MWP

Natura Impact Statement

Proposed Maintenance Dredging, Aughinish, Co. Limerick

Aughinish Alumina Ltd

October 2024

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1. Summary of Findings

Project Title	Proposed Maintenance Dredging, Aughinish, Co. Limerick
Project Proponent	Aughinish Alumina Ltd
Project Location	Shannon Estuary, Aughinish, Co. Limerick
Conclusion	For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the project which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered. The NIS contains information which the competent authority may consider in making its own complete, precise and definitive findings and conclusions and upon which the competent authority is capable of determining that all reasonable scientific doubt has been removed as to the effects of the project on the integrity of the relevant Natura 2000 sites. Provided the recommended mitigation measures are implemented in full, it is not expected that the proposal to carry out maintenance dredging at Aughinish, Co. Limerick will result in an adverse residual impact on the Natura 2000 sites considered in this NIS, namely: • Lower River Shannon SAC (002165) • River Shannon and River Fergus Estuaries SPA (004077) • Belgica Mound SAC (002327) • Duvillaun Islands SAC (000495) • Hook Head SAC (000764) • Porcupine Bank Canyon SAC (003001) • South-west Porcupine Bank SAC (002329) • Codling Fault Zone SAC (003015) • Slyne Head Islands SAC (000328) • Slyne Head Peninsula SAC (002074) • St. John's Point SAC • West Connacht Coast SAC (002998) • Blasket Islands SAC • Horn Head and Rinclevan SAC (000147) • Inishbofin and Inishshark SAC (000278) • Inishkea Islands SAC (000507) • Roaringwater Bay and Islands SAC (000101) • Slieve Tooey/Tormore Islnand/Loughros Beg Bay SAC (000328) • Clew Bay Complex SAC (001482) • Galway Bay Complex SAC (000268) • Kenmare River SAC (002158) • Kilkieran Bay and Islands SAC (002111) • Inishmore Island SAC (000213) • Lambay Island SAC (000204) • Blackwater Bank SAC (002953) • Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (000625) • Carnsore Point SAC (002269) • Abers - Côte des legends ZSC (FR5300017) • Anse de Vauville ZSC (FR2502019) • Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard ZSC (FR5300012) • Baie du Mons Saint-Michel ZSC (FR2500077) • Baie de Morlaix ZSC (FR300015) • Baie de Saint-Brieuc – Est ZSC (FR5300066) • Banc et récifs de Surtainville ZSC (2502018) • Cap d'Erquy-Cap Frehel ZSC (FR5300011) • Chausey ZSC (FR2500079) • Chaussée de Sein ZSC (FR5302007) • Côtes de Crozon ZSC (FR5302006) • Côte de Granit rose-Sept-Iles ZSC (FR5300009) • Estuaire de la Rance ZSC (FR5300061)

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2. Introduction

Appropriate Assessment is the consideration of the impact on the integrity of Natura 2000 site(s) of any proposed plan or project, either alone or in combination with other plans or projects, with respect to the site's conservation objectives.

In cases where an Appropriate Assessment is required, a Natura Impact Statement (NIS) comprising a report of a scientific examination of evidence and data, is prepared by competent persons, to identify and classify any implications for Natura 2000 sites in view of the conservation objectives of the site or sites. The purpose of the NIS is to provide a sufficient level of information to the competent authority on which to base their Appropriate Assessment of the plan or project. The plan or project should be fully described particularly in relation to the aspects that could interact with the surrounding environment.

The focus of this NIS is to determine whether a proposed programme of maintenance dredging at the deep sea jetty of an alumina refinery at Aughinish, County Limerick, and the dumping at sea of the dredge arisings will have a significant negative impact on the features of interest of the Natura 2000 site i.e. habitats and species. This NIS identifies the environmental aspects of the project that will interact with the ecological requirements or sensitivities of the habitats and species.

The test of the assessment is whether the plan or project will have 'an adverse effect on the integrity of the site'. Where potentially significant effects are identified proven mitigation measures will be recommended.

2.1 Purpose of the Natura Impact Statement

This Natura Impact Statement (NIS) has been prepared to assist the competent authority, in this case the Environmental Protection Agency (EPA) and the Maritime Area Regulatory Authority (MARA), to conduct the appropriate assessment of the implications of a proposed programme of maintenance dredging works for the Lower River Shannon SAC (002165), the River Shannon and River Fergus Estuaries SPA (004077) and further afield European sites for which far-ranging marine mammal species are designated.

The NIS comprises:

- the identification, in Section 3, of the Qualifying Interests for which the Lower River Shannon SAC (002165) and further afield European sites, as well as Special Conservation Interests for which the River Shannon and River Fergus Estuaries SPA (004077) are selected.
- a description, in Section 5, of the proposed development, particularly those aspects or elements that could interact with the receiving environment.
- the identification, in Section 6, of the impacts that are reasonably foreseeable as potentially ensuing from it.
- a determination, in Section 8.1.3, as to whether these predicted impacts, either alone or in combination with the other plans or projects, identified in Section 6, are likely to have significant effects on the Natura 2000 sites identified above, in view of those sites' conservation objectives.

Mitigation measures designed to avoid or minimise impacts are outlined in Section 10.

2.2 Legislative Context

The requirements for Appropriate Assessment are set out in Article 6 of the Habitats Directive (92/43/EEC) and Part XAB of the Planning and Development Act 2000, as amended. Article 6(3) provides in full:

"*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

3. Characteristics of Natura 2000 Sites

The Lower River Shannon SAC (002165) is selected for the protection of 14 annexed habitat types and for the protection of the resident populations of seven species. Eleven of the annexed habitat types are coastal or halophytic in their distributions, two are terrestrial types, and one is riparian. Six of the species are aquatic. The other species, namely otter, is a terrestrial mammal with a strong dependency on aquatic habitats. While the strongest determinant of its distribution is the availability of riparian habitats, this species' distribution can extend to near-shore coastal waters.

While the River Shannon and River Fergus Estuaries SPA (004077) site is not selected for any annexed habitat types it is selected for the protection of the wetland habitat that is a resource for the regularly occurring migratory waterbirds that utilise the site, and for the protection of the populations of twenty species of migratory, wintering, waterfowl and one breeding population that is resident year-round, namely cormorant (*P. carbo*) (NPWS, 2012b).

Marine species are transient by nature, often having large ranges for feeding, migration, and breeding. Foraging ranges for grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) are a factor considered for marine and estuarine based projects using the S-P-R approach. The maximum foraging range for these species is 273 km for harbour seals and 448 km for grey seal (Carter *et al.*, 2022). This can significantly increase the ZOI for these types of projects but allows for a comprehensive assessment of the receiving environment and the ecological pathways between proposed works. Similarly, JNCC Management Units (MU) are included under MARA guidance to include all European sites (Natura 2000 sites and Designated UK Sites) with Harbour Porpoise (*Phocoena phocoena*) and Bottlenose Dolphin (*Tursiops truncatus*) as a Qualifying Interest. This, similar to the aforementioned foraging ranges for seals, does have the potential to extend the ZOI for the proposed survey works using the S-P-R model. With regard to grey seal and maximum foraging range, on the basis of a pathway via water, all Irish SACs designated for the species except Lambay Island SAC (Site code: 000204) are screened in for further assessment in Stage 2 Appropriate Assessment. Lambay Island SAC is located approximately 630 km away via sea and is beyond the maximum foraging range for QI seal species.

Regarding MU, the area designated for Bottlenose Dolphin relevant to the proposed works is the West Coast of Ireland MU (Code: WCI) and encompasses an area of 27,758 km². Within this MU, there are two Natura 2000 sites with Bottlenose Dolphin listed as a QI, the Duvillaun Islands SAC (Site code: 000495), Lower River Shannon SAC (Site code: 002165), Slyne Head Islands SAC (Site code: 000328), Slyne Head Peninsula SAC (Site code: 002074), St. John's Point SAC (Site code: 000191), West Connacht Coast SAC (Site code 002998).

For Harbour Porpoise, the relevant MU is significant in size, known as the Celtic and Irish Seas (Site Code CIS), and is c. 516,893 km². This MU encompasses part of the northwest of France, west coast of Wales and England, and Ireland's east, south, and west coasts. The Hook Head SAC is discussed in the following section as Harbour Porpoise is a QI of that site. All site listed below are screened in for further assessment in Stage 2 Appropriate Assessment.

The table below details the European Sites (Irish and UK SACs), along with select Zones Spéciales de Conservation (ZSCs) from France screened in for Stage 2 Appropriate Assessment. For international Natura sites, only Qualifying Interest species that are screened in for Stage 2 assessment have been listed in Table 3-1.

Table 3-1 lists the Qualifying Interests (QI) for which the SAC, and the Special Conservation Interests (SCI) for which the SPA, are selected.

Table 3-1: European sites with QI/SCI for which each is selected

Site Name	SCI/QI[1]
Lower River Shannon SAC (002165)	**Coastal and Halophytic Habitats** • Sandbanks which are slightly covered by sea water all the time [1110] • Estuaries [1130] • Mudflats and sand flats not covered by seawater at low tide [1140] • Coastal lagoons [1150]* • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • *Salicornia* and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] **Riparian Habitat** • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] **Terrestrial Habitats** • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]* **Aquatic Species** • Freshwater pearl mussel *(Margaritifera margaritifera)* [1029] • Sea lamprey *(Petromyzon marinus*) [1095] • Brook lamprey *(Lampetra planeri*) [1096] • River lamprey *(Lampetra fluviatilis)* [1099] • Atlantic salmon *(Salmo salar*) [1106] (only in fresh water) • Common bottlenose dolphin *(Tursiops truncates)* [1349] **Terrestrial-aquatic Species** • Otter *(Lutra lutra*) [1355]
River Shannon and River Fergus Estuaries SPA (004077)	**Resident, breeding population** • Cormorant (*Phalacrocorax carbo*) [A017] **Migratory, non-breeding populations** • Whooper swan (*Cygnus cygnus*) [A038] • Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Shoveler (*Anas clypeata*) [A056] • Scaup (*Aythya marila*) [A062] • Ringed plover (*Charadrius hiaticula*) [A137] • Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149] • Black-tailed godwit (*Limosa l*imosa) [A156] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Greenshank (*Tringa nebularia*) [A164] • Black-headed gull (*Chroicocephalus ridibundus*) [A179] **Habitat & Species Complex**

[1] Asterisk indicates a priority habitat i.e., a natural habitat type in danger of disappearance.

Site Name	SCI/QI[1]
	• Wetland and Waterbirds [A999]
Belgica Mound Province SAC (002327)	**Coastal Habitats** • Reefs **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) • Harbour porpoise (*Phocoena Phocoena*)
Duvillaun Islands SAC (000495)	**Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) • Grey Seal (*Halichoerus grypus*)
Hook Head SAC (000764)	**Coastal Habitats** • Large shallow inlets and bays • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) • Harbour porpoise (*Phocoena Phocoena*)
Porcupine Bank Canyon SAC (003001)	**Coastal Habitats** • Reefs **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*)
South-West Porcupine Bank SAC (002329)	**Coastal Habitats** • Reefs **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*)
Slyne Head Islands SAC (000328	**Coastal Habitats** • Reefs **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) • Grey Seal (*Halichoerus grypus*)
Slyne Head Peninsula SAC (002074)	**Coastal Habitats** • Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] • Machairs (* in Ireland) [21A0] **Terrestrial and Riparian Habitats** • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] • Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] • Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] • European dry heaths [4030] • Juniperus communis formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] • Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] • Alkaline fens [7230] **Terrestrial Plant Species**

Site Name	SCI/QI[1]
	• Slender Naiad (*Najas flexilis*) **Aquatic Plant Species** • Petalwort (*Petalophyllum ralfsii*) **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*)
St. John's Point SAC (000191)	**Coastal Habitats** • Reefs • Large shallow inlets and bays • Vegetated sea cliffs of the Atlantic and Baltic Coasts • Submerged or partially submerged sea caves **Terrestrial Habitats** • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) • Alkaline fens • Limestone pavements **Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) **Terrestial Insect** • Marsh Fritillary (*Euphydryas aurinia*)
West Connacht Coast SAC (002998)	**Aquatic Species** • Bottlenose dolphin (*Tursiops truncatus*) • Harbour porpoise (*Phocoena Phocoena*)
Blasket Islands SAC (002172)	**Coastal Habitats** • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts • Submerged or partially submerged sea caves **Terrestrial Habitats** • European dry heaths **Aquatic Species** • Grey Seal (*Halichoerus grypus*) • Harbour porpose (*Phocoena phocoena*)
Horn Head and Rinclevan SAC (000147)	**Coastal Habitats** • Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • Fixed coastal dunes with herbaceous vegetation (grey dunes) • Dunes with *Salix repens* ssp. argentea (*Salicion arenariae*) • Humid dune slacks • Machairs (* in Ireland) **Freshwater Habitats** • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* **Freshwater Plant Species** • Slender Naiad (*Najas flexilis*) **Terrestrial Plant Species** • Petalwort (*Petalophyllum ralfsii*) **Terrestrial Invertebrate** • Geyer's Whorl Snail (*Vertigo geyeri*) **Aquatic Species** • Grey Seal (*Halichoerus grypus*)
Inishbofin and Inishshark SAC (000278)	**Coastal Habitats** • Coastal laggons **Terrestrial Habitats** • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Site Name	SCI/QI[1]
	• Northern Atlantic wet heaths with Erica tetralix • European dry heaths **Aquatic Species** • Grey Seal (*Halichoerus grypus*)
Inishkea Islands SAC (000507)	**Coastal Habitats** • Machairs (* in Ireland) **Terrestrial Plant Species** • Petalwort (*Petalophyllum ralfsii*) **Aquatic Species** • Grey Seal (*Halichoerus grypus*)
Roaringwater Bay and Islands SAC (000101)	**Coastal Habitats** • Large shallow inlets and bays • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts • European dry heaths • Submerged or partially submerged sea caves **Aquatic Species** • Otter (*Lutra lutra*) • Grey Seal (*Halichoerus grypus*) • Harbour porpoise (*Phocoena phocoena*)
Slieve Tooey/Tormore Island/ Loughros Beg Bay SAC (000328)	**Coastal Habitats** • Vegetated sea cliffs of the Atlantic and Baltic coasts • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Mediterranean salt meadows (Juncetalia maritimi) • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) • Fixed coastal dunes with herbaceous vegetation (grey dunes) • Decalcified fixed dunes with Empetrum nigrum • Atlantic decalcified fixed dunes (Calluno-Ulicetea) • Dunes with Salix repens ssp. argentea (Salicion arenariae) • Humid dune slacks **Terrestiral Habitats** • Alpine and Boreal heaths • Blanket bogs (* if active bog) **Terrestiral Invertebrate** • Narrow-mouthed Whorl Snail (*Vertigo angustior*) **Aquatic Species** • Otter (*Lutra lutra*) • Grey Seal (*Halichoerus grypus*)
Clew Bay Complex SAC (001482)	**Coastal Habitats** • Mudflats and sandflats not covered by seawater at low tide • Coastal lagoons • Large shallow inlets and bays • Annual vegetation of drift lines • Perennial vegetation of stony banks • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) • Machairs (* in Ireland) **Terrestrial Habitats** • Old sessile oak woods with Ilex and Blechnum in the British Isles **Aquatic Species** • Otter (*Lutra lutra*) • Harbour Seal (*Phoca vitulina*)

Site Name	SCI/QI[1]
Galway Bay Complex SAC (000268)	**Coastal Habitats** • Mudflats and sandflats not covered by seawater at low tide • Coastal lagoons • Large shallow inlets and bays • Reefs • Perennial vegetation of stony banks • Vegetated sea cliffs of the Atlantic and Baltic coasts • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Mediterranean salt meadows (Juncetalia maritimi) **Terrestrial Habitats** • Turloughs [3180] • Juniperus communis formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] • Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] • Alkaline fens [7230] • Limestone pavements [8240] **Aquatic Species** • Otter (*Lutra lutra*) • Harbour Seal (*Phoca vitulina*)
Kenmare River SAC (002158)	**Coastal Habitats** • Large shallow inlets and bays • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean salt meadows (*Juncetalia maritimi*) • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes • Fixed coastal dunes with herbaceous vegetation (grey dunes) • Submerged or partially submerged sea caves **Terrestrial Habitats** • Perennial vegetation of stony banks • European dry heaths • *Juniperus communis* formations on heaths or calcareous grasslands • Calaminarian grasslands of the *Violetalia calaminariae* **Aquatic Species** • Otter (*Lutra lutra*) • Harbour Seal (*Phoca vitulina*) • Harbour Porpoise (*Phocoena Phocoena*)
Kilkieran Bay and Islands SAC (002111)	**Coastal Habitats** • Mudflats and sandflats not covered by seawater at low tide • Coastal lagoons • Large shallow inlets and bays • Reefs • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Mediterranean salt meadows (Juncetalia maritimi) • Machairs (* in Ireland) **Terrestrial Habitats** • Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea • Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **Aquatic Species** • Harbour Seal (*Phoca vitulina*) • Harbour Porpoise (*Phocoena phocoena*)

Site Name	SCI/QI[1]
Abers - Côte des legends ZSC (FR5300017)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Anse de Vauville (2502019)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR5300012)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Baie du Mons Saint-Michel (FR2500077)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Baie de Morlaix ZSC (FR300015)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Baie de Saint-Brieuc – Est (FR5300066)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Banc et récifs de Surtainville (2502018	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Blackwater Bank SAC (0002953)	**Marine Habitat** • Sandbanks which are slightly covered by sea water all the time **Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (000625)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Carnsore Point SAC (0002269)	**Coastal Habitats** • Mudflats and sandflats not covered by seawater at low tides • Reefs **Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Cap d'Erquy-Cap Frehel ZSC (FR5300011)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Chausey (FR2500079)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Chaussee de Sein ZSC (FR5302007)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Codling Fault Zone SAC (0003015)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*) **Deep-sea Structure** • Submarine sturcutres made by leaking gases
Cotes de Croxzon ZSC (FR5302006)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Cote de Granit rose-Sept-Iles ZSC (FR5300009)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Estuaire de la Rance (FR5300061)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Inishmore Island SAC (000213)	**Coastal Habitats** • Coastal lagoons • Reefs • Perennial vegetation of stony banks • Vegetated sea cliffs of the Atlantic and Baltic coasts • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) • Fixed coastal dunes with herbaceous vegetation (grey dunes) • Dunes with Salix repens ssp. argentea (Salicion arenariae) • Humid dune slacks

Site Name	SCI/QI[1]
	• Machairs (* in Ireland) • Submerged or partially submerged sea caves **Terrestrial Habitats** • European dry heaths • Alpine and Boreal heaths • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) • Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) • Limestone pavements **Terrestrial Species** • Narrow-mouthed Whorl Snail (*Vertigo angustior*) **Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Lambay Island SAC (000204)	**Coastal Habitats** • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts **Aquatic Species** • Grey Seal (*Halichoerus grypus*) • Harbour Seal (*Phoca vitulina*) • Harbour Porpoise (*Phocoena phocoena*)
Mers Celtiques -Talus du golfe de Gascogne ZSC (FR5302015)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Nord Bret DH ZSC (FR2502022)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Ouessant-Molene ZSC (FR5300018)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Recifs du talus du golfe de Gascogne ZSC (FR5302016)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Recifs et lands de la Hague (2500084)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Rockabill to Dalkey Island SAC (0003000)	**Coastal Habitats** • Reefs **Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Tregor Goelo ZSC (FR5300010)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
Bristol Channel Approaches cSAC (UK0030396)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
West Wales Marine cSAC (UK0030397)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
North Anglesey Marine cSAC (UK0030393)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)
North Channel cSAC (UK0030399)	**Aquatic Species** • Harbour Porpoise (*Phocoena phocoena*)

4. Methodology

4.1 Appropriate Assessment Guidance

This NIS has been prepared in compliance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC 2001, 2021), the European Commission Guidance '*Managing Natura 2000 Sites*' (EC 2000, 2018) and *Appropriate Assessment of Plans & Projects - Guidance for Planning Authorities* prepared by the NPWS (DoEHLG, 2010).

