

Belfast Harbour

Maintenance Dredging

Information to Inform a Marine Conservation Zone Assessment - Stage 0 Screening Assessment

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Project Nr

755

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Belfast Harbour - Maintenance Dredging MCZ Stage 0 Screening Information

Client: Belfast Harbour Commissioners
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Assessment – Stage 0 Screening Assessment

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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 (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 their current marine licence (licence number: ML2023020) expires on 26 July 2026. 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 Marine Conservation Zone Assessment

Assessment Process

- 1.2.1 Section 23 of the Marine Act (Northern Ireland) 2013 places a duty on a public authority, before deciding to undertake, or give any consent, permission or other authorisation for an activity, to make an assessment of whether the activity is capable of affecting other than insignificantly (a) the protected features of a Marine Conservation Zone (MCZ) and (b) any ecological or geomorphological process on which the conservation of any protected features of an MCZ is (wholly or in part) dependent.
- 1.2.2 The assessment process is referred to as MCZ Assessment. MCZ Assessment comprises a process with up to three stages depending on the decision made at each



stage, as follows:

- Stage 0: screening – a determination of whether Section 23 of the Marine Act (NI) 2013 applies based on whether an activity is taking place within or near an area being put forward or already designated as an MCZ, and is capable of affecting other than insignificantly either the protected features of an MCZ, or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent. An activity must be subject to a MCZ Assessment if its effects on the MCZ cannot be shown to be insignificant.
- Stage 1: MCZ assessment – an assessment of whether there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ, and whether there is an alternative way of proceeding with an activity which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ (e.g., by applying some form of mitigation). An activity can proceed if its effects on the MCZ can be shown to pose no significant risk of hindering the achievement of the conservation objectives stated for the MCZ. An activity must be subject to a Stage 2 MCZ Assessment if its effects on the MCZ cannot be shown to pose no significant risk of hindering the achievement of the conservation objectives stated for the MCZ.
- Stage 2: MCZ assessment – an assessment of whether the benefit to the public of proceeding with an activity clearly outweighs the risk of environmental damage hindering the achievement of the conservation objectives stated for the MCZ, and whether measures of equivalent environmental benefit can be undertaken to address the environmental damage associated with proceeding with an activity. An activity can proceed if its benefit to the public outweighs the risk of environmental damage, and if its damage to the MCZ can be addressed through measures of equivalent environmental benefit. An activity cannot proceed if its benefit to the public does not outweigh the risk of environmental damage, and/or if its damage to the MCZ cannot be addressed through measures of equivalent environmental benefit.

Approach to Providing Information to Inform a MCZ Screening Assessment

- 1.2.3 This report provides the information required for a public authority to undertake a MCZ screening assessment.
- 1.2.4 For the purposes of consenting the proposed activities, the relevant public authorities under the Marine Act (Northern Ireland) 2013 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 are capable of affecting, other than insignificantly, the protected features of a MCZ and any ecological or geomorphological process on which the conservation of any protected features of an MCZ is (wholly or in part) dependent. 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 protected features of an MCZ), as follows:
- If there is not 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 an MCZ, and there is no need for an MCZ assessment.



- If there is 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 an MCZ, and there is a need for an MCZ assessment.

2 Information to Inform an MCZ 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 pass over 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 Potentially Affected MCZ Sites

Name and Location of Potentially Affected MCZ Sites

Outer Belfast Lough MCZ

- 2.3.1 Reference to the Northern Ireland Marine Mapviewer (gis.daera-ni.gov.uk; accessed 31-03-2026) shows that there are currently five MCZ sites in the Northern Ireland inshore region. Only one of these sites is situated within 40km of the proposed maintenance dredging and dredged material transport and deposition and, therefore, potentially affected by the proposed maintenance dredging and dredged material transport and deposition, namely, the Outer Belfast Lough MCZ.
- 2.3.2 The Outer Belfast Lough MCZ is situated in an open water location at the mouth of the lough, as shown in Figure A7 in **Appendix A**. It covers an area of seabed of approximately 2.51km².

Description of the Outer Belfast Lough MCZ

- 2.3.3 The Outer Belfast Lough MCZ has been designated for its well-established population of ocean quahog (*Arctica islandica*), a large, slow-growing bivalve mollusc, and its associated habitat of subtidal (sublittoral) sand with occasional small patches of gravelly muddy sand. The location and extent of the MCZ's species and habitat features are shown in Figure A8 in **Appendix A**.

Subtidal (Sublittoral) Sand Habitat Feature

- 2.3.4 Surveys undertaken in 2015 and 2022 show the subtidal (sublittoral) sand habitat feature to be characterised as a broad and complex seabed habitat dominated by sand with occasional small patches of gravelly muddy sand. The distributions of the principal habitat types within the MCZ are shown on Figure A9 in **Appendix A**. The predominant biotopes include A5.354 (*Virgularia mirabilis* and *Ophiura* spp with *Pecten maximus* on circalittoral sandy or shelly mud) and A5.262 (*Amphiura brachiata* with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand), although other biotopes are present including A5.444 (*Flustra foliacea* and *Hydrallmania falcata* on tide swept circalittoral mixed sediment) and A5.361 (Seapens and burrowing megafauna in circalittoral fine mud) which indicate the presence of muddy sand and sandy mud (DAERA, 2015b, 2025). The distributions of the principal biotopes within the MCZ are shown on Figure A10 in **Appendix A**.

Ocean Quahog Species Feature

- 2.3.5 The ocean quahog population is the primary selection reason for the MCZ. In Belfast Lough it is restricted to a small area at the mouth of the lough, with recorded densities of 4.5 individuals/m². This species is known to inhabit a range of sediments from coarse sand to muddy sand, over a wide range of water depths from 4m to 400m+. However, within the MCZ it predominately occurs on sublittoral firm sediments at water depths of approximately 20m to 25m (DAERA, 2016b). The presence/absence and abundance of the ocean quahog within the MCZ are shown on Figures A11 and A12 respectively in **Appendix A**.



Conservation Objectives

- 2.3.6 The following conservation objectives apply to the MCZ's habitat and species features:
- As subtidal (sublittoral) sand in Outer Belfast Lough MCZ is currently in unfavourable condition, the conservation objective is set to recover this feature to favourable condition.
 - As ocean quahog in Outer Belfast Lough MCZ is currently in unfavourable condition, the conservation objective is set to recover this feature to favourable condition.

Condition Status

- 2.3.7 The latest condition assessment (DAERA, 2025) identifies the condition status of the MCZ's designated features to be:
- Ocean quahog - 'Unfavourable – No change'.
 - Subtidal (sublittoral) sand - 'Unfavourable – No change'.

2.4 Potential for Activities to Affect the MCZ

Vulnerability of the MCZ Features

- 2.4.1 DAERA have identified that the MCZ's habitat and species features are vulnerable to the following pressures:
- Temperature changes.
 - Salinity changes.
 - Water flow (tidal current) changes.
 - Wave exposure changes.
 - De-oxygenation.
 - Organic enrichment.
 - Physical loss (to land or freshwater habitat).
 - Physical change (to another seabed or sediment type).
 - Habitat structure changes - removal of substratum (extraction)
 - Overall abrasion/disturbance of the surface/subsurface of the substratum or the seabed.
 - Siltation rate changes (including smothering).
 - Removal of non-target species (DAERA, 2016b).

Existing Activities Affecting the MCZ Features

- 2.4.2 DAERA have identified that the MCZ's features may be affected by the following activities within Belfast Lough:
- Extraction of living resources (e.g., fishing).
 - Energy generation.
 - Coastal infrastructure (e.g., docks, ports, marinas, coastal defences).
 - Waste management (e.g., sewage disposal, dredged material disposal).
 - Maritime transport (e.g., moorings, anchorages, vessel movements).
 - Recreation and leisure.
 - Marine research.



- Other man-made structures (e.g., submarine cable and pipeline operations) (DAERA, 2016b).

2.4.3 As noted above, the latest conservation status of the MCZ habitat and species features is 'unfavourable'. The principal reason for the unfavourable status is the physical damage caused by anchoring by commercial vessels and the use of demersal mobile fishing gear (DAERA, 2025). The use of demersal mobile fishing gear in the MCZ was prohibited in 2023 leaving unregulated anchoring as the main threat to the MCZ achieving its conservation objectives. Commercial vessels frequently anchor in Outer Belfast Lough and cause significant physical disturbance to the seabed due to anchoring and chain scouring, with approximately 30% of the MCZ estimated to be impacted between 2017-2021. DAERA have identified that managing anchoring could significantly reduce potentially long-term impacts to the MCZ's habitat and species features, and have noted that plans are underway to introduce a byelaw restricting anchoring in the MCZ (DAERA, 2025).

Potential for Proposed Activities to Affect the MCZ

2.4.4 The proposed activities associated with maintaining Belfast Harbour include the following activities with the potential to affect the MCZ:

- Coastal infrastructure activities - maintenance dredging activities.
- Maritime transport activities – dredged material transport activities.
- Waste management activities - dredged material deposition activities.

