NOAA, 2024).
- 2.6.21 The PTS and TTS sound exposure levels relate to the underwater noise frequencies that are within the marine mammals' most susceptible hearing ranges. The underwater noise frequencies of the most susceptible hearing ranges are 5.93kHz-186kHz for harbour porpoise and 0.81kHz-68.3kHz for harbour seal and grey seal (NOAA, 2024). As noted above, research has recorded the underwater noise frequencies emitted by TSHDs to be generally below 1kHz during dredging, dredged material transport and dredged material deposition (Jones et al., 2015) and, therefore, are outside the most susceptible hearing ranges for harbour porpoise and largely outside the most susceptible hearing ranges for harbour seal and grey seal. This means that the sound levels emitted by the TSHD have to be higher than the PTS and TTS sound exposure levels identified above to produce a similar effect on a receptor's threshold of audibility (NOAA, 2024).
- 2.6.22 Based on this information, dredging, dredged material transport and dredged material deposition are unlikely to have a significant effect on the marine mammal species. Although the source sound levels at 1m from the TSHD are slightly above harbour porpoise's PTS and/or TTS sound exposure levels, the source frequencies from the TSHD are well below its most susceptible hearing frequencies (Table 2). Also, the source sound levels at 1m from the TSHD are below the harbour seal and grey seal's PTS sound exposure levels, and although the source sound levels at 1m from the TSHD are slightly above their TTS sound exposure levels, the source frequencies are generally below their most susceptible hearing frequencies (Table 3). Also, harbour porpoise, harbour seal and grey seal are highly mobile species so can readily distance themselves from the TSHD, and they are likely to be well habituated to the TSHD sound levels and frequencies given the number of cargo vessel movements in Belfast Harbour, Belfast Lough and the North Channel.



Table 2 Harbour Porpoise Sensitivities relating to Underwater Noise Effects (source: NOAA, 2024)

Source Activity	Source Sound Level at 1m (dB)	Receptor PTS Sound Exposure Level (dB)	Receptor TTS Sound Exposure Level (dB)	Source Sound Frequency (kHz)	Receptor Susceptible Hearing Frequency (kHz)
Dredging	172-185	181	161	0.25-0.5	5.93-186
Transport	165-185	181	161	0.5	5.93-186
Deposition	154-175	181	161	<1	5.93-186

Table 3 Harbour Seal and Grey Seal Sensitivities relating to Underwater Noise Effects (source: NOAA, 2024)

Source Activity	Source Sound Level at 1m (dB)	Receptor PTS Sound Exposure Level (dB)	Receptor TTS Sound Exposure Level (dB)	Source Sound Frequency (kHz)	Receptor Susceptible Hearing Frequency (kHz)
Dredging	172-185	195	175	0.25-0.5	0.81-68.3
Transport	165-185	195	175	0.5	0.81-68.3
Deposition	154-175	195	175	<1	0.81-68.3

Conclusion

- 2.6.23 On the basis of the above, there is not a sufficient source and/or pathway for underwater noise, so there is unlikely to be significant effect on the favourable condition of the European sites and their features.

Potential for a Significant Effect due to the Remobilisation, Dispersion and Deposition of Sediment

- 2.6.24 Reference to the European sites' management considerations identifies that the sites' principal conservation objective - maintaining the features in a favourable condition - is potentially vulnerable to various threats associated with dredging activities, including habitat change due to remobilisation, dispersion and deposition of sediment.
- 2.6.25 The following paragraphs consider whether the proposed maintenance dredging and dredged material deposition activities have the potential to release contaminated sediment and, if so, whether they could have a significant effect on maintaining the features in a favourable condition.

Sources, Pathways and Receptors of Effect

- 2.6.26 The TSHD will be the principal source of remobilised sediment during the proposed maintenance dredging and dredged material deposition (but not dredged material transport).
- 2.6.27 Sediment will be released into the surrounding water column during maintenance dredging within Belfast Harbour, largely due to sediment disturbance as the TSHD's drag-head passes across the dredging area, and dredged material deposition at the Belfast Dredgings C (Live) disposal site, largely due to sediment release from the TSHD's hopper onto the seabed.
- 2.6.28 Sediment dispersion within the water column and deposition on the seabed will be the principal pathways for sediment during the proposed maintenance dredging and dredged material deposition. This is because the sediment will disperse through the water column and deposit on the seabed in all directions from the source, but predominantly influenced by the directions of tidal currents.



- 2.6.29 The receiving water column and/or seabed potentially provide the habitats supporting the qualifying bird species of the Belfast Lough SPA, Belfast Lough Open Water SPA, East Coast (NI) Marine SPA, Outer Ards SPA and Copeland Islands SPA, and the qualifying marine mammal species of the North Coast SAC, Strangford Lough SAC, The Maidens SAC and Skerries and Causeway SAC.

Test of Likely Significant Effect

- 2.6.30 The following objective information indicates that the proposed maintenance dredging and dredged material deposition should not have a significant effect in relation to remobilised sediment.
- 2.6.31 The proposed maintenance dredging and dredged material transport and deposition is similar in scale (both spatially and temporally) to the previous maintenance dredging and dredged material transport and deposition undertaken in 2023. The previous maintenance dredging and dredged material deposition was monitored for the following effects associated with sediment remobilisation, dispersion and deposition:
- Water quality changes (turbidity) due to maintenance dredging activities, monitored at three locations within Belfast Harbour and the inner part Belfast Lough for increases in total suspended solids (TSS) concentrations for compliance with a standard of not exceeding 300mg/l for more than 6 hours and not exceeding 600mg/l at any point.
 - Water quality changes (deoxygenation) due to maintenance dredging activities, monitored at three locations within Belfast Harbour and the inner part Belfast Lough for decreases in dissolved oxygen (DO) concentrations for compliance with a standard of not falling below 4mg/l.
 - Seabed changes (physical habitat or biological community) due to dredged material deposition, monitored at two locations within the Belfast Dredgings C (Live) disposal site for changes to macrobenthic assemblages visible at the seabed.
- 2.6.32 Monitoring was undertaken by the Agri-Food & Biosciences Institute (AFBI) on behalf of BHC. Monitoring found that at no point during maintenance dredging, carried out in 2023, were the compliance standards for TSS or DO concentrations breached because of maintenance dredging. The TSS compliance standard was exceeded on occasion, but was not sustained, and examination of the monitoring data identified elevated concentrations were isolated and likely due to natural conditions unrelated to maintenance dredging. Monitoring also found that dredged material deposition caused no substantive change in the physical seabed composition and no perceivable effect on mean species richness (AFBI, 2024).

Conclusion

- 2.6.33 On the basis of the above, there is not a sufficient source and/or pathway for sediment, so there is unlikely to be significant effect on the favourable condition of the European sites and their features.

Potential for a Significant Effect due to the Remobilisation, Dispersion and Deposition of Contaminated Sediment

- 2.6.34 Reference to the European sites' management considerations identifies that the sites' principal conservation objective - maintaining the features in a favourable condition - is potentially vulnerable to various threats associated with dredging activities, including habitat change due to remobilisation, dispersion and deposition of contaminated sediment.



- 2.6.35 The following paragraphs consider whether the proposed maintenance dredging and dredged material deposition activities have the potential to release contaminated sediment and, if so, whether they could have a significant effect on maintaining the features in a favourable condition.

Sources, Pathways and Receptors of Effect

- 2.6.36 The TSHD will be the principal source of remobilised contaminated sediment during the proposed maintenance dredging and dredged material deposition (but not dredged material transport).
- 2.6.37 Sediment will be released into the surrounding water column during maintenance dredging within Belfast Harbour, largely due to sediment disturbance as the TSHD's drag-head passes across the dredging area, and dredged material deposition at the Belfast Dredgings C (Live) disposal site, largely due to sediment release from the TSHD's hopper onto the seabed.
- 2.6.38 Sediment dispersion within the water column and deposition on the seabed will be the principal pathways for contaminated sediment during the proposed maintenance dredging and dredged material deposition. This is because the sediment will disperse through the water column and deposit on the seabed in all directions from the source, but predominantly influenced by the directions of tidal currents.
- 2.6.39 The receiving water column and/or seabed potentially provide the habitats supporting the qualifying bird species of the Belfast Lough SPA, Belfast Lough Open Water SPA, East Coast (NI) Marine SPA, Outer Ards SPA and Copeland Islands SPA, and the qualifying marine mammal species of the North Coast SAC, Strangford Lough SAC, The Maidens SAC and Skerries and Causeway SAC.

Test of Likely Significant Effect

- 2.6.40 The following objective information indicates that the proposed maintenance dredging and dredged material deposition should not have a significant effect in relation to remobilised contaminated sediment.
- 2.6.41 The sediment to be dredged has been subject to sampling and analyses in accordance with a sample plan agreed with DAERA. The sediment samples have been analysed for their physical composition (i.e., particle sizes) and a range of chemical contaminants including various metals, organotin compounds, polycyclic aromatic hydrocarbons (PAHs), total hydrocarbon content (THC) and polychlorinated biphenyls (PCBs). The results of the analyses have been compared to two sediment quality standards: the UK Action Levels (Mason et al., 2021) and the US Effects Ranges (Long et al., 1995, MacDonald et al., 1996 and Gorham-Test, 1998.).
- 2.6.42 The UK action levels are used to inform marine licence applications for dredging and/or disposal at sea activities. They do not represent pass / fail criteria; rather, they are used to determine the contaminant loading of sediment (as dredged material) and its suitability for disposal at sea. Generally, sediment with chemical parameters at concentrations below action level 1 (AL1) is considered suitable for disposal at sea, and sediment with chemical parameters at concentrations above action level 2 (AL2) is considered not suitable for disposal at sea, and sediment with chemical parameters at concentrations between AL1 and AL2 is considered in more detail through a 'weight of evidence' approach.
- 2.6.43 UK action levels are partially available (AL1 but no AL2) for some PAHs and PCBs.



Accordingly, other sediment quality standards can be used to inform marine licence applications - albeit on an advisory basis because the other standards have no legal or policy standing in the UK - by contextualising the contaminant loading of sediment and its suitability for disposal at sea. The US effects ranges are used to contextualise concentrations of PAHs for marine licence applications due to the absence of a AL2. The effect ranges were devised in the US to assess whether sediment has the potential for adverse biological effects. The effects range low (ERL) equates to a contaminant concentration below which adverse biological effects rarely occur, while the effects range median (ERM) equates to a contaminant concentration above which adverse biological effects frequently occur. While the US effects ranges are not formally recognised in the UK, they provide useful criteria for PAHs in the absence of a AL2.

- 2.6.44 The results of the analyses have been compared to the sediment quality criteria, as shown in **Appendix B**. In summary, all results show that contaminant concentrations are either below AL1 and the ERL, or slightly above AL1 and the ERL, but no results are approaching or above AL2 or the ERM. On this basis, the level of contamination within the sediment is likely to be considered suitable for disposal within the marine environment, and is unlikely to have a significant effect on receiving habitats and species.

Conclusion

- 2.6.45 On the basis of the above, there is not a sufficient source of contaminated sediment, so there is unlikely to be significant effect on the favourable condition of the European sites and their features.

Potential for a Significant Effect due to an In-Combination Effect with Other Plans or Projects

- 2.6.46 Reference to DAERA's public register identifies that various marine licences have been recently granted for activities in Belfast Harbour, Belfast Lough and the Belfast Dredging C (Live) disposal site, as shown in Table 4. While some of the activities overlap spatially with the proposed maintenance dredging and dredged material transport and deposition, the end dates for all marine licences have passed, which means that none of the activities overlap temporally with the proposed maintenance dredging and dredged material transport and deposition.
- 2.6.47 Of the activities identified in Table 4, the various activities associated with BHC's development of D3 have the most potential for in-combination effects with the proposed maintenance dredging and dredged material transport and deposition. The D3 development was subject to a HRA at screening assessment and appropriate assessment stages which considered the potential for the D3 development to have in-combination effects with ongoing maintenance dredging and dredged material transport and deposition (as per marine licence reference ML 19-19 in Table 4). The shadow HRA report found no potential for in-combination effects (Allen and Mellon Environmental Ltd, 2016).

Table 4 Marine Licences for Activities at Belfast Harbour, Belfast Lough and the Belfast Dredging C (Live) Disposal Site (source: daera-ni.gov.uk; accessed 08-04-2026)

Reference	Start Date	End Date	Description
ML 122_15	01-08-2022	31-07-2025	Construction of new facilities at D3 in Belfast Harbour for project cargo, break bulk, and dry bulk during the cruise ship off season.
ML 149_16	01-08-2022	31-07-2025	Capital dredging of 372,000m ³ of material to form a berthing pocket adjacent to D3 in Belfast Harbour.
ML 150_16	01-08-2022	31-07-2025	Disposal of 372,000m ³ of material removed from a berthing pocket adjacent to D3 at the Belfast Dredging C disposal site, albeit with



Belfast Harbour - Maintenance Dredging HRA Stage 1 Screening Information

			disposal of approximately 97,000m ³ of contaminated material at the Musgrove containment area in Belfast Harbour.
ML 2_18	23-08-2019	22-08-2020	Demolition and removal of an existing suspended timber quay at Queen's Queen in Belfast Harbour, and the reconstruction of the quay with a reinforced concrete wall supported on piles.
ML 38_18	20-03-2019	14-03-2020	Capital dredging of 100m ³ of material to excess silt deposits from the channel invert beneath a railway bridge on the Belfast to Bangor line adjacent to Holywood Exchange Retail Park.
ML 7_19	25-03-2022	24-03-2023	Installation of floating pontoon units at Abercorn Basin within Belfast Harbour for pleasure craft use.
ML 13_19	16-10-2019	15-10-2020	refurbishment of existing weir, provisions of a new boat lock, mooring pontoons, new footpath and footbridge over the River Lagan at Belfast.
ML 19_19	01-06-2020	31-05-2023	Disposal of up to 972,000 tonnes of material removed to maintain the berths and channels within Belfast Harbour at the Belfast Dredging C disposal site.

2.7 Conclusion

- 2.7.1 Based on the above findings, the proposed maintenance dredging, dredged material transport and dredged material deposition activities are not expected to have a significant effect, either alone or in-combination with other plans and projects, on a European site's conservation objective of maintaining the favourable condition of site features.

3 References

AFBI (2024). Belfast Harbour Dredge Monitoring 2023-2024. Agri-Food & Biosciences Institute, January 2024.

Allen and Mellon Environmental Ltd (2016). Quay Development Belfast Harbour Quay Development at D3. Habitats Regulations Assessment. Prepared for Belfast Harbour Commissioners, March 2016.

BHC (2025). Belfast Harbour. Annual Report & Accounts 2024.

Burger, C., Schubert, A., Heinänen, S., Dorsch, M., Kleinschmidt, B., Zydels, R., Morkūnas, J., Quillfeldt, P. and Nehls, G. (2019). A novel approach for assessing effects of ship traffic on distributions and movements of seabirds. Journal of Environmental Management Volume 251, 1 December 2019.

CEDA (2011). Central Dredging Association (CEDA) Position Paper: Underwater Sound in Relation to Dredging. Terra et Aqua, Number 125, December 2011.

De Jong C., Ainslie M., Dreschler J., Jansen E., Heemskerk E. & Groen W. (2010). Underwater noise of Trailing Suction Hopper Dredgers at Maasvlakte 2: Analysis of source levels and background noise (Report Reference TN0-DV 2010 C335). TNO Defence, Security and Safety: 82.

Goodship, N.M. and Furness, R.W. (2022) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Gorham-Test, C. (1998). Regional Environmental Monitoring and Assessment Program. Galveston Bay 1993. EPA/906/R-98/002.



Michol Ghezze, M., Petrizzo, A., Madricardo, F., Folegot, T., Gallou, R., Clorennec, D., Chavanne, R., Hemon, E., Ferrarin, C., Mihanovic, H., Pikelj, K., Bastianini, M., Pari, A., Parie, S., Menegon, S., McKiver, W.J., Farella, G., Bosi, S., Barbanti, A. and Picciulin, M. (2024). Natural and shipping underwater sound distribution in the Northern Adriatic Sea basin and possible application on target areas. Marine Pollution Bulletin Volume 207, October 2024.