4.2 Consultation

The following consultations have been undertaken in support of this application:

1. EPA Dumping at Sea (DaS) pre-application meetings held on 04/03/2022 and 28 Sept 2023
1. Marine Institute contacted for guidance on surveys in Feb 2022 and 3 March 2023
2. Maritime Area Regulatory Authority (MARA) - Maritime Usage License (MUL) pre-application meeting held on 7th September 2023.
3. Shannon Foynes Port Company (SFPC) consultations (08/04/2022 and 19 Sept 2023)

4.3 Desk Study

In order to complete the NIS, certain information on the existing environment is required. A desk study was carried out to collate available information on the site's natural environment. This comprised a review of the following publications, data and datasets:

- OSI Aerial photography and 1:50000 mapping, and other online mapping sources (online).
- National Parks and Wildlife Service (NPWS) (online).
- National Biodiversity Data Centre (NBDC) (online).
- BirdWatch Ireland.
- Teagasc soil area maps (NBDC website).
- Geological Survey Ireland (GSI) area maps (online).
- Marine Institute (MI) (confirmed marine sediment quality parameters).
- Environmental Protection Agency (EPA) water quality data (online).
- Shannon International River Basin District (ShIRBD) datasets (Water Framework Directive).
- Other information sources and reports footnoted in the course of the report.

4.4 Surveys (2016 – 2022)

4.4.1 Marine Mammal Monitoring (MMM)

IWDG Consulting carried out a programme of Marine Mammal Observer Surveys during each annual dredging period and a report was submitted as part of the Aughinish Alumina Limited (AAL) Annual Environmental Report (AER)[2] for the purposes of the Dumping at Sea (DaS) permit. The results are provided in Section 5.1.3.1, below.

[2] AERs are available by using Permit Nr. S0026-01 at: https://www.epa.ie/our-services/licensing/licencesearch/

4.4.2 Turbidity monitoring

As per Schedule C.1.3 of DAS permit No. S0026-01, continuous turbidity monitoring was carried out at two monitoring locations during each dredging campaign and a report was submitted as part of the Aughinish Alumina Limited (AAL) Annual Environmental Report (AER)[2] for the purposes of the Dumping at Sea (DaS) permit. The results are provided in Section 5.1.3.2, below.

4.4.3 Marine Sediment

As per Schedule C.1.3 of DAS permit No. S0026-01, on the 14th of December 2017, 3 sediment stations, detailed in Table 4-1 and illustrated in Figure 4-1, below, were sampled for physical and chemical analysis by AQUAFACT as per Condition 4.5 of said permit. Subsequent analysis determined that the level of Zinc (Zn) in sediment at Station 2 (652 mg/kg) was above the expected background range for Irish waters. As a consequence, additional sampling was carried out on the 4th of April 2018 to determine how localised the elevated Zn levels were at Station 2 and to determine Zn levels at 4 additional sites within the wider Inner Berth Dredge Area.

On the 7th of January 2021, the 3 sediment stations sampled in 2016 were again sampled for physical and chemical analysis The results of surveys described are provided in Section 5.1.3.3, below.

Table 4-1: 2017 Sampling Stations Detail

Station	Latitude	Longitude	Depth (m)	Description
S1	52.63699	-9.05784	1.5	Light brown surface/ black anoxic below <5mm, Sandy mud
S2	52.64505	-9.05688	11	Light brown surface/ black anoxic below <5mm, Sandy mud
S3	52.64558	-9.05739	13	Light brown surface/ black anoxic below <5mm, Sandy mud

Table 4-2: 2018 Sampling Stations Co-ordinates

Station	Latitude	Longitude
S1	52.64494	-9.0579
S2	52.64505	-9.05688
S3	52.64505	-9.05604
S4	52.64507	-9.05531
S5	52.64509	-9.05455

Figure 4-1: Locations of Sampling Stations (2017)

Figure 4-2: Stations sampled for zinc analysis on April 4th, 2018

4.5 Surveys 2023

4.5.1 Turbidity monitoring

As per Schedule C.1.3 of DAS permit No. S0026-01, continuous turbidity monitoring was carried out, by IDS Monitoring Ltd., at two monitoring locations during the dredging campaign and the report is included in Appendix 2. The results are provided in Section 5.1.4.1, below.

4.5.2 Marine Sediment

On the 11th of April 2023, as per Schedule C.1.3 of DAS permit No. S0026-01, 4 sediment stations, detailed in Table 4-3, and illustrated in Figure 4-3, below, were sampled, for physical and chemical analysis, by Hydrographic Surveys Ltd., as per Condition 4.5 of said permit. The analytical results for each parameter were reviewed against guidance level values. The results are provided in Section 5.1.4.2, below.

Table 4-3: 203 Sampling Stations Detail

Station	Latitude	Longitude	Description	Gravel (> 2 mm)	Sand (63-2000 µm)	Silt (< 63 µm)
S1	52.64558	-9.05688	Greyish brown clayey SILT	0.00	27.65	72.35
S2	52.63691	-9.05795O	Greyish brown clayey SILT	0.00	18.99	81.01
S3	52.64505	-9.05688	Brown silty CLAY	0.00	32.94	67.05
S4	52.64094	-9.05938	Brown silty CLAY	0.00	42.79	57.21

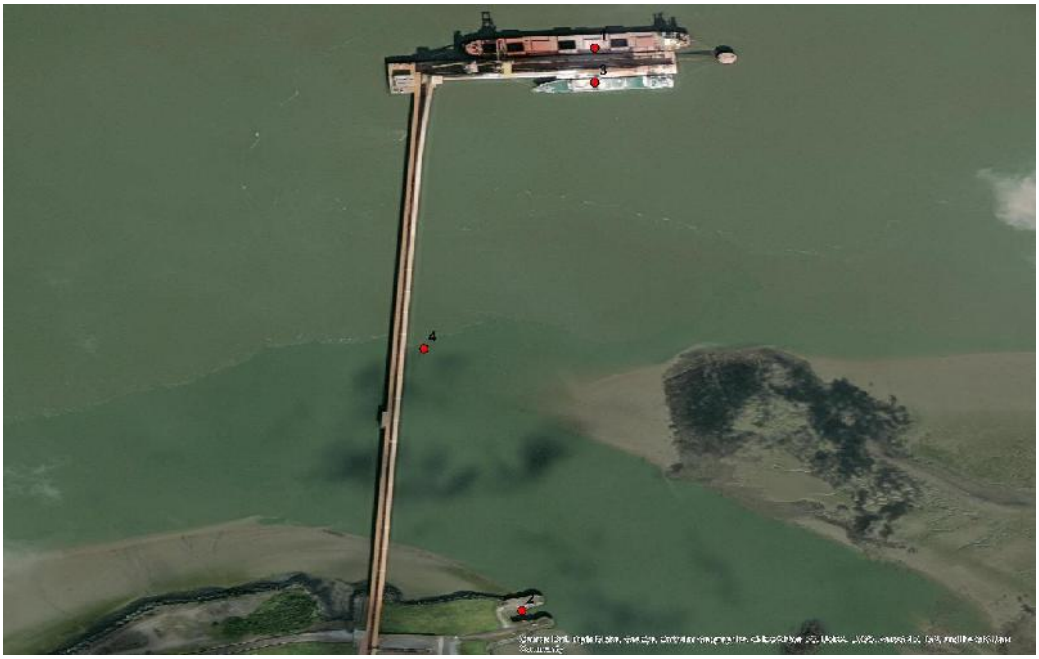


Figure 4-3: Sample locations.

5. Description of the Project

5.1 Description of the Location of the proposed dredging works

5.1.1 Aughinish Alumina Limited Refinery

Aughinish Alumina Ltd. (AAL) is the largest alumina refinery in Europe. Situated at Aughinish Island, Co. Limerick, it is approximately 3.5 km north-east of Foynes, 12.5 km south-west of Shannon, and 27 km west of Limerick City (see Figure 5-1). There is an Industrial Emissions Licensed (IEL) facility [License No. P0035-07[3]] situated within the refinery. The Licence grants AAL permission to carry out the following activities in accordance with the requirements and conditions set out in the Licence:

- The production of inorganic chemicals;
- The combustion of fuels installations with a total rated thermal input of 50MW or more; and
- The recovery or disposal of waste in the facility

Delivery of bauxite and export of finished product alumina requires a deep-water jetty which extends into the sub-tidal waters of the Shannon Estuary as shown in Photograph 5-1. The 285 m outer berth handles vessels up to 90,000 dwt with 12.4 m depth alongside, while the inner berth caters for vessels up to 40,000 dwt and up to 180 m long with 11 m depth alongside[4]. The jetty is accessed from land via a causeway which extends northwards for c.940 m, from the plant into the estuary.

The Shannon Estuary is the largest estuary in Ireland and one of the most important deep-water channels in the country. All marine activities conducted in it are under the control of Shannon Foynes Port Company (SFPC). In

[3] Class of Activity: Sectors 2 (Energy), 5 (Chemicals) and 11 (Waste)
[4] https://www.sfpc.ie/terminals/aughinish/

order to maintain design depths and provide safe navigation, maintenance dredging is routinely carried out at various locations in the Shannon Estuary as part of maintenance operations.

Photograph 5-1: View of refinery with deep water jetty

A Dumping at Sea Permit (Nr. S0026-01) and Foreshore Licence (Nr. FS006578) which permit the current ongoing maintenance dredging will expire in August 2024. There is, therefore, is a need for a new DaS permit and MUL to allow for ongoing maintenance dredging and an application will be submitted seeking a DAS Permit and MUL for a further period of 8 years. The proposed dredging sites, illustrated in Figure 5-3, are located within the immediate vicinity of the jetty. The location of the proposed dumping site, relative to the Aughinish refinery, is illustrated in Figure 5-4.

Figure 5-1: Location of Rusal Aughinish Alumina Refinery

5.1.2 Habitats

Habitat distribution mapping indicates that distribution of 2 of the annexed habitats for which the Lower River Shannon SAC is selected extend to the area adjacent to the jetty (Maps 4 and 5: NPWS, 2012a). These habitat types are 'Estuaries [1130]' and 'Mudflats and sandflats not covered by seawater at low tide [1140]'. Additional mapping indicates that the waters that encompasses the jetty comprise the "Subtidal sand to mixed sediment with *Nephtys* spp. community complex" (Map 6b: NPWS, 2012c). The intertidal areas adjacent to the east of the jetty and along the shore of Aughinish Island comprise "Intertidal sand to mixed sediment with polychaetes,

molluscs and crustaceans community complex" (Map 6b: NPWS, 2012c). This latter community complex overlaps with the area mapped as the annexed habitat type 'Mudflats and sandflats not covered by sea water at low tide [1140]' (Map 5: NPWS, 2012a). The majority of the estuary extending away from the jetty at Aughinish is sub-tidal, which enables marine vessels transiting through the waters of the estuary to off-load and on-load cargo at the jetty. The land immediately adjacent to the jetty and within the footprint of the Aughinish Alumina facility is classified as 'Industrial and commercial' with 'Inter-tidal flats' extending along the shoreline to the east and west of the facility. Pre-dominant land-use in the greater area is given over to agriculture, classified as 'Pastures'[5].

5.1.3 Survey Results (2016 - 2022)

In order to avail of the Dumping at Sea (DAS) permitting process the first step is to confirm that the proposed dredge material is clean and uncontaminated. In that regard the Marine Institute was consulted to agree a sampling and testing campaign. This process was completed by Hydrographic Surveys and the results were reviewed against the required standards and the results were within all required levels. Accordingly, the material was deemed suitable for dredging and dumping at sea.

5.1.3.1 Marine Mammal Monitoring

5.1.3.1.1 *Common bottlenose dolphin (T. truncates)*

The observations from the period 2016 to 2022 are provided in Table 5-1.

Table 5-1: Observations of common bottle nose dolphins 2016 - 2022

Year	No of Observations	Details	Description	Individuals active prior to start up
2016	1	12 individuals including one juvenile and one calf on August 25th	At a distance of approximately 1 km from vessel while operations were ongoing.	No
2017	0			
2018	2	3 individuals on April 20th 6 individuals on August 21st	April 20th: At a distance of approximately 250 m from vessel while operations were ongoing. August 21st: At a distance of approximately 200 m from vessel while operations were ongoing.	No
2019	0			
2020	2	4 individuals on July 1st 5 individuals on July 3rd	July 1st: At a distance of approximately 400 m from vessel while operations were ongoing. July 3rd: At a distance of approximately 400 m from vessel while operations were ongoing.	No
2021	0			
2022	2	2 individuals at 09:44 3 individuals at 13:15	While operations were ongoing.	

No observations of common bottle nose dolphins were recorded in three of the seven years of monitoring. The number of observations and the numbers of individuals recorded in any one year is low.

[5] CORINE (2018) Available at https://gis.epa.ie/EPAMaps/

5.1.3.1.2 *Otter (Lutra lutra)*

There was one observation of this QI species. On July 5th, 2020, a single otter was observed travelling along the wall of the Cells. It was observed walking slowly from the north shore to the southern shoreline, where it was assumed to have entered the water. Plough dredging operations were active at the time of this sighting and the otter was active within approximately 20 m of the vessel.

5.1.3.2 Turbidity monitoring

Table 5-2: Turbidity 2016 - 2022

Year	Duration
2016	A peak value of 301 NTU[6] was recorded at the receptor buoy during the ebbing tide – i.e., the receptor buoy was upstream of the dredging sites and therefore the increase cannot be attributed to the dredging activity.
2017	There were no significantly elevated readings reported during the dredging period.
2018	No reading during the dredging operation exceeded 100 NTU.
2019	No reading during the dredging operation exceeded 25 NTU.
2020	There were some isolated readings before and during the dredging period that exceeded the 280 NTU threshold, but these were single isolated readings and as such did not trigger an alert. The dredging operation, in terms of its impact on suspended sediment, was compliant and operated within the terms of the dredging licence.
2021	No reading during the dredging operation exceeded 25 NTU.
2022	No reading during the dredging operation exceeded 22 NTU.

The graphs provided in each AER, which capture turbidity in the periods before, during and after each dredging campaign, are reproduced in Appendix 1. These illustrate that large fluctuations in turbidity naturally prevail as a result of flood and ebb current tidal flow and that these fluctuations span a very broad range of values, due to tidal affects alone, that can be far in excess of those recorded during any dredging campaign. It is clear therefore that the structure and function of adjacent QI habitats are the result of this dynamic, both on micro and macro scales. It is reasonable to infer that QI species that select these habitat types are adapted to these prevailing, albeit intrinsically highly dynamic, environmental conditions.

5.1.3.3 Marine Sediment

A summary of the analysis of each set of results is provided in the subsections hereunder. The results are consistent with those carried out by the same company, in 2016, that were provided in the NIS that accompanied the original application (MWP Document No. 17076-6002) an extract from which is provided hereunder, in that, bed material at the dredge sites was then, and is now, considered to be clean and therefore suitable for dumping at sea.

> *Marine sediment analysis determined that the sediments within the proposal site do not comprise a radiological hazard. Results indicate that disturbance of these sediments as a result of the proposed dredge campaign will not result in any radiological hazard to the receiving environment.*
>
> *Chemical analysis found that all parameters except zinc were below the relevant upper Irish action limits. Zinc was found to have exceeded the upper Irish action limit at station 1 but was found to be below the lower Irish action limits at stations 2 and 3. Consultation between Aquafact International Services Ltd. and Margot Cronin of the Marine Institute determined that in this instance, zinc concentrations are not expected to pose any significant risk to the receiving environment. In summary, bed material at the dredge sites is considered to be clean and therefore suitable for the proposed activity.*

[6] Nephelometric Turbidity unit, i.e., the unit used to measure the turbidity of a fluid or the presence of suspended particles in water.

5.1.3.3.1 *2017*

The sediments analysed were below the lower Irish action limits for organochlorines, PCBs, total extractable hydrocarbons, organotins and ∑16 PAH's[7]. Arsenic was above the lower Irish action limit at two of the three stations sampled, Nickel was above the lower Irish action limit at all three stations and Zinc was above the upper Irish action limit at one out of the three stations sampled. All other metals were below the lower Irish action limit.

5.1.3.3.2 *2018*

The results from this survey showed no evidence of the previously high levels of Zn contamination at Station 2 or in the wider dredge area.

5.1.3.3.3 *2021*

Apart from Nickel, the sediments analysed were below the lower Irish action limits for metals, organochlorines, PCBs, total extractable hydrocarbons, organotins and ∑16 PAH's.

5.1.4 2023

5.1.4.1 Turbidity Monitoring

Figure 5-2 shows the turbidity readings collected for the dredging period and for one week pre- and post-dredging. No single turbidity reading above 17 NTU was recorded during the dredging period.

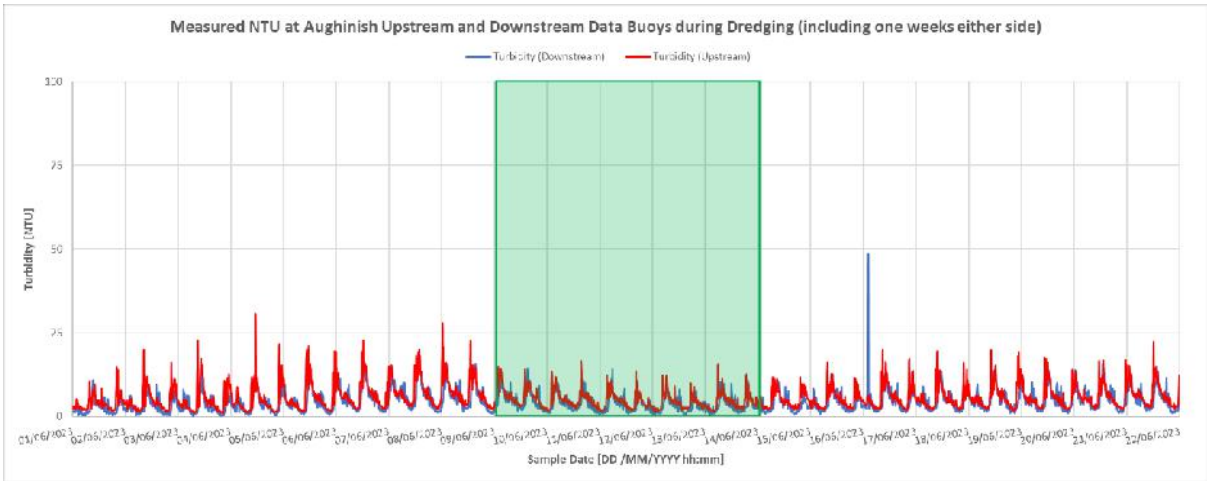


Figure 5-2: Data from Dredge period (green box) including one weeks pre- and post-dredging periods.

5.1.4.2 Marine Sediment

Subsequent analysis determined that the results for all parameters are within the Lower guidance level values. High Resolution Gamma Spectrometry analysis indicate that dumping of these materials at sea will not result in a radiological hazard.

5.2 Purpose of the Project

The purpose of maintenance dredging is as follows:

- to maintain design and navigational depths for shipping.
- to allow for the full use of the length of the jetty structure and manoeuvring area.

[7] The sum of 16 priority pollutant polycyclic aromatic hydrocarbons (PAH)

- to allow for the berthing of larger ships in conjunction with a new unloader being provided on the jetty structure.

The river systems that drain to the estuary introduce vast volumes of sediment into the estuary on an ongoing basis and the movement of this sediment load from upper reaches to lower is a fundamental element of the dynamics of the estuarine system, as are fluctuations in the patterns of deposition of the sediments within the estuary. Within the confines of the immediate environs of the jetty at Aughinish, the jetty itself constitutes a barrier to lateral movement of sediments and this leads to accumulations of sediments which result in raised areas or mounds occurring on the seabed.

In order to maintain design depths and provide safe navigation at the jetty there is a need for ongoing maintenance dredging. This maintenance dredging is required to adjust these bed levels, as build-up over time results in insufficient water depths to allow large cargo vessels access to berthing facilities at the jetty. In 2016 a Dumping at Sea (DAS) permit (Nr. S0026-01) and Foreshore Licence (Nr. FS006578) were granted to provide for ongoing maintenance dredging activity, and these will expire in August 2024. There now is a need for a new licence to allow for ongoing maintenance dredging and an application will be submitted seeking a DAS permit for a further period of 8 years. A new Marine Usage Licence (MUL) from Maritime Area Regulatory Authority (MARA) will also be required. The previous permit allowed for two dredge periods per year, and each period had a duration of 4-5 days and could only take place when the main jetty berth was free due to a shut down for maintenance. This was a very challenging window to dredge within. In addition, using only the plough dredge technology restricted the process of maintenance dredging in a marine environment which is very dynamic.