Potential for Maintenance Dredging Activities to Affect the MCZ

2.4.5 Maintenance dredging will take place to remove accreted sediment from within the confines of Belfast Harbour, as shown in Figures A2 to A4 in **Appendix A**, which at its closest point will be approximately 18km distant from the MCZ boundary, as shown in Figure A13 in **Appendix A**.

2.4.6 DAERA identified that the MCZ features are vulnerable to various pressures associated with existing coastal infrastructure activities including water flow changes, wave exposure changes, physical loss to land or freshwater habitat, physical change to another seabed type, habitat structure changes, seabed abrasion (surface and subsurface), and siltation rate changes including smothering (DAERA, 2016b). In addition, DAERA identified that existing coastal infrastructure activities (including maintenance dredging) pose a low risk of the MCZ features not achieving the conservation objectives unless the location or intensity of infrastructure or the associated operations are to change in the future (DAERA, 2016b).

2.4.7 The proposed maintenance dredging will not change the location or intensity of historical and ongoing maintenance dredging within Belfast Harbour, including the location and intensity of maintenance dredging that was taking place before the designation of the MCZ and has continued to take place during the designation of the MCZ. Monitoring of the previous maintenance dredging campaign in 2023 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 (AFBI, 2024). Accordingly, the proposed maintenance dredging is not expected to be capable of causing habitat change and loss, and/or direct damage to species within the MCZ.



- 2.4.8 Given the above findings, the proposed maintenance dredging is not expected to be capable of affecting, other than insignificantly, the MCZ's features and the ecological or geomorphological processes on which the conservation of MCZ's features are dependent.

Potential for Dredged Material Transport Activities to Affect the MCZ

- 2.4.9 Dredged material will be transported from dredging locations within Belfast Harbour to the deposition location at the Belfast Dredgings C (Live) disposal site, resulting in vessels passing close to the MCZ boundary, but not resulting in vessels anchoring within the MCZ boundary, as shown in Figure A6 in **Appendix A**.
- 2.4.10 DAERA identified that the MCZ features are vulnerable to various pressures associated with existing shipping activities including overall abrasion (surface and subsurface) and siltation rate changes (including smothering), most likely due to anchoring (DAERA, 2016b). In addition, DAERA identified that the existing shipping activities as transiting activities (including transport of dredged material) are significant in number (approximately 12,000 vessel movements per annum), with some transiting activities (including routine ferry transits) taking place within the MCZ boundary, as shown in Figure A14 in **Appendix A**, but pose a low risk of the MCZ features not achieving the conservation objectives (DAERA, 2016b).
- 2.4.11 The proposed dredged material transport will not change the location or intensity of historical and ongoing vessel transits within the MCZ boundary, including the location and intensity of vessel transits that was taking place before the designation of the MCZ and has continued to take place during the designation of the MCZ. Notably, the TSHD movements associated with the proposed dredged material transport activities are anticipated to contribute approximately 5-6% of the annual number of vessel movements through Belfast Lough. Accordingly, the proposed dredged material transport is not expected to be capable of causing habitat change and loss, and/or direct damage to species within the MCZ.
- 2.4.12 Given the above findings, the proposed dredged material transport is not expected to be capable of affecting, other than insignificantly, the MCZ's features and the ecological or geomorphological processes on which the conservation of MCZ's features are dependent.

Potential for Dredged Material Deposition Activities to Affect the MCZ

- 2.4.13 Dredged material deposition will take place at the Belfast Dredgings C (Live) disposal site, as shown in Figure A6 in **Appendix A**, which at its closest point will be approximately 7km distant from the MCZ boundary. [Note: the 'dredge disposal area' shown in Figure A15 in **Appendix A** is incorrect as it is a former sewage sludge disposal area and, therefore, not the Belfast Dredgings C (Live) disposal site.]
- 2.4.14 DAERA identified that the MCZ features are vulnerable to various pressures associated with existing waste management activities including de-oxygenation, organic enrichment, habitat structure changes, overall abrasion (surface and subsurface), siltation rate changes (including smothering) and removal of non-target species (DAERA, 2016b). In addition, DAERA identified that existing waste management activities (including deposition of dredged material) pose a low risk of the MCZ features not achieving the conservation objectives unless the location or intensity of dredged material deposition activities are to change in the future (DAERA, 2016b).



- 2.4.15 The proposed dredged material deposition will not change the location or intensity of historical and ongoing dredged material deposition at the Belfast Dredgings C (Live) disposal site, including the location and intensity of dredged material deposition that was taking place before the designation of the MCZ and has continued to take place during the designation of the MCZ. Monitoring of the previous maintenance dredging campaign in 2023 was undertaken by the AFBI on behalf of BHC. Monitoring found that dredged material deposition caused no substantive change in the physical seabed composition and no perceivable effect on mean species richness (AFBI, 2024). In addition, sediment sampling and analysis shows that the dredged material to be deposited does not contain contaminants at significant concentrations, as indicated by the information presented in **Appendix B**. Accordingly, the proposed dredged material deposition is not expected to be capable of causing habitat change and loss, and/or direct damage to species within the MCZ.
- 2.4.16 Given the above findings, the proposed dredged material deposition is not expected to be capable of affecting, other than insignificantly, the MCZ's features and the ecological or geomorphological processes on which the conservation of MCZ's features are dependent.

2.5 Conclusion

- 2.5.1 Based on the above findings, the proposed maintenance dredging, dredged material transport and dredged material deposition activities are not expected to be capable of affecting, other than insignificantly, the MCZ's features and the ecological or geomorphological processes on which the conservation of MCZ's features are dependent.

3 References

- AFBI (2024). Belfast Harbour Dredge Monitoring 2023-2024. Agri-Food & Biosciences Institute, January 2024.
- BHC (2025). Belfast Harbour. Annual Report & Accounts 2024.
- DAERA (2016a). Outer Belfast Lough Marine Conservation Zone Designation Order.
- DAERA (2016b). Outer Belfast Lough Marine Conservation Zone Conservation Objectives and Potential Management Options.
- DAERA (2025). Outer Belfast Lough MCZ Condition Assessment Report 2025.