Jones, D., Marten, K. and Harris, K. (2015). Underwater Sound from Dredging Activities: Establishing Source Levels and Modelling the Propagation of Underwater Sound. CEDA Dredging Days 2015: Innovative dredging solutions for ports, Rotterdam, the Netherlands – Proceedings.

Long, E.R., MacDonald, D.D., Smith, S.L. and Calder, F.D. (1995). Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. Environmental Management. Vol.19, No.1, 81-97p.

Macdonald, D.D., Carr, R.S., Calder, F.D., Long, E.R. and Ingersoll, C.G. (1996). Development and evaluation of sediment quality guidelines for Florida coastal waters. Ecotoxicology 5, 253-278 (1996).

Mason, C., Vivian, C., Griffith, A., Warford, L., Hynes, C., Barber, J., Sheahan, D., Bersuder, P., Bakir, A. and Lonsdale, J.A. (2021). Reviewing the UK's action levels for the management of dredged material. Geosciences, 12(1), p.3.

NOAA (2024). Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0). Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. National Oceanic and Atmospheric Administration Technical Memorandum NMFS-OPR-71 October 2024.

OSPAR (2009). Overview of the impacts of anthropogenic underwater sound in the marine environment, Vol. OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic (www.ospar.org).

Robinson SP, Theobald PD, Hayman G, Wang LS, Lepper PA, Humphrey V, Mumford S (2011). Measurement of underwater noise arising from marine aggregate dredging operations-MEPF report 09/P108, Marine Aggregate Levy Sustainability Fund.

Scottish Government (2024). Scottish Seabird Vulnerability Report. December 2024.

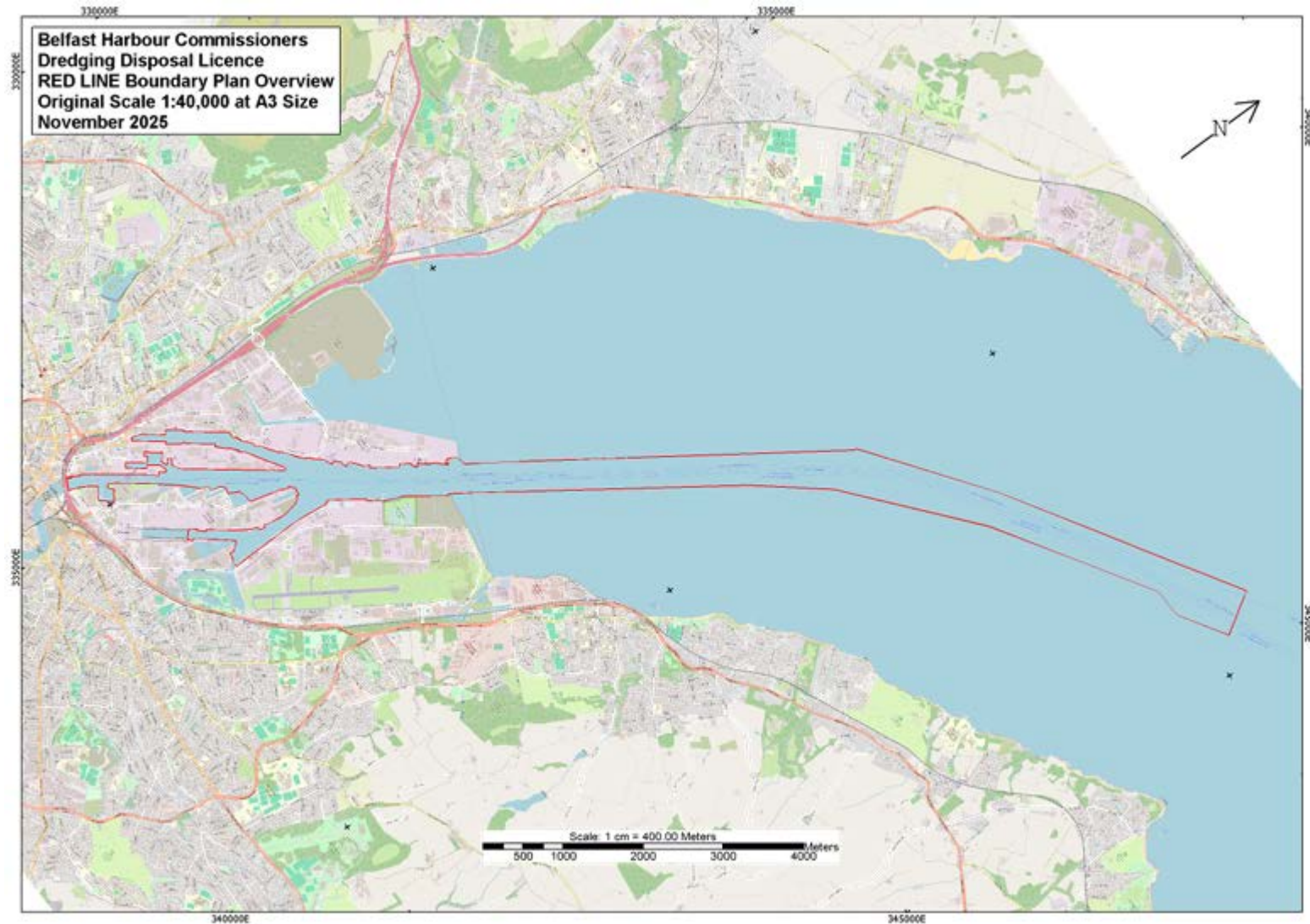


APPENDIX A FIGURES



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Figure A1 Belfast Harbour Maintenance Dredging Area - Harbour and Approach Channel





Belfast Harbour Commissioners
 Depth of material relative to design depths
 With proposed SAMPLE locations Rev 1 12/12/2025
 Grey = -0.5-0m below design depth
 Greens = 0m to 0.99m above design depth
 Orange-Red = are greater than 1m above design depth
 Survey data May 2025
 Original Scale 1:10,000 at A3 size
 Sheet 1 of 4

Scale: 1 cm = 100.00 Meters

100 200 400 600 800 Meters



Belfast Harbour Commissioners
 Depth of material relative to design depths
 With proposed SAMPLE locations Rev 1 12/12/2025
 Grey = -0.5-0m below design depth
 Greens = 0m to 0.99m above design depth
 Orange-Red = are greater than 1m above design depth
 Survey data May 2025
 Original Scale 1:10,000 at A3 size
 Sheet 2 of 4

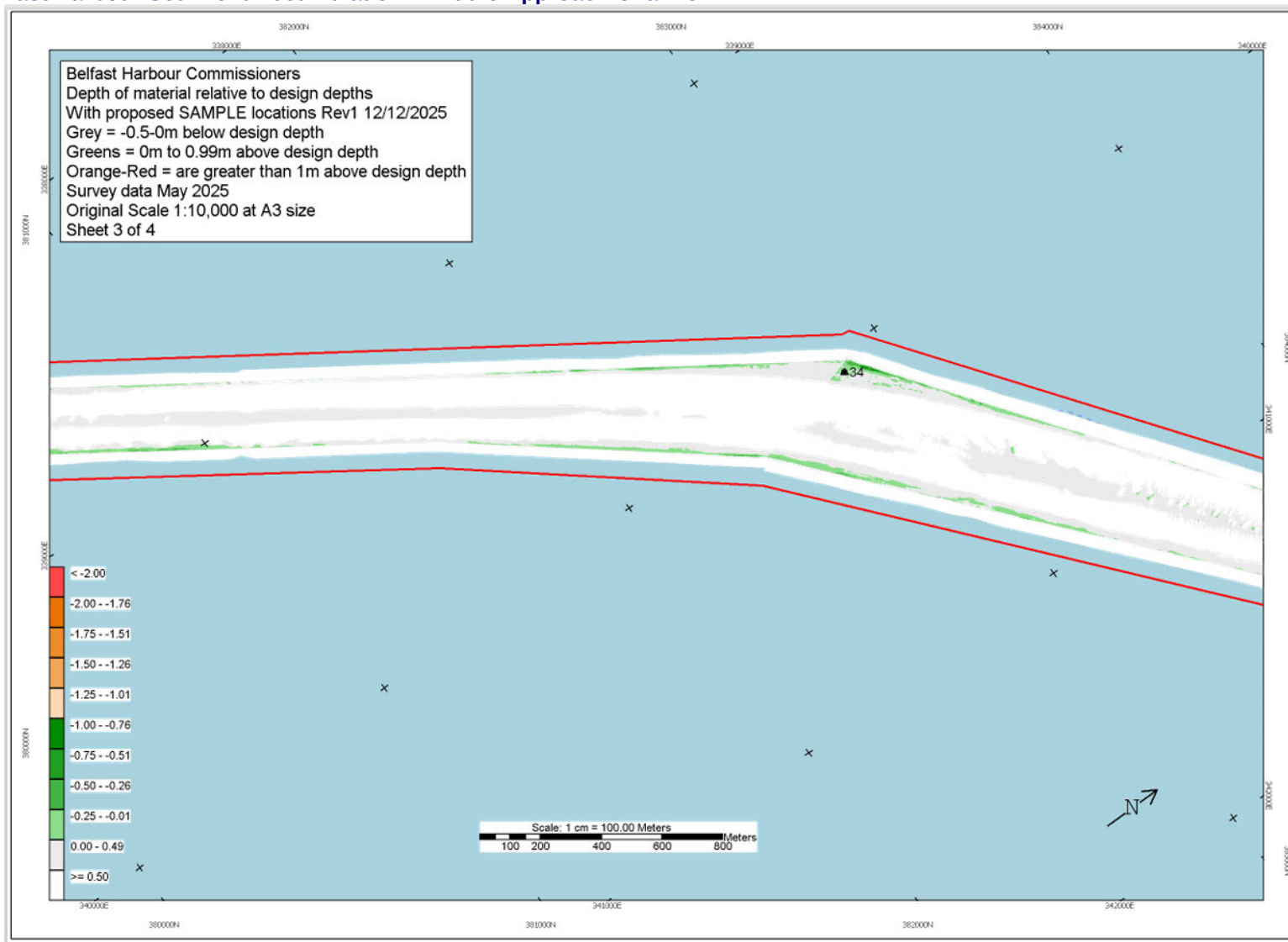
Scale: 1 cm = 100.00 Meters
 100 200 400 600 800 Meters

Legend:
 < -2.00
 -2.00 - -1.76
 -1.75 - -1.51
 -1.50 - -1.26
 -1.25 - -1.01
 -1.00 - -0.76
 -0.75 - -0.51
 -0.50 - -0.26
 -0.25 - -0.01
 0.00 - 0.49
 >= 0.50



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

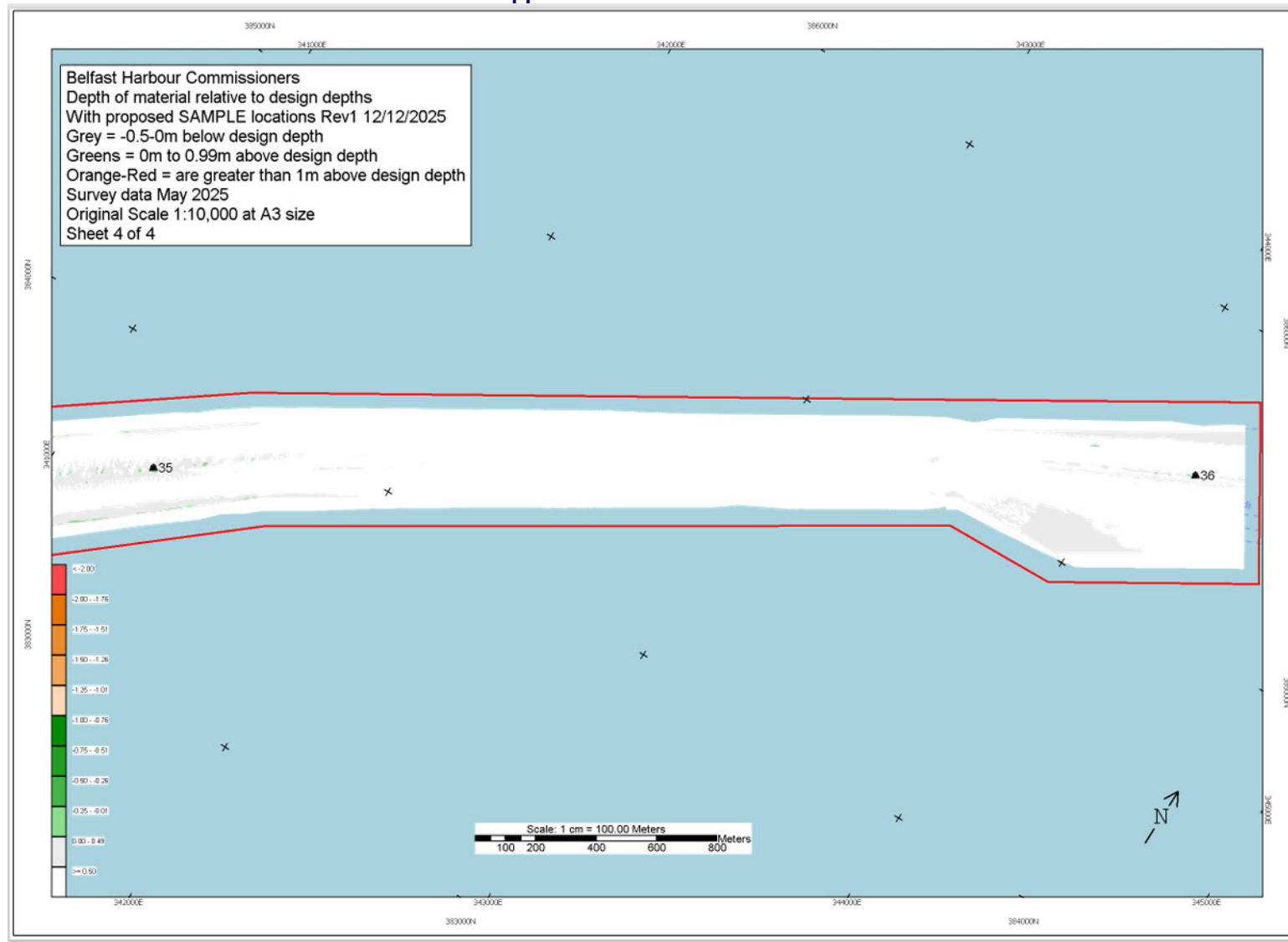
Figure A4 Belfast Harbour Sediment Accumulation – Middle Approach Channel





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Figure A5 Belfast Harbour Sediment Accumulation – Outer Approach Channel