The application associated with this NIS will include the plough dredge permitted under the previous licence, Trailing Suction Hopper Dredger (TSHD) and long reach excavator/barge which will facilitate localised movement of material on the seabed. The use of a long reach machine on a barge is necessary to move material that is not accessible to the plough dredge or TSHD, e.g., material under the jetty structure or close to jetty structures. These two dredging technologies are more appropriate to the actual sedimentation processes occurring at the Aughinish Alumina jetty and will provide greater flexibility in the dredging campaigns going forward.

For the purposes of the new DAS permit application the two main components or areas are as follows:

- The 4 Dredge/Dumping Areas (**Figure 5-3**)
- The Dump Site (**Figure 5-4**)

These are described in more detail in **Section 5.3.1**, below.

5.3 Characteristics of the Project

The application which is the subject of this NIS seeks to give better flexibility to the maintenance dredging process by allowing for a range of dredging technologies, wider periods for dredging, larger areas to accommodate dredging and dumping activities and the introduction of a new dredge location adjacent to the jetty approach arm (Area D, **Figure 5-3**), along with a Dump Site in the estuary to receive material dredged by means of a trailing suction hopper dredger (TSHD). Given that each area will have the use of a plough and other technologies, the dredging area is also the proposed Dump Site area as the material will be moved within the red lined area. The physical areas of dredging within the red line areas will be less and will be focussed on high points or accumulations of material on the seabed.

5.3.1 Size, scale, area, land-take

5.3.1.1 Dredging Areas

The proposed dredging areas comprise a total of 21.57 ha.

- Area A (Outer Berth) 6.3 ha — TSHD, Plough and a Long Reach Track Machine on a barge.
- Area B (Cells) 3.75 ha — Plough and Long Reach Track Machine on a barge.
- Area C (Inner Berth) 4.8 ha — TSHD, Plough and a Long Reach Track Machine on a barge.
- Area D (Jetty Approach Arm) 6.72 ha — Plough and Long Reach Track Machine on a barge

The locations where it is proposed that plough-dredging will take place are shown in **Figure 5-3** and the quantities of material to be dredged at each area are listed in **Table 5-5**, **Section 5.3.5**, below. The plough functions by scraping the seabed and pushing accumulated material forward. Discharge of the plough dredged material is subsurface at the termination of each run. In other words, dumping emanates from the plough dredge process, where, in effect, the dredge area acts as the dump area. The dredging technologies of a plough and long reach excavator/barge will facilitate material to be moved locally on the seabed and this will be relocated and dispersed by the plough dredger within the red line areas. The use of a long reach machine on a barge is necessary to move material that is not accessible to the plough dredge or TSHD, for example, material under the jetty structure or close to jetty structures.

Figure 5-3: Locations of proposed dredging areas

Photograph 5-2: View of outer berth with vessels alongside

5.3.1.2 Dump Site

When using the TSHD a Dump Site is required to dispose of the material. The dredged material that has been excavated from the seabed is held within the hold of the TSHD ship ready for transport away from the jetty and berths. Accordingly, a potential dump site location has been identified within the Shannon Estuary and is located within an area of the permitted SFPC Dump Site off Foynes Island. (EPA Nr. S0009-03). The Dump Site area being sought has an area of 8.43 ha and is shown, relative to Areas A to D, in Figure 5-4, below. The proposed Dump Site will only receive material from the Trailing Suction Hopper dredging activities from the main berth and possibly from the inner berth where required. A detailed view is shown in Figure 5-5. The quantities of material to be dumped at this location are listed in Table 5-4, Section 5.3.5, below.

5.3.2 Description of resource requirements (water resources, construction material, human presence, etc.,)

Images and illustrations of the dredge technologies are provided in Table 5-3. A Trailing Suction Hopper Dredger (THSD) will be utilised for the main berth, where a larger dredge campaign is required to take the bed level down to the required design/operational depth. In this scenario it may be necessary to remove 1 to 2 m of material. For that depth and volume of dredging the TSHD is the best solution. The TSHD is only expected to be used every few years within the overall 8 year cycle. This technology may also be required in the inner berth, but based on historical deposition rates it is unlikely.

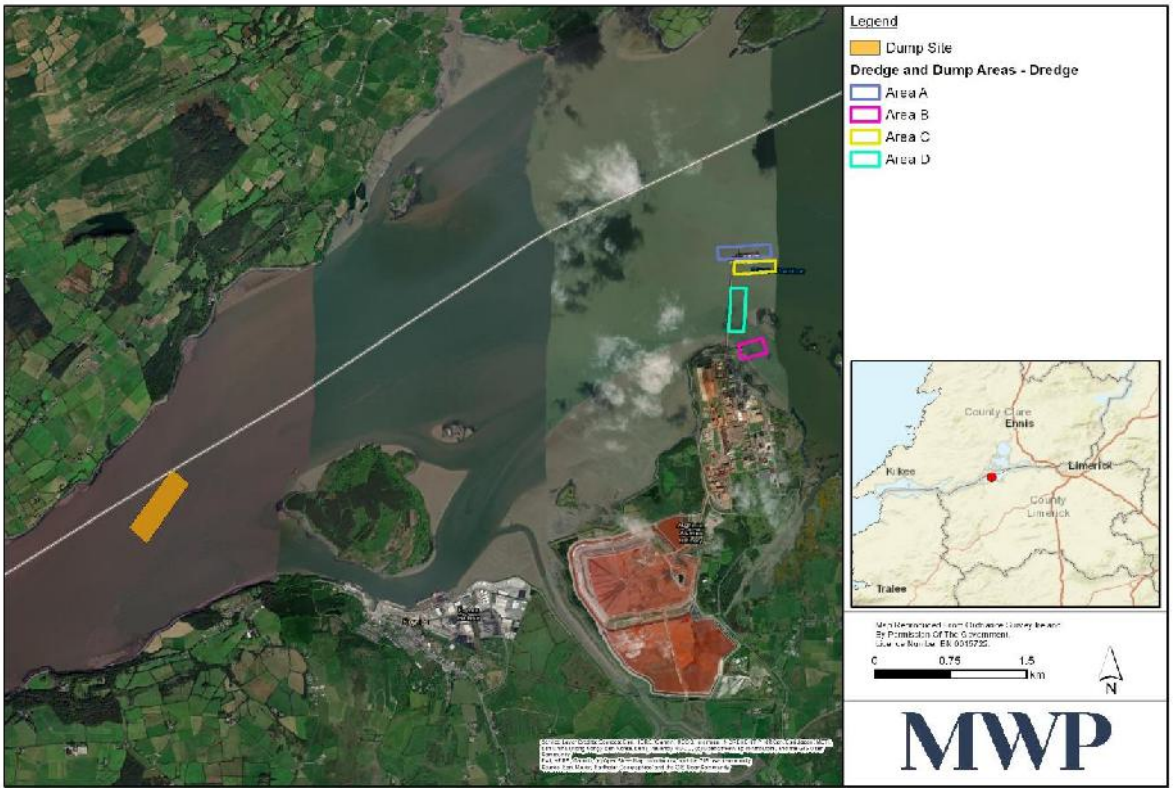
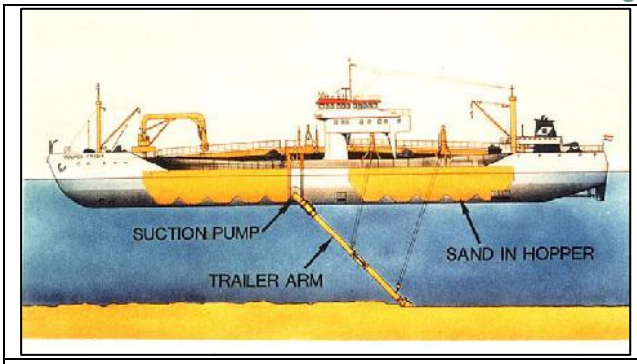


Figure 5-4: Location of proposed dumping site relative to the proposed dredge sites.

Figure 5-5: Detailed view of proposed Dump Site currently used by the SFPC

Table 5-3: Dredging Vessels



Drawing of a Trailing Suction Hopper Dredger (TSHD)

Photograph of a TSHD

Long Arm Reach operating from a Barge

Plough Dredger

5.3.3 Details of physical changes that will take place during the various stages of implementing the proposal

A plough dredger is composed of a steel bar equipped with a bade which is pulled over the seabed and cuts into sediment layers. The plough mobilises material underwater and then uses the bed slopes and natural water currents to move the material to adjacent areas within the dredge footprint. The process moves, rather than removes, the bed material, thereby flattening areas where sediment has accumulated without the need to lift material from the seabed and place it elsewhere. This means they require no disposal sites as they level the seabed, towed behind a suitable boat.

Trailing suction hopper dredgers are classified as hydraulic dredgers, i.e., dredgers which make use of centrifugal pumps. They excavate sediment from a borrow area and then can transport the material to the placement area, which, in the case of this proposal, will be a designated and licensed Dump Site. These craft have articulated dredging pipes, known as “drag arms”, that extend to the seabed. At the end of the drag arm, a drag head is attached. Trailers move at low speeds suctioning up the seabed material through the drag heads and pipes to the hopper i.e., storage areas in the hull for keeping dredged material. The TSHD will work within the berth/dredge area and remove material from the seabed down to the desired level. It is assisted by a plough for bed levelling and in some instances, there may be a need to deploy a long reach excavator on a barge to move hard to reach material under the jetty.

Both technologies will result in the introduction of suspended sediment into the water column.

When the hopper is filled to capacity, the TSHD will move down river to the proposed Dump Site. When the vessel arrives at the Dump Site it will travel through and within the area in a defined pattern and the bottom opening doors of the vessel will allow material to be dropped to the seabed. The material as it drops to the seabed will also have a proportion of fine silt that will go into suspension in the water column. The heavier fraction will fall to

the bed first and then over time the other lighter particles will settle out of suspension and onto the seabed. A proportion of the material will also disperse with the currents and tidal change regime.

There are two distinct areas where material will be dumped comprising the Dump Site, shown Figure 5-4, and the four dredge areas at the Aughinish jetty shown in Figure 5-3. D umping at the jetty emanates from the plough dredge process, where in effect your dredge area acts as your dump area. Table 5-4 details the volume of material that will be dredged by means of the TSHD and brought to the Dump Site. Table 5-5 details the volumes of material to be plough dredged within the four dredge areas at the Aughinish jetty. It is envisaged that a maximum volume of 53,846 tonnes per annum could be deposited at the proposed Dump Site. This volume will vary year to year depending on the dredging cycle, deposition rates and requirements within the main berth.

Table 5-4: Quantity to be Loaded and Dumped at Sea

Location	Maximum annual quantity (tonnes wet)	Total Maximum quantity to be dumped over 8 years (tonnes wet)
SFPC - Site "C" Foynes Island - Mid Channel	53,846	430,771
Total	**53,846**	**430,771**

Table 5-5: Quantity of Material to be Plough-dredged

Location	Maximum annual quantity (tonnes wet)	Total Maximum quantity to be dumped over 8 years (tonnes wet)
A (Outer Berth)	13,309	106,470
B (Cells)	2,520	20,160
C (Inner Berth)	5,962	47,693
D (Approach Arm)	7,920	63,360
Total	**29,710**	**237,683**

5.3.4 Description of timescale for the various activities that will take place as a result of implementation (including likely start and finish date)

In order to provide flexibility in the dredging process it is intended to have provision in the DAS permit to dredge/dump twice a year over a period of 8 years (2025- 2033). While the dredge plan will vary from year to year, each biannual dredge campaign will have a maximum duration of 21 days and dredging operations will take place for 24 hrs per day during each 21-day cycle. The application for a Dumping at Sea Permit (DaS) and MUL will cover a period of 8 years and will be based on a multi-annual dredge plan which will vary from year to year. The outer jetty will be closed to vessel activity for 1 week and that is when the TSHD will be used. For the rest of the 21 day cycle - the Long arm reach/barge and plough dredger will be used.

The specific locations and quantities of sediment that need to be dredged will vary considerably between campaigns and years depending on the methods and technology used, and the weather and logistical factors such as the availability of the jetty and TSHD. The volumes to be removed will also be influenced by the natural cycle of deposition of material on the seabed at each location over time. Hence the dredging activities and durations will vary year to year and 21-day cycle to cycle. In some years, AAL may only do one cycle in any year due to these same weather and logistical factors.

The TSHD is only expected to be used every few years within the overall 8 year cycle. This technology may also be required in the inner berth, but based on historical deposition rates it is unlikely.

5.3.5 Identification of wastes arising and other residues (including quantities) that may be of particular concern in the context of the Natura 2000 network

Seabed sediments from the jetty area excavated by the TSHD that will be dumped in a designated dump location will comprise a maximum annual of 53,846 tonnes (wet). Total Maximum quantity to be dumped over 8 years 430, 771 tonnes (wet).

5.3.6 Description of any additional services required to implement the project or plan, their location and means of construction

Dredge activity monitoring by Marine Mammal Observer (see Section 10.1.1).

Dredge activity monitoring by Archaeologist.

6. Identification of Potential Impacts

EC (2021) sets out the main parameters that need to be identified in order to ascertain which elements of a proposed plan or project have the potential to have significant effects. To that end these, aforementioned, parameters are used, in Table 6-1, to identify those elements of the proposed programme of dredging likely to give rise to potential ecological impacts.

Table 6-1: Potential likely ecological impacts arising from the proposed programme of dredging.

Description of elements of the project likely to give rise to potential ecological impacts sites.	• **Dredging of the estuary bed at the jetty resulting in re-suspension of sediment into the water column and dispersal onto adjacent areas.** • **Disposal of dredged material at proposed Dump Site.** • **Increase in vessel movements during dredging operations.** • **Increase in noise emissions to air and water during dredging operations, from both the dredge vessel itself and the physical dredge activity.** • **Use of oils/fuels/lubricants.**
Describe any likely direct, indirect or secondary ecological impacts of the project (either alone or in combination with other plans or projects) by virtue of: • Size and scale; • Land-take; • Distance from Natura 2000 Site or key features of the Site; • Resource requirements; • Emissions; • Excavation requirements; • Transportation requirements; • Duration of construction, operation etc.; and • Other.	• The proposed dredging works will take place entirely within the boundary of two Natura 2000 sites; Lower River Shannon SAC (002165) and the River Shannon and River Fergus Estuaries SPA (004077) • Dredging activity will result in alteration of estuary bed at the dredge sites • Water quality impacts from increased suspended sediment and turbidity in the water column potentially causing habitat alteration and/or species displacement • Pollutants/harmful substances could disperse into the aquatic environment once sediments are disturbed impacting on water quality and potentially causing indirect species displacement • Deposition of dredged material, at the jetty and the 8.43 ha Dump Site, could cause habitat alteration and/or species displacement through smothering impacts on benthic in-faunal communities, potentially affecting the food resource of SCI bird species • Increased vessel movements could result in both aquatic and avian species disturbance/displacement • Fugitive noise emissions during dredging operations could lead to temporary disturbance/displacement of qualifying bird/mammal species both locally and far afield including for marine mammal species designated for Natura 2000, both nationally and internationally depending on foraging range. • Accidental spills of fuels/lubricants could lead to habitat alteration and/or species displacement through adverse impacts to water quality which may impact prey availability

7. Identification of Other Plans, Projects and Activities

EC (2018) refers to the cumulative impacts due to other plans or projects 'that are currently under consideration together with the effects of any existing or proposed projects or plans'. As the underlying intention of the in-combination provision is to take account of cumulative effects (DoEHLG, 2010) it is necessary to identify not only these aforementioned projects or plans but all likely sources of effects in the existing environment (DoEHLG, 2010) with which the proposed development could interact synergistically to cause in-combination impacts that will have adverse effects on the integrity of the Natura 2000 sites identified in Table 3-1, above.

7.1.1 Threats and Pressures with impacts on Natura 2000 sites[8]

Under Article 17 of the Habitats Directive, Member States are obliged to identify, using a standard list of descriptors and codes, activities deemed to constitute Threats and Pressures to Natura 2000 sites.

A Threat is defined as an "Activity expected to have an impact on a species/habitat type in the future".

A Pressure is defined as an "Activity impacting a species/habitat type during the reporting cycle"[9]. A differentiation is made as to whether the Threats and Pressures identified are considered to exert influences within or outside each site. As the proposed works are located entirely within the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, these sites are considered to be the only European sites with assigned threats and pressures which have the potential to have an impact on any species or habitat within that site due to location. These threats and pressures are not considered likely to extend to European sites beyond the sites' designation and consequently only the Lower River Shannon SAC and Lower River Shannon and River Fergus Estuaries SPA are considered in this section.

The Threats and Pressures identified in the Natura 2000 Standard Data Form for each site are assigned a rating indicating whether each is considered to be a Low, Medium, or High Threat or Pressure. Those considered active within the SAC are listed in Table 7-1, those considered active within the SPA are listed in Table 7-2.

7.1.1.1 Lower River Shannon SAC (002165)

A review of the Natura 2000 Standard Data form for the Lower River Shannon cSAC indicates that the estuarine habitats and associated species are vulnerable to land reclamation, industrial development, water pollution (from industrial, agricultural and domestic sources) and spread of Spartina. Dolphins are vulnerable to underwater aquatic disturbance, entanglement in fishing gear and collision with fast moving craft. Sublittoral sediments and submerged sand banks could be threatened by future developments. The specific threats and pressures are listed in Table 7-1, below.

Table 7-1: Ranked threats and pressures

Rank	Category[10]
Medium	Grazing.
Medium	Fertilisation.
Low	Forestry.
Low	Hand cutting of peat.
Low	Paths, tracks, cycling tracks.

[8] http://cdr.eionet.europa.eu/help/habitats_art17

[9] Every six years, Member States must report to the Commission on the conservation status of species and habitat types protected under the Habitats Directive that are present on their territory.

[10] Natura 2000 Standard Data Form https://natura2000.eea.europa.eu/expertviewer/

Low	Discharges.
Medium	Marine and freshwater aquaculture.
Low	Hunting.
Low	Nautical sports.
Low	Invasive non-native species.
Medium	Polderisation.
Low	Removal of beach materials.
Low	Sea defense or coast protection works, tidal barrages.

7.1.1.2 River Shannon and River Fergus Estuaries SPA (004077)

A review of the Natura 2000 Standard Data form for the River Shannon and River Fergus SPA indicates that site receives pollution from several sources, including industry and agriculture. Reclamation of land is a threat near to urbanised and industrial areas. Aquaculture occurs and may increase in the future. Common cord grass (*Spartina anglica)*[11] is well established and may threaten the estuarine habitats. Some disturbance occurs from boating activities. The specific threats and pressures are listed in Table 7-2, below.

Table 7-2: Ranked threats and pressures

Rank	Category[12]
Medium	Nautical sports.
Medium	Shipping lanes.
High	Discharges.
Medium	Marine and freshwater aquaculture.

7.1.2 Plans

The term plan has, for the purposes of Article 6(3), a potentially broad meaning, including land-use or spatial plans and sectoral plans (e.g. for transport, energy, waste management, water management, forest management, etc.) (EC, 2021). A review of the relevant plans that could potentially interact with the proposed project was undertaken. Plans that could interact synergistically with the project include:

- Limerick Development Plan 2022-2028
- Clare County Development Plan 2017–2023
- Strategic Integrated Framework Plan for the Shannon Estuary 2013-2020

7.1.3 Projects

Projects are defined (EC, 2021) as undertakings that involve construction works, installations and other interventions in the natural environment, including regular activities aimed at utilising natural resources. A search of the adjacent local authorities' on-line planning enquiry systems determined that there are an abundance of permissions and applications associated with projects distributed throughout the wider geographical area. As would be expected these are primarily for minor development works typical of rural settings with a mix of small towns and villages, interspersed with dispersed dwellings, where agriculture is the dominant activity. The projects

[11] Invasive species - risk of High Impact
[12] Natura 2000 Standard Data Form https://natura2000.eea.europa.eu/expertviewer/

include, *inter alia*, dwelling houses with ancillary works (WWTS, extensions, landscaping, etc.), farm structures (silage pits, sheds, etc.).

There is one exception, notable because of its proximity and the characteristics of the works involved. This is described in Section 7.1.3.1,below.

7.1.3.1 Port of Foynes, port capacity extension

The permitted[13] works consist of:

- Construction of an open-piled jetty structure with suspended 116.5 m concrete deck connecting the West Quay to the East Jetty.
- Quayside furniture, including quay fenders, mooring bollards, safety ladders, toe rail and lighting columns.
- Construction and remedial works to both the existing West Quay and East Jetty ends to facilitate structural tie-in of the proposed new jetty structure.
- Removal of the existing small craft landing pontoon walkway from its current position affixed to the shore between the West Quay and the East Jetty and provision of a new, small craft, landing pontoon and walkway affixed to the western side of the West Quay wall.
- All associated site development works.