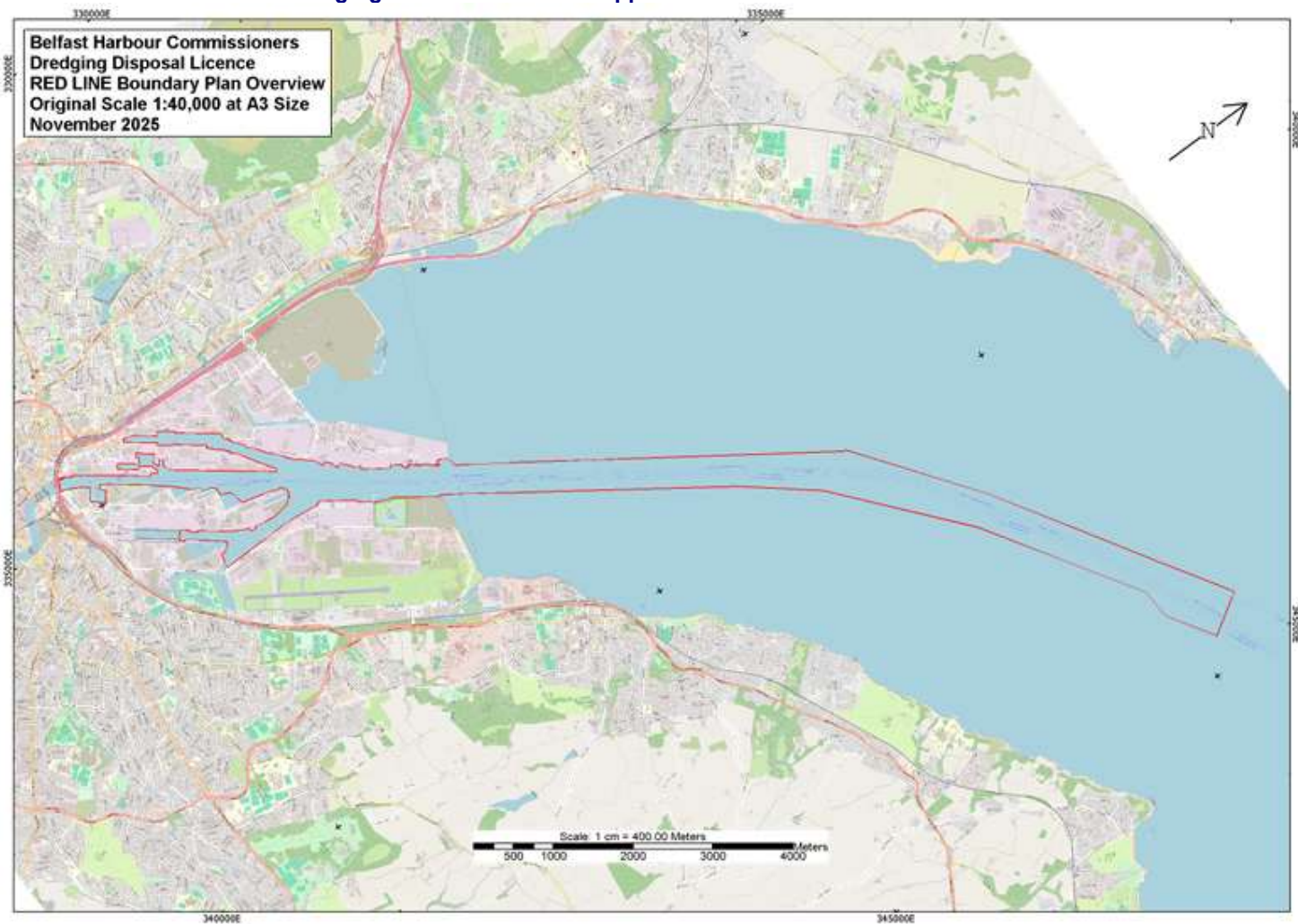


APPENDIX A FIGURES



Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

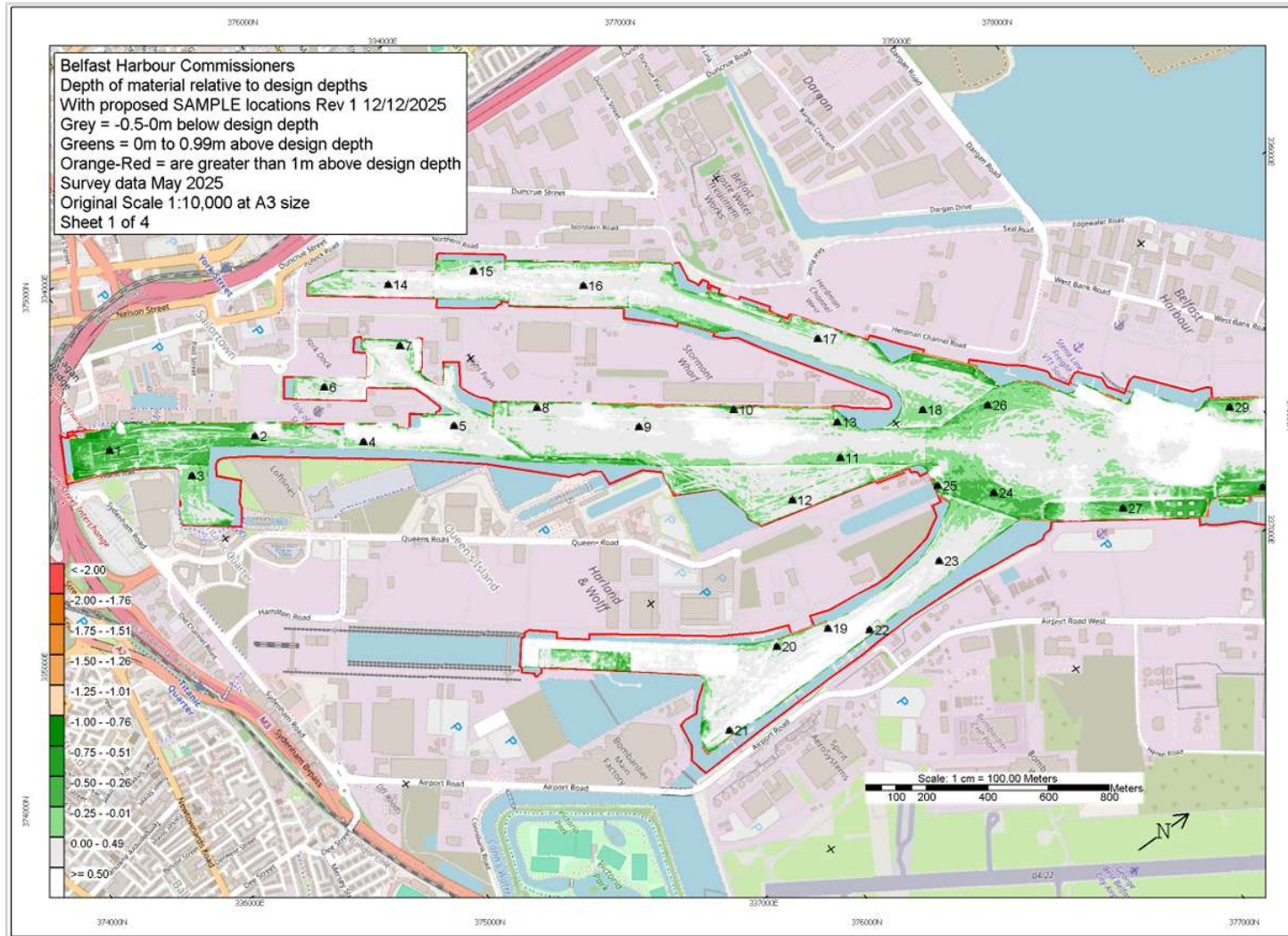
Figure A1 Belfast Harbour Maintenance Dredging Area - Harbour and Approach Channel





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

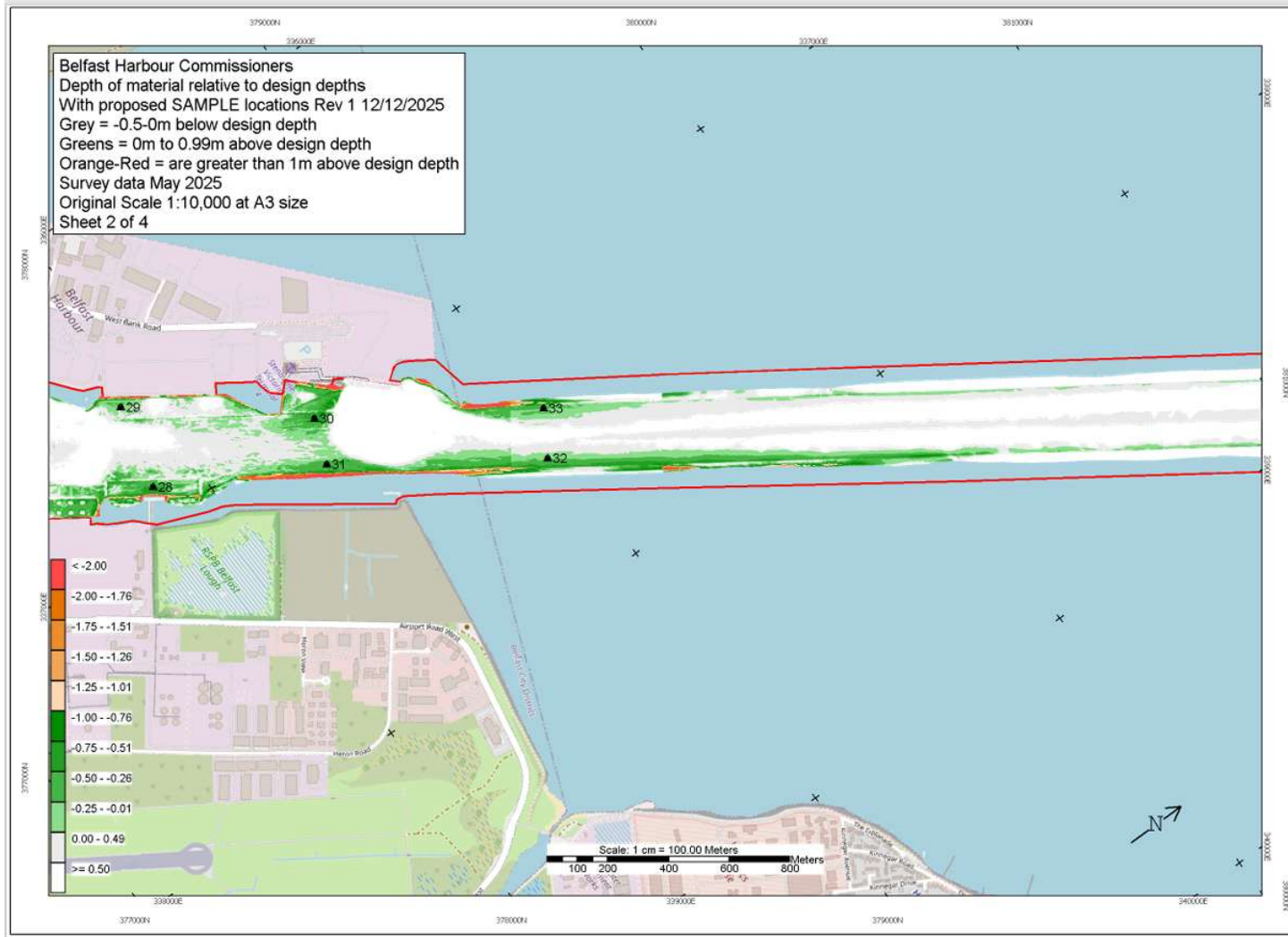
Figure A2 Belfast Harbour Sediment Accumulation – Harbour