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

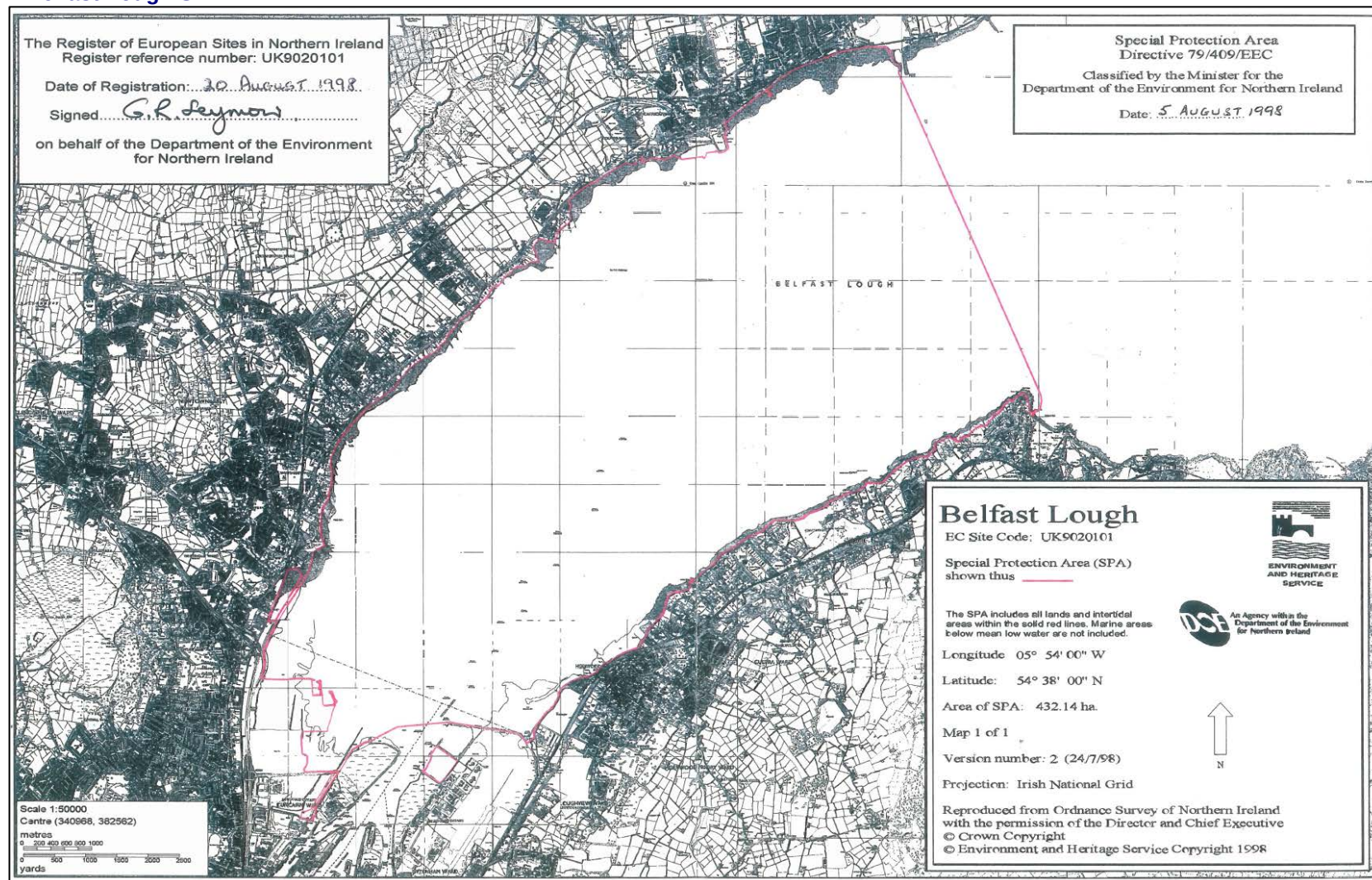
Figure A6 Belfast Dredgings C (Live) Disposal Site with TSHD tracks in 2023, transport to and return from licenced disposal site.





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

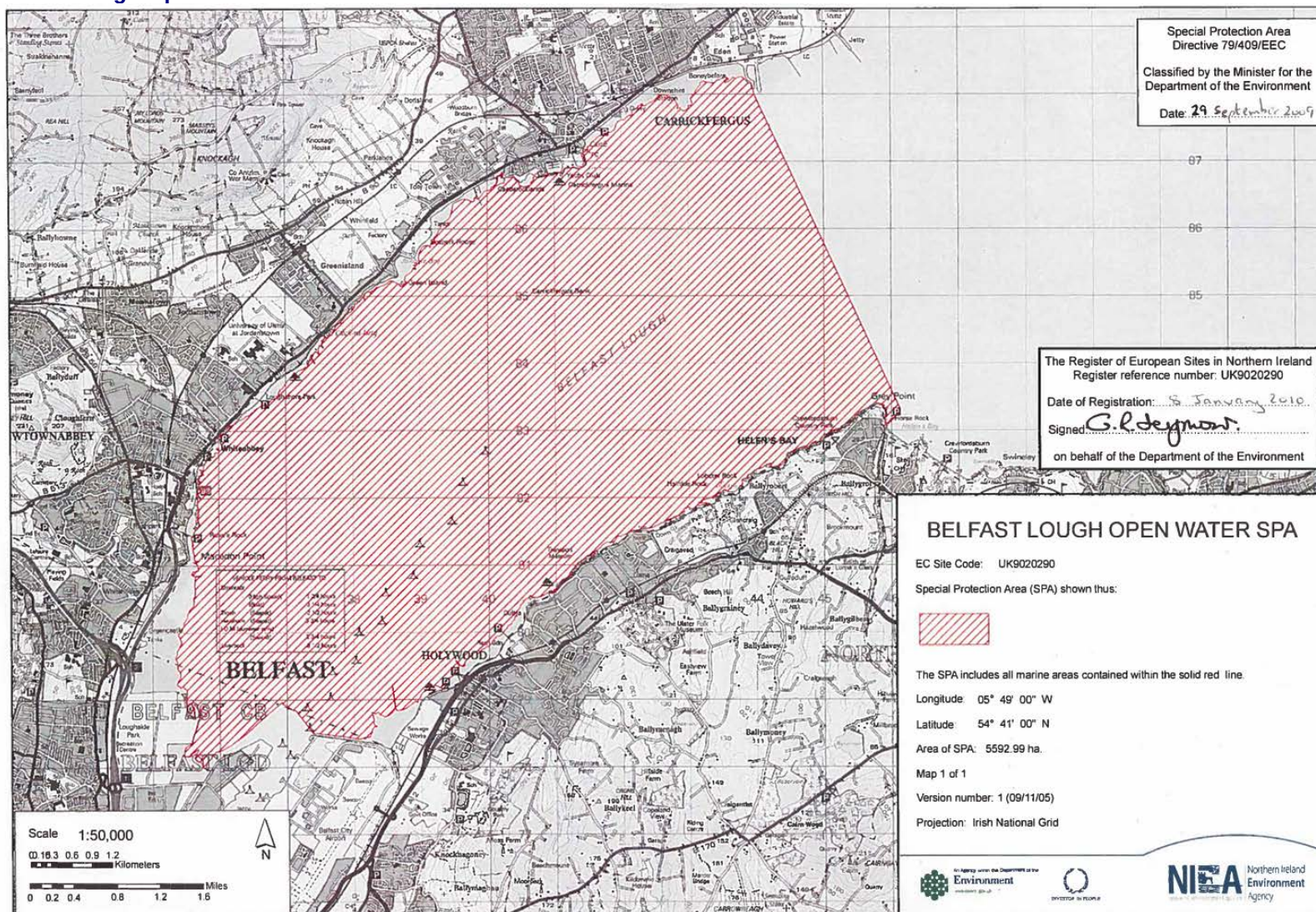
Figure A7 Belfast Lough SPA





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

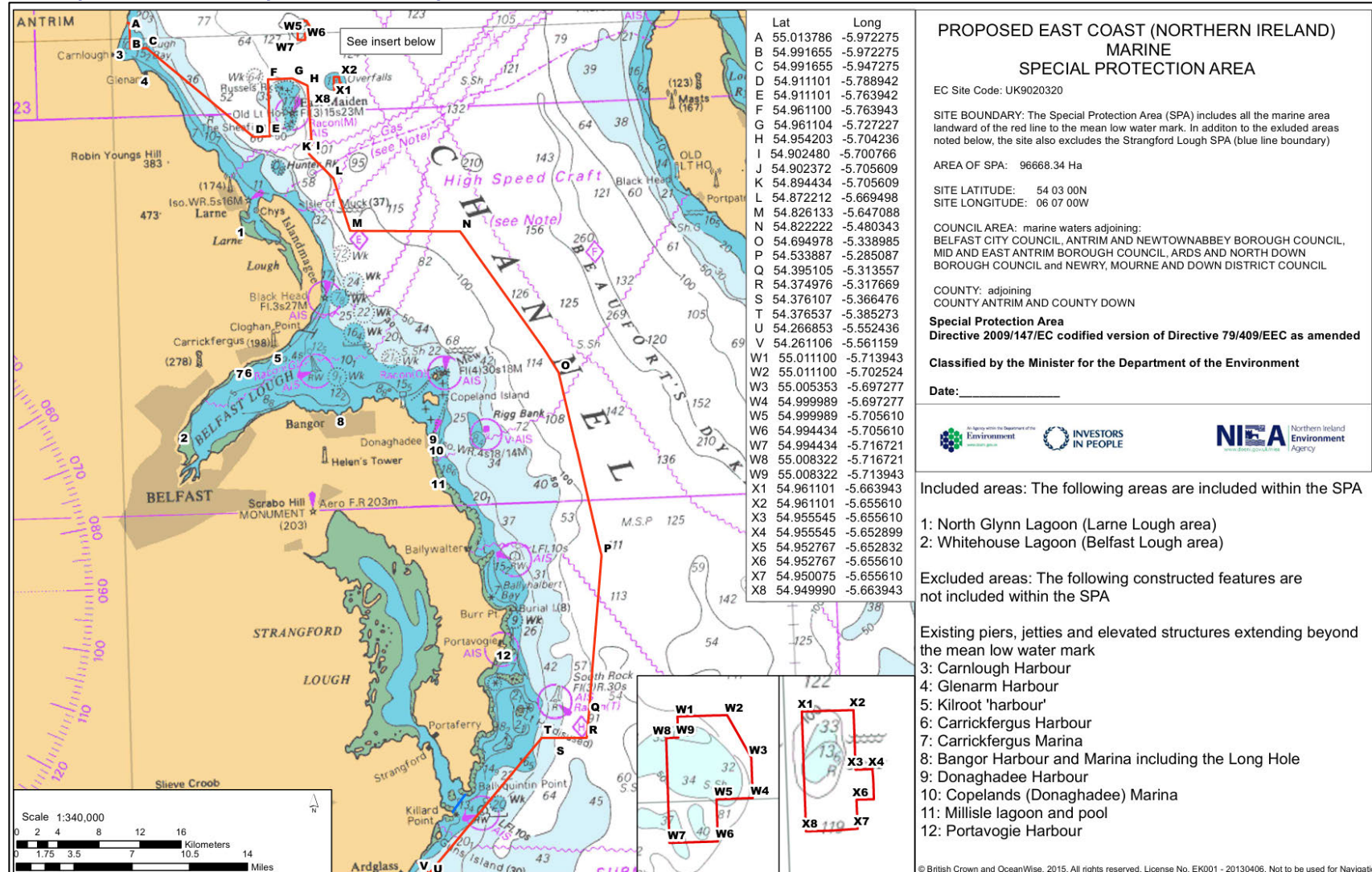
Figure A8 Belfast Lough Open Water SPA





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

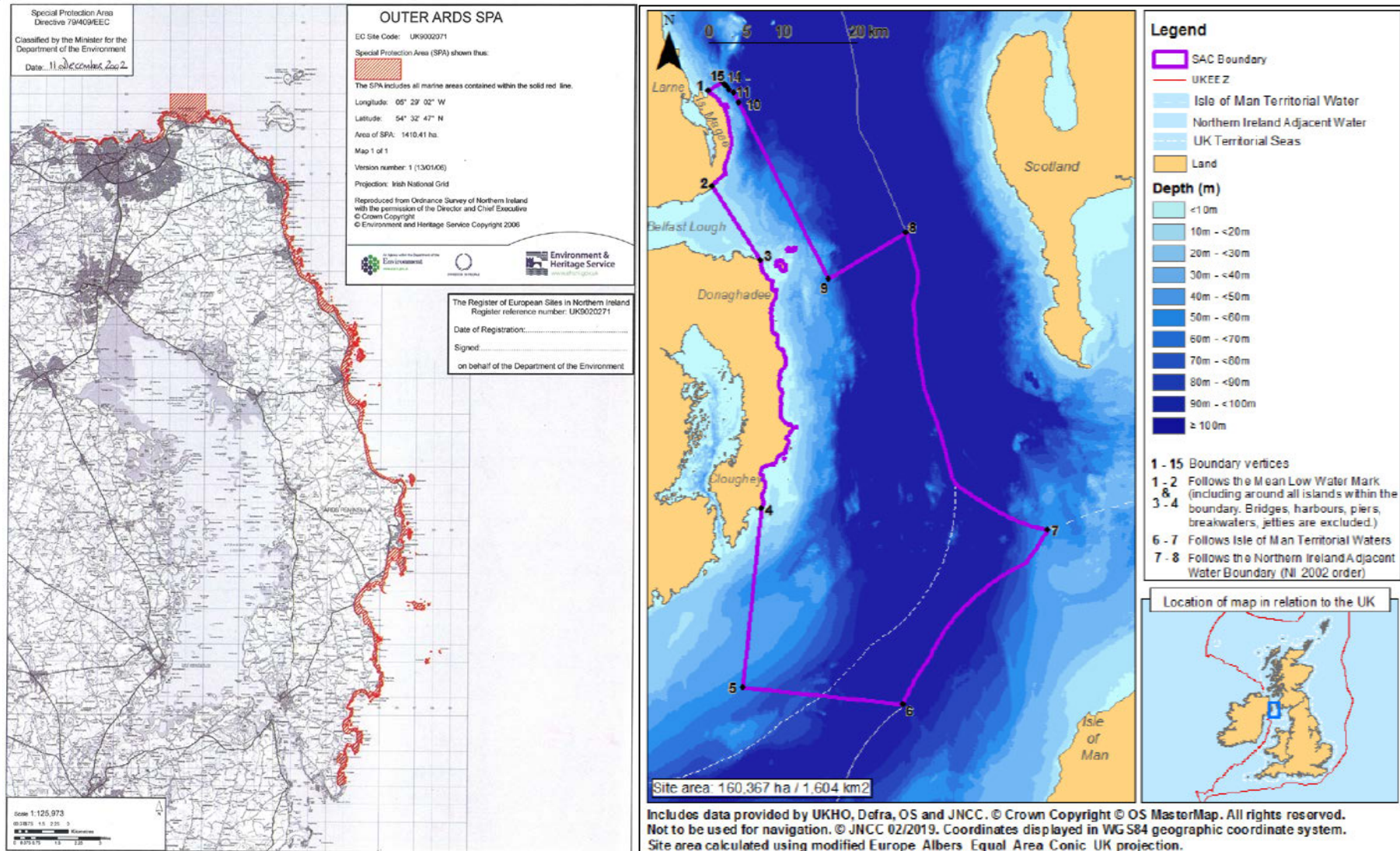
Figure A9 Proposed East Coast (Northern Ireland) Marine SPA