The development will include a phased expansion of the port estate, on 33.95 ha of land immediately adjacent to the east of that existing, to provide serviced industrial land and to accommodate marine-related industry, port-centric logistics, and associated infrastructure that will be provided in accordance with a development framework programme prepared for the overall expansion area.

7.1.4 Other Activities

7.1.4.1 Dredging and Dumping Activities in the Estuary

SFPC is permitted to conduct annual dredging campaigns, estimating between 75,000 and 150,000 wet tons of material per annum. This includes dumping material at the dump site off Foynes Island – that AAL are now proposing to use part of (see Figure 2-4). Waterways Ireland is planning a campaign near Limerick city above Shannon Bridge, but details and licensing status are unclear.

7.1.4.2 Estuary Operations

The Shannon Estuary is one of the most important navigation channels in the country as the deep waters provide access by some of the largest marine vessels entering Irish waters to ports such as Shannon and Foynes as well as numerous industries located along the estuary's shores. Due to the level of industry in the region significant numbers of vessels utilise the channel, including cargo vessels which berth at the existing deep-water jetty at Aughinish, and as such activity associated with these vessels could potentially result in in-combination effects as a result of the proposal. .

[13] Bord Pleanála Case reference: PA91.301561

7.1.4.3 Diffuse and Point Sources of Pollution

The individual sources identified in the subsections hereunder would each fall under the Threat/Pressure category 'Discharges' identified in Section 7.1.1, above.

7.1.4.3.1 *Agriculture*

Agriculture is the dominant activity in the geographical area surrounding the estuary and is considered the main pressure on surface water quality in the various river systems draining to the it. As a result, there is potential for the proposed dredging and dumping at sea to contribute to in-combination impacts on the quality of marine waters within the relevant Natura 2000 sites. This derives from the potential for sediments and other pollutants entering the estuary waters as a result of the dredging and dumping at sea. Within this landscape commercial woodland plantations are also present but the distribution of these is relatively diffuse in the flood plain of the River Deel that extends eastwards from the ridge of the Mullaghareirk Mountains that tracks southwards from the coast.

7.1.4.3.2 *Aquaculture*

There are four aquaculture sites in the vicinity of Aughinish. These comprise both intensive and extensive mussel and oyster sites, the closest of which is located approximately 550 m to the east. The closest designated shellfish waters are ca. 27 km west of Aughinish at Ballylongford. A study of the marine atlas showed that the closest fishing ground is Pot fishing for shrimp ca.19.6 km west of Aughinish.

7.1.4.3.3 *Urban Waste Water*

Raw sewage, from an Agglomeration[14] with a Population Equivalent (PE)[15] of 592, is discharged to the estuary at Foynes[16] (Reg No. D0502-01) at a location approximately 4.5 southwest of the jetty at Aughinish.

7.1.4.3.4 *EPA Licensed Facilities*

Industrial and waste facilities are classed into different sectors depending on the nature of their activity and its potential impact on the environment. There are two Licensed Waste facilities within the port area in Foynes that are registered by the EPA, however, neither are currently active. One issued to Greenport Environmental Limited was withdrawn and the other issued to Irish Bulk Liquid Storage was never active. There are a further three in Limerick City, one in Ennis and another in Kilkee.

There is an Industrial Emissions Licensed (IEL) facility [License No. P0035-07[17]] situated within the AAL refinery. The Licence grants AAL permission to carry out the following activities in accordance with the requirements and conditions set out in the Licence:

- The production of inorganic chemicals;
- The combustion of fuels installations with a total rated thermal input of 50 MW or more; and
- The recovery or disposal of waste.

[14] An urban settlement (village, town or city area) which is connected through a pipe network to a wastewater treatment plant.
[15] Wastewater treatment plants are described in terms of their designed treatment capacity, which is generally expressed as PE
[16] https://gis.epa.ie/EPAMaps/SewageTreatment
[17] Class of Activity: Sectors 2 (Energy), 5 (Chemicals) and 11 (Waste)

Submitting an Annual Environmental Report (AER), a summary of environmental information for a given year, is a requirement of all EPA licences. Each AER includes:

- Details of the licence holder's environmental goals achieved goals to maintain compliance and/or improve their environmental performance;
- Answers to questions regarding their facility's activities;
- Tables of results from monitoring emissions such as air, water, noise, and odour; and
- Details of waste generated, accepted and treated.

To date AAL have been compliant with the conditions of the IEL.

8. Identification of QI or SCI Potentially Exposed to Significant Impacts

Identifying a risk that could, in theory, cause an impact does not automatically mean that the risk event will occur, or that it will cause or create an adverse impact. However, identification of the risk does mean that there is a latent possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature of the risk, the extent of the exposure to the risk and the characteristics of the receptor. When assessing impact, the QI or SCI for which the relevant Natura 2000 sites are selected, are only considered relevant where a credible or tangible source-pathway-receptor link exists between the plan or project, in this case the proposed programme of dredging, and dumping at sea, described in Section 5.3, and the aforementioned QI or SCI. In order for an impact to be transmitted from source to receptor there must be a risk initiated by:

- a source - the origin of potential impacts (e.g., near stream construction works at a proposed development site);
- a pathway – the means by which the effect reaches the receiving receptor (e.g., a watercourse which connects the proposed development site to the site designated for the protection of a receptor); and
- a receptor (e.g., a protected species, associated aquatic or riparian habitats).

If the source, pathway, or receptor is absent, no linkage exists and thus, there will be no potential for an impact to be transmitted.

Therefore, bearing in mind the scope, scale, nature and size of the proposed dredging, including the Dump Site, their locations relative to the distribution of the QI and SCI listed in Table 3-1,and the degree of connectedness that exists between the locations of the proposed dredging and the Dump Site and the potential receptors, it is considered that not all of the receptors considered in Table 3-1 are within the zone of potential impact of the proposal. An evaluation based on these factors to determine which QI species and habitats and/or SCI species are the plausible ecological receptors for potential impacts of the unmitigated proposal is provided in Sections 8.1.1 and 8.1.2, below. This evaluation determined that certain habitats and species (listed in Table 8-1 and Table 8-2, below) should be selected for further assessment as plausible ecological receptors

8.1.1 Lower River Shannon SAC (002165)

This site is selected for the protection of fourteen annexed habitat types and for the protection of the resident populations of seven species. Eleven of the annexed habitat types are coastal or halophytic in their distributions, Two are terrestrial types, and one is riparian. Six of the species are aquatic; the other, namely otter, is a terrestrial

mammal with a strong dependency on aquatic habitats. While the strongest determinant of its distribution is the availability of riparian habitats, this species' distribution can extend to near-shore coastal waters.

Table 8-1 lists the QI species and habitat types for which this site is selected and evaluates, through a scientific examination of evidence and data, whether or not each QI should or should not be selected for further assessment in the NIS. An assessment of potentially significant effects arising from the impacts identified in Section 6, as they pertain to the selected QI, is then provided in Section 8.1.3.

The QI selected are listed below.

- Habitats
    - Estuaries [1130]
    - Mudflats and sandflats not covered by seawater at low tide [1140]
    - Reefs [1170]c
- Species
    - Sea lamprey (*Petromyzon marinus*) [1095]
    - River lamprey (*Lampetra fluviatilis*) [1099]
    - Atlantic salmon (*Salmo salar*) [1106]
    - Otter (*Lutra lutra*) [1355]
    - Bottle-nosed dolphin (*Tursiops truncates*) [1349]

8.1.2 River Shannon and River Fergus Estuaries SPA (004077)

This site is selected for the protection of the populations of 20 species of migratory, wintering, waterfowl and 1, breeding, population that is resident year-round, namely cormorant (*P. carbo*) (NPWS, 2012b); the full species list is provided below. And while, as an SPA, the site is not selected for any annexed habitat types it is selected for the protection of the wetland habitat that is a resource for the regularly occurring migratory waterbirds that utilise the site and which is estimated as comprising 32,261 ha (NPWS, 2012b) of the SPA.

- Resident, breeding population
    - Cormorant (*Phalacrocorax carbo*) [A017]
- Migratory, non-breeding populations
    - Whooper swan (*Cygnus cygnus*) [A038]
    - Light-bellied brent goose (*Branta bernicla hrota*) [A046]
    - Shelduck (*Tadorna tadorna*) [A048]
    - Wigeon (*Anas penelope*) [A050]
    - Teal (*Anas crecca*) [A052]
    - Pintail (*Anas acuta*) [A054]
    - Shoveler (*Anas clypeata*) [A056]
    - Scaup (*Aythya marila*) [A062]
    - Ringed plover (*Charadrius hiaticula*) [A137]
    - Golden plover (*Pluvialis apricaria*) [A140]
    - Grey plover (*Pluvialis squatarola*) [A141]
    - Lapwing (*Vanellus vanellus*) [A142]
    - Knot (*Calidris canutus*) [A143]
    - Dunlin (*Calidris alpina*) [A149]
    - Black-tailed godwit (*Limosa l*imosa) [A156]
    - Bar-tailed godwit (*Limosa lapponica*) [A157]
    - Curlew (*Numenius arquata*) [A160]
    - Redshank (*Tringa totanus*) [A162]
    - Greenshank (*Tringa nebularia*) [A164]

- Black-headed gull (*Chroicocephalus ridibundus*) [A179]

Table 8-2 lists the SCI, i.e., the bird species and the habitat complex, for which the site is selected. It evaluates through a scientific examination of evidence and data whether or not each SCI should or should not be selected for further assessment in the NIS. An assessment of potentially significant effects arising from the impacts identified in Section 6, as they pertain to the selected SCI is provided in Section 8.1.3.

Table 8-1: Identification of QI for which the Lower River Shannon SAC (002165) is selected that are potentially exposed significant impacts

Qualifying Interest	Potential for Significant Impacts	Rationale
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	No	– Freshwater species. – No plausible impact pathway.
Sea lamprey (*Petromyzon marinus*) [1095]	**Yes**	– Range could include the habitat within the vicinity of the proposal – Sea lampreys spend their adult life in marine and estuarine waters, living as external parasites on other fish species before migrating up rivers in spring to spawn in areas of clean gravel. – Potential impacts identified could have an adverse effect on the species during marine phase. – Precautionary principle
Brook lamprey (*Lampetra planeri*) [1096]	No	– Freshwater species. – No plausible impact pathway.
River lamprey (*Lampetra fluviatilis*) [1099]	**Yes**	– Range could include the habitat within the vicinity of the proposal. – River lampreys spend their adult life in marine and estuarine waters, living as external parasites on other fish species before migrating up rivers in spring to spawn in areas of clean gravel. – Potential impacts identified could have an adverse effect on the species during marine phase – Precautionary principle
Atlantic salmon (*Salmo salar*) [1106]	**Yes**	– Anadromous species whose range, during its migration to, and return from the ocean, could include the habitat within the vicinity of the proposal. – Potential impacts identified could have an adverse effect on the species during migratory periods – Precautionary principle
Otter (*Lutra lutra*) [1355]	**Yes**	– Terrestrial/semi-aquatic species whose range includes the habitats within the vicinity of the proposal – Potential impacts identified could have an adverse effect on the species – Precautionary principle
Bottle-nosed dolphin (*Tursiops truncates*) [1349]	Yes	– Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Sandbanks which are slightly covered by seawater all the time [1110]	No	– This annexed habitat type is restricted in its distribution to the deeper waters in the centre of the estuary west of Ballybunnion and south of Rinevella Point, County Clare (Map-3 NPWS, 2012a), at a remove of approximately 44 km due west of the jetty[18].

[18] Measure Distance Tool at https://www.bing.com/maps

Estuaries [1130]	**Yes**	– The distribution of this habitat type encompasses the waters at the jetty and the proposed Dump Site (Map 4: NPWS, 2012a).
Mudflats and sandflats not covered by seawater at low tide [1140]	**Yes**	– While the distribution of this habitat type extends into areas adjacent to the east of the jetty and the shore of Aughinish Island (Map 5: NPWS, 2012a), it does not include the proposed dredge site. – The proposed dredge site is mapped as comprising 'Subtidal sand to mixed sediment with *Nephtys* spp. Community complex' (Map 6b: NPWS, 2012c), which is a constituent community of the annexed habitat type. – Precautionary principle.
Coastal lagoons [1150]*	No	– Notwithstanding the proximity of the Quayfield and Poulaweala Loughs (IL031) site (Map 6: NPWS, 2012a), due to the approximately 2.5 km distance intervening, and its land-locked location upstream of Aughinish, this annexed habitat type is not likely to be exposed to significant effects.
Large shallow inlets and bays [1160]	No	– The distribution of this annexed habitat extends, west to east, from the debouche of the Shannon to the Atlantic, to a line drawn between Kilrush, on the Clare coast of the estuary, and Ballylongford, on the coast of Kerry (Map 7: NPWS, 2102a). In light of the approximately 30 km intervening, this annexed habitat type is not likely to be exposed to significant effects.
Reefs [1170]	**Yes**	– Distribution of this habitat type includes an area adjacent to the jetty and the proposed Dump Site (Map 8: NPWS, 2012a). – Precautionary principle.
Perennial vegetation of stony banks [1220]	No	– This annexed habitat type comprises vegetation that is found at or above the mean high water spring tide[19] mark on shingle beaches (i.e., beaches composed of cobbles and pebbles). – The closest mapped location, namely Ballymacrinan Bay in County Clare (Map 10: NPWS, 2012a), is at a remove of approximately 22 km from the jetty. – In light of the distance intervening, and/or the fact that the habitat is restricted in its distribution to areas at or above mean high water spring tide mark, this annexed habitat type is not likely to be exposed to significant effects.
Vegetated sea cliffs of Atlantic and Baltic coasts [1230]	No	– A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal (littoral) or subtidal (sublittoral) zone which may support a range of plant communities such as grassland, heath, scrub and bare rock communities (Barron *et al.*, 2011). – A distance of approximately 20 km intervenes between the jetty at Aughinish and the nearest location where this habitat type is mapped at Burrane, adjacent to the east of Killimer, County Clare (Map 11: NPWS, 2012a).

[19] Average throughout the year, when the average maximum declination of the moon is 23.5° of 2 successive high waters during those periods of 24 hours when the range of the tide is at its greatest. [https://www.ntslf.org/tgi/definitions]

		– In light of the distance intervening, and the terrestrial characteristics of its typical plant communities, this annexed habitat type is not likely to be exposed to significant effects.
Salicornia and other annuals colonising mud and sand [1310]	No	– The area of this habitat type within the SAC is limited and its distribution scattered and diffuse with none of its mapped locations in any proximity to either the dredge or proposed Dump Sites (Map 12: NPWS 2012a) – The impact from the dredging operation will be limited to the marine sub-tidal environment; therefore, significant intertidal impacts to this habitat type are not expected to occur
Atlantic salt meadows (*Glauco-Puccinellietalia-maritimae*) [1330]	No	– The distribution of this habitat includes the location identified as SMP 0079 (Map 12: NPWS 2012a), which is situated in the inner reaches of Robertstown River along the shore of Churchfield, Sroolane North, Dysert, and Oorla townlands, approximately 4 km to the south-west of the jetty. – Potential 1330 habitat is also mapped to the south east of the jetty, in the area around Lisillaun and the peninsula landward of Moreena Point, approximately 2 km to the south-east of the jetty (Map 12: NPWS 2012a), and at locations on the eastern and western shores of Aughinish Island and at numerous locations along the shore between the island and Illaunavoley Point, approximately 5 km east of the jetty. – The impact from the dredging operation will be limited to the marine sub-tidal environment; therefore, significant impacts to this habitat type are not expected to occur
Mediterranean salt meadows (*Juncetalia maritimi*)[1410]	No	– The distribution of this habitat includes the location identified as SMP 0079 (Map 12: NPWS 2012a), which is situated in the inner reaches of Robertstown River along the shore of Churchfield, Sroolane North, Dysert, and Oorla townlands, approximately 4 km to the south-west of the jetty. – The impact from the dredging operation will be limited to the marine sub-tidal environment; therefore, significant impacts to this habitat type are not expected to occur
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	No	– Freshwater habitat. – No plausible impact pathway.
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caeruleae)* [6410]	No	– Terrestrial habitat. – No plausible impact pathway.
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]*	No	– Terrestrial habitat. – No plausible impact pathway.

Table 8-2 : Identification of SCI for which the River Shannon and River Fergus Estuaries SPA (004077) is selected that are potentially exposed significant impacts

SCI	Potential for Significant Impacts	Rationale
Resident, breeding population Cormorant (*Phalacrocorax carbo*) [A017] **Migratory, non-breeding populations** Whooper swan (*Cygnus cygnus*) [A038] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Ringed plover (*Charadrius hiaticula*) [A137] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa l*imosa) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Black-headed gull (*Chroicocephalus ridibundus*) [A179]	**Yes**	– These species potentially utilise habitats within the zone of influence – Impacts identified could affect species intensity of use of areas within the site – Precautionary principle
Habitat & Species Complex Wetland and Waterbirds [A999	No	– There will be no reduction in the permanent area of wetland within the site – Therefore, there will be no adverse impact on the favourable conservation condition of 'Wetlands' and so it is not considered further in this assessment

8.1.3 Other European Sites

Due to the nature of the proposed works, and in light of the maximum foraging range of species detailed in **Section 3**, additional European sites must be considered for which these species are designated. The species of interest are limited to two cetacean species, Harbour porpoise (*Phocoena phocoena*) and Bottle-nosed dolphin (*Tursiops truncatus*), and two pinniped species, Harbour seal (*Phoca vitulina*) and Grey seal (*Haliochoerus grypus*). Potential impacts to marine cetaceans and pinniped QI species include noise from underwater operations as well as impacts to prey availability due to impacts to water quality and increased sedimentation from dredging activities. The location of the Natura 2000 network in relation to Harbour Porpoise and Bottlenose Dolphin Management Units are detailed in Figure 8.1 below.