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

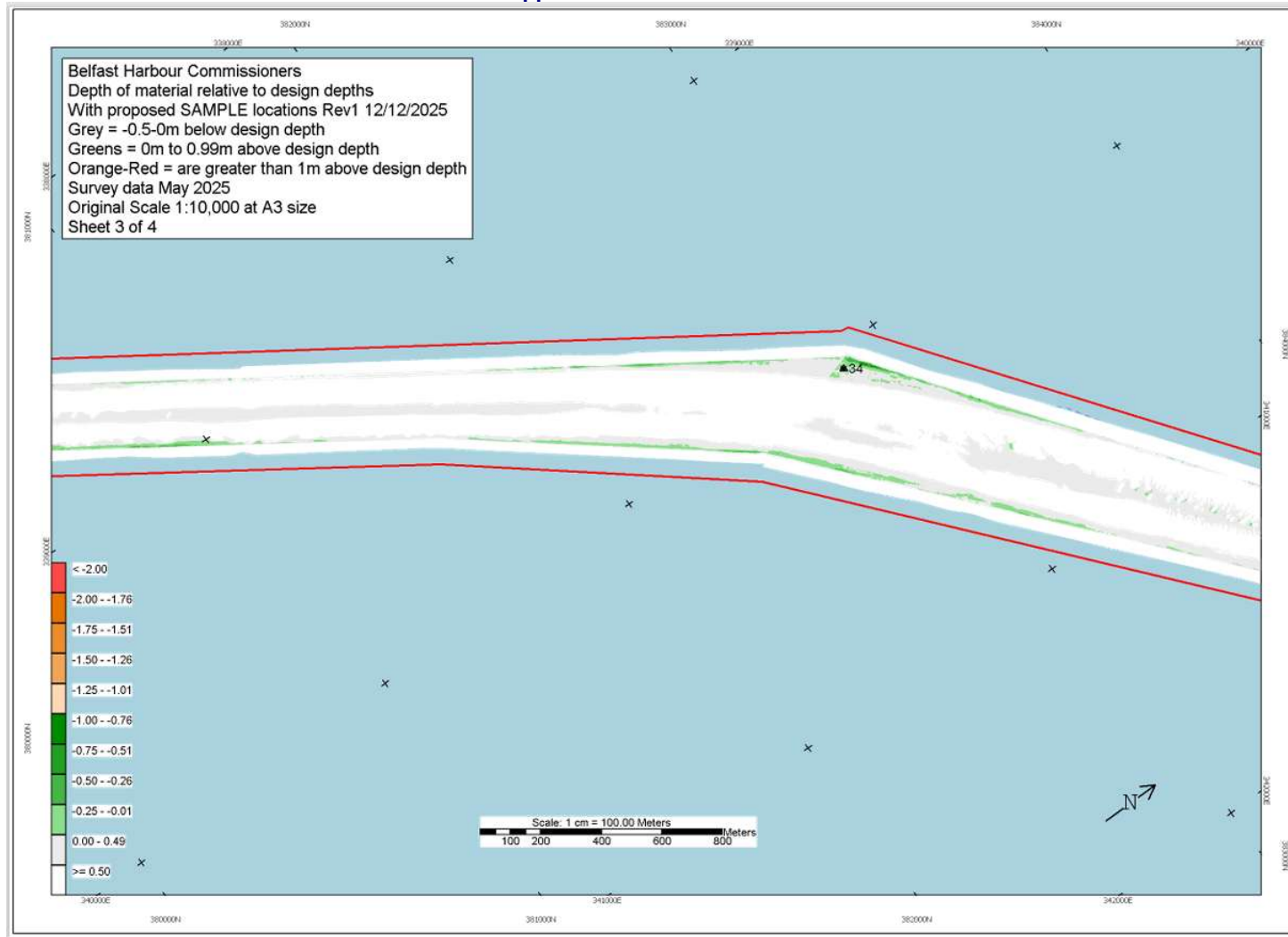
Figure A3 Belfast Harbour Sediment Accumulation – Inner Approach Channel





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

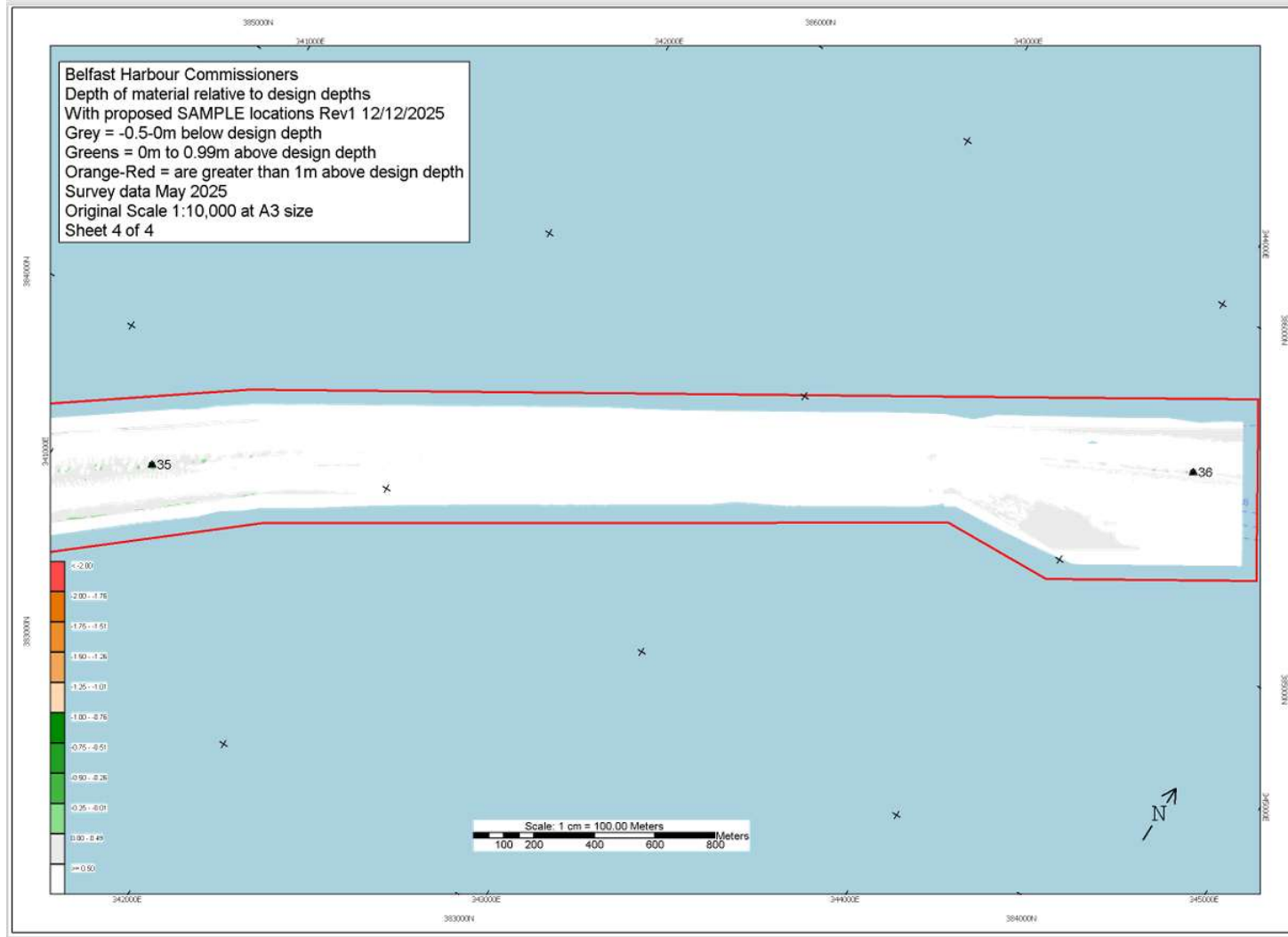
Figure A4 Belfast Harbour Sediment Accumulation – Middle Approach Channel