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

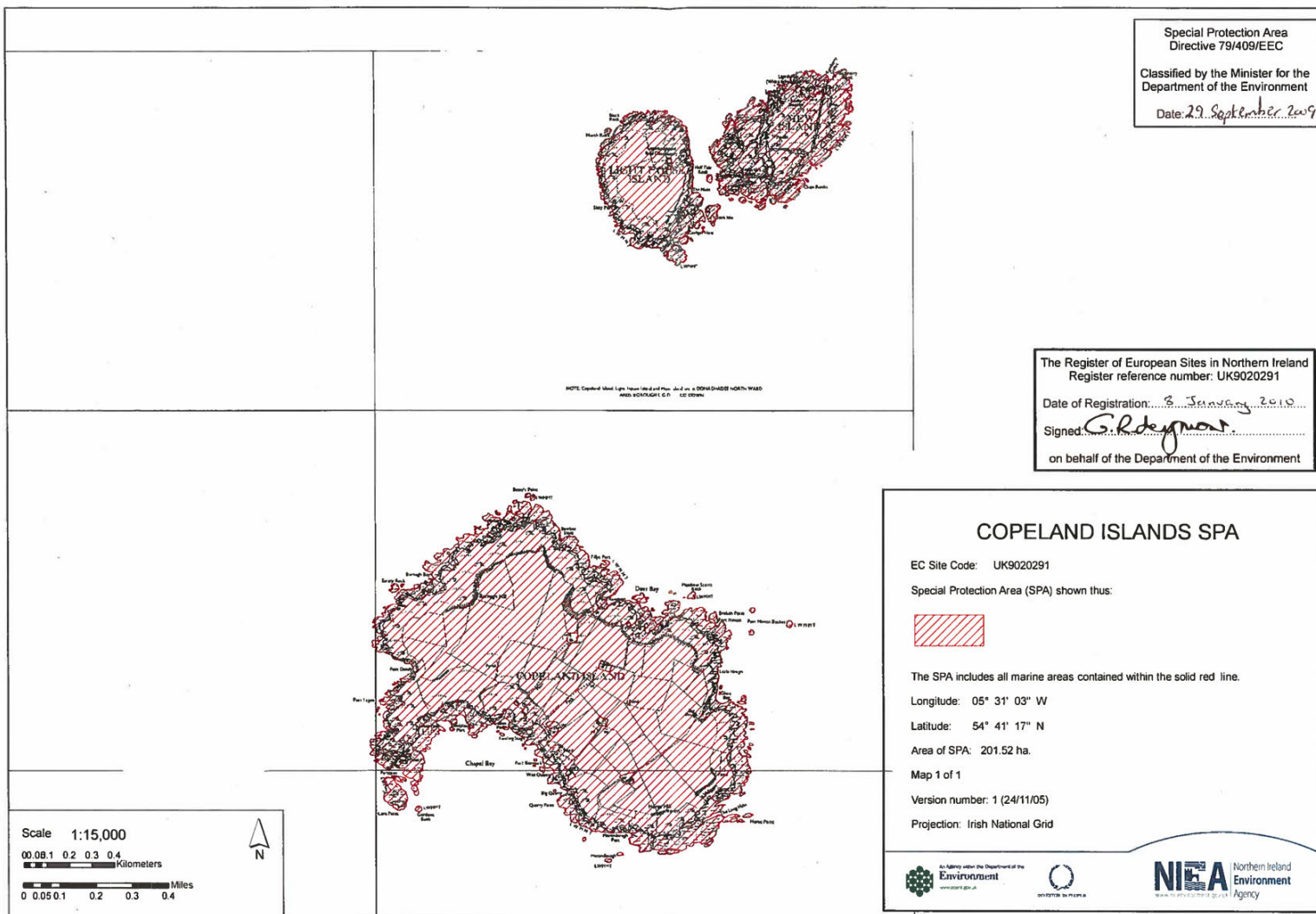
Figure A10 Outer Ards SPA and Figure A11 North Channel SAC





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

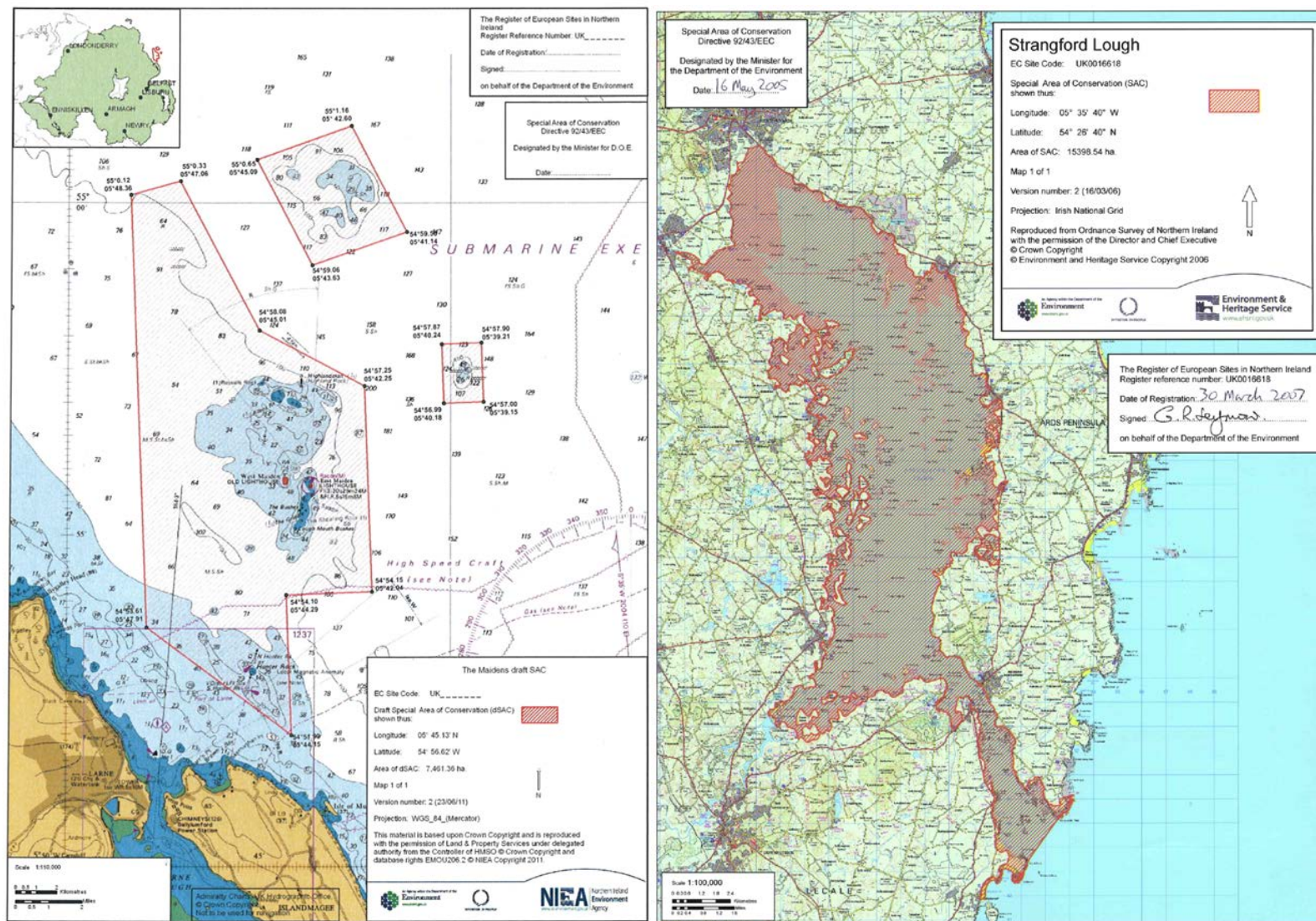
Figure A12 Copeland Islands SPA





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

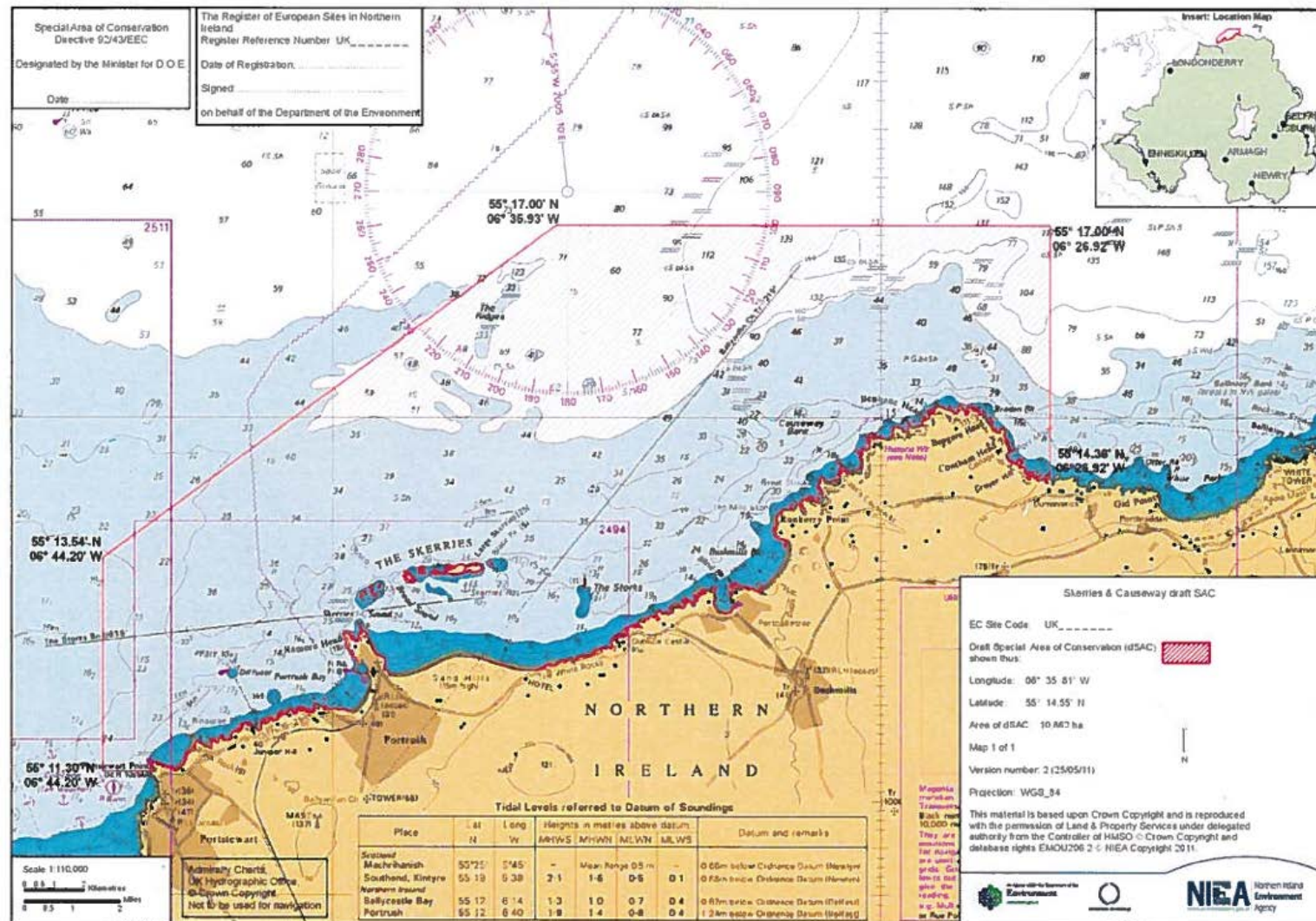
Figure A13 The Maidens SAC and Figure A14 Strangford Lough SAC