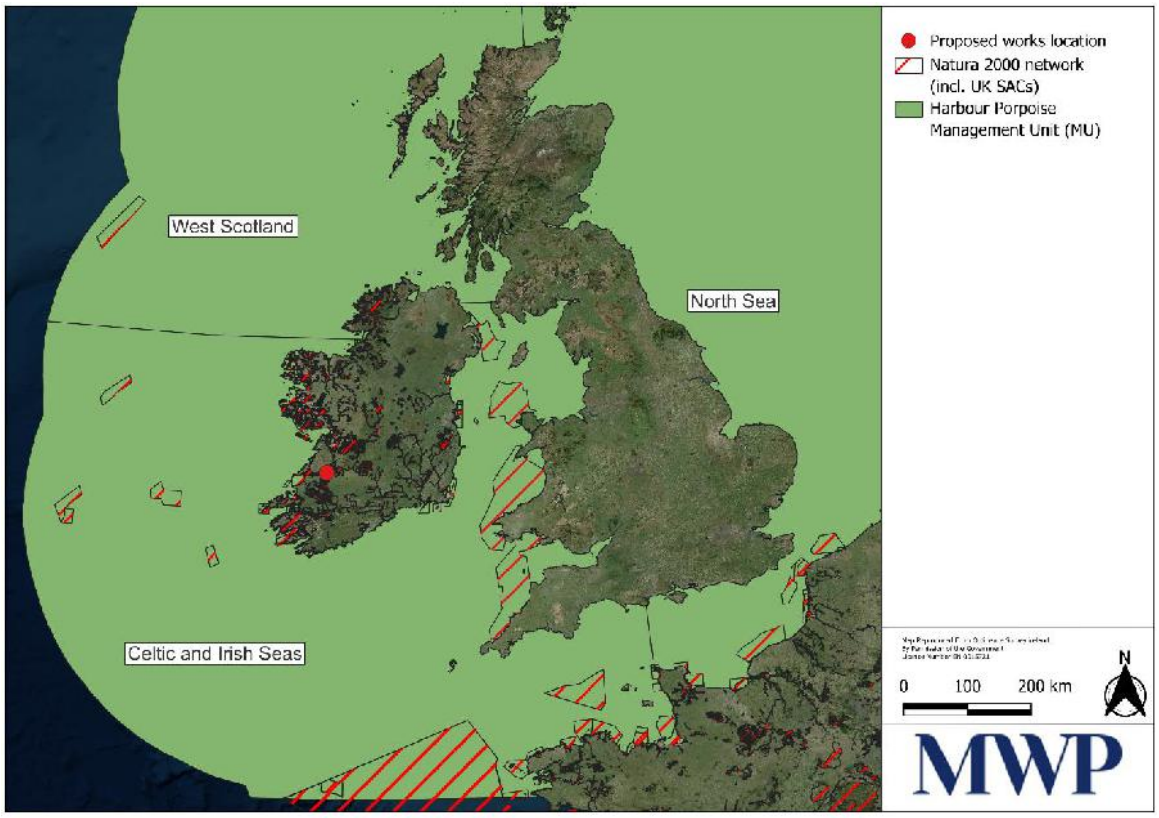


Figure 8-1: Harbour Porpoise Management Units (MUs) relative to Natura 2000 network

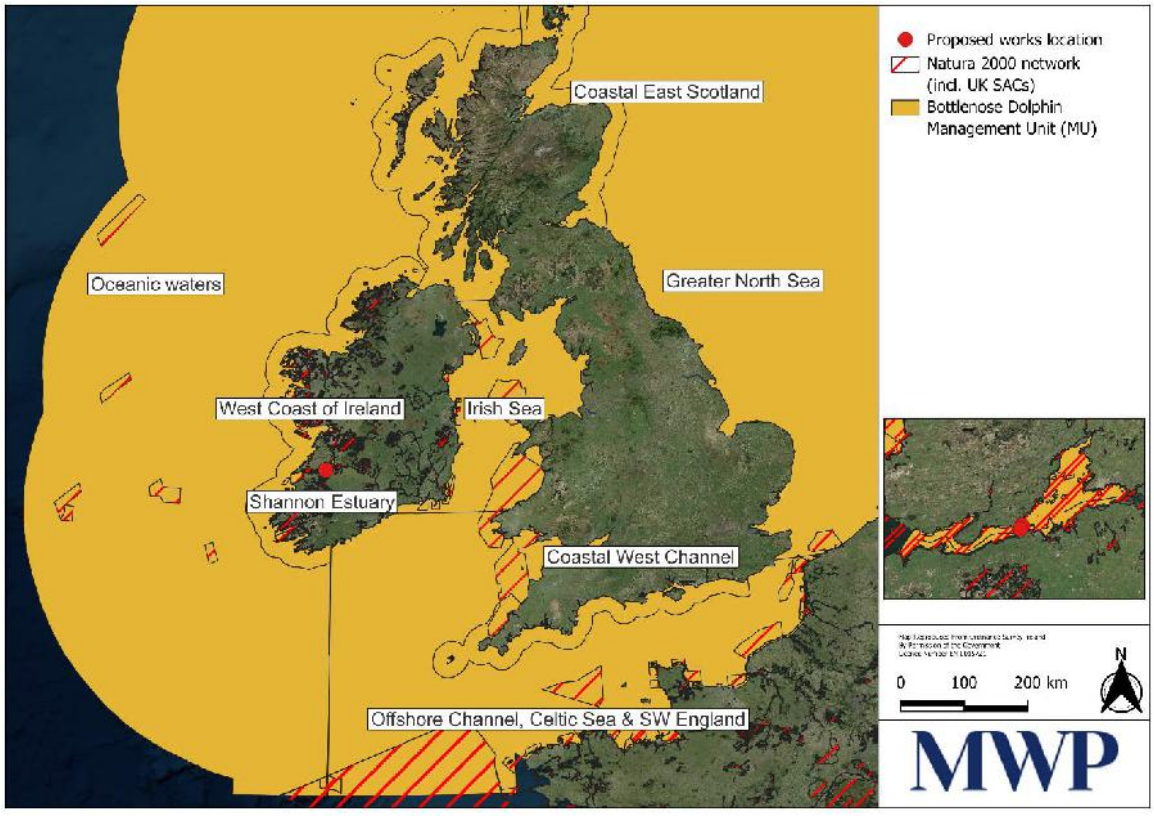


Figure 8-2: Bottlenose Dolphin Management Units (MUs) relative to Natura 2000 network

Table 8-3: European sites (SACs and ZSCs) for which far-ranging cetacean and pinniped species are qualifying interests

Qualifying Interest	Potential for Significant Impacts	Rationale
Belgica Mound SAC (002327) (Located *c.* 217km southwest via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitat
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit (MU) – Foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC is located in 'Oceanic Waters' MU however, foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Duvillaun Islands SAC (000495) (Located 232km north via sea)		
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC located in West Coast of Ireland MU, however foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Grey seal (*Halichoerus grypus*) [1364]	**Yes**	– Proposed works areas are located within the foraging range for grey seal, where site is located approximately 232km north by sea when compared to the foraging range for grey seal is 448km – Consequently, there source-pathway-receptor link exists to grey seal for which the Duvillaun Islands SAC is designated and therefore foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Hook Head SAC (000764) (Located 431.5km southeast via sea)		
Large shallow inlets and bays [1160]	No	– No Source-Pathway-Receptor link for habitat
Reefs [1170]	No	– No Source-Pathway-Receptor link for habitat
Vegetated sea cliffs of the Atlantic and Batlic coasts [1230]	No	– No Source-Pathway-Receptor link for habitat
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC is located in Irish SEA MU, separate to the Shannon Estuary MU where the project is located. However, the foraging foraging range could include the habitat within the vicinity of the proposal

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas MU – Foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Porcupine Bank Canyon SAC (003001) (Located *c.* 400km west via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitat
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC located in Oceanic Waters MU however foraging range could include the habitat within the vicinity of the proposal and potential impacts conisdered – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
South-west Porcupine Bank SAC (002329) (Located *c.* 415km west via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitat
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– Foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Codling Fault Zone SAC (003015) (Located *c.* 618km east via sea)		
Submarine structures made by leaking gas [1180]	No	– No source-pathway-receptor link for habitat
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC located in Irish Sea MU for the species – However, potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Slyne Head Islands SAC (000328) (Located *c.* 154.5km north via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitat
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC located in West Coast of Ireland MU, though species' foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle

Qualifying Interest	Potential for Significant Impacts	Rationale
Grey seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering distance (154.5km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Slyne Head Peninsula SAC (002074) (Located *c.* 156.5km north via sea)		
Coastal lagoons [1150]	No	– No source-pathway-receptor link for habitats
Large shallow inlets and bays [1160]	No	
Reefs [1170]	No	
Annual vegetation of drift lines [1210]	No	
Perennial vegetation of stony banks [1220]	No	
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1130]	No	
Mediterranean salt meadows (Juncetalia maritimi) [1410]	No	
Embryonic shifting dunes [2110]	No	
Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]	No	
Machairs (* in Ireland) [21A0]	No	
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No	
Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]	No	
Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]	No	
European dry heaths [4030]	No	
Juniperus communis formations on heaths or calcareous grasslands [5130]	No	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No	
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]	No	
Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510]	No	
Alkaline fens [7230]	No	
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]	No	
Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]	No	
Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]	No	
European dry heaths [4030]	No	

Qualifying Interest	Potential for Significant Impacts	Rationale
Juniperus communis formations on heaths or calcareous grasslands [5130]	No	
Slender Naiad (*Najas flexilis*)	No	– No source-pathway-receptor link for freshwater plant species
Petalwort (*Petalophyllum ralfsii*)	No	– No source-pathway-receptor link for terrestrial plant species
Bottlenose dolphin (*Tusiops truncates*) [1349]	**Yes**	– SAC located in West Coast of Ireland MU, though species' foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
St. John's Point SAC (000191) (Located *c.* 370km north via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitats
Large shallow inlets and bays [1160]	No	
Vegetated sea cliffs of the Atlantic and Baltic Coasts [1230]	No	
Submerged or partially submerged sea caves [8330]	No	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No	
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]	No	
Alkaline fens [7230]	No	
Limestone pavements [8240]	No	
Bottlenose dolphin (*Tursiop[s truncatus*) [1349]	**Yes**	– SAC located in West Coast of Ireland MU, though species' foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Marsh Fritillary (*Euphydras aurinia*) [1065]	No	– No source-pathway-receptor link for terrestrial insect species
West Connacht Coast SAC (002998) (Located *c.* 163km north via sea)		
Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Yes**	– SAC located in West Coast of Ireland MU, though species' foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Precautionary principle
Blasket Islands SAC (Located 111.5km *c.* southwest via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitats
Vegetated sea cliffs of the Atlantic and Blatic coasts [1230]	No	
European dry heaths [4030]	No	
Submerged or partially submerged sea caves [8330]	No	
Harbour Porpoise (*Phocoena Phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering intervening distance (111.5km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Horn Head and Rinclevan SAC (000147) (Located *c.* 422.5km north via sea)		
Embryonic shifting dunes [2110]	No	– No source-pathway-receptor link for habitats
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	
Dunes with *Salix repens* ssp. argentea (*Salicion arenariae*) [2170]	No	
Humid dune slacks [2190]	No	
Machairs (* in Ireland) [21A0]	No	
Oligotrophic te mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and or *Isoeto-Nanojuncetea* [3130]	No	
Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	No	– No source-pathway-receptor link for terrestrial mollusc species
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Though SAC represents site at near maximum distance based on foraging range, where shortest intervening distance via aquatic pathway is 422.5km and species maximum foraging range is 448km, foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Petalwort (*Petalophyllum ralfsii*) [1395]	No	– No source-pathway-receptor link for terrestrial plant species
Slender Naiad (*Najas flexilis*)	No	– No source-pathway-receptor link for aquatic plant species

Qualifying Interest	Potential for Significant Impacts	Rationale
Inishbofin and Inishshark SAC (000278) (Located *c.* 175km north via sea)		
Coastal lagoons [1150]	No	– No source-pathway-receptor link for habitats
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]	No	
Northern Atlantic wet heaths with *Erica tetralix* [4010]	No	
European dry heaths [4030]	No	
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering intervening distance (175km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Inishkea Islands SAC (000507) (Located *c.* 232km north via sea)		
Machairs (* in Ireland) [21A0]	No	– No source-pathway-receptor link for habitats
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering intervening distance (232km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Petalwort (*Petalophyllum ralfsii*) [1395]	No	– No source-pathway-receptor link for terrestrial plant species
Roaringwater Bay and Islands SAC (000101) (Located *c.* 225km south via sea)		
Large shallow inlets and bays [1160]	No	– No source-pathway-receptor link for habitats
Reefs [1170]	No	
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No	
European dry heaths [4030]	No	
Submerged or partially submerged sea caves [8330]	No	
Harbour Porpoise (*Phocoena Phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for distant otter species
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering intervening distance (225km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Precautionary principle
Slieve Tooey/Tormore Islnand/Loughros Beg Bay SAC (000328) (Located *c.* 353.7km north via sea)		
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No	– No source-pathway-receptor link for habitats
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	No	
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	
Embryonic shifting dunes [2110]	No	
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	
Decalcified fixed dunes with *Empetrum nigrum* [2140]	No	
Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]	No	
Dunes with *Salix repens* ssp. argentea (*Salicion arenariae*) [2170]	No	
Humid dune slacks [2190]	No	
Alpine and Boreal heaths [4060]	No	
Blanket bogs (* if active bog) [7130]	No	
Narrow-mouthed Whorl Snail (*Vertigo angufstior*) [1014]	No	– No source-pathway-receptor link for terrestrial snail species
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for otter considering distance
Grey Seal (*Halichoerus grypus*) [1364]	**Yes**	– Considering intervening distance (353.7km) from SAC and grey seals' foraging range (448km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Clew Bay Complex SAC (001482) (Located 220.5km north via sea)		
Mudflats and sandflats not covered by seawater at low tide [1140]	No	– No source-pathway-receptor link for habitats
Coastal lagoons [1150]	No	
Large shallow inlets and bays [1160]	No	
Annual vegetation of drift lines [1210]	No	
Perennial vegetation of stony banks [1220]	No	
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	No	
Embryonic shifting dunes [2110]	No	
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	
Machairs (* in Ireland) [21A0]	No	
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	No	

Qualifying Interest	Potential for Significant Impacts	Rationale
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for otter considering distance
Harbour Seal (*Phoca vitulina*) [1365]	**Yes**	– Considering intervening distance (220.5km) from SAC and harbour seals' foraging range (273km), range could include the habitat within the vicinity of the proposal, though close to maximum foraging limit, – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Galway Bay Complex SAC (000268) (Located *c.* 150km north via sea)		
Mudflats and sandflats not covered by seawater at low tide [1140]	No	– No source-pathway-receptor link for habitats
Coastal lagoons [1150]	No	
Large shallow inlets and bays [1160]	No	
Reefs [1170]	No	
Perennial vegetation of stony banks [1220]	No	
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No	
Salicornia and other annuals colonising mud and sand [1310]	No	
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	No	
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	
Turloughs [3180]	No	
Juniperus communis formations on heaths or calcareous grasslands [5130]	No	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No	
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	No	
Alkaline fens [7230]	No	
Limestone pavements [8240]	No	
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for otter considering distance
Harbour Seal (*Phoca vitulina*) [1365]	**Yes**	– Considering intervening distance (150km) from SAC and harbour seals' foraging range (273km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Kenmare River SAC (002158) (Located *c.* 163.6km south via sea)		
Large shallow inlets and bays [1160]	No	– No source-pathway-receptor link for habitats
Reefs [1170]	No	
Perennial vegetation of stony banks [1220]	No	

Qualifying Interest	Potential for Significant Impacts	Rationale
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No	
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	No	
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	
European dry heaths [4030]	No	
Juniperus communis formations on heaths or calcareous grasslands [5130]	No	
Calaminarian grasslands of the *Violetalia calaminariae* [6130]	No	
Submerged or partially submerged sea caves [8330]	No	
Narrow-mouthed Whorl Snail (Vertigo angustior)[1014]	No	– No source-pathway-receptor link for terrestrial snail species
Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303]	No	– No source-pathway-receptor link for terrestrial volant mammal species
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for semi-aquatic mammal sepceis considering interveining distance
Harbour Seal (*Phoca vitulina*) [1365]	**Yes**	– Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Kilkieran Bay and Islands SAC (002111) (Located *c.* 132.2km north via sea)		
Mudflats and sandflats not covered by seawater at low tide [1140]	No	
Coastal lagoons [1150]	No	
Large shallow inlets and bays [1160]	No	
Reefs [1170]	No	
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	No	– No source-pathway-receptor link for habitats
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	
Machairs (* in Ireland) [21A0]	No	
Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130]	No	
Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]	No	
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Otter (*Lutra lutra*) [1355]	No	– No source-pathway-receptor link for semi-aquatic mammal species
Harbour Seal (*Phoca vitulina*) [1365]	**Yes**	– Considering intervening distance (132.2km) from SAC and harbour seals' maximum foraging range (273km), foraging range could include the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Slender Naiad (*Najas flexilis*) [1833]	No	– No source-pathway-receptor link for aquatic plant species
Inishmore Island SAC (000213) (Located 118.5km north via sea)		
Coastal lagoons [1150]		– No source-pathway-receptor link for habitats
Reefs [1170]		
Perennial vegetation of stony banks [1220]		
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]		
Embryonic shifting dunes [2110]		
Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]		
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]		
Dunes with Salix repens ssp. argentea (Salicion arenariae) [2170]		
Humid dune slacks [2190]		
Machairs (* in Ireland) [21A0]		
European dry heaths [4030]		
Alpine and Boreal heaths [4060]		
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]		
Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510]		
Limestone pavements [8240]		
Submerged or partially submerged sea caves [8330]		
Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1014]		– No source-pathway-receptor link for terrestrial snail species
Harbour Porpoise (*Phocoena phocoena*) [1351]		– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Precautionary principle
Lambay Island SAC (000204) (Located *c.* 635km east by sea)		
Reefs [1170]	No	– No source-source-pathway receptor link for habitats
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No	
Grey Seal (*Halichoerus grypus*)	No	– Proposed works areas are located beyond the foraging range for grey seal, where site is located approximately 635km east by sea when compared to the foraging range for grey seal is 448km – Consequently, there is no source-pathway-receptor link to grey seal for which the Lambay Island SAC is designated
Harbour Seal (*Phoca vitulina*)	No	– Proposed works areas are located beyond the foraging range for harbour seal, where site is located approxaimteyl 635km east by sea when compared to the the foraging range for harbour seal is 273km. – Consequently, there is no source-pathway-receptor link to harbour seal for which the Lambay Island SAC is designated
Harbour Porpoise (*Phocoena phocoena*)	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Blackwater Bank SAC (002953) (Located *c.* 493 km southeast by sea)		
Sandbanks which are slightly covered by sea water all the time [1110]	No	– No source-pathway-receptor link for habitats
Harbour Porpoise (Phocoena phocoena) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (000625) (Located *c.* 369 km north by sea)		
Harbour Porpoise (*Phocoena phocoena*)	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Carnsore Point SAC (002269) (located *c.* 469.5km east via sea)		
Mudflats and sandflats not covered by seawater at low tide [1140]	No	– No source-pathway-receptor link for habitats
Reefs [1170]	No	
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Abers - Côte des legends ZSC (FR5300017) (Located *c.* 715km southeast by sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Anse de Vauville ZSC (FR2502019) (Located *c.* 848km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard ZSC (FR5300012) (Located *c.* 844km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Baie du Mons Saint-Michel ZSC (FR2500077) (Located *c.* 864.5km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Baie de Morlaix ZSC (FR300015) (Located *c.* 736km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Baie de Saint-Brieuc – Est ZSC (FR5300066) Located *c.* 819.5km southeast via sea)		

Qualifying Interest	Potential for Significant Impacts	Rationale
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Banc et récifs de Surtainville ZSC (2502018) (Located *c.* 820km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Cap d'Erquy-Cap Frehel ZSC (FR5300011) (Located *c.* 822km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Chausey ZSC (FR2500079) Located *c.* 846.5km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Chaussée de Sein ZSC (FR5302007) (Located *c.* 710km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Côtes de Crozon ZSC (FR5302006) (Located *c.* 725km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle

Qualifying Interest	Potential for Significant Impacts	Rationale
Côte de Granit rose-Sept-Iles ZSC (FR5300009) (Located *c.* 730km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Estuaire de la Rance ZSC (FR5300061) (Located *c.* 858km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Mers Celtiques -Talus du golfe de Gascogne ZSC (FR5302015) (Located *c* 567.5km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Nord Bret DH ZSC (FR2502022) (Located c. 663.5km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Ouessant-Molene ZSC (FR5300018) (Located *c.* 682.5km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Récifs du talus du golfe de Gascogne ZSC (FR5302016) (Located *c.* 557km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species

Qualifying Interest	Potential for Significant Impacts	Rationale
		– Precautionary principle
Récifs et lands de la Hague ZSC (FR2500084) (Located *c.* 869km southeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Rockabill to Dalkey Island SAC (0003000) (Located *c.* 602km east via sea)		
Reefs [1170]	No	– No source-pathway-receptor link for habitats
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
		–
Tregor Goëlo ZSC (FR5300010) (Located c. 748.5km via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
Bristol Channel Approaches SAC (UK0030396) (Located c. 560.5km east via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
West Wales Marine SAC (UK0030397) (Located c, 593.5km east via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	**Yes**	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
North Anglesey Marine SAC (UK0030393) (Located *c.* 635km northeast via sea)		

Qualifying Interest	Potential for Significant Impacts	Rationale
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle
North Channel SAC (UK0030399) (Located 715km northeast via sea)		
Harbour Porpoise (*Phocoena phocoena*) [1351]	Yes	– Harbour Porpoise within Celtic and Irish Seas Management Unit – Marine species whose range includes the habitat within the vicinity of the proposal – Potential impacts identified, in particular fugitive noise emissions to water, could have an adverse effect on the species – Precautionary principle

9. Assessment of Potentially Significant Effects

In order for an effect to be significant, its character, magnitude, duration, or intensity must be such that it alters a sensitive aspect of the environment. If a plan or project will have impacts on a Natura 2000 site, but these impacts will clearly not affect or undermine the site's conservation objectives, it is not considered that it will have a significant effect on the site concerned (DoEHLG, 2010). The key determination to be made by the competent authority is, therefore, whether the project is 'capable of having an effect' and whether there is a possibility that the effect, or effects, in question will be significant[20].

The level and significance of any putative effect also depends upon the existence of a plausible and functional source-pathway-receptor link between the proposed development and the relevant Natura 2000 sites. It is also determined by the extent of the exposure of the receptor(s), i.e., the QIs and/or SCIs for which the Natura 2000 sites are selected, to the risk and the characteristics of said receptor(s).