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

Figure A5 Belfast Harbour Sediment Accumulation – Outer Approach Channel





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

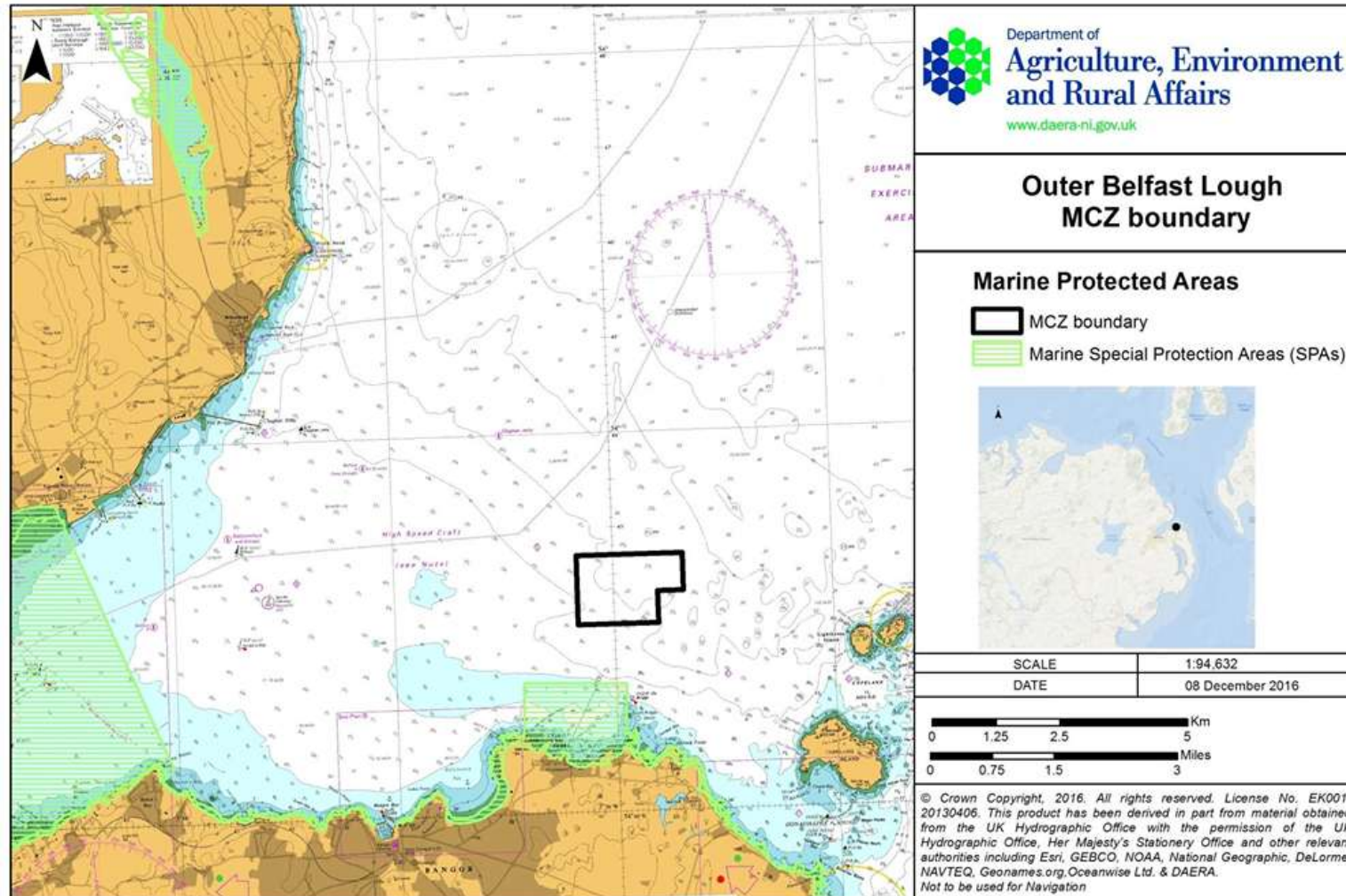
Figure A6 Belfast Dredgings C (Live) Disposal Site and TSHD Tracks in 2023 in relation to the Outer Belfast Lough MCZ Boundary





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

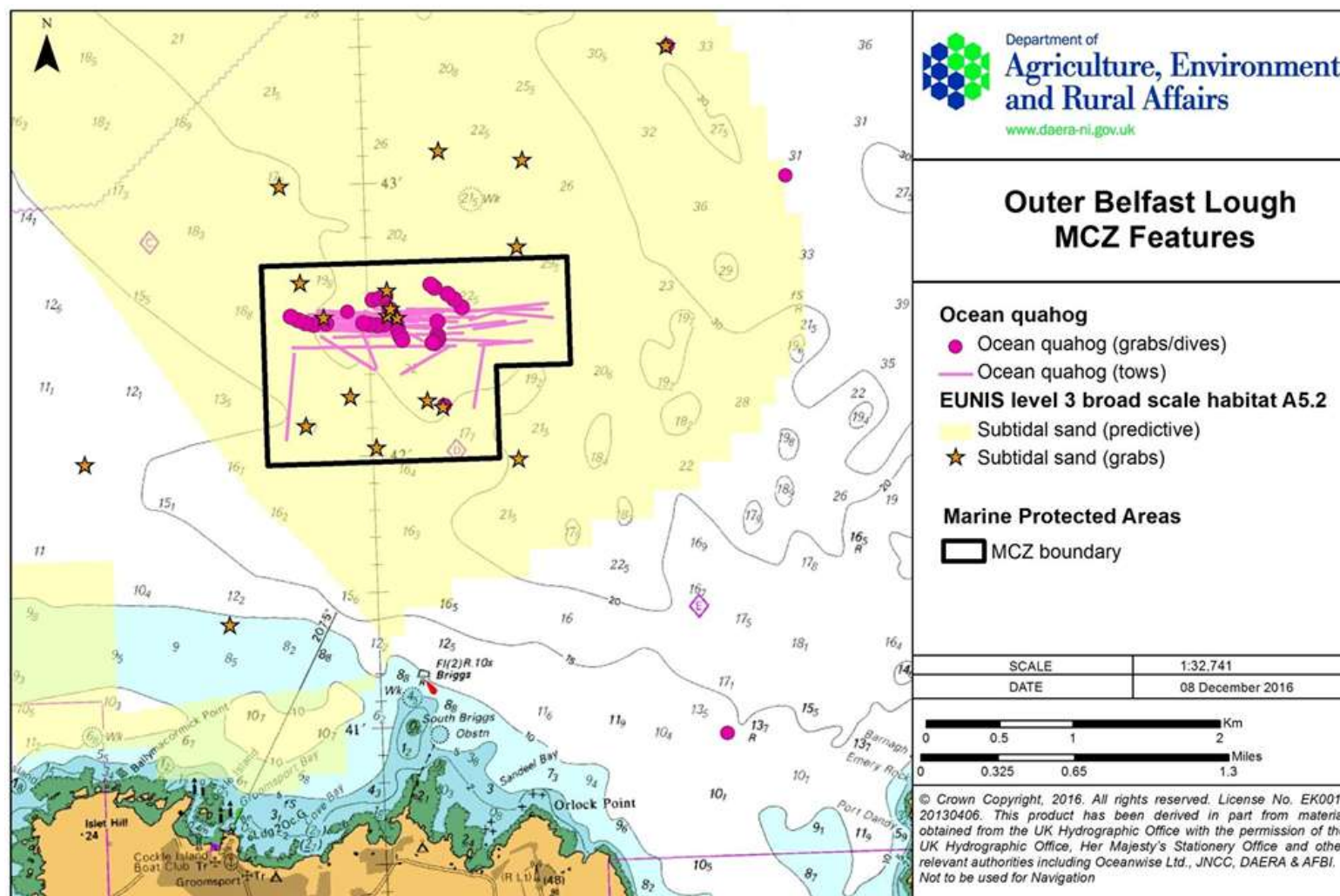
Figure A7 Outer Belfast Lough MCZ Boundary (source: DAERA, 2016b)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