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

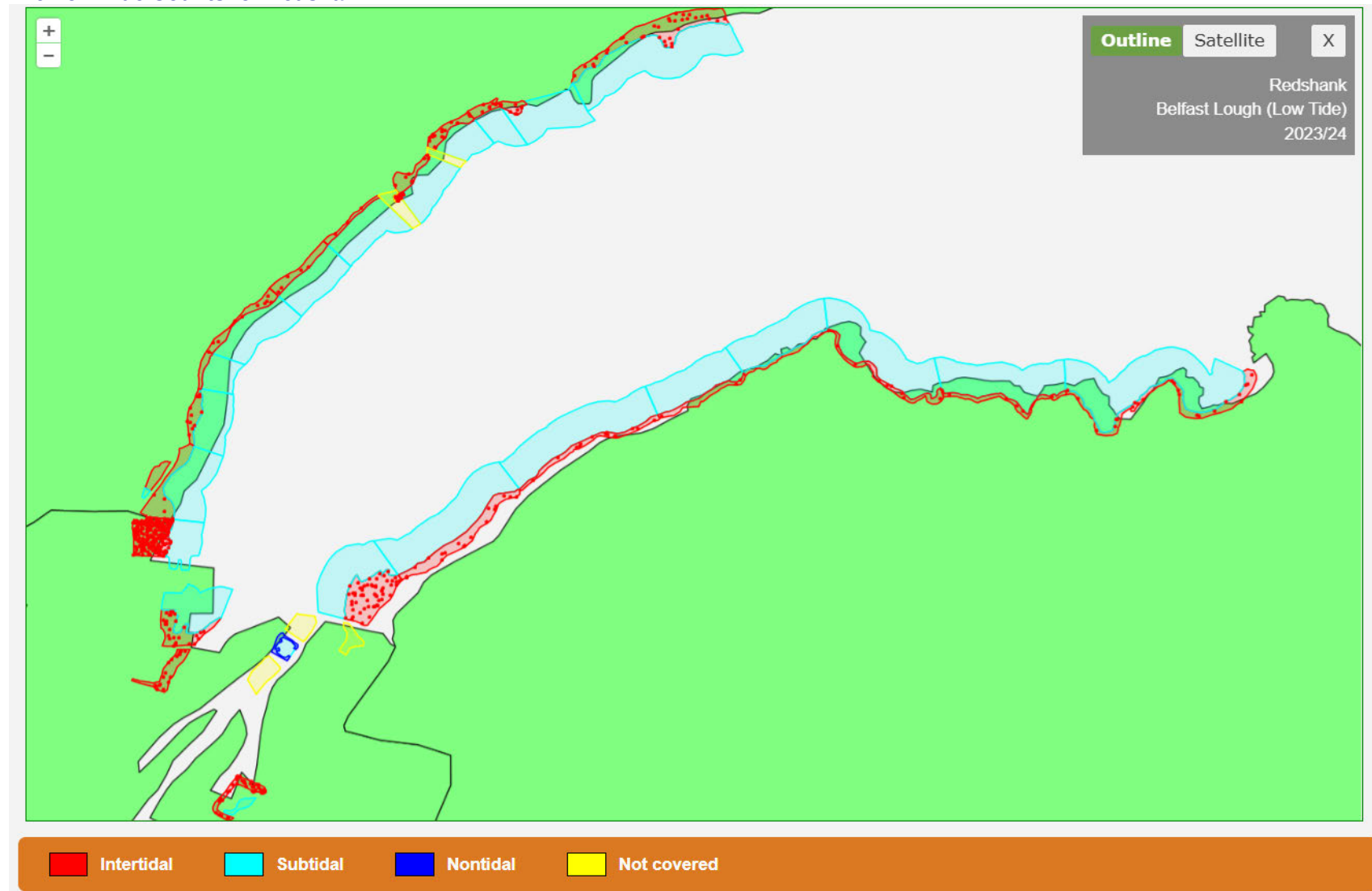
Figure A14 Skerries and Causeway SAC





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

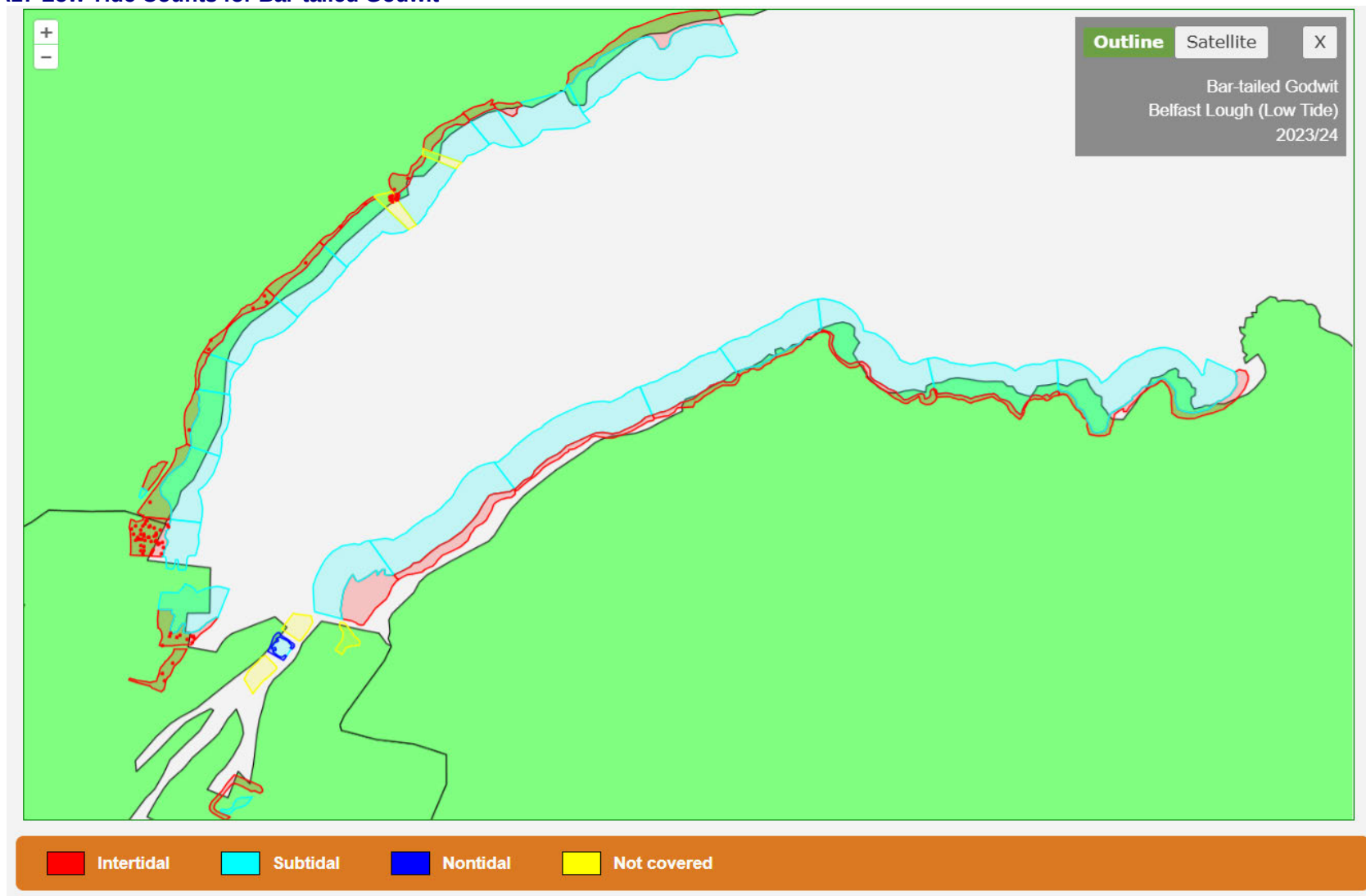
Figure A16 Low Tide Counts for Redshank





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

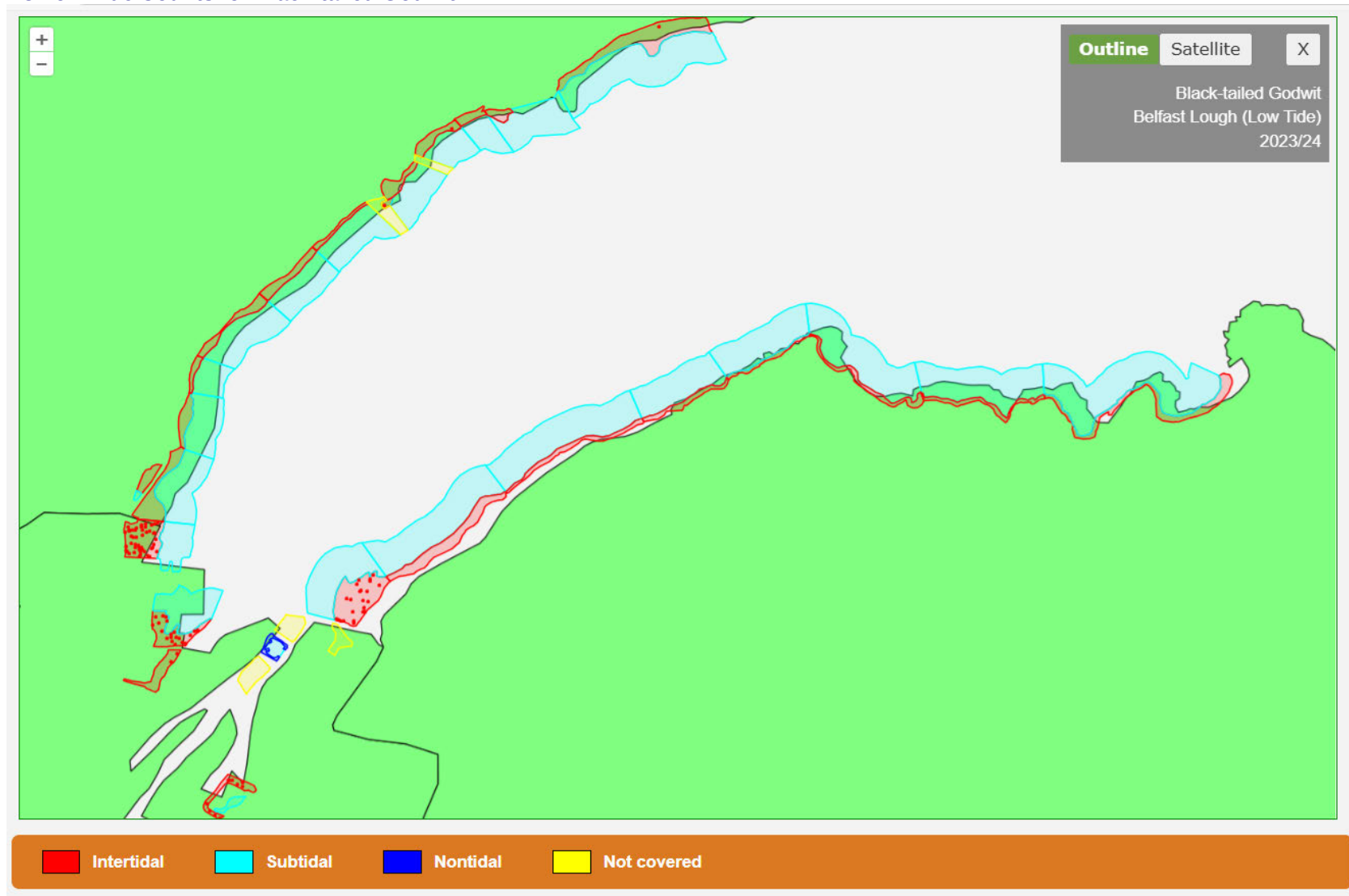
Figure A17 Low Tide Counts for Bar-tailed Godwit





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

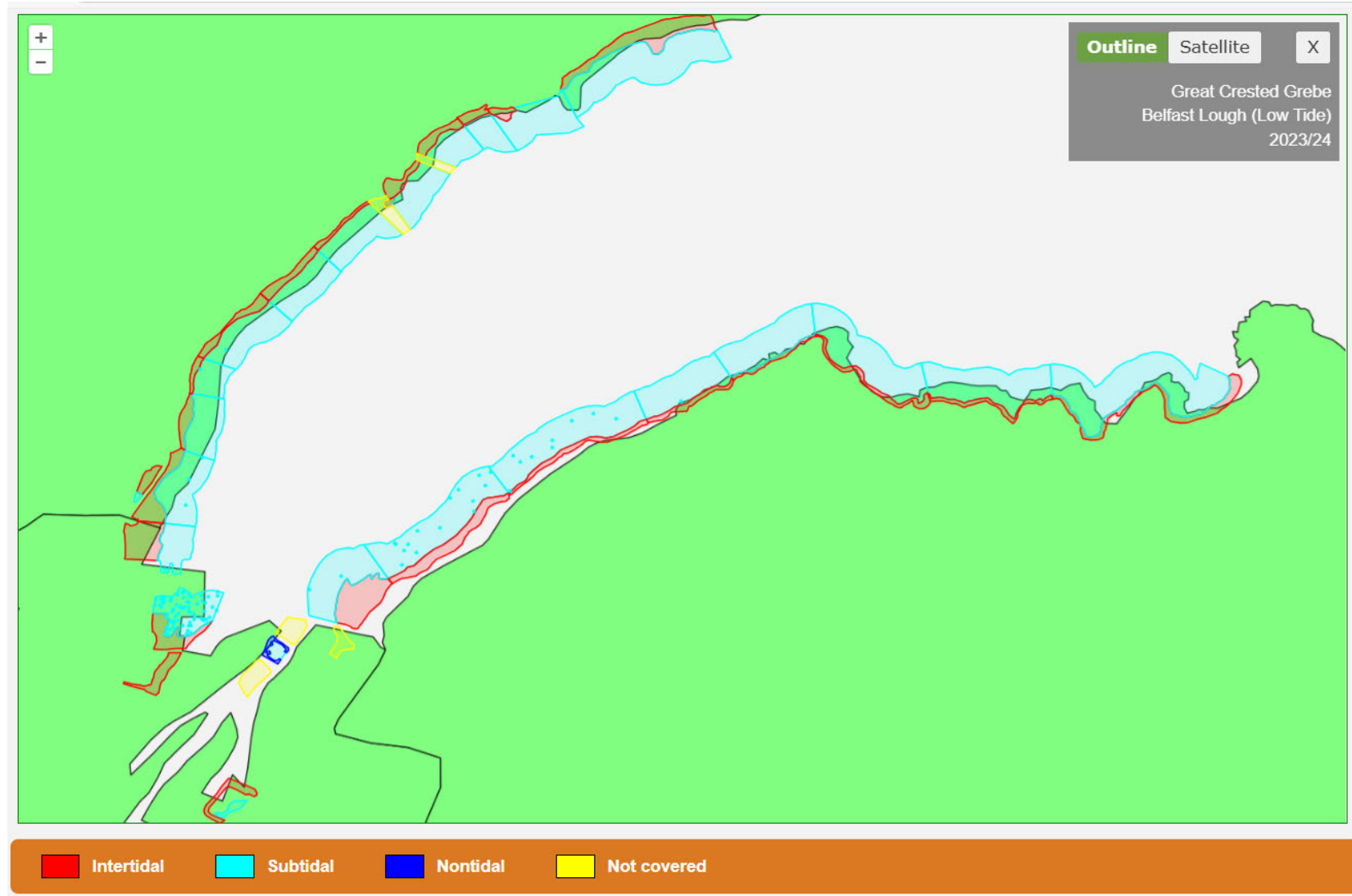
Figure A18 Low Tide Counts for Black-tailed Godwit





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

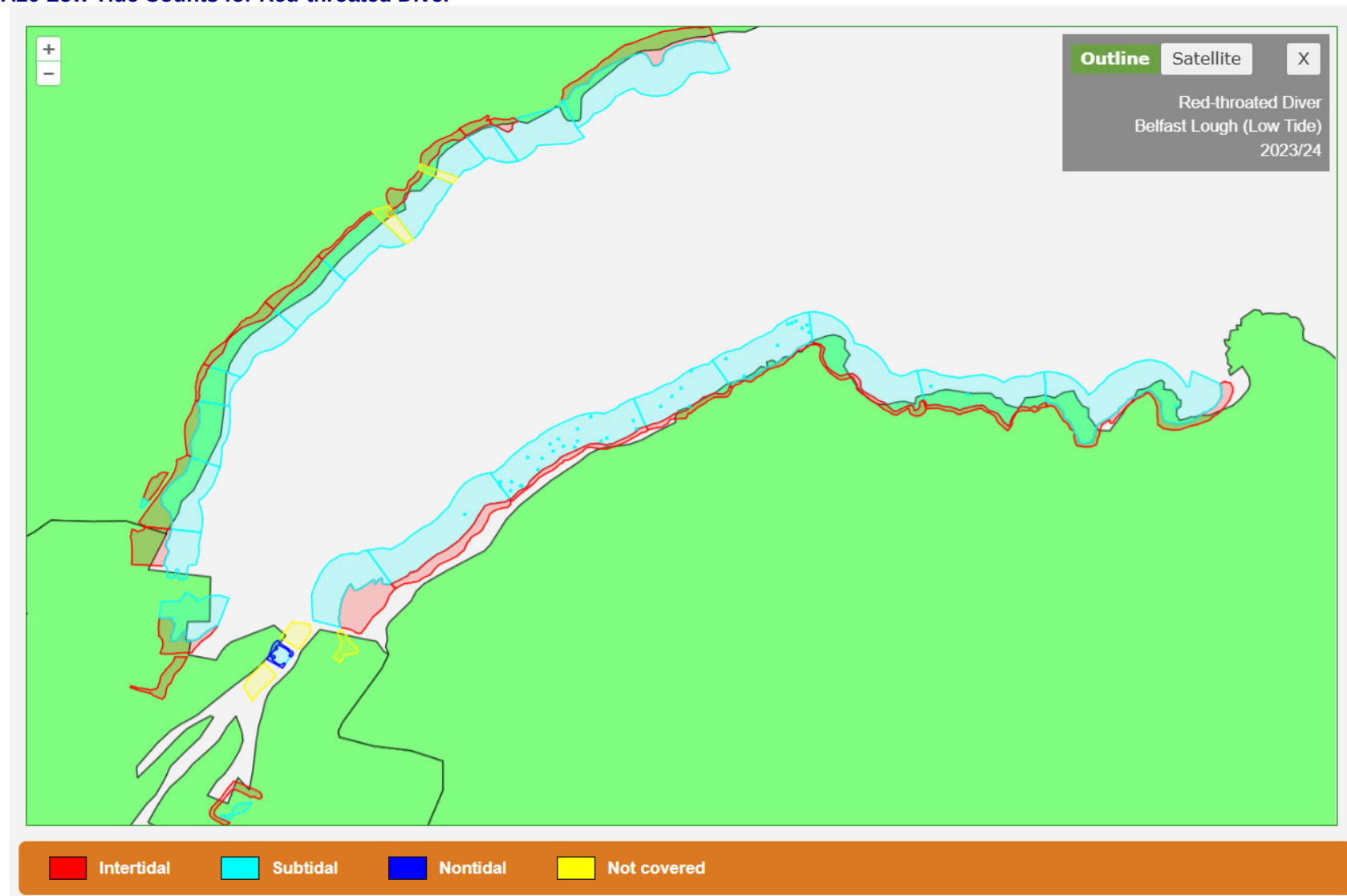
Figure A19 Low Tide Counts for Great-crested Grebe





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

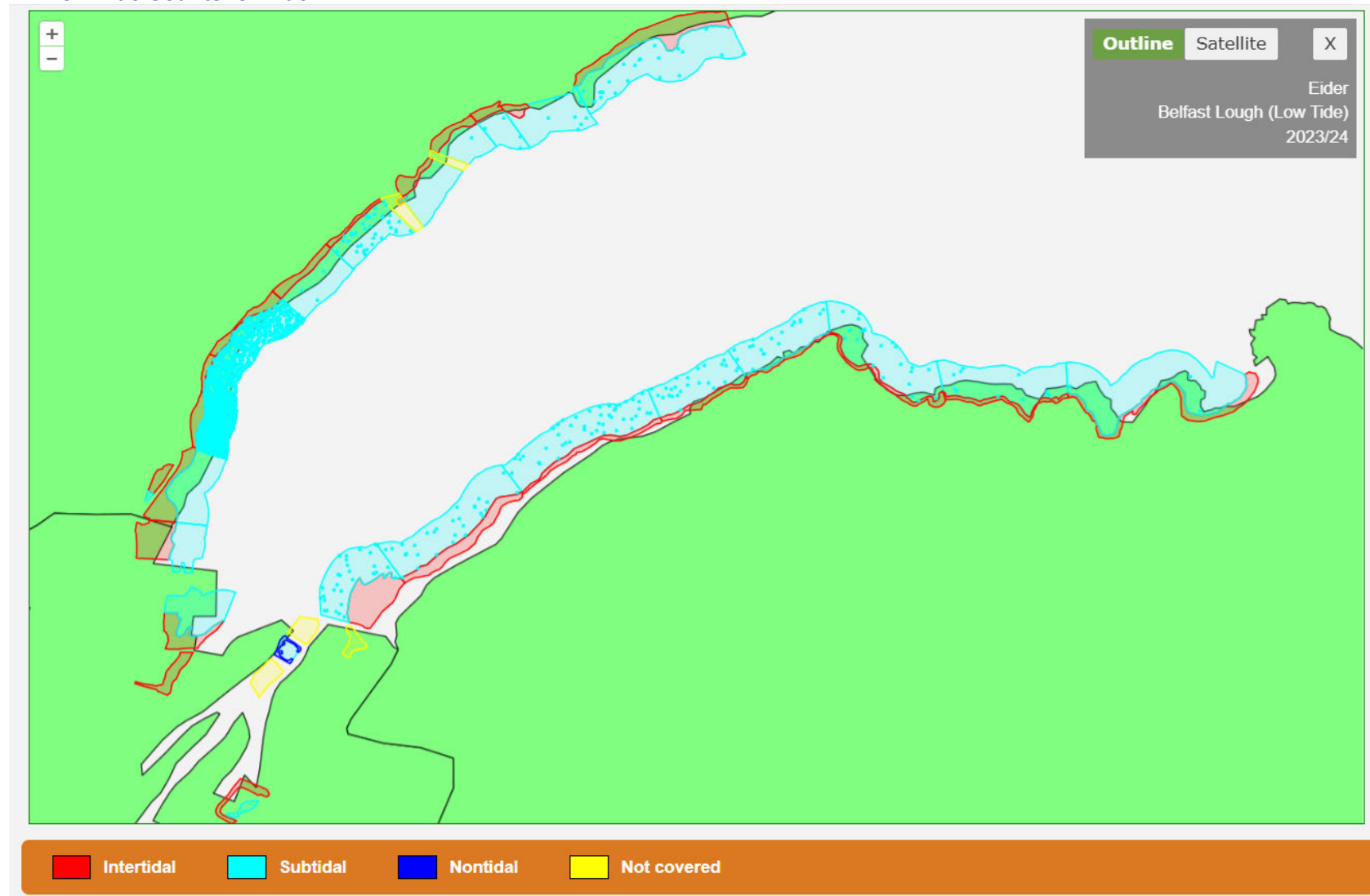
Figure A20 Low Tide Counts for Red-throated Diver