The test criteria that pertains to an appropriate assessment carried out under Article 6(3) is to determine whether the impacts identified in Section 6, above, will have an adverse effect on the integrity of the relevant Natura 2000 sites. The focus is to determine whether the potential impacts identified as plausibly ensuing from the proposal will have adverse impacts on the Conservation Objectives of the sites selected. The sections hereunder consider the QI and SCI habitats and species identified in the preceding section together with the potential impacts identified in Section 6, above, and determines whether the proposed dredging campaign and the dumping at sea is likely to have significant effects on the Natura 2000 selected for inclusion in this NIS.

The likelihood of adverse effects to a Natura 2000 site from the project was determined based on a number of indicators including:

- Habitat loss, alteration or degradation
- Water quality and resource
- Disturbance and/or displacement of species
- Habitat or species fragmentation

These indicators are used because any significant change, loss, disturbance or deterioration in the ecological structure and function of these indicators could affect the integrity of the Natura 2000 site being considered and, thereby, the conservation objectives of said 2000 sites.

The dominant physical processes in any estuary depend on the forcing conditions -- river flow and tidal amplitude -- and on the seabed topography. These directly affect the salinity distribution and transport of material (sediment, nutrients, contaminants, organisms) between the river and the ocean. This governing factor informs much of the content pertaining to the assessments of impacts in the sections hereunder.

[20] ECJ Case C-258/11 Peter Sweetman, Ireland, Attorney General, Minister for the Environment, Heritage and Local Government v An Bord Pleanála.

9.1 Habitat loss, alteration or degradation

9.1.1 Lower River Shannon SAC (002165)

The annexed marine habitats selected for assessment in this section are:

- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Reefs [1170]

While habitat type 1170 comprises hard compact substrata (EC, 2013), habitats 1130 and 1140 are sedimentary habitats. 1130 is characterised by fine sediments forming extensive intertidal sand and mud flats (EC, 2013), and 1140, as is clear from the habitat name, by sands and muds (EC, 2013). Dredging will occur within or adjacent to each of the three types. Dumping will occur within type 1130, albeit at a different location to the dredging, and adjacent to 1170.

NPWS (2012c) provides a basis for assessment of impacts on Annex I marine habitats, that may be caused by anthropogenic disturbance, which recognises the inherent capacity of these marine habitats to recover from physical disturbance, i.e., habitat resilience, as a fundamental characteristic.

> *It is worth considering* […] *that in relation to Annex I habitat structure and function, the extent and quality of all habitats varies considerably in space and time and marine habitats are particularly prone to such variation. Habitats which vary naturally, i.e., biotic and/or abiotic variables are changing within an envelope of natural variation, must be considered to have favourable conservation condition. Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes. The capacity of the habitat to recover from this change is obviously an important consideration (i.e., habitat resilience) thereafter*.

With regard to the constituent communities that are structurally important to Annex I marine habitats, NPWS (2012c) further states:

> [T]*his Department takes the view that licensing of activities likely to cause continuous disturbance of each community type should not exceed an approximate area of 15%.*

This stipulation, when read in conjunction with the sentence from the preceding paragraph that states that 'Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes', clearly reflects the dynamism of tidal marine areas and the continuous state of change, i.e., disturbance due to natural processes, that habitats are adapted to and, indeed, formed by. It is clear, therefore, that marine habitats have an inherent resilience to a range of activities and while the dredging programme is entirely anthropogenic, it mimics natural processes that are characteristic of the estuary.

9.1.1.1 Estuaries [1130]

The distribution of this annexed habitat type encompasses the waters at the jetty and the proposed Dump Site (Map 4: NPWS, 2012a). As areas of the estuary bed will be plough-dredged there will be discrete areas of direct habitat alteration within the vicinity of the jetty. Localised high points on the estuary bed will be levelled such that these areas and adjacent areas to which sediment will be moved will be subject to direct habitat alteration

impacts. Accumulations of sediment and the sub-littoral communities present within them will be dragged to adjacent areas by the action of the plough-dredge. Therefore, adjacent bed areas will be overlain with newly dredged material.

The marine communities present within the Lower River Shannon SAC (002165) have been mapped (Map 9: NPWS, 2012a) and from this it has been determined that the community-type present within the dredge proposal area is classified as 'Subtidal sand to mixed sediment with *Nephtys* spp. Community complex' (NPWS, 2012a). The substrate that supports this community complex comprises sand to mixed sediment with a great deal of variation within the sediment fractions. The community is distinguished by the polychaete genera *Nephtys* spp. (NPWS, 2012a).

The conservation objectives for habitat-type Estuaries [1130] is that the permanent habitat area remains stable or increasing, subject to natural processes, and that the constituent community types are conserved in a natural condition (NPWS, 2012a). The Department's view, set out in Section 9.1.1, that continuous, anthropogenic disturbance of constituent community types should not exceed a threshold of 15% provides a useful metric to assess whether the proposed dredging activity has the inherent potential to cause adverse effects on this annexed habitat type. The evidence provided in the Section 9.1.1, particularly as it pertains to the inherent reliance of marine habitats outlined in NPWS, (2012c) is also germane. 15% of the 24,273 ha of this habitat type within the SAC (NPWS, 2102a) comprises 3,640 ha. The Dump Site comprises 8.43 ha and the dredge site comprises 21.57 ha in total which equates to approximately 0.12% of the 24,273 ha of this annexed habitat type within the SAC. It is clear, therefore, that the area is significantly below the 15% threshold. In addition, as neither the dredge nor Dump Site will be subject to sustained disturbance beyond any 21-day dredging window, continuous, anthropogenic disturbance of constituent community types will not occur.

While there may be some limited alteration of the estuary bed within the proposed dredging area, there will be no reduction in the overall habitat area. And while there may be some localised and temporary disturbance of the 'Subtidal sand to mixed sediment with *Nephtys* spp. Community complex' within the dredge proposal area, at most a minor number of these taxa may be lost or may be disturbed to adjacent bed areas where they are expected to re-colonise over a relatively short space of time. Studies of *Nephtys hombergii* indicate that this species continually changes course in the sediment in the hunt for food and Vader (1964) showed that the worm can move very quickly through the substratum, downwards on the ebb tide and up again on the flood tide (Clay, 1967f) and the species is capable of swimming short distances[21]. In other words, the species has an intrinsic capacity to respond to changes in the sedimentary overburden as would any benthic infaunal species assemblage present.

In light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraphs, particularly as it pertains to the inherent reliance of marine habitats outlined in NPWS (2012c) it is concluded, that direct, indirect or secondary habitat loss or alteration effects as a result of the proposed works on the Lower River Shannon SAC (002165) are not, in view of the site's conservation objectives for this annexed habitat type, likely as a result of the proposed dredging and dumping.

9.1.1.2 Mudflats and sandflats not covered by seawater at low tide [1140]

While the proposed Dump Site does not overlap with this annexed habitat type, the habitat lies within the immediate vicinity of the proposed dredging site i.e., between the jetty and the shoreline (Map 5: NPWS, 2012a).

[21] https://www.marlin.ac.uk/species/detail/1710

There will be no dredging within areas mapped as habitat type 1140. There will, therefore, be no direct loss of this habitat-type or of the signature community complexes which are[22]:

- Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. Community Complex
- Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans Community Complex

There is, however, some limited potential for indirect habitat alteration through deposition of re-suspended sediment as a result of the proposed dredge activity. Such impacts could in turn result in smothering of benthic community complexes identified above. However, the limited quantity of material which may potentially settle out will be derived from the indigenous material from the adjacent seabed which supports any benthic species present. Because there will be no reduction in the overall habitat area, or any long term change to the benthic community present or to the community complexes associated with this habitat-type, significant effects to the structure and function and therefore the overall integrity of this habitat-type are not likely.

Therefore, in light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in Section 9.1, particularly as it pertains to the inherent reliance of marine habitats outlined in NPWS (2012c), it is concluded that direct, indirect or secondary habitat loss or alteration effects as a result of the proposed works in the Lower River Shannon SAC (002165) are not, in view of the site's conservation objectives for this annexed habitat type, likely as a result of the proposed programme of dredging.

9.1.1.3 Reefs [1170]

This annexed habitat type occurs as small, discrete areas of habitat within the vicinity of the jetty, and it also occupies a larger and more substantial footprint adjacent to the proposed dump site. There is some potential for indirect habitat alteration through smothering impacts as a result of the re-suspension and subsequent dispersal of dredged material at the jetty or as a result of deposition of sediment in significant volumes at each dumping event. However, as outlined in Section 5.3.3, above, much of the coarser fraction of material is expected to re-settle out of suspension very quickly and so will not pose a risk to areas of reef within the estuary. In terms of finer material which becomes re-suspended in the water column, such as fine sands and silts, this material is expected to be transported into the main estuary channel where it will be influenced heavily by tidal currents and will be transported accordingly on the ebbing and flooding tide. Furthermore, as outlined in Section 5.1.3.2, above, any increases in suspended sediment concentrations as a result of the proposed dredging works are not considered to be of concern in light of the background rates of suspended sediment concentrations already occurring naturally within the estuary channel. Any dredged material which does happen to settle onto areas of reef adjacent to the jetty will not be in excess of that which would normally occur due to the natural deposition and dispersal of sediment within the estuary channel.

With regard to the area of this annexed habitat adjacent to the proposed Dump Site, it is the scouring action of the river and tidal flows, within the estuary, that has led to the sustained presence of the rocky seabed, without a significant overburden of sediment, that is a distinguishing characteristic of this annexed habitat, at this location. It is concluded that any sediment from the dredged material, which primarily comprises fine silt of particle size less than 63 µm, will be washed away over a relatively short period of time. In the event that smothering of some of the anemones from the 'Anemone-dominated subtidal reef community' present at the location (Map 9: NPWS,2012a) occurs, it is expected that the prodigious powers of regeneration of cnidarian species which can reproduce asexually, by budding, fragmentation, or longitudinal or transverse binary fission will ensure rapid recovery of species abundance and density. It is reasonably foreseeable that these species will recolonise from

[22] NPWS 2012c

adjacent populations within a relatively short period. As a result, there will be no significant change to the conservation condition of the community type and any effects, within the 8.43 ha proposed Dump Site[23], are not likely to adversely affect the conservation condition of this habitat type which comprises 21,421 ha within the SAC (NPWS, 2012a).

Therefore, in light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraph, and in Section 9.1, as it pertains to the inherent reliance of marine habitats outlined in NPWS (2012c), it is concluded, that direct, indirect or secondary habitat loss or alteration effects as a result of the proposed works on the Lower River Shannon SAC (002165) are not, in view of the site's conservation objectives for this annexed habitat type, likely as a result of the proposed programme of dredging and dumping at sea.

9.1.2 Other European Sites

Due to the intervening distance between all other sites and habitats for which they are designated, and in consideration of the finding of no likely habitat loss or alteration effects to habitats designated for the Lower River Shannon SAC, it can be concluded that it is not likely for potential impacts to habitats of other European sites as a result of the proposed programme of dredging and dumping at sea.

9.2 Water quality and resource

9.2.1 Increase in suspended solid concentration

Because the proposed dredging will involve disturbance of the estuary bed, some increase in levels of suspended sediment will occur in the surrounding water column. This will also occur when dredged material is transported to the Dump Site. However, increases in suspended sediment concentrations are expected to be relatively low as a result of the plough dredge, relative to other dredge methods, as the plough will simply push any localised accumulations of sediment to adjacent areas of a lower bed depth. It is expected, therefore, that dredge activity will cause only minor increases in the level of re-suspended sediment. Furthermore, it is expected that any material which becomes re-suspended as a result of bed disturbance will remain close to the estuary bed and relatively low in the water column. It is expected that the coarser fraction of re-suspended material will quickly fall out of the water column towards the estuary bed. Some of the minor fraction, which migrates into areas with lower currents, will also be taken out of suspension. A minor proportion may remain in suspension and will be subject to local water currents.

Given that sediment in the water column is normal in the estuary, any temporary increases in suspended sediment concentrations are expected to be minor relative to the naturally high suspended sediment levels that pertain. Therefore, the potential suspended sediment concentrations as a result of the proposed dredging works are not expected to pose any significant adverse risk to water quality, particularly as any relatively higher suspended sediment concentrations will cover small areas that move with the tide. The evidence presented in Section 5.1.3.2, above, demonstrates that large fluctuations in turbidity naturally prevail due to tidal affects alone, that can be far in excess of those recorded during any dredging campaign. It is clear therefore that any increase are unlikely to be in excess of what could reasonably be envisaged under natural processes. It is reasonable to infer that QI species that select these habitat types are adapted to these prevailing, albeit intrinsically highly dynamic, environmental conditions. While the dispersal of sediments at the proposed Dump Site will be different in

[23] 0.04% of the area of the Annex I Reefs [1170] habitat within the SAC

character in that the sediment loads will be introduced into the water column in pulses as the hopper empties, these events are unlikely to be in excess of what could reasonably be envisaged under natural processes.

Therefore, in light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraphs, and Section 9.1, particularly as it pertains to the inherent reliance of marine habitats outlined in NPWS (2012c), it is concluded, that direct, indirect or secondary effects as a result of the proposed works are not, in view of all sites' conservation objectives, likely as they are mediated as a result of the proposed programme of dredging and dumping.

9.2.2 Benthic contaminants

As evidenced by the analyses outlined in Section 5.1.3.3 and 5.1.4.2, above, the bed material at the dredge sites is considered to be clean and therefore suitable for the proposed activity.

9.2.3 Fuel/oil spill

There is a risk without appropriate mitigation measures in place that point source pollution impacts could ensue through accidental spillage of fuel/oil into the surrounding aquatic environment resulting in adverse water quality impacts. Such impacts, were they to arise, could then exert, both direct and indirect, impacts on the QI habitats and species and the SCI species for which the European sites are selected. Given that the potential source of any fugitive emissions of such substances in that the dredge vessels will be within the Shannon estuary, there is a direct and immediate link between the potential source and ecological receptors identified.

Section 10, below, outlines a programme of mitigation measures designed to control and eliminate the point and diffuse pollution sources identified and to ameliorate the potential adverse water quality impacts that might ensue including those from fuel or oils spill.

9.3 Disturbance and/or displacement of species

9.3.1 Lower River Shannon SAC (002165)

9.3.1.1 Sea lamprey (*Petromyzon marinus*) [1095] & River lamprey (*Lampetra fluviatilis*) [1099]

Adopting the precautionary approach, it would be prudent to assume that both lamprey species could migrate through the area around the jetty during the migratory phases of their life cycles when adults migrate upstream to spawning sites or young make their seaward migration. Once they move into deeper waters, each uses its suction disk mouth to attach to host fish, puncture the skin, and drain the fish's body fluids. While river lamprey remain relatively close to the coast for about 18 months before migrating back up into the river to spawn, sea lamprey spend up to three years at sea before returning back up into the river to spawn.

In the unlikely event of lamprey migrating through the area either during or immediately following dredging works, any increased suspended sediment concentration within the water column is not expected to pose any significant risk to either species, given the scale and intermittent nature of the works and the temporary and localised nature of the dredging. Given the limited increase in suspended material which may occur and the background levels of suspended sediment occurring naturally, any increase associated with dredging activity is not expected to have adverse impacts on lamprey which may be passing through the area. Therefore, significant

impacts to either sea lamprey or river lamprey are not expected to occur as a result of the proposed dredging activity.

While the dispersal of sediments at the Dump Site will be different in character in that the sediment loads will be introduced into the water column in pulses as the hopper empties, it is unlikely that either species will be exposed to any impacts in significant numbers either as free swimming individuals or attached to host fish.

It is important to note that these species have a reproductive strategy that accommodates the high attrition rate that naturally occurs, and which reduces species abundance due to predation or environmental pressures that cause death. Both species utilise high fecundity to reproduce a strategy which ensures that at least some of the progeny will survive to reproduce. This aspect of their ecology protects these species against high mortality rates. Therefore, even in the event that the dredging and dumping at sea was to lead to fatalities of members of the populations of these species for which the Lower River Shannon SAC (002165) is selected, the reduction in species numbers would be unlikely to exert any influence on said populations of these species' capacities to maintain their population numbers.

In light of the characteristics of the project described in **Section 5,** bearing in mind the impacts identified in **Section 6**, and the evidence provided in the preceding paragraphs, it is concluded, therefore, that direct, indirect or secondary disturbance or displacement of the populations of sea lamprey and river lamprey for which the Lower River Shannon SAC (002165) is selected are not, in view of the site's conservation objectives for these species, likely as a result of either the dredging or dumping at sea.

9.3.1.2 Atlantic salmon (*Salmo salar*) [1106]

While this species is not protected during the marine phase of its life cycle it is included for assessment on the basis of the precautionary principle and because of the proximity of the proposed dredge site to river outflows. The wider estuary area acts as a corridor for returning adults and migrating smolts, linking a variety of freshwater watercourses located upstream to the Atlantic Ocean. These factors notwithstanding, this species is not expected to be present in significant numbers within the brackish waters of the estuary for significant periods as, during both the outward and return journeys, salmon move quickly through the estuary to, and from, natal watercourses. In the unlikely event of salmon migrating through the area either during or immediately following dredging works any increase in suspended sediment concentrations within the immediate vicinity of the dredge areas will be temporary and not significant, particularly in light of existing background levels. Therefore, it is considered that the proposed dredging works are extremely unlikely to pose any significant risk to this species.

While the dispersal of sediments at the Dump Site will be different in character in that the sediment loads will be introduced into the water column in pulses as the hopper empties, it is unlikely that this species will be exposed to any impacts in significant numbers as it transits to the Atlantic and back to natal rivers. Salmon observed in the wild demonstrate avoidance responses to visual and sound stimuli as do caged salmon (Bui *et. al*, 2013). It is, therefore, reasonable to expect that these avoidance responses will be activated as a result of the sound generated by the dredging and dumping at sea activities causing fish to move rapidly away from the impact sources at both locations.

This species also has a reproductive strategy that accommodates a high attrition rate and ensures that at least some of the progeny will survive to reproduce an aspect of its ecology that protects it against high mortality rates. Therefore, even in the event that the dredging and dumping at sea was to lead to fatalities of members of the population of this species for which the Lower River Shannon SAC (002165) is selected, the reduction in numbers would be unlikely to exert any influence on said population's capacity to maintain its population numbers.

In light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraphs, it is concluded, therefore, that direct, indirect or secondary disturbance or displacement of the population of Atlantic salmon for which the Lower River Shannon SAC (002165) is selected are not, in view of the site's conservation objectives for this species, likely as a result of either the dredging or dumping at sea.

9.3.1.3 Otter (*Lutra lutra*) [1355]

The main threat to this species from the proposal is disturbance associated with fugitive noise from dredging and human presence during the works. Some potential also resides for impacts to otters should the proposal lead to a reduction in prey availability by means of adverse water quality impacts.

It is noted that, because otters are an aggressively territorial species, the number of individuals present within the general Aughinish area is expected to be low. With regard to disturbance due to fugitive noise from machinery or human activity, it is considered that any otter(s) present are already habituated to the levels of disturbance that prevail at the existing jetty and the sources of noise will be restricted to the temporary duration of the proposed programme of works. Therefore, significant disturbance or displacement impacts, from fugitive noise associated with the proposal, are not expected to occur. The fact that dredging operations were active when an individual was observed on July 5th, 2020 (see Section 5.1.3.1.2) suggests that behavioural displacement does not occur as a result of dredging. This individual was observed travelling along the wall of the Cells and walking slowly from the north shore to the southern shoreline, where it was assumed to have entered the water.

With regard to a potential reduction in prey availability, which could potentially result from adverse water quality impacts, attention is drawn to the assessment provided in Section 9.1.2 and to the analysis that pertains to impacts on salmon provided in Section 9.3.1.2. Given the temporary nature of the increased sedimentation associated with the proposed dredging works, particularly in light of greater existing background levels, a reduction in prey availability that could adversely affect otter potentially in the area is not expected as a result of the proposal.

In light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraphs, it is concluded, therefore, that direct, indirect or secondary disturbance or displacement of the population otter for which the Lower River Shannon SAC (002165) is selected are not, in view of the site's conservation objectives for this species, likely as a result of either the dredging or dumping at sea.