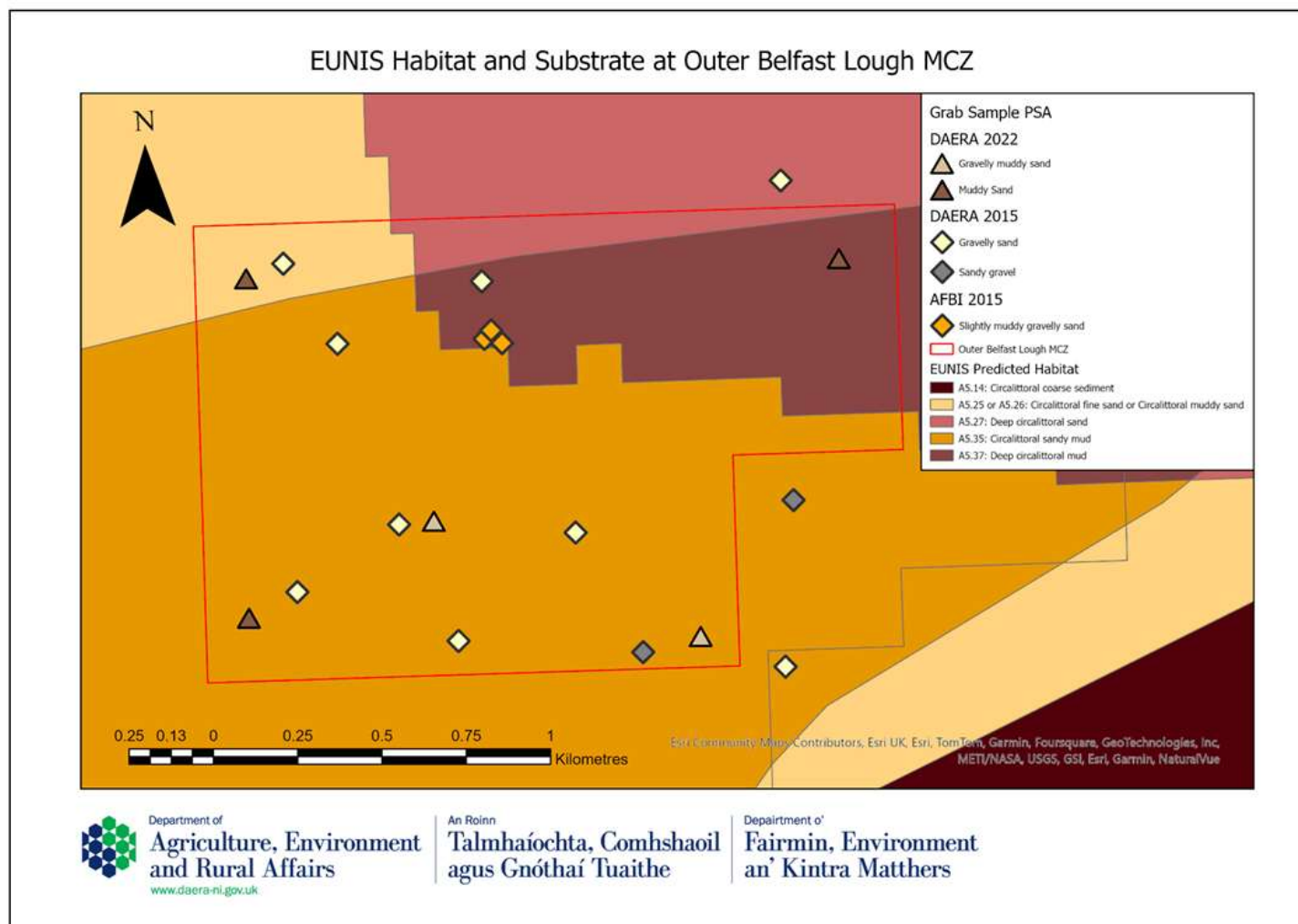
Figure A8 Location and Extent of Species and Habitat Features in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2016b)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

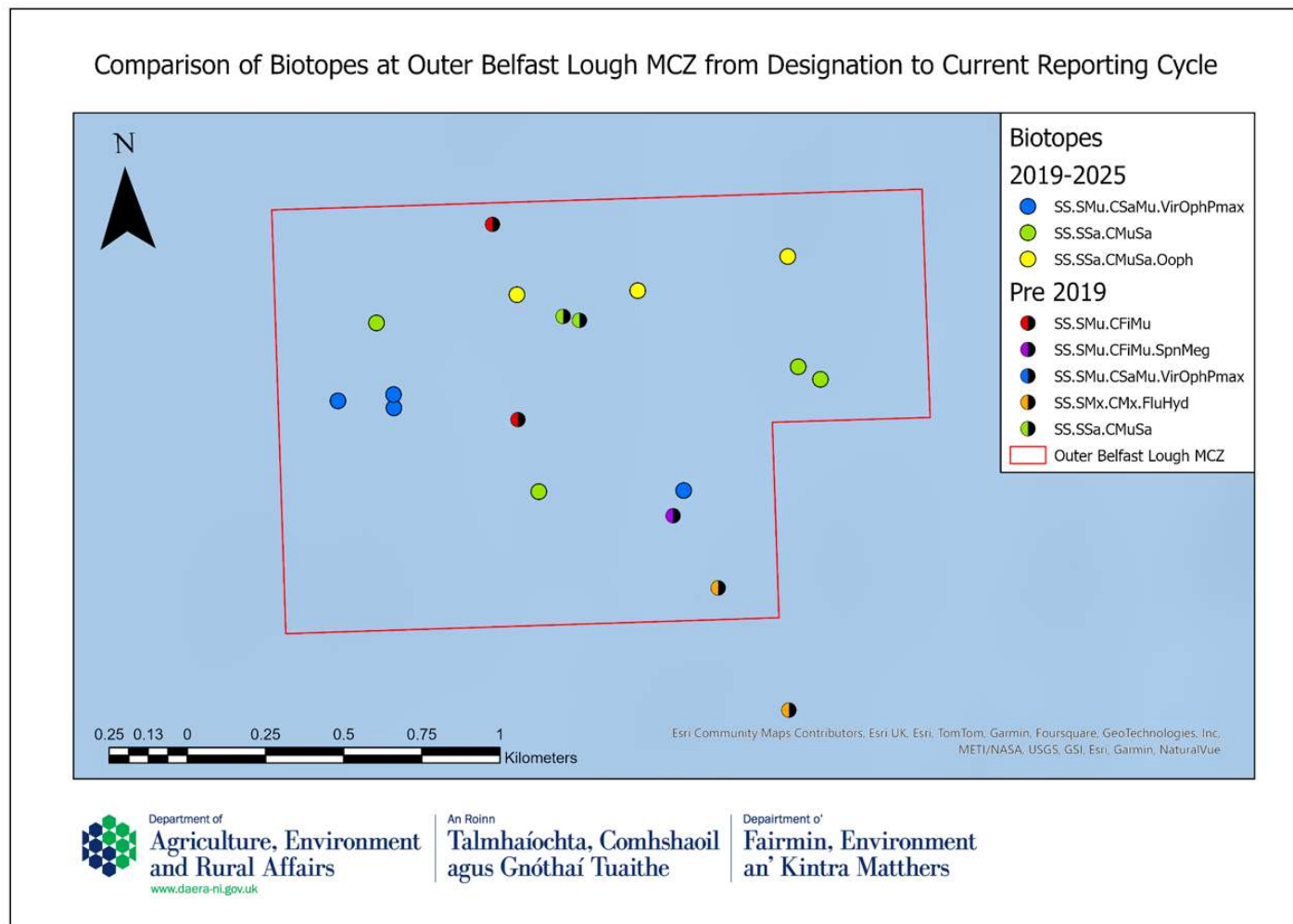
Figure A9 Distribution of Habitat Types in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2025)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

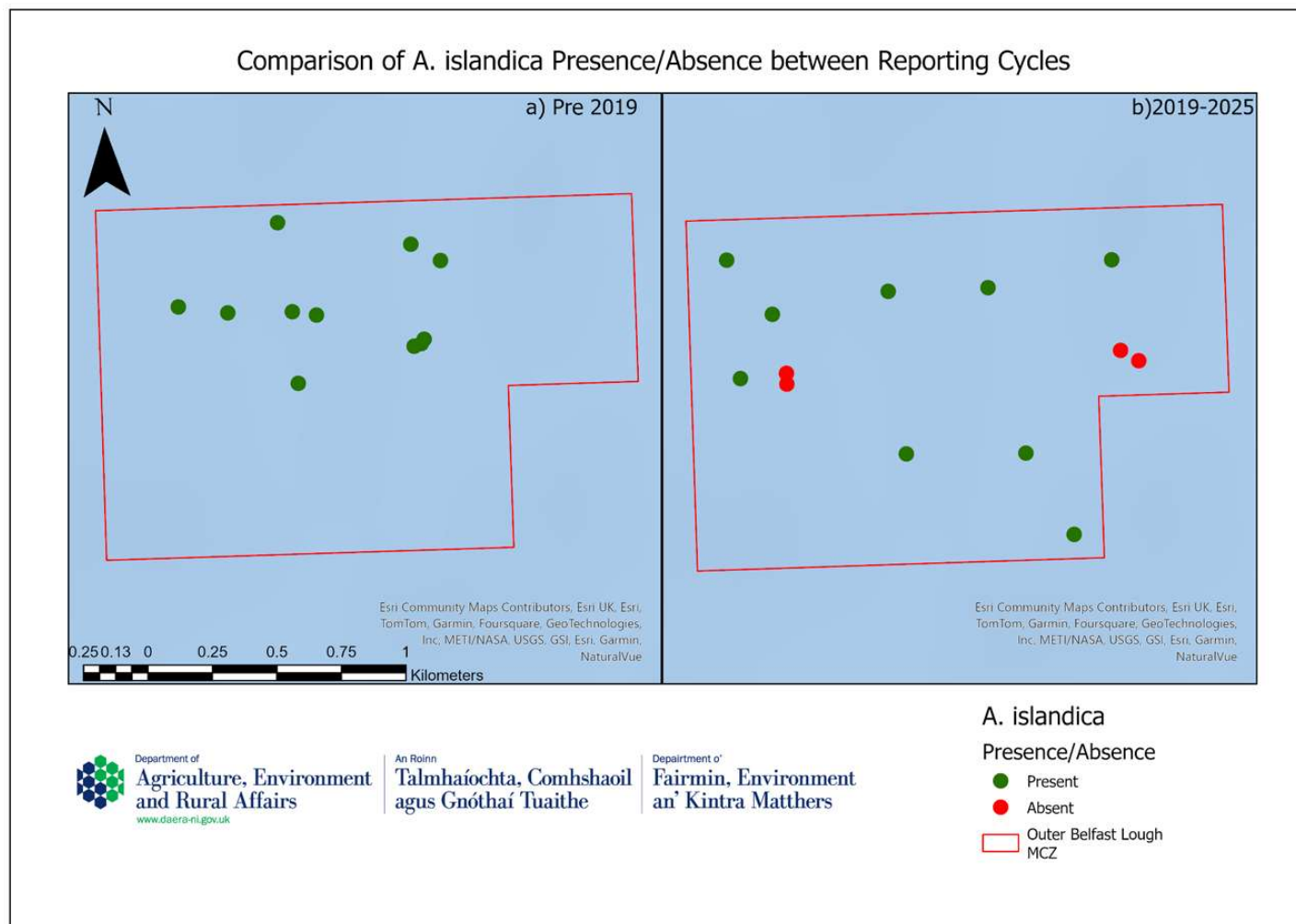
Figure A10 Distribution of Biotopes in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2025)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