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

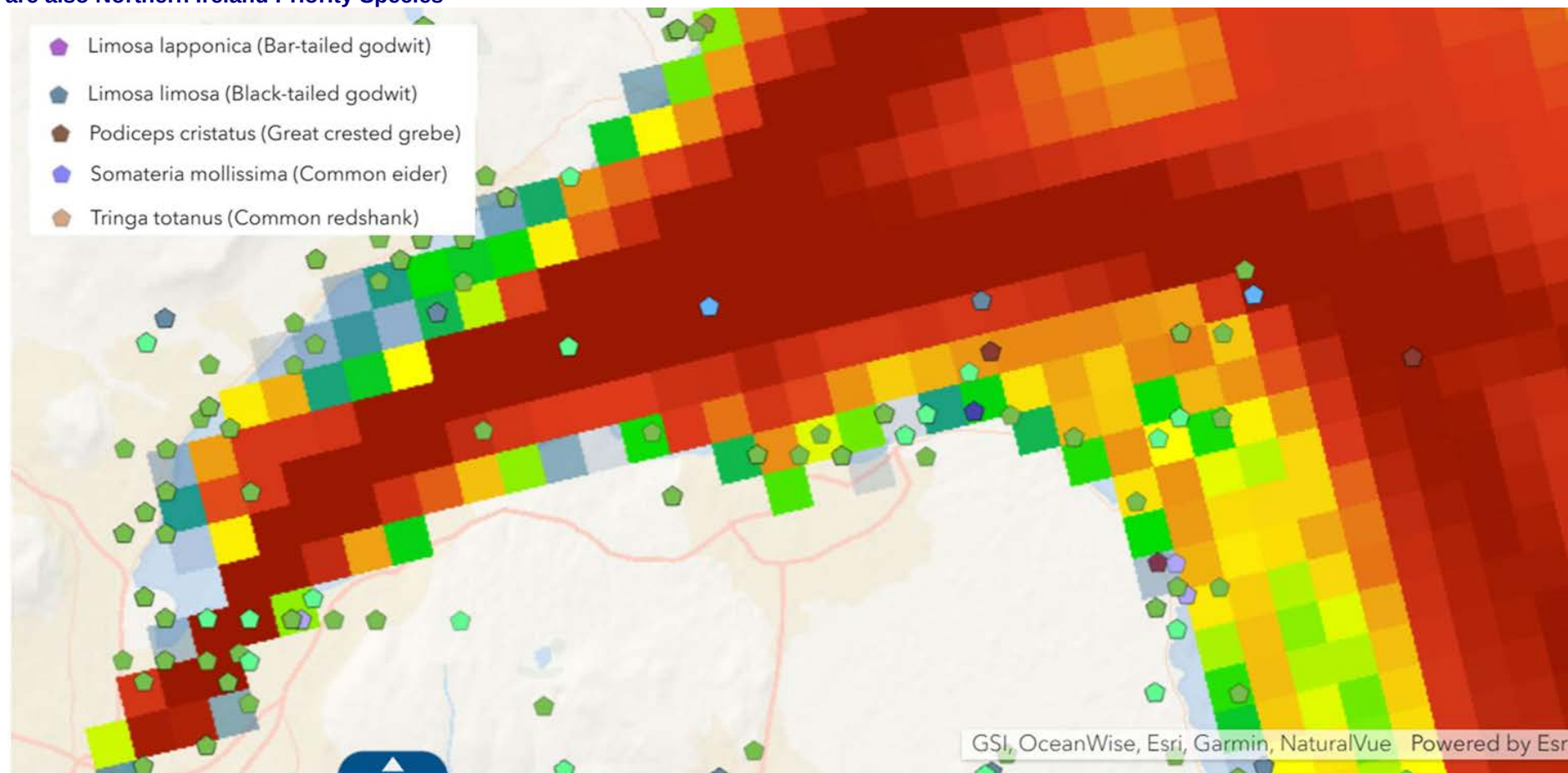
Figure A21 Low Tide Counts for Eider





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

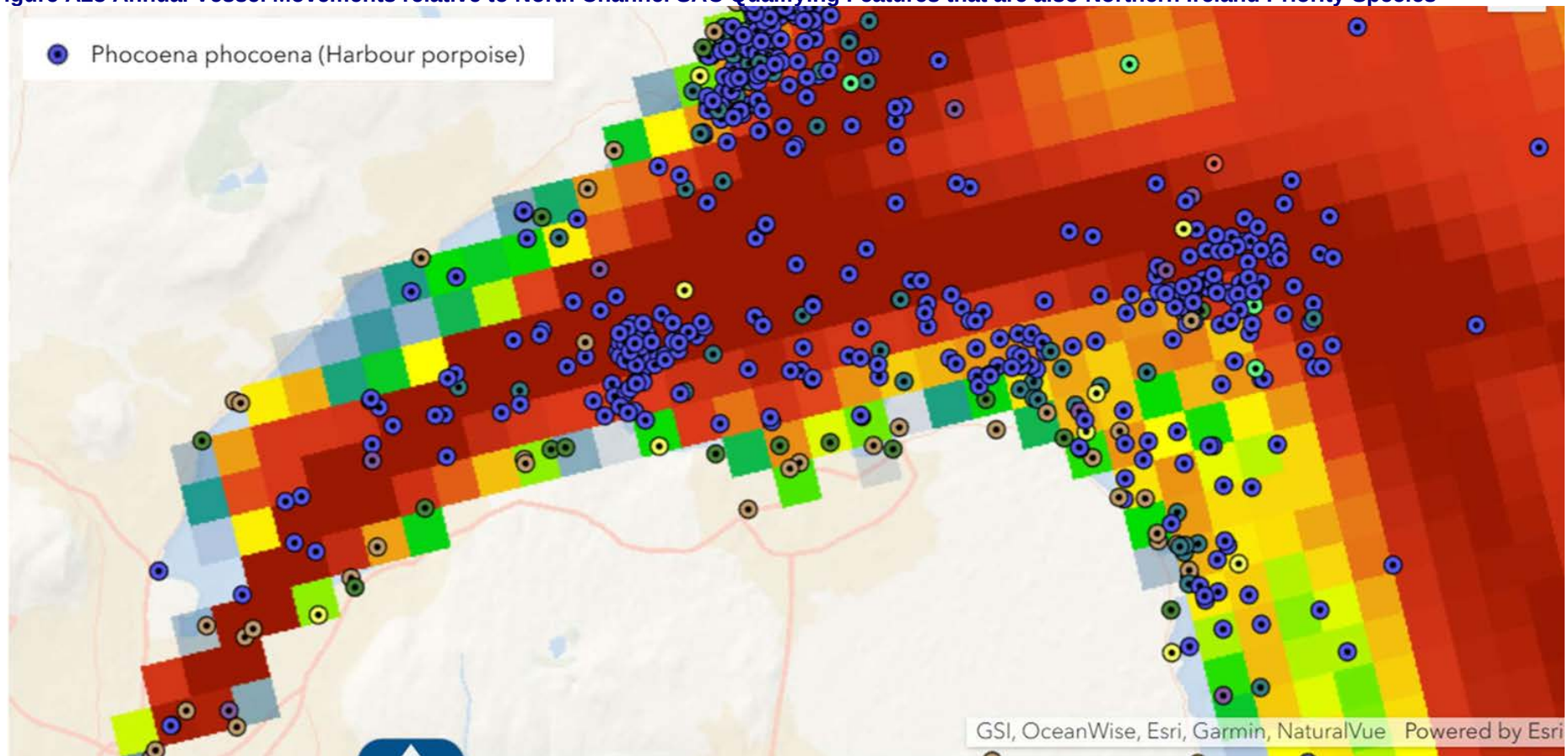
Figure A22 Annual Vessel Movements relative to Belfast Lough SPA and proposed East Coast (Northern Ireland) Marine SPA Qualifying Species that are also Northern Ireland Priority Species





Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Figure A23 Annual Vessel Movements relative to North Channel SAC Qualifying Features that are also Northern Ireland Priority Species





APPENDIX B

SEDIMENT CHARACTERISATION DATA AND COMPARISON TO SEDIMENT QUALITY STANDARDS



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Table B1 Sediment Sample Composition

Sample ID	Moisture Content (%)	Total Solids (%)	Gravel (>2mm) (%)	Sand (63µm-2mm) (%)	Silt (<63µm) (%)	Total Organic Carbon (%)
1	75.7	24.3	0.43	50.51	49.05	6.93
2	76.5	23.5	0.00	27.50	72.50	5.87
3	76.0	24.0	0.23	35.36	64.40	5.71
4	59.6	40.4	0.29	40.61	59.10	2.77
5	72.3	27.7	0.00	14.16	85.84	4.87
6	70.5	29.5	0.00	22.73	77.27	4.03
7	73.2	26.8	5.47	16.55	77.98	4.28
8	83.4	16.6	0.78	74.67	24.54	>22.2
9	61.7	38.3	0.00	0.00	100.00	4.72
10	65.9	34.1	1.51	2.14	96.35	5.63
11	68.2	31.8	0.00	6.92	93.08	1.85
12	67.9	32.1	0.07	3.80	96.14	2.08
13	66.3	33.7	0.00	1.71	98.29	2.25
14	66.6	33.4	1.46	4.95	93.59	3.56
15	62.3	37.7	0.69	0.83	98.49	3.51
16	55.4	44.6	6.44	4.51	89.05	4.09
17	63.3	36.7	0.96	0.87	98.16	2.20
18	64.3	35.7	0.00	0.00	100.00	2.00
19	60.2	39.8	0.00	0.28	99.72	3.63
20	61.6	38.4	9.11	5.93	84.97	9.26
21	68.7	31.3	0.16	34.74	65.10	6.21
22	62.7	37.3	0.00	0.32	99.68	2.68
23	59.9	40.1	0.00	7.85	92.15	2.02
24	68.1	31.9	0.00	0.10	99.90	2.20
25	66.4	33.6	0.00	0.10	99.90	2.27
26	66.8	33.2	0.00	3.76	96.24	2.50
27	66.5	33.5	0.00	4.96	95.04	2.33
28	67.1	32.9	0.00	0.97	99.03	2.31
29	56.2	43.8	3.65	9.30	87.05	1.56
30	61.0	39.0	0.00	0.00	100.00	2.01



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	Moisture Content (%)	Total Solids (%)	Gravel (>2mm) (%)	Sand (63µm-2mm) (%)	Silt (<63µm) (%)	Total Organic Carbon (%)
31	64.9	35.1	0.00	0.28	99.72	2.26
32	55.8	44.2	0.26	27.02	72.72	1.27
33	50.5	49.5	0.00	38.71	61.29	1.23
34	51.4	48.6	0.33	56.92	42.75	0.53
35	39.6	60.4	0.09	55.77	44.15	0.62
36	51.1	48.9	0.24	54.83	44.93	0.77

Table B2 Analyte Abbreviations

Abbreviations have been used in the headings of the following tables, as defined in the table below.

Analyte Groups	Abbreviations
Organotins	TBT (tributyltin) DBT (dibutyltin) MBT (monobutyltin)
PAHs	PAHs (polycyclic aromatic hydrocarbons) BAA (benzo[a]anthracene) BAP (benzo[a]pyrene) BBF (benzo[b]fluoranthene) BENZGHIP (benzo[ghi]perylene) BKF (benzo[k]fluoranthene) DBENZAH (dibenzo[ah]anthracene) INDPYR (indeno[1,2,3-cd]pyrene)
THC	THC (total hydrocarbons content)
PCBs	PCBs (polychlorinated biphenyls) ΣICES7 (sum of the International Council for the Exploration of the Sea (ICES) 7 PCB congeners 28, 52, 101, 118, 138, 153 and 180) Σ25 PCBs (sum of all 25 PCB congeners)



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Table B3 Sediment Quality Standards

Sediment quality has been determined by comparing the data identifying the contaminant concentrations within the sediment samples to sediment quality standards.

Contaminant	Units	UK Action Levels*		US Effects Ranges**	
		Action Level 1 (AL1)	Action Level 2 (AL2)	Effect Range Low (ERL)	Effect Range Median (ERM)
Metals: arsenic	mg.kg ⁻¹ dry weight	20	100		
Metals: cadmium	mg.kg ⁻¹ dry weight	0.4	5		
Metals: chromium	mg.kg ⁻¹ dry weight	40	400		
Metals: copper	mg.kg ⁻¹ dry weight	40	400		
Metals: mercury	mg.kg ⁻¹ dry weight	0.3	3		
Metals: nickel	mg.kg ⁻¹ dry weight	20	200		
Metals: lead	mg.kg ⁻¹ dry weight	50	500		
Metals: zinc	mg.kg ⁻¹ dry weight	130	800		
Organo-tins: TBT	mg.kg ⁻¹ dry weight	0.1	1		
Organo-tins: DBT	mg.kg ⁻¹ dry weight	0.1	1		
PCBs: sum of ICES 7 congeners	mg.kg ⁻¹ dry weight	10			
PCBs: sum of 25 congeners	mg.kg ⁻¹ dry weight	0.02	0.2		
PAHs: individual	mg.kg ⁻¹ dry weight	0.1			
PAHs: acenaphthene	mg.kg ⁻¹ dry weight			0.044	0.64
PAHs: acenaphthylene	mg.kg ⁻¹ dry weight			0.016	0.5
PAHs: anthracene	mg.kg ⁻¹ dry weight			0.085	1.1
PAHs: benz[a]anthracene	mg.kg ⁻¹ dry weight			0.261	1.6
PAHs: chrysene	mg.kg ⁻¹ dry weight			0.384	2.8
PAHs: dibenz[a,h]anthracene	mg.kg ⁻¹ dry weight			0.063	0.26
PAHs: fluoranthene	mg.kg ⁻¹ dry weight			0.6	5.1
PAHs: fluorene	mg.kg ⁻¹ dry weight			0.019	0.54
PAHs: naphthalene	mg.kg ⁻¹ dry weight			0.16	2.1
PAHs: phenanthrene	mg.kg ⁻¹ dry weight			0.24	1.5
PAHs: pyrene	mg.kg ⁻¹ dry weight			0.665	2.6

Table B4 Key to Sediment Contaminant Data Comparison

Indicator	Data Comparison to Cefas Action Levels and US Effects Ranges
	Data is below UK Action Level 1 / US Effects Range Low
	Data is above UK Action level 1 and below UK Action Level 2 / above US Effects Range Low and below US Effects Range Median
	Data is above UK Action Level 2 / above US Effects Range Median
	Not applicable as there is no UK Action Level / US Effects Range



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Table B5 Metals (mg/kg dry weight) and Organo-tins (mg/kg dry weight) compared to UK Action Levels