9.3.1.4 Bottle-nosed dolphin (*Tursiops truncatus*) [1349]

The most likely impact the population of bottle-nosed dolphin for which the Lower River Shannon SAC (002165) is selected would be potential disturbance /displacement as a result of noise emissions from dredging activity. Dredge operations emit continuous low frequency sound into the marine environment, however, the sound signature associated with these types of works is generally considered of lesser concern for impacts on marine mammals[24]. The increase in noise will be greatest within the immediate vicinity of the dredger but its transmission will decrease with distance. Therefore, although the presence of an operational dredger at the site will lead to a small local increase in noise, given that the Shannon Estuary is Ireland's premier deep-water port, and caters for ships up to 200,000 deadweight tonnage, disturbance from these operations are likely to be minimal[24].

The proposed dredging works will be temporary and intermittent in nature which will minimise any potential disturbance of dolphins which may be in the area. Given the high level of vessel activity which occurs throughout the estuary on a daily basis, any increase in noise emissions associated with dredge activity are not expected to

[24] IWDG report in AER 2016 available using Permit Nr. S0026-01 at: https://www.epa.ie/our-services/licensing/licencesearch/

result in any significant disturbance impacts as it is expected that the resident population would be reasonably habituated to fugitive noise emissions to water. Bearing current levels of vessel activity in mind, the resident population of dolphins can also be expected to be used to vessel activity within the estuary and so the presence of the dredge vessel is not considered to pose any risk of collision to dolphins which may potentially be in the area.

While it is possible that the low level of activity by this species recorded annually from 2016 to 2022, summarised in Section 5.1.3.1.1, indicates the dredging activity causes members of the population, for which this site is selected, to avoid the jetty and its environs while dredging is ongoing that this species is present in the area infrequently and in low numbers. However, the fact that the observations did occur, indicates that even if behavioural displacement did occur it did not extend significantly beyond the jetty and dredged areas. In terms of the species' avoidance of the area it is notable that, as none were active in the area prior to start-up, the observations were of individuals that deliberately approached and that did so while the putative disturbance source was active and ongoing. The fact that, in 2018, in April and again in August, small groups not only selected the waters adjacent to the jetty but also came within 250 m of the dredging vessel while operations were ongoing can reasonably be interpreted as an indication of this QI species' intrinsic or inherent tolerance of the point source of disturbance the dredging activity constituted.

As can be seen from the data summarised in Table 5-1, Section 5.1.3.1.1, no observations of common bottlenose dolphins were recorded on 3 of the 7 years and the number of observations and the numbers of individuals which were recorded was very low. In fact, the report[24] describing the activity recorded in 2016, when the largest group, by far, was recorded, included the following:

> *In the opinion of IWDG Consulting, the low number and frequency of sightings along with the method of dredging used indicate that it is highly unlikely that the dredging activities had any significant impact on marine mammals in the area.*

While dolphins may be temporarily displaced from the area whilst dredging is taking place, or as a result of any temporary and localised increase in suspended sediment concentrations, it is expected that dolphins will quickly return to the area once dredging activity has ceased and given that suspended material will be quickly dispersed by tidal currents. Any temporary displacement will be localised to the Aughinish area and as such displacement from key areas of habitat within the estuary is not likely to occur. Again, bearing in mind the existing levels of vessel activity throughout the estuary it is considered likely that any displacement would be short-lived. Notwithstanding the relatively low likelihood of adverse effect, in order to minimise the risk of permanent or temporary disturbance to the population of common bottlenose dolphins for which the Lower River Shannon SAC (002165) is selected, the mitigation practices and procedures for dredging activities, outlined in DAHG (2014), and included in Section 10.1.1, below, will be implemented. These measures will pertain to the dredge site and the proposed Dump Site.

9.3.2 River Shannon and River Fergus Estuaries SPA (004077)

This SPA site is selected for the resident population of one species, namely cormorant and the migratory, overwintering, populations of twenty other SCI species listed, below. Table 9-1 provides information on the ecological characteristics, habitat requirements and feeding strategies of each species and an indication as to the extent to which each is, or is not, capable of utilising alternative resources and locations as an alternative to the preferentially selected habitat within the SPA site.

- Resident, breeding population
    - Cormorant (*Phalacrocorax carbo*) [A017]

- Migratory, non-breeding populations
  - Whooper swan (*Cygnus cygnus*) [A038]
  - Light-bellied brent goose (*Branta bernicla hrota*) [A046]
  - Shelduck (*Tadorna tadorna*) [A048]
  - Wigeon (*Anas penelope*) [A050]
  - Teal (*Anas crecca*) [A052]
  - Pintail (*Anas acuta*) [A054]
  - Shoveler (*Anas clypeata*) [A056]
  - Scaup (*Aythya marila*) [A062]
  - Ringed plover (*Charadrius hiaticula*) [A137]
  - Golden plover (*Pluvialis apricaria*) [A140]
  - Grey plover (*Pluvialis squatarola*) [A141]
  - Lapwing (*Vanellus vanellus*) [A142]
  - Knot (*Calidris canutus*) [A143]
  - Dunlin (*Calidris alpina*) [A149]
  - Black-tailed godwit (*Limosa l*imosa) [A156]
  - Bar-tailed godwit (*Limosa lapponica*) [A157]
  - Curlew (*Numenius arquata*) [A160]
  - Redshank (*Tringa totanus*) [A162]
  - Greenshank (*Tringa nebularia*) [A164]
  - Black-headed gull (*Chroicocephalus ridibundus*) [A179]

Table 9-1: Waterbirds of SCI for site 004077 – Ecological characteristics, requirements & specialities (Adapted from NPWS, 2012d)

Species	Status	Food/Prey Requirements[A]	Principal supporting habitat within site[B]	Ability to utilise other/alternative habitats[C]	Trophic Guild[D]
Cormorant	Breeding + Wintering	Highly Specialised	Sheltered & shallow subtidal over sand and mud flats	1	3
Whooper swan	Wintering	Wide	Lagoon and associated habitats, Intertidal mudflats and shallow subtidal	2	1,7
Light-bellied Brent goose	Wintering	Highly Specialised	Intertidal mud and sand flats	2	1,5,7
Shelduck	Wintering	Wide	Intertidal mud and sand flats; Shallow subtidal	3	1,5
Wigeon	Wintering	Narrower	Intertidal mud and sand flats and sheltered and shallow subtidal	2	1,5
Teal	Wintering	Wide	Intertidal mud and sand flats and sheltered and shallow subtidal	3	1
Pintail	Wintering	Wide	Shallow subtidal	2	1
Shoveler	Wintering	Wide	Lagoon, brackish and freshwater lakes plus intertidal mud and sand flats	3	1
Scaup	Wintering	Wide	Subtidal	1	2
Ringed plover	Wintering	Wide	Intertidal mud and sand flats	3	4
Golden plover	Wintering	Wide	Intertidal mud and sand flats	2	4
Grey plover	Wintering	Wide	Intertidal mud and sand flats	3	4
Lapwing	Wintering	Wide	Intertidal mud and sand flats	2	4
Knot	Wintering	Narrower	Intertidal mud and sand flats	3	4
Dunlin	Wintering	Wide	Intertidal mud and sand flats	3	4
Black-tailed godwit	Wintering	Wide	Intertidal mud and sand flats	2	4
Bar-tailed godwit	Wintering	Wide	Intertidal mud and sand flats	2	4
Curlew	Wintering	Wide	Intertidal mud and sand flats	2	4
Redshank	Wintering	Wide	Intertidal mud and sand flats	2	4
Greenshank	Wintering	Wide	Intertidal mud and sand flats	3	6
Black-headed gull	Wintering	Wide	Intertidal flats & sheltered &	2	1,2,4,6,7

Species	Status	Food/Prey Requirements[A]	Principal supporting habitat within site[B]	Ability to utilise other/alternative habitats[C]	Trophic Guild[D]
			shallow subtidal		

A: *Food/prey requirements* – species with a **wide** prey/food range. Species with a **narrower** prey range (e.g., species that forage upon a few species/taxa only). Species with **highly specialised** foraging requirements
B: *Principal supporting habitat within site* - Principal supporting habitat present within the SPA. Note that this is the main habitat used when foraging
C: *Ability to utilise alternative habitats* (refers to species ability to utilise other habitats adjacent to the site). **1** = wide ranging species with requirement to utilise the site as and when required. **2** = reliant onsite but highly likely to utilise alternative habitats at certain times (e.g., high tide). **3** = considered totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements.
D: *Waterbird foraging guilds*: **1** = Surface swimmer, **2** = Water column diver (shallow), **3** = water column diver (deeper), **4/5** intertidal walker (out of water), **6** = intertidal walker (in water), **7** = terrestrial walker.
SUBTIDAL (The area that lies below mean low water). **INTERTIDAL** (The area between mean high water and mean low water)

9.3.2.1 Behavioural Displacement due to Disturbance

As can be seen from **Table 9-1,** the species for which this Natura 2000 is selected are associated with, and are reliant, to varying extents, on tidal, intertidal and estuarine habitats and some species are, therefore, likely to be present in the area adjacent to the jetty. This theoretical exposure to risk is not, however, absolute as there are a number of factors that determine the level of exposure. In the first instance, members of these populations will only be within the area if the dredging occurs during the period of their residency at the SPA which, with the exception of cormorant, usually extends from the period October to March. In addition, as the majority of the species preferentially select intertidal areas for foraging, the daily pattern of alternating high and low tide will impose limits on when any of the species can use the areas adjacent to the jetty even when the dredging activity is underway. In the event that some species are displaced, an additional ameliorating factor is each species' capacity to utilise alternative habitats within the SPA. While 8 of the species are considered totally reliant on wetland habitats within the SPA, due to unsuitable surrounding habitats and/or these species' limiting habitat requirements, 2 of the species are wide ranging and utilise the SPA as and when required, and 11, while reliant on the habitats within the SPA, are highly likely to utilise alternative habitats at certain times (e.g., high tide). It is also the case that the use of even preferentially selected habitats varies daily, and different habitats are likely to be used by day and night.

Surveys were conducted in 2011 to determine, *inter alia*, the distribution of waterbirds at subsite level[25]. The results showed that this varied greatly across the SCI species. Only five species (teal, dunlin, curlew, redshank and black-headed gull) were recorded in over 50% of subsites, and nearly half of all species occurred in less than 20% of subsites counted. The least widespread-occurring species was scaup (3.8%) which occurred mostly in one subsite only. Restricted distributions were also recorded for pintail and shoveler; both occurring in less than 10% of the total area counted. Light-belied brent geese, ringed plover, knot and bar-tailed godwit also exhibited relatively restricted ranges, occurring in 26% or less of the total area counted during surveys (NPWS, 2012d). These data are not intended, in their usage here, to be predictive. In addition to interannual variation, the time that has elapsed since then militates against any reliance on their probative value and no such reliance is claimed or asserted herein. However, these data do provide a useful demonstration of the variation in the distribution of the SCI species that normally occurs across the SPA and illustrate, in addition to the factors outlined in the preceding paragraph, that many factors influence the extent to which the SCI species will be exposed to any risk of behavioural displacement due to the proposed dredging activities.

[25] Mapping of 66 subsites within the SPA is provided in NPWS (2012d)

Dredging and dumping at sea will occur for a maximum of 21 days during each of the 2 dredging periods per year. Dredging operations will take place for 24 hrs per day during each period. The proposed works could potentially result in some limited disturbance of birds in the area due to noise emissions from dredging activity. However, given that the works will be temporary and intermittent any potential disturbance is expected to be short-term and not significant. Furthermore, given the high level of activity which normally takes place within the vicinity of Aughinish and throughout the greater estuarine area, it is likely that any SCI species present will be habituated to a relatively high level of noise associated with vessel movements and plant operations. Therefore, given that dredging will take place while the vessel berths are not in use, any noise emissions resulting from dredging activity are not expected to exceed those which would normally occur were the jetty fully operational. In the event that SCI species present are displaced, there is an abundance of alternative intertidal habitat area within the SPA i.e., the area contained between the mean high-water mark and the mean low watermark, which is estimated to be 9,085 ha (NPWS, 2012d), of which any displaced birds can avail.

Some of the wintering species, such as shelduck, scaup and greenshank, do occasionally utilise sub-tidal areas for foraging. However, given that there will be no significant direct alteration of the sub-tidal bed areas, significant displacement of these species from potential feeding areas is not considered likely to occur. Bed material will simply be levelled, rather than removed and as such no significant impacts to potential marine prey resources for these species is envisaged.

Therefore, in light of the characteristics of the project described in Section 5, bearing in mind the impacts identified in Section 6, and the evidence provided in the preceding paragraphs, it is concluded that direct, indirect or secondary disturbance or displacement of the populations of SCI species for which the River Shannon and River Fergus Estuaries SPA (004077) is selected are not, in view of the site's conservation objectives for these species, likely as a result of either the dredging or dumping at sea.

9.3.3 Cetacean species in other Natura 2000 sites (incl. UK, France)

With regard to far-ranging cetacean species Bottlenose dolphin (*Tursiops truncatus*) and Harbour porpoise (*Phocoena phocoena*) which are designated for distant European sites in Ireland, France, and the UK; it is considered unlikely there will be any effect resulting in disturbance and/or displacement of either species where the sound signature associated with these dredging works is generally considered of lesser concern for impacts on marine mammals and dredge operations emit continuous low frequency sound into the marine environment. Considering the conclusion in Section 9.3.1.4, regarding disturbance to the local dolphin population designated for the Lower River Shannon SAC wherein it was concluded the proposed works would result in localised temporary disturbance to the dolphin population, when considering populations designated for SACs and ZSCs located outside the estuary, it can be considered that there is even less of an effect to cetacean species, specifically bottlenose dolphins, which are not from local populations to the estuary.

Harbour porpoise are ubiquitous in Irish waters and are designated for a number of national and international sites throughout the Natura 2000 network. Dredging activities have been reported to produce relatively low-frequency omnidirectional sound of several tens of Hz to several thousand Hz at sound pressure levels of 135-186 dB, which are operating frequencies which are considered perceptible to harbour porpoise but are considered to be below that expected to cause injury to the species (DAHG, 2014). Considering the closest SAC is located approximately 111.5km southwest of the closest works location, it is considered that any significant disturbance and/or displacement effects to Harbour Porpoise populations designated for SACs within the Celtic and Irish Seas MU are unlikely likely to occur as a result of the proposed works.

Though some significant effects to cetaceans are unlikely, insignificant temporary disturbance effects may be experienced by cetacean species during the work's commencement and duration. The appointment of a marine mammal observer for the duration of the works will minimise risk to any cetaceans located within 500m of the dredging vessel. Details regarding the use of mitigation practices and monitoring are detailed in Section 10.1.1.

9.3.4 Pinniped species in other Natura 2000 sites (incl. UK, France)

Far-ranging pinniped species include grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) breed on all shoreline in Ireland and use coastal waters in daily life habitats such as foraging and transition between terrestrial resting haul-out sites. The closest SAC designated for grey seal is the Blasket Islands Sac, located approximately 111.5km southwest of the proposed works by sea. The closest site for harbour seal is the Galway Bay Complex SAC located approximately 150km north via sea.

No known haul-out, moulting, or resting sites are known to occur within the Shannon Estuary and therefore any effects from dredging are limited to likely affect small number of individuals for which are designated for SACs outside the estuary. With regard to conservation objectives for grey seal designated for the Blasket Islands SAC, the only attribute which has any potential to be affected is 'Disturbance' for which the target set is that "*Human activities should occur at levels that do not adversely affect eh grey seal population at the site*". It is unlikely that any disturbance associated with dredging would lead to any likely significant effects to the grey seal designated for this SAC or those further afield for which grey seal is designated and it can be considered that the conservation objective for the species will not be compromised as a result of the proposed activity.

With regard to harbour seal designated for Galway Bay SAC, the attribute and target for the QI are the same as above wherein the target for disturbance is that '*human activities should occur at levels that do not adversely affect the harbour sea population at the site*" and it is unlikely that any disturbance associated with dredging would lead to any likely significant effects to the harbour seal designated for this SAC or those further afield for which the species is designated. Consequently, it can be considered that the conservation objective for the species will not be compromised as a result of the proposed activity.

Both grey seal and harbour seal are known to occur within estuarine waters including the Shannon Estuary. Their presence in these waters may occur as a result of foraging habitats and effects to either species may occur in the vicinity of the works during the commencement and duration of the proposed project. Though sound exposure from dredging activities are generally thought to be below that expected to cause injury to pinnipeds, disturbance effects may nonetheless occur where the species are located within the immediate vicinity of the works. Though these impacts are likely to only affect individuals of either species and will not result adversely affect the integrity of any Natura 2000 site for which either species are designated; the appointment of a marine mammal observer for the duration of the works will minimise risk to any pinnipeds located within 500m of the dredging vessel. Details regarding the use of mitigation practices and monitoring are detailed in Section 10.1.1.

9.4 Habitat or species fragmentation

Habitat fragmentation has been defined as 'reduction and isolation of patches of natural environment' (Hall et al., 1997 cited in Franklin et al., 2002) which results in spatial separation of habitat areas which had previously been in a state of greater continuity. Adverse effects of habitat fragmentation on species or populations can include the increased isolation of populations which can detrimentally impact on the resilience or robustness of the populations thereby reducing overall species diversity and altering species abundance.

The preceding sections have concluded that significant habitat loss or alteration to any Natura 2000 site are not foreseen, no significant water quality impacts are predicted and significant disturbance or displacement to any species are not expected to ensue. Having regard to the nature and scale of the proposed dredge and dumping at sea campaign and the conclusions of the preceding sections it is considered that significant habitat or species fragmentation impacts are not reasonably foreseeable as a result of the proposed dredging and dumping at sea considered in this report.

It is objectively concluded that significant habitat or species fragmentation impacts are not, in view of the Lower River Shannon SAC (002165), the River Shannon and River Fergus Estuaries SPA (004077), nor any European sites' detailed in Table 8-3, conservation objectives, likely as a result of either the dredging or dumping at sea.

9.5 In-combination Effects

When in-combination effects are assessed, it is necessary to identify the types of impacts that may ensue from other sources in the existing environment that, in combination with those ensuing from the project under consideration, may affect aspects of the structure and function of the relevant Natura 2000 sites (EC, 2001; EC, 2021). The potential impacts from the proposed development have been identified in Section 6, above, and the Plans, Projects, and Activities, with which the proposed development could interact synergistically to create adverse effects on the integrity of the Natura 2000 sites listed in Table 3-1, above, have been identified in Section 6, above. It is concluded that the potential for synergistic interaction between the Plans, Projects, and Activities identified in Section 6, above, and the impacts identified in Section 6, above, above, resides in interactions that could, cumulatively, exert in combination effects on certain Annexed habitats that are exclusively marine in their distribution namely, Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], and Reefs [1170] and on the populations of QI species namely, bottlenose dolphin, harbour porpoise, grey seal, harbour seal, sea lamprey, river lamprey, salmon and otter, for which the Lower River Shannon SAC (002165) and further afield coastal SACs throughout the Natura 200 network are selected.

Due to the intervening distance for which far-ranging species are designated and considering that any in-combination effects that could occur would likely only occur within the vicinity of the proposed works, there is no potential for in-combination effects to occur to any sites located outside the Shannon Estuary.

In order for synergistic interaction to occur both sources must reach a threshold of interactive potential that is of a sufficient character, magnitude, duration, or intensity. The preceding sections, 9.1 to 9.3.3, have concluded that significant annexed habitat loss or alteration are not foreseen, no significant water quality impacts are predicted, significant disturbance or displacement to the populations of QI or SCI species, for which the Natura 2000 sites are selected, are not expected to ensue and no habitat or species fragmentation effects are likely.

As can be seen from Section 5.3, above, a crucial limiting factor on the potential for synergistic interaction is intrinsic to the works: its short duration which, at a maximum, will comprise two cycles, each of a duration of 21 days-totalling 42 days annually. As a result, the risk window for interaction is extremely limited equating to 12% of each year.

While the agriculture-derived discharges, and the sewage from Foynes, may impact upon on physico-chemical parameters such as the levels of dissolved nutrients, suspended solids and some elemental components, the pressures resulting from the proposed dredging and dumping at sea are primarily associated with increased levels of sediments and some, albeit very limited, risk of fuel or oils spills. However, these synergistic effects are unlikely as the volumes generated by the proposed dredging and dumping would need to be very large for any adverse impact to ensue and they are not, in any event, likely to impact on physico-chemical parameters in the water

column. Any material which becomes re-suspended into the water column will be of the same composition as the indigenous material already occurring naturally on the estuary bed and levels of re-suspended material are not expected to exceed normal ambient background levels. It is, therefore, concluded that any in-combination effects with the sediments released from the dredging and dumping campaign are likely to minimal or negligible.