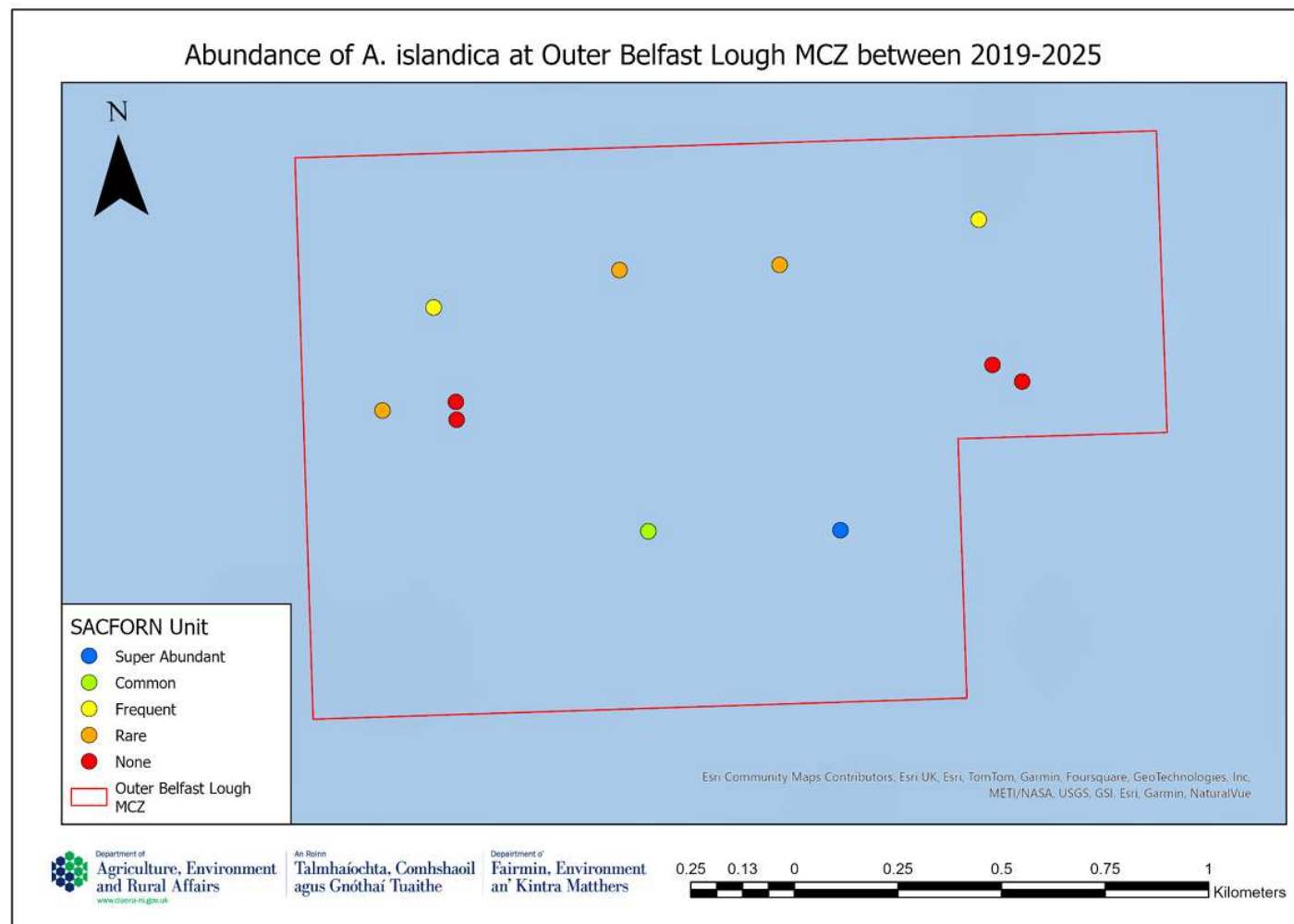
Figure A11 Presence/Absence of Ocean Quahog in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2025)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

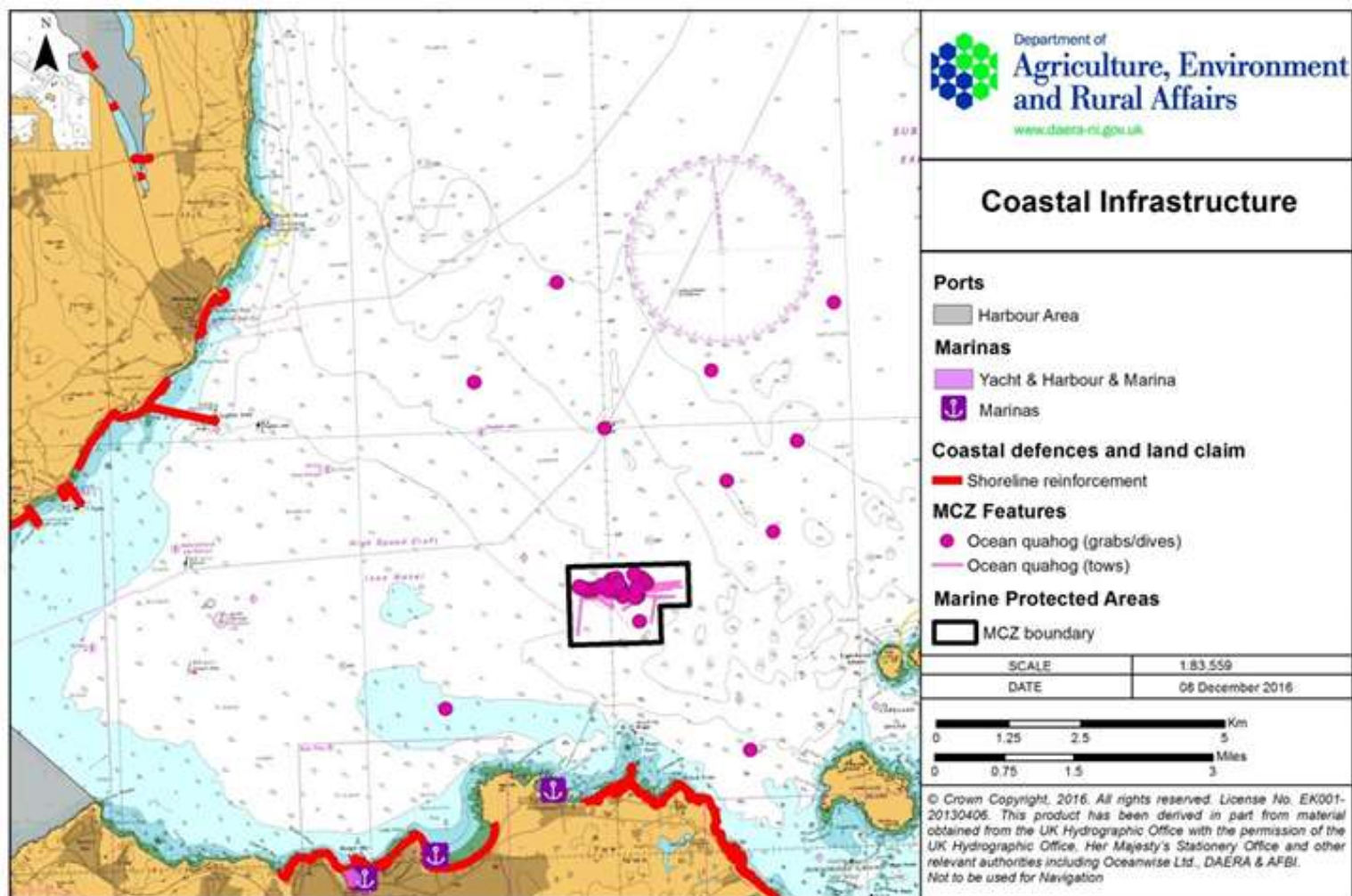
Figure A12 Abundance of Ocean Quahog in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2025)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