Sample ID	Metals									Organotins		
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Aluminium	TBT	DBT	MBT
1	8.4	0.51	135	69.8	55.3	0.26	60.9	269	62200	<0.005	<0.005	0.045
2	12.5	0.60	125	71.1	52.4	0.23	59.1	259	80400	<0.005	<0.005	0.032
3	10.6	0.58	116	67.2	48.3	0.17	54.6	246	80700	<0.005	<0.005	0.032
4	9.4	0.37	94.5	40.7	33.7	0.12	43.7	140	63500	<0.005	0.013	0.016
5	12.1	0.40	97.6	48.0	41.4	0.14	45.9	168	79200	<0.005	<0.005	0.023
6	14.2	0.81	101	73.2	80.6	0.32	44.5	239	71600	<0.005	0.045	0.020
7	11.9	0.56	104	58.0	47.4	0.19	50.9	196	74500	<0.005	0.031	<0.005
8	3.9	0.12	19.8	14.8	10.1	0.22	12.5	80.3	14900	<0.005	<0.005	<0.005
9	14.1	0.40	113	49.2	49.5	0.20	51.4	299	70700	<0.005	<0.005	0.027
10	10.2	0.45	110	55.2	39.4	0.15	47.4	194	60400	0.022	0.079	0.015
11	11.1	0.28	98.2	31.3	29.9	0.10	41.2	125	63100	<0.005	<0.005	0.044
12	23.7	0.66	200	71.4	62.2	0.23	79.9	268	66400	<0.005	<0.005	0.037
13	13.0	0.30	95.3	34.4	35.9	0.11	44.5	142	68500	<0.005	<0.005	0.033
14	13.5	1.14	121	66.4	58.9	0.18	48.1	279	72500	0.033	0.095	0.763
15	11.6	0.88	99.2	54.2	51.6	0.19	47.7	273	61600	0.022	0.058	0.027
16	11.1	0.58	108	47.7	38.9	0.17	51.9	178	62300	0.014	0.031	0.024
17	13.1	0.57	116	42.4	43.6	0.24	47.5	172	68900	<0.005	0.017	0.060
18	14.4	0.33	116	36.6	40.5	0.13	50.0	158	66800	<0.005	<0.005	0.054
19	14.8	0.78	133	65.4	77.0	0.28	53.4	319	61400	0.048	0.034	0.088
20	14.6	0.65	106	78.0	77.5	0.23	51.6	286	76600	0.045	0.056	0.102
21	12.9	0.88	131	81.1	83.7	0.36	58.8	352	75800	0.148	0.032	0.119
22	14.4	0.46	110	51.6	56.5	0.24	48.0	219	73200	0.032	0.023	0.087
23	14.2	0.34	114	38.0	44.1	0.15	47.6	157	90400	0.006	0.013	0.014
24	14.6	0.25	102	29.7	43.8	0.12	44.0	147	79500	<0.005	<0.005	0.021
25	15.2	0.26	108	33.5	44.3	0.14	47.7	158	81400	<0.005	<0.005	0.023
26	14.0	0.24	102	30.0	39.5	0.15	44.2	145	74700	<0.005	<0.005	0.020
27	16.1	0.26	116	33.6	45.7	0.15	50.8	163	90900	<0.005	<0.005	0.017
28	13.4	0.22	92.3	27.8	37.7	0.11	41.6	139	93800	<0.005	<0.005	0.020
29	11.7	0.22	110	26.5	29.6	0.08	45.4	116	71600	<0.005	<0.005	0.021
30	13.1	0.22	97.8	27.4	37.0	0.10	42.0	137	73100	<0.005	<0.005	0.020



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	Metals									Organotins		
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Aluminium	TBT	DBT	MBT
31	15.4	0.25	106	31.0	43.7	0.12	47.3	156	94500	<0.005	<0.005	0.018
32	10.5	0.21	98.0	22.0	29.0	0.09	36.9	104	70500	<0.005	<0.005	0.017
33	11.1	0.23	101	21.6	30.5	0.08	36.6	106	82300	<0.005	<0.005	0.017
34	7.6	0.11	97.5	11.0	18.0	0.03	25.9	57.6	48600	<0.001	<0.001	<0.001
35	8.5	0.09	90.3	11.0	17.3	0.02	24.7	55.2	46700	<0.001	<0.001	<0.001
36	7.8	0.10	89.3	11.7	21.8	0.03	27.7	66.1	49500	<0.001	<0.001	<0.001
AL1	20	0.4	40	40	50	0.3	20	130	-	0.1	0.1	-
AL2	100	5	400	400	500	3	200	800	-	1	1	-

Table B6 Polyaromatic Hydrocarbons (PAHs) and Total Hydrocarbon Content (THC) (mg/kg dry weight) compared to UK Action Levels

Sample ID	PAHs							
	Acenaphthene	Acenaphthylene	Anthracene	BAA	BAP	BBF	BGHIP	BKF
1	0.024	0.101	0.116	0.306	0.409	0.320	0.304	0.335
2	0.036	0.043	0.101	0.274	0.359	0.339	0.307	0.278
3	0.030	0.062	0.093	0.283	0.362	0.352	0.309	0.308
4	0.028	0.050	0.081	0.162	0.208	0.166	0.181	0.162
5	0.033	0.041	0.088	0.190	0.259	0.198	0.251	0.196
6	0.063	0.077	0.156	0.402	0.518	0.475	0.399	0.385
7	0.056	0.037	0.098	0.220	0.287	0.256	0.298	0.189
8	0.277	0.204	0.381	1.030	1.310	0.955	1.000	0.930
9	0.035	0.025	0.075	0.179	0.190	0.183	0.215	0.152
10	0.029	0.019	0.067	0.158	0.239	0.172	0.256	0.133
11	<0.005	<0.005	0.020	0.068	0.047	0.130	0.113	0.099
12	0.023	<0.005	0.028	0.073	0.100	0.103	0.096	0.094
13	<0.005	<0.005	0.026	0.076	0.113	0.128	0.123	0.120
14	0.035	0.023	0.083	0.122	0.101	0.092	0.100	0.046
15	0.050	0.048	0.120	0.303	0.422	0.337	0.391	0.234
16	0.043	0.032	0.102	0.288	0.402	0.259	0.389	0.169
17	0.021	0.021	0.043	0.183	0.260	0.250	0.244	0.156
18	<0.005	<0.005	0.025	0.077	0.106	0.109	0.114	0.079
19	0.026	0.026	0.073	0.156	0.226	0.265	0.246	0.204



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PAHs							
	Acenaphthene	Acenaphthylene	Anthracene	BAA	BAP	BBF	BGHIP	BKF
20	0.112	0.045	0.233	0.389	0.431	0.427	0.450	0.347
21	0.045	0.055	0.134	0.367	0.470	0.464	0.440	0.481
22	0.017	0.022	0.042	0.109	0.159	0.180	0.164	0.138
23	<0.005	0.013	0.020	0.075	0.110	0.116	0.123	0.092
24	<0.005	<0.005	0.024	0.065	0.100	0.129	0.107	0.095
25	<0.005	<0.005	0.022	0.062	0.103	0.108	0.114	0.108
26	<0.005	<0.005	0.016	0.055	0.088	0.097	0.107	0.087
27	<0.005	<0.005	0.017	0.064	0.086	0.093	0.106	0.087
28	<0.005	<0.005	<0.005	0.060	0.040	0.096	0.105	0.105
29	<0.005	<0.005	0.014	0.040	0.062	0.072	0.073	0.062
30	<0.005	<0.005	0.015	0.046	0.067	0.077	0.074	0.074
31	<0.005	<0.005	0.015	0.047	0.077	0.082	0.087	0.095
32	<0.005	<0.005	0.015	0.050	0.061	0.071	0.058	0.062
33	<0.005	<0.005	<0.005	0.028	0.040	0.043	0.045	0.045
34	<0.001	0.003	0.004	0.015	0.020	0.027	0.021	0.024
35	0.009	0.004	0.011	0.033	0.045	0.051	0.042	0.044
36	0.003	0.005	0.005	0.026	0.040	0.051	0.041	0.044
AL1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
AL2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table B6 (cont) Polyaromatic Hydrocarbons (PAHs) and Total Hydrocarbon Content (THC) (mg/kg dry weight) compared to UK Action Levels

Sample ID	PAHs								THC
	Chrysene	DBENZAH	Fluoranthene	Fluorene	INDPYR	Naphthalene	Phenanthrene	Pyrene	
1	0.385	0.067	0.460	0.058	0.279	0.082	0.203	0.519	1140
2	0.352	0.065	0.462	0.065	0.269	0.129	0.309	0.535	1140
3	0.338	0.058	0.487	0.059	0.295	0.095	0.239	0.528	834
4	0.220	0.048	0.235	0.055	0.145	0.107	0.188	0.295	497
5	0.251	0.069	0.256	0.064	0.203	0.175	0.298	0.327	795
6	0.487	0.116	0.514	0.108	0.351	0.267	0.396	0.670	867
7	0.286	0.078	0.298	0.104	0.185	0.222	0.364	0.391	821
8	1.160	0.284	1.450	0.274	0.833	0.463	0.728	1.730	2000



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PAHs								THC
	Chrysene	DBENZAH	Fluoranthene	Fluorene	INDPYR	Naphthalene	Phenanthrene	Pyrene	
9	0.216	0.053	0.251	0.074	0.161	0.224	0.353	0.330	708
10	0.211	0.080	0.169	0.056	0.141	0.189	0.263	0.239	529
11	0.102	0.030	0.104	0.023	0.108	0.047	0.088	0.115	243
12	0.115	0.030	0.112	0.028	0.090	0.062	0.123	0.131	244
13	0.122	0.033	0.109	0.029	0.113	0.075	0.113	0.127	298
14	0.141	0.023	0.195	0.058	0.041	0.240	0.320	0.263	1040
15	0.419	0.118	0.303	0.091	0.237	0.214	0.307	0.473	761
16	0.426	0.133	0.242	0.082	0.185	0.207	0.344	0.417	631
17	0.329	0.088	0.153	0.040	0.175	0.114	0.184	0.257	460
18	0.146	0.031	0.084	0.020	0.085	0.051	0.093	0.117	272
19	0.186	0.045	0.233	0.051	0.208	0.091	0.197	0.344	786
20	0.490	0.087	0.639	0.165	0.303	0.353	0.653	0.780	1100
21	0.470	0.094	0.812	0.069	0.400	0.097	0.393	0.785	1640
22	0.158	0.037	0.164	0.029	0.151	0.065	0.113	0.219	604
23	0.149	0.031	0.087	0.022	0.103	0.046	0.079	0.111	313
24	0.096	0.026	0.104	0.021	0.099	0.039	0.085	0.123	258
25	0.092	0.032	0.088	0.020	0.111	0.043	0.083	0.100	296
26	0.092	0.025	0.076	0.019	0.097	0.043	0.076	0.091	199
27	0.094	0.023	0.089	0.018	0.092	0.040	0.075	0.099	258
28	0.088	0.025	0.088	0.018	0.106	0.040	0.069	0.098	257
29	0.060	0.016	0.065	0.015	0.064	0.030	0.053	0.072	189
30	0.065	0.015	0.086	0.015	0.071	0.029	0.061	0.091	207
31	0.075	0.021	0.078	0.017	0.092	0.036	0.067	0.089	228
32	0.067	0.015	0.086	0.015	0.057	0.026	0.075	0.089	162
33	0.039	<0.005	0.048	<0.005	0.040	0.021	0.041	0.052	125
34	0.019	0.004	0.031	0.004	0.021	0.009	0.023	0.029	21.4
35	0.042	0.008	0.062	0.010	0.039	0.015	0.053	0.067	38.3
36	0.034	0.008	0.035	0.007	0.040	0.019	0.028	0.037	35.6
AL1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
AL2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Table B7 Polyaromatic Hydrocarbons (PAHs) and Total Hydrocarbon Content (THC) (mg/kg dry weight) compared to US Effects Ranges

Sample ID	PAHs							
	Acenaphthene	Acenaphthylene	Anthracene	BAA	BAP	BBF	BGHIP	BKF
1	0.024	0.101	0.116	0.306	0.409	0.320	0.304	0.335
2	0.036	0.043	0.101	0.274	0.359	0.339	0.307	0.278
3	0.030	0.062	0.093	0.283	0.362	0.352	0.309	0.308
4	0.028	0.050	0.081	0.162	0.208	0.166	0.181	0.162
5	0.033	0.041	0.088	0.190	0.259	0.198	0.251	0.196
6	0.063	0.077	0.156	0.402	0.518	0.475	0.399	0.385
7	0.056	0.037	0.098	0.220	0.287	0.256	0.298	0.189
8	0.277	0.204	0.381	1.030	1.310	0.955	1.000	0.930
9	0.035	0.025	0.075	0.179	0.190	0.183	0.215	0.152
10	0.029	0.019	0.067	0.158	0.239	0.172	0.256	0.133
11	<0.005	<0.005	0.020	0.068	0.047	0.130	0.113	0.099
12	0.023	<0.005	0.028	0.073	0.100	0.103	0.096	0.094
13	<0.005	<0.005	0.026	0.076	0.113	0.128	0.123	0.120
14	0.035	0.023	0.083	0.122	0.101	0.092	0.100	0.046
15	0.050	0.048	0.120	0.303	0.422	0.337	0.391	0.234
16	0.043	0.032	0.102	0.288	0.402	0.259	0.389	0.169
17	0.021	0.021	0.043	0.183	0.260	0.250	0.244	0.156
18	<0.005	<0.005	0.025	0.077	0.106	0.109	0.114	0.079
19	0.026	0.026	0.073	0.156	0.226	0.265	0.246	0.204
20	0.112	0.045	0.233	0.389	0.431	0.427	0.450	0.347
21	0.045	0.055	0.134	0.367	0.470	0.464	0.440	0.481
22	0.017	0.022	0.042	0.109	0.159	0.180	0.164	0.138
23	<0.005	0.013	0.020	0.075	0.110	0.116	0.123	0.092
24	<0.005	<0.005	0.024	0.065	0.100	0.129	0.107	0.095
25	<0.005	<0.005	0.022	0.062	0.103	0.108	0.114	0.108
26	<0.005	<0.005	0.016	0.055	0.088	0.097	0.107	0.087
27	<0.005	<0.005	0.017	0.064	0.086	0.093	0.106	0.087
28	<0.005	<0.005	<0.005	0.060	0.040	0.096	0.105	0.105
29	<0.005	<0.005	0.014	0.040	0.062	0.072	0.073	0.062
30	<0.005	<0.005	0.015	0.046	0.067	0.077	0.074	0.074



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PAHs							
	Acenaphthene	Acenaphthylene	Anthracene	BAA	BAP	BBF	BGHIP	BKF
31	<0.005	<0.005	0.015	0.047	0.077	0.082	0.087	0.095
32	<0.005	<0.005	0.015	0.050	0.061	0.071	0.058	0.062
33	<0.005	<0.005	<0.005	0.028	0.040	0.043	0.045	0.045
34	<0.001	0.003	0.004	0.015	0.020	0.027	0.021	0.024
35	0.009	0.004	0.011	0.033	0.045	0.051	0.042	0.044
36	0.003	0.005	0.005	0.026	0.040	0.051	0.041	0.044
ERL	0.044	0.016	0.085	0.261	0.43	n/a	n/a	n/a
ERM	0.64	0.5	1.1	1.6	1.6	n/a	n/a	n/a

Table B7 (cont) Polyaromatic Hydrocarbons (PAHs) and Total Hydrocarbon Content (THC) (mg/kg dry weight) compared to US Effects Ranges

Sample ID	PAHs								THC
	Chrysene	DBENZAH	Fluoranthene	Fluorene	INDPYR	Naphthalene	Phenanthrene	Pyrene	
1	0.385	0.067	0.460	0.058	0.279	0.082	0.203	0.519	1140
2	0.352	0.065	0.462	0.065	0.269	0.129	0.309	0.535	1140
3	0.338	0.058	0.487	0.059	0.295	0.095	0.239	0.528	834
4	0.220	0.048	0.235	0.055	0.145	0.107	0.188	0.295	497
5	0.251	0.069	0.256	0.064	0.203	0.175	0.298	0.327	795
6	0.487	0.116	0.514	0.108	0.351	0.267	0.396	0.670	867
7	0.286	0.078	0.298	0.104	0.185	0.222	0.364	0.391	821
8	1.160	0.284	1.450	0.274	0.833	0.463	0.728	1.730	2000
9	0.216	0.053	0.251	0.074	0.161	0.224	0.353	0.330	708
10	0.211	0.080	0.169	0.056	0.141	0.189	0.263	0.239	529
11	0.102	0.030	0.104	0.023	0.108	0.047	0.088	0.115	243
12	0.115	0.030	0.112	0.028	0.090	0.062	0.123	0.131	244
13	0.122	0.033	0.109	0.029	0.113	0.075	0.113	0.127	298
14	0.141	0.023	0.195	0.058	0.041	0.240	0.320	0.263	1040
15	0.419	0.118	0.303	0.091	0.237	0.214	0.307	0.473	761
16	0.426	0.133	0.242	0.082	0.185	0.207	0.344	0.417	631
17	0.329	0.088	0.153	0.040	0.175	0.114	0.184	0.257	460
18	0.146	0.031	0.084	0.020	0.085	0.051	0.093	0.117	272
19	0.186	0.045	0.233	0.051	0.208	0.091	0.197	0.344	786



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PAHs								THC
	Chrysene	DBENZAH	Fluoranthene	Fluorene	INDPYR	Naphthalene	Phenanthrene	Pyrene	
20	0.490	0.087	0.639	0.165	0.303	0.353	0.653	0.780	1100
21	0.470	0.094	0.812	0.069	0.400	0.097	0.393	0.785	1640
22	0.158	0.037	0.164	0.029	0.151	0.065	0.113	0.219	604
23	0.149	0.031	0.087	0.022	0.103	0.046	0.079	0.111	313
24	0.096	0.026	0.104	0.021	0.099	0.039	0.085	0.123	258
25	0.092	0.032	0.088	0.020	0.111	0.043	0.083	0.100	296
26	0.092	0.025	0.076	0.019	0.097	0.043	0.076	0.091	199
27	0.094	0.023	0.089	0.018	0.092	0.040	0.075	0.099	258
28	0.088	0.025	0.088	0.018	0.106	0.040	0.069	0.098	257
29	0.060	0.016	0.065	0.015	0.064	0.030	0.053	0.072	189
30	0.065	0.015	0.086	0.015	0.071	0.029	0.061	0.091	207
31	0.075	0.021	0.078	0.017	0.092	0.036	0.067	0.089	228
32	0.067	0.015	0.086	0.015	0.057	0.026	0.075	0.089	162
33	0.039	<0.005	0.048	<0.005	0.040	0.021	0.041	0.052	125
34	0.019	0.004	0.031	0.004	0.021	0.009	0.023	0.029	21.4
35	0.042	0.008	0.062	0.010	0.039	0.015	0.053	0.067	38.3
36	0.034	0.008	0.035	0.007	0.040	0.019	0.028	0.037	35.6
ERM	0.384	0.063	0.600	0.019	n/a	0.16	0.24	0.665	n/a
ERL	2.8	0.260	5.1	0.54	n/a	2.1	1.5	2.6	n/a

Table B8 Polychlorinated Biphenyls (PCBs) (mg/kg dry weight) compared to UK Action Levels

Sample ID	PCB Congener													
	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB18	PCB105	PCB110	PCB128	PCB141	PCB149	PCB151	PCB156
1	0.00112	0.00044	0.00138	0.00121	0.00023	0.00144	0.00033	0.00129	0.00040	0.00156	0.00019	0.00021	0.00051	0.00043
2	0.00115	0.00051	0.00120	0.00152	0.00037	0.00160	0.00047	0.00129	0.00043	0.00179	0.00035	0.00042	0.00066	0.00030
3	0.00098	0.00038	0.00100	0.00106	0.00025	0.00154	0.00026	0.00122	0.00038	0.00155	0.00017	0.00029	0.00048	0.00023
4	0.00067	0.00033	0.00074	0.00079	0.00021	0.00119	0.00019	0.00092	0.00026	0.00126	0.00015	0.00018	0.00041	0.00019
5	0.00055	0.00026	0.00050	0.00075	0.00016	0.00082	0.00012	0.00069	0.00019	0.00118	0.00009	0.00019	0.00035	0.00012
6	0.00211	0.00074	0.00203	0.00224	0.00056	0.00335	0.00056	0.00291	0.00089	0.00385	0.00039	0.00040	0.00143	0.00052
7	0.00115	0.00040	0.00099	0.00116	0.00026	0.00172	0.00020	0.00136	0.00048	0.00200	0.00022	0.00022	0.00055	0.00031



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PCB Congener													
	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB18	PCB105	PCB110	PCB128	PCB141	PCB149	PCB151	PCB156
8	0.00015	0.00009	0.00029	0.00032	<0.00008	0.00022	<0.00008	0.00035	0.00012	0.00028	<0.00008	0.00009	<0.00008	0.00011
9	0.00049	0.00021	0.00039	0.00075	0.00010	0.00068	<0.00008	0.00064	0.00015	0.00088	<0.00008	0.00010	0.00024	0.00009
10	0.00047	0.00019	0.00050	0.00063	0.00013	0.00064	<0.00008	0.00062	0.00016	0.00090	0.00009	0.00010	0.00028	0.00012
11	0.00028	0.00018	0.00026	0.00047	0.00012	0.00062	<0.00008	0.00041	0.00012	0.00061	<0.00008	0.00009	0.00016	<0.00008
12	0.00040	0.00018	0.00036	0.00053	0.00008	0.00059	0.00009	0.00046	0.00013	0.00070	0.00008	<0.00008	0.00018	<0.00008
13	0.00041	0.00017	0.00035	0.00052	0.00017	0.00061	<0.00008	0.00051	0.00013	0.00077	<0.00008	0.00011	0.00021	0.00008
14	0.00213	0.00072	0.00201	0.00224	0.00051	0.00315	0.00072	0.00351	0.00113	0.00452	0.00035	0.00046	0.00154	0.00081
15	0.00212	0.00059	0.00200	0.00211	0.00044	0.00295	0.00064	0.00301	0.00074	0.00376	0.00034	0.00044	0.00130	0.00044
16	0.00091	0.00042	0.00089	0.00100	0.00021	0.00124	0.00022	0.00124	0.00035	0.00144	0.00013	0.00022	0.00050	0.00022
17	0.00079	0.00030	0.00074	0.00103	0.00019	0.00118	0.00020	0.00102	0.00027	0.00123	0.00012	0.00018	0.00037	0.00017
18	0.00037	0.00017	0.00037	0.00056	0.00010	0.00055	<0.00008	0.00044	0.00011	0.00071	<0.00008	0.00010	0.00017	<0.00008
19	0.00223	0.00081	0.00216	0.00226	0.00051	0.00290	0.00070	0.00323	0.00094	0.00381	0.00040	0.00041	0.00180	0.00288
20	0.00296	0.00112	0.00333	0.00332	0.00061	0.00320	0.00060	0.00293	0.00098	0.00413	0.00046	0.00056	0.00104	0.00283
21	0.00144	0.00061	0.00185	0.00205	0.00045	0.00213	0.00045	0.00195	0.00048	0.00252	0.00027	0.00044	0.00075	0.00036
22	0.00106	0.00047	0.00116	0.00134	0.00028	0.00136	0.00021	0.00124	0.00027	0.00178	0.00020	0.00030	0.00043	0.00025
23	0.00059	0.00029	0.00063	0.00093	0.00014	0.00078	0.00009	0.00063	0.00017	0.00088	0.00012	0.00015	0.00024	0.00009
24	0.00037	0.00015	0.00028	0.00055	0.00017	0.00058	<0.00008	0.00044	0.00014	0.00069	<0.00008	0.00009	0.00020	<0.00008
25	0.00034	0.00018	0.00035	0.00056	0.00016	0.00057	<0.00008	0.00047	0.00013	0.00072	<0.00008	0.00011	0.00017	<0.00008
26	0.00034	0.00016	0.00026	0.00052	0.00009	0.00059	<0.00008	0.00044	0.00010	0.00071	0.00008	0.00008	0.00014	<0.00008
27	0.00033	0.00018	0.00028	0.00047	0.00015	0.00058	<0.00008	0.00040	0.00013	0.00068	<0.00008	0.00010	0.00018	<0.00008
28	0.00033	0.00017	0.00024	0.00054	0.00011	0.00054	0.00008	0.00042	0.00011	0.00069	<0.00008	0.00011	0.00020	<0.00008
29	0.00029	0.00018	0.00029	0.00046	0.00008	0.00053	<0.00008	0.00039	0.00011	0.00063	<0.00008	<0.00008	0.00017	<0.00008
30	0.00026	0.00013	0.00024	0.00046	0.00010	0.00046	<0.00008	0.00033	0.00011	0.00060	<0.00008	<0.00008	0.00015	<0.00008
31	0.00031	0.00015	0.00023	0.00045	0.00011	0.00054	<0.00008	0.00038	0.00012	0.00058	<0.00008	<0.00008	0.00016	<0.00008
32	0.00018	0.00011	0.00015	0.00035	0.00009	0.00035	<0.00008	0.00029	0.00010	0.00042	<0.00008	<0.00008	0.00012	<0.00008
33	0.00022	0.00011	0.00018	0.00026	<0.00008	0.00033	<0.00008	0.00023	<0.00008	0.00037	<0.00008	<0.00008	0.00009	<0.00008
34	<0.00008	<0.00008	<0.00008	0.00013	<0.00008	0.00011	<0.00008	0.00012	<0.00008	0.00014	<0.00008	<0.00008	<0.00008	<0.00008
35	<0.00008	<0.00008	<0.00008	0.00010	<0.00008	0.00011	<0.00008	0.00008	<0.00008	0.00013	<0.00008	<0.00008	<0.00008	<0.00008
36	0.00009	<0.00008	<0.00008	0.00016	<0.00008	0.00013	<0.00008	0.00011	<0.00008	0.00017	<0.00008	<0.00008	<0.00008	<0.00008
AL1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PCB Congener													
	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB18	PCB105	PCB110	PCB128	PCB141	PCB149	PCB151	PCB156
AL2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table B8 (cont) Polychlorinated Biphenyls (PCBs) (mg/kg dry weight) compared to UK Action Levels

Sample ID	PCB Congener											Sum of 7 PCBs	Sum of 25 PCBs
	PCB158	PCB170	PCB180	PCB183	PCB187	PCB194	PCB31	PCB44	PCB47	PCB49	PCB66		
1	0.00132	0.00025	0.00061	0.00032	0.00067	0.00059	0.00075	0.00025	0.00076	0.00110	0.00086	0.00843	0.01822
2	0.00131	0.00043	0.00078	0.00041	0.00068	0.00046	0.00057	0.00027	0.00053	0.00079	0.00090	0.00883	0.01919
3	0.00138	0.00031	0.00070	0.00031	0.00058	0.00039	0.00042	0.00017	0.00044	0.00065	0.00069	0.00774	0.01583
4	0.00093	0.00025	0.00046	0.00026	0.00042	0.00034	0.00037	0.00013	0.00030	0.00045	0.00049	0.00572	0.01189
5	0.00077	0.00014	0.00044	0.00016	0.00035	0.00025	0.00021	0.00009	0.00021	0.00032	0.00042	0.00474	0.00933
6	0.00324	0.00074	0.00170	0.00075	0.00107	0.00088	0.00080	0.00028	0.00081	0.00132	0.00135	0.01717	0.03492
7	0.00139	0.00036	0.00079	0.00037	0.00062	0.00051	0.00040	0.00018	0.00042	0.00067	0.00077	0.00869	0.0175
8	0.00021	<0.00008	0.00012	<0.00008	0.00020	0.00010	<0.00008	<0.00008	<0.00008	0.00011	0.00012	0.00149	0.0036
9	0.00055	0.00013	0.00036	0.00018	0.00030	0.00020	0.00014	0.00008	0.00018	0.00026	0.00037	0.00391	0.00763
10	0.00057	0.00016	0.00030	0.00016	0.00031	0.00022	0.00020	0.00009	0.00018	0.00027	0.00037	0.00379	0.00774
11	0.00042	0.00013	0.00025	0.00013	0.00020	0.00014	0.00011	<0.00008	0.00012	0.00016	0.00027	0.00276	0.00557
12	0.00047	0.00013	0.00028	0.00014	0.00024	0.00014	0.00014	<0.00008	0.00012	0.00019	0.00027	0.00313	0.00614
13	0.00044	0.00011	0.00028	0.00012	0.00024	0.00017	0.00015	<0.00008	0.00013	0.00020	0.00032	0.00319	0.00644
14	0.00402	0.00096	0.00212	0.00104	0.00133	0.00128	0.00119	0.00042	0.00128	0.00182	0.00169	0.01922	0.04095
15	0.00318	0.00067	0.00161	0.00084	0.00086	0.00074	0.00085	0.00030	0.00088	0.00136	0.00125	0.01634	0.03342
16	0.00132	0.00031	0.00065	0.00032	0.00055	0.00045	0.00041	0.00016	0.00039	0.00062	0.00069	0.00708	0.01486
17	0.00089	0.00024	0.00057	0.00026	0.00041	0.00031	0.00026	0.00012	0.00031	0.00048	0.00053	0.00602	0.01217
18	0.00049	0.00013	0.00027	0.00014	0.00022	0.00016	0.00012	<0.00008	0.00015	0.00021	0.00031	0.00312	0.00617
19	0.00683	0.00126	0.00349	0.00480	0.00372	0.00368	0.00188	0.00061	0.00187	0.00211	0.00260	0.02385	0.05789
20	0.00240	0.00063	0.00152	0.00081	0.00395	0.00369	0.00194	0.00064	0.00187	0.00254	0.00264	0.02249	0.0507
21	0.00182	0.00038	0.00093	0.00043	0.00069	0.00069	0.00060	0.00023	0.00057	0.00087	0.00086	0.01151	0.02382
22	0.00115	0.00026	0.00060	0.00035	0.00061	0.00048	0.00044	0.00018	0.00040	0.00058	0.00076	0.00789	0.01616
23	0.00059	0.00016	0.00038	0.00022	0.00025	0.00018	0.00018	<0.00008	0.00017	0.00030	0.00036	0.00431	0.0086
24	0.00044	0.00011	0.00027	0.00013	0.00022	0.00013	0.00011	<0.00008	0.00011	0.00016	0.00026	0.00301	0.00592
25	0.00042	0.00014	0.00030	0.00013	0.00022	0.00014	0.00011	<0.00008	0.00013	0.00019	0.00031	0.00302	0.00617
26	0.00040	0.00011	0.00029	0.00015	0.00022	0.00012	0.00013	<0.00008	0.00012	0.00016	0.00029	0.00294	0.00574



Belfast Harbour Maintenance Dredging HRA Stage 1 Screening Information

Sample ID	PCB Congener											Sum of 7 PCBs	Sum of 25 PCBs
	PCB158	PCB170	PCB180	PCB183	PCB187	PCB194	PCB31	PCB44	PCB47	PCB49	PCB66		
27	0.00040	0.00011	0.00027	0.00012	0.00020	0.00012	0.00013	<0.00008	0.00012	0.00016	0.00028	0.00282	0.00571
28	0.00041	0.00012	0.00026	0.00015	0.00018	0.00011	0.00013	<0.00008	0.00010	0.00014	0.00026	0.00283	0.00564
29	0.00040	0.00010	0.00021	0.00013	0.00019	0.00012	0.00012	<0.00008	0.00011	0.00015	0.00025	0.00266	0.00531
30	0.00040	0.00009	0.00023	0.00012	0.00017	0.00010	0.00010	<0.00008	0.00009	0.00012	0.00022	0.00247	0.00488
31	0.00037	0.00010	0.00024	0.00012	0.00019	0.00012	0.00010	<0.00008	0.00010	0.00014	0.00024	0.00258	0.00515
32	0.00028	<0.00008	0.00017	<0.00008	0.00013	0.00009	<0.00008	<0.00008	<0.00008	0.00010	0.00017	0.00181	0.00382
33	0.00016	<0.00008	0.00012	<0.00008	0.00012	<0.00008	<0.00008	<0.00008	<0.00008	0.00009	0.00016	0.00155	0.0034
34	0.00010	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00067	0.0022
35	0.00009	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00058	0.00211
36	0.00009	<0.00008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00009	0.00075	0.00228
AL1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.01	0.02
AL2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.2