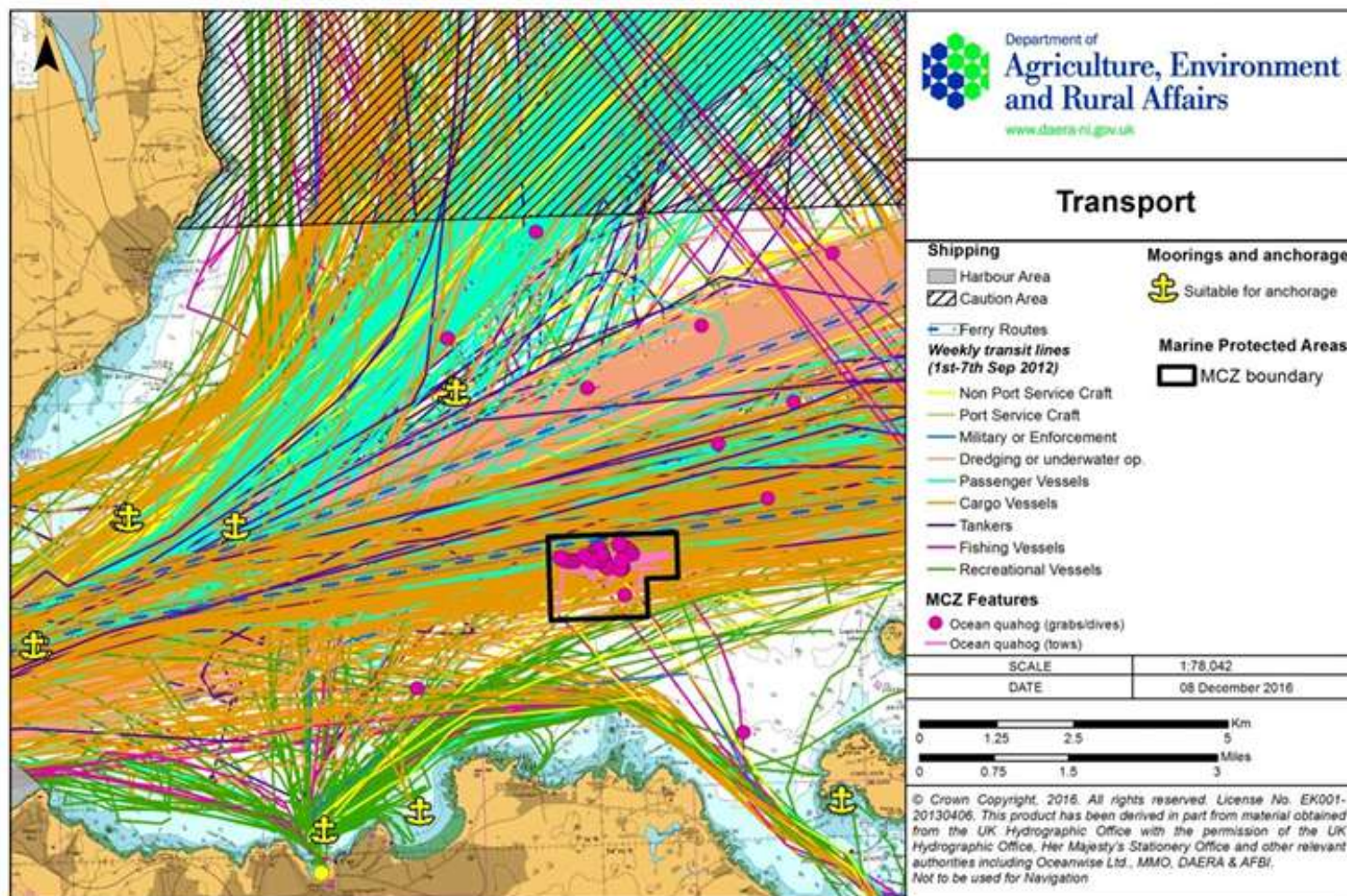
Figure A13 Location of Coastal Infrastructure in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2016b)





Belfast Harbour Maintenance Dredging MCZ Stage 0 Screening Information

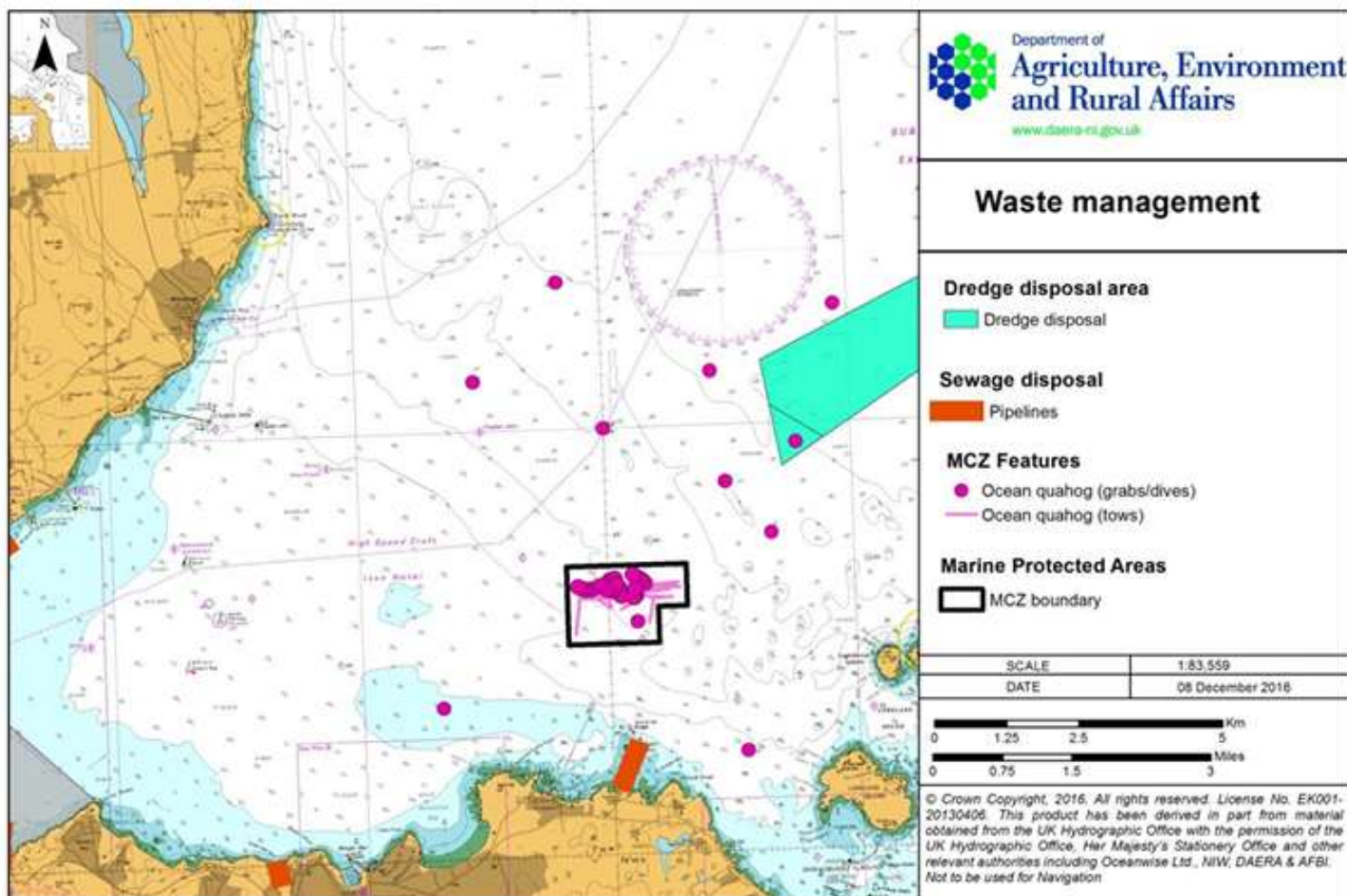
Figure A14 Location of Shipping Activities (Vessels Transits) in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2016b)





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Figure A15 Location of Waste Management Activity in relation to the Outer Belfast Lough MCZ Boundary (source: DAERA, 2016b) [Note: the 'dredge disposal area' shown in this figure is a former sewage sludge disposal area and, therefore, not the Belfast Dredgings C (Live) disposal site.]





APPENDIX B

SEDIMENT CHARACTERISATION DATA AND COMPARISON TO SEDIMENT QUALITY STANDARDS



Belfast Harbour Maintenance Dredging MCZ Stage 0 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 MCZ Stage 0 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) BENZGHIIP (benzo[ghi]perylene) BKF (benzo[k]fluoranthene) DBENZAHI (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 MCZ Stage 0 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 MCZ Stage 0 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



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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



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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



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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 MCZ Stage 0 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



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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



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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



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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



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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



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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