9.5.1 Threats and Pressures with impacts on Natura 2000 sites

As outlined previously, a threat is an activity expected to have an impact on a species/habitat type in the future and a pressure is an activity impacting a species/habitat type during the reporting cycle. The threats and pressures identified in Section 7.1.1, above with a potential for synergistic interaction in the marine environment encompassed within the relevant Natura 2000 sites are listed in Table 9-2: Threats and pressures as identified for local Natura 2000 sites in the Shannon Estuary.

Table 9-2: Threats and pressures as identified for local Natura 2000 sites in the Shannon Estuary

Lower River Shannon SAC (002165)	
Low	Discharges.
Medium	Marine and freshwater aquaculture.
Low	Nautical sports.
Low	Invasive non-native species.
Medium	Polderisation.
Low	Removal of beach materials.
Low	Sea defense or coast protection works, tidal barrages.
River Shannon and River Fergus Estuaries SPA (004077)	
Medium	Nautical sports.
Medium	Shipping lanes.
High	Discharges.
Medium	Marine and freshwater aquaculture.

As can be seen, three of the categories, Nautical sports, Discharges, and Aquaculture are considered potentially capable of exerting influence in both Natura 2000 sites. Bearing in mind the content of the opening paragraphs, in Section 9.5, above, no in-combination impacts with the Threats and Pressures identified in Section 7.1.1 are likely.

9.5.2 Plans

Each of the Plans listed Section 7.1.2, above, has a range of environmental and natural heritage policy safeguards in place. These safeguards to protect the natural environment and Natura 2000 sites will also apply to the proposal described in this report. It is, therefore, concluded that it is unlikely that synergistic interaction with the Plans identified in Section 7.1.2, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites, will occur.

9.5.3 Projects

While there are numerous permitted and proposed developments in the greater area, these permissions and applications are largely for minor development works typical of a rural setting. Those permitted are, and those

yet to be completed will be, subject to conditions stipulated by the relevant competent authorities, which have been, or will be, designed to prevent negative interactions with the natural environment and ecology of the area.

In light of these controls, and bearing in mind the content of the opening paragraphs in Section 9.5, it is concluded that it is unlikely that synergistic interaction with the Projects described in Section 7.1.3, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites will occur. Therefore, no in-combination impacts are predicted with the Projects described in Section 7.1.3, above, including the project specified in in Section 7.1.3.1.

9.5.4 Other Activities

9.5.4.1 Dredging and Dumping Activities in the Estuary

9.5.4.2 Estuary Operations

The proposed dredge activity will be short-term and intermittent in nature. The outer jetty will be closed to vessel activity for 1 week and that is when the TSHD will be used. For the rest of the 21 day cycle - the Long arm reach/barge and plough dredger will be used. While the THSD will travel to the proposed Dump Site and operate at the jetty, the plough dredge vessel will remain within the vicinity of the dredge sites during these dredge windows. Given the large numbers of vessels which utilise the greater estuary area, movements and activities of the dredge vessel itself are not expected to result in any significant in-combination impacts with other vessels in the area.

In light of the content in the preceding paragraph, and bearing in mind the content of the opening paragraphs in Section 9.5, it is concluded that it is unlikely that synergistic interaction with estuary operations identified in Section 7.1.4.2, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites, will occur.

9.5.4.3 Diffuse and Point Sources of Pollution

The individual sources identified in the subsections hereunder would each fall under the Threat/Pressure category 'Discharges' identified in Section 7.1.1, above. The assessments pertaining to Threats and Pressures provided in Section 9.5.1, above, by inference, also address these diffuse and point sources.

9.5.4.3.1 *Agriculture*

While the agriculture-derived discharges may impact upon physico-chemical parameters such as the levels of dissolved nutrients, suspended solids and some elemental components, the pressures resulting from the proposed dredging and dumping at sea are primarily associated with increased levels of sediments and some, albeit very limited, risk of fuel or oils spills. However, these are unlikely as to be of a a sufficient character, magnitude, duration, or intensity to reach a threshold sufficient to initiate synergistic interaction particularly because the sediments are not likely to impact on physico-chemical parameters in the water column (see Sections 5.1.3.3 and 5.1.4). Any material which becomes re-suspended into the water column will be of the same composition as the indigenous material already occurring naturally on the estuary bed and levels of re-suspended material are not expected to exceed normal ambient background levels. It is, therefore, concluded that, given the pressure resulting from diffuse and point sources are not likely to significantly affect physico-chemical parameters in the water column, any in-combination effects with the sediments released from the dredging and dumping campaign are likely to minimal or negligible.

In light of the content in the preceding paragraph, and bearing in mind the content of the opening paragraphs, in Section 9.5, above, it is concluded that it is unlikely that synergistic interaction with diffuse and point sources of pollution, identified in Section 7.1.4.3.1, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites, will occur.

9.5.4.3.2 *Aquaculture*

In light of the content in the preceding section, and bearing in mind the content of the opening paragraphs, in Section 9.5, above, it is concluded that it is unlikely that synergistic interaction with aquacultural activities identified in Section 7.1.4.3.2, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites, will occur.

9.5.4.3.3 *Urban Waste Water*

Raw sewage discharges to the estuary at Foynes. The pollutants contained in the discharge may impact upon on physico-chemical parameters such as the levels of dissolved nutrients, suspended solids and some elemental components. It should be noted that the pressures resulting from the proposed programme of dredging and dumping at sea are primarily associated with fuel or oils spills and with any increase of sediments suspended in the water column, rather than any chemicals or compounds chemically bound to them. The monitoring carried out in 2017,2018, 2021, and 2023, described in Sections 4.4.3 and 4.5.2, established that all parameters were within the Lower guidance level values (see Sections 5.1.3.3 and 5.1.4) and the sediments are, in effect, inert.

As a practical matter sediment introduced into the water column by dredging activities is unlikely to be a sufficient character, magnitude, duration, or intensity to reach a threshold sufficient to initiate synergistic interaction particularly because the sediments are not likely to impact on physico-chemical parameters in the water column (see Sections 5.1.3.3 and 5.1.4). Any material which becomes re-suspended into the water column will be of the same composition as the indigenous material already occurring naturally on the estuary bed and levels of re-suspended material are not expected to exceed normal ambient background levels. It is, therefore, concluded that, given the pressure resulting from the discharge at Foynes will affect physico-chemical parameters, any in-combination effects with the sediments released from the dredging and dumping campaign are likely to minimal or negligible.

In light of the content in the preceding paragraphs, and bearing in mind the content of the opening paragraphs, in Section 9.5, above, it is concluded that it is unlikely that synergistic interaction with the waste discharge identified in Section 7.1.4.3.3, above, above, that could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites, will occur.

9.5.4.3.4 *EPA Licensed Facilities*

In light of the content in the preceding paragraphs, and bearing in mind the content of the opening paragraphs, in Section 9.5, above, it is concluded that it is unlikely that synergistic interaction with the EPA licensed facility identified in Section 7.1.4.3.4 above, could cause in-combination impacts that would cause adverse effects on the integrity of the relevant Natura 2000, sites.

10. Mitigation

10.1.1 Monitoring by Marine Mammal Observer

To minimise the risk of permanent or temporary disturbance to the population of common bottlenose dolphins for which the Lower River Shannon SAC (002165) is selected, the mitigation practices and procedures for dredging activities, outlined in DAHG (2014), and listed below, will be implemented. These measures will pertain to the dredge site and the proposed Dump Site.

- A suitably qualified and experienced Marine Mammal Observer (MMO) will be appointed for the duration of the dredging works and will log all relevant events using standardised data forms.
- The MMO will conduct a 30-minute watch within 500 m of the dredging vessel prior to the start-up. If a common bottlenose dolphin is sighted within 500 m of the vessel, start-up will be delayed until the mammal observed moves outside the mitigation zone, or 30 minutes has passed without the mammal being sighted within the mitigation zone.
- An agreed and clear on site communication signal will be used between the MMO and the Superintendent/Site Engineer as to whether the relevant activity may proceed, or not, or resume following any break in activities. It shall only commence on positive confirmation with the MMO.
- Dredging activities will only commence in daylight hours where effective visual monitoring, as preformed and determined by the MMO, has been achieved. Where effective monitoring (determined by the MMO), has not been achieved/was not possible for some reason, the sound producing activities will be postponed until effective monitoring is possible.
- This pre-start-up monitoring will be followed immediately by normal dredging activities. The delay between the end of pre-start-up monitoring and the full dredging driving must be minimised.
- Once normal dredging operations commence, there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate, nor if common bottlenose dolphins occur within a 500 m radial distance of the sound source, i.e., within the monitored zone.
- If there is a break in sound output for greater than 30 minutes (equipment failure/location change/shutdown), then pre-start monitoring will be carried out again, prior to recommencement of dredging activities.
- Any approach by common bottlenose dolphins into the immediate works area will be reported to the National Parks and Wildlife Service.
- During movement of vessels, caution will be exercised to minimize risks to common bottlenose dolphins that may avoid detection by the MMO. A speed limit of 10 knots will be considered

In addition, it is recommended that the following mitigation measures are implemented to reduce the magnitude of the impact of dredging activities associated with the works to common bottlenose dolphins :

- Minimise the duration over which these activities are taking place.
- Incorporate “ramp-up” (i.e. “soft start”) procedures whereby sound is introduced in a gradual manner to the marine environment.

10.1.2 Bathymetric Surveys

Pre-dredge and post-dredge bathymetric surveys of the dredge/dump sites and reporting on same will be undertaken annually.

10.1.3 Sediment Sampling

Chemical and granulometric analysis of sediment samples will be collected from the dredge sites in years 2, 5 and 8, with associated reporting.

The locations of proposed sampling points for the chemical and granulometric analysis are illustrated in **Figure 4-3**, above, and are detailed in **Table 10-1**, below.

Table 10-1: Chemical and Granulometric sampling points[26] for monitoring of dredge activities.

Dredge Site	Sample No.	Latitude	Longitude
A	1	52.64558	-9.05688
B	2	52.63691	-9.05795
C	3	52.64505	-9.05688
D	4	52.64094	-9.05938

10.1.4 Water Quality Measures

Baseline suspended solids sampling will be undertaken at two sampling points shown in **Figure 10-1** (one upstream and one downstream of the jetty) prior to activities commencing, once every second day during dredging activities, and one week post the dredging. Reports will be provided for all sampling and analysis. The locations of the proposed sampling points are detailed in **Table 10-2**.

Figure 10-1: Location of the proposed suspended solids monitoring points

[26] Coordinates in WGS84

Table 10-2: Sampling points for monitoring of suspended solids

Sample Site	Latitude[26]	Longitude
Downstream	52.646316	-9.0067
Upstream	52.641066	-9.0448

The following water quality measures will also be carried out:

- Consultation with relevant stakeholders prior to dredging, to inform them.
- Preparation of contracts which meet the requirements of all licenses, consents and agreements applicable.
- The contractor will be fully briefed beforehand on the sensitivities of the site, and any monitoring that will be taking place.

10.1.4.1 Fuel and Oil

There will be no refuelling of the dredger at the site.
Potential leaks from vessels/boats will be mitigated by contractually requiring the contractors to only operate/supply vessels/boats that are in good working order, up to date in servicing etc., and free of leaks.

10.1.4.2 Emergency Plans and Procedures

The contractor will prepare an emergency response plan and set of procedures for events likely to cause pollution of the waters of the estuary with fuels/oils, spillages, etc. The following accident prevention and emergency response procedures are developed and implemented by AAL and Shannon Foynes Port Company (SFPC).

- AAL Marine Emergency Plan.
- AAL Accident Prevention Policy.
- SFPC Shannon Estuary Marine Emergency Plan.
- SFPC Accident Prevention Procedure.
- SFPC Standard Operating Procedure EHS/021 – Reporting Procedures for SFPC Water Craft.
- SFPC Standard Operating Procedure EHS/054 – Accident, Incident, Near Miss Reporting.

11. Residual Impacts

Residual impacts are impacts that remain, once mitigation has been implemented or, impacts that cannot be mitigated. Provided that the mitigation measures outlined in Section 10, above, are implemented in full, it is not expected that residual impacts, to the Lower River Shannon SAC (002165), the River Shannon and River Fergus Estuaries SPA (004077), or other European sites as part of the Natura 2000 network, will occur.

12. Conclusion

Provided the recommended mitigation measures are implemented in full, it is concluded that no reasonable scientific doubt remains as to the absence of adverse effects, on the Lower River Shannon SAC (002165), the River Shannon and River Fergus Estuaries SPA (004077), or any other European sites as identified, in view of those sites' conservation objectives, as a result of the a proposed programme of dredging and dumping at sea described in Section 5, above.

13. References

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Appendix 1

Graphical Representation of Turbidity Data from IDS Monitoring reports 2016 – 2022

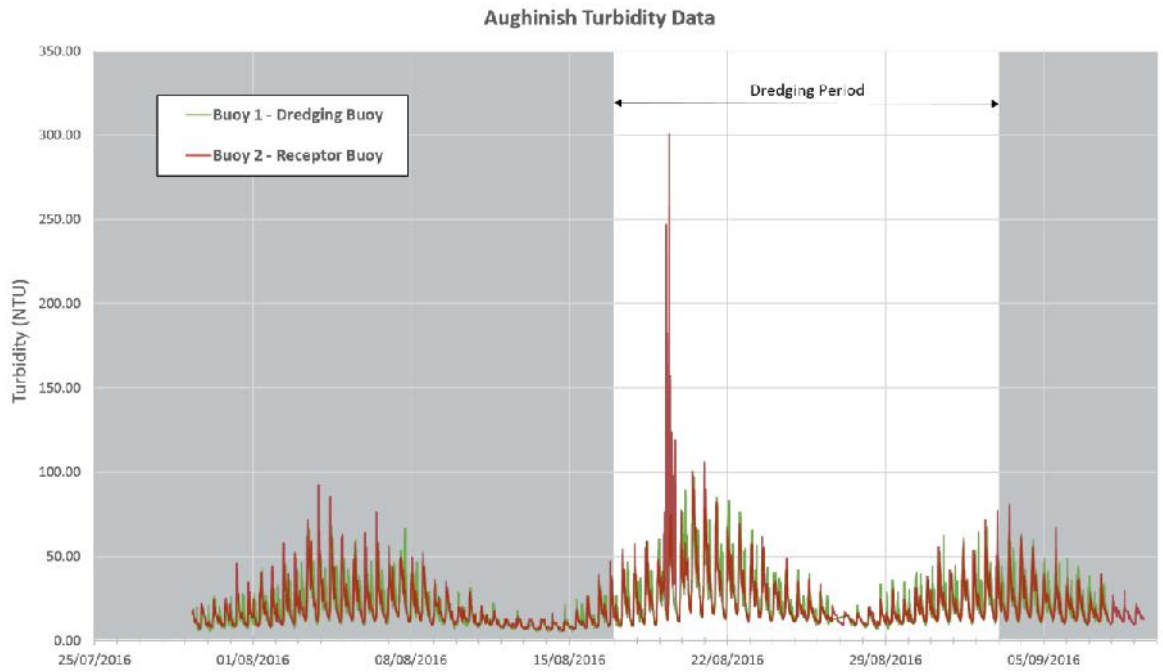

Figure 1: Turbidity Data 2016. The area highlighted in blue shows the period before and after the dredging works. There is a clear tidal signal reflected on both buoys showing not only daily variation but also spring and neap cycles.

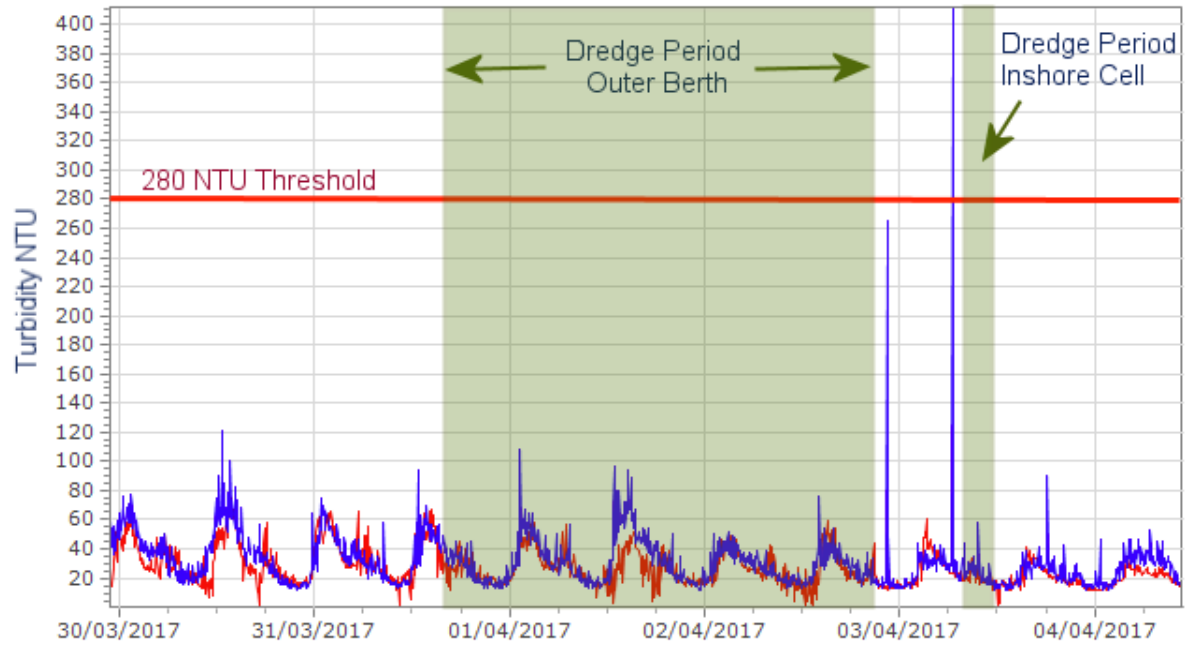

Figure 2: Data from 2017 dredge period showing two reported spikes (blue is upstream, red is downstream)

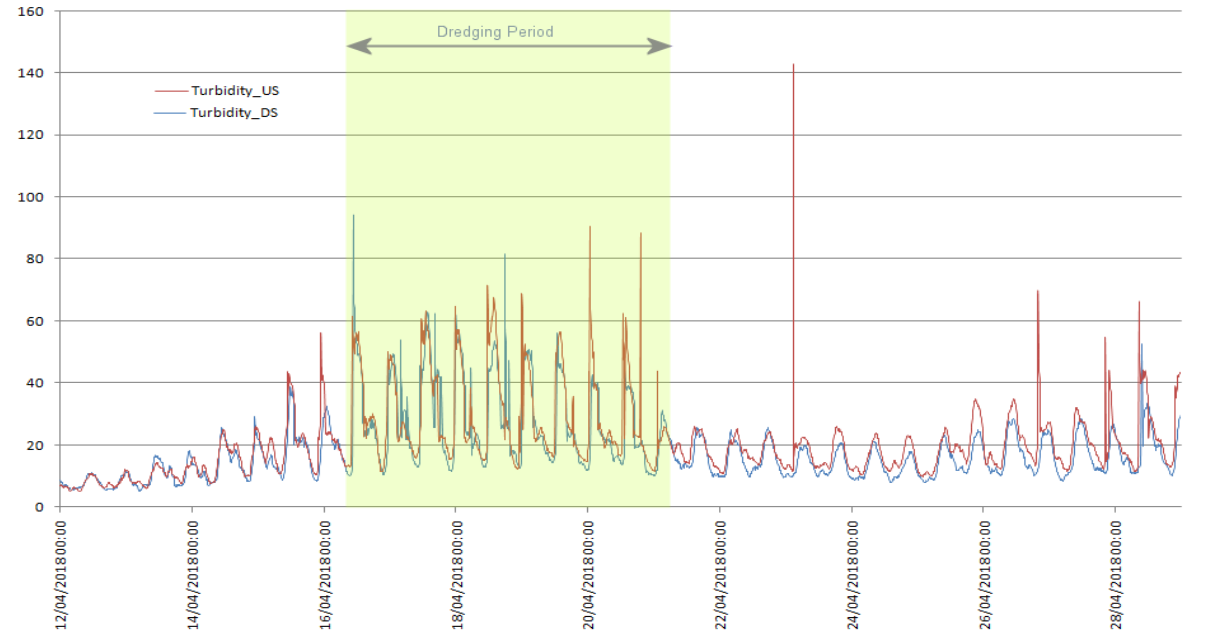

Figure 3: Data from first 2018 dredge period showing pre and post dredging periods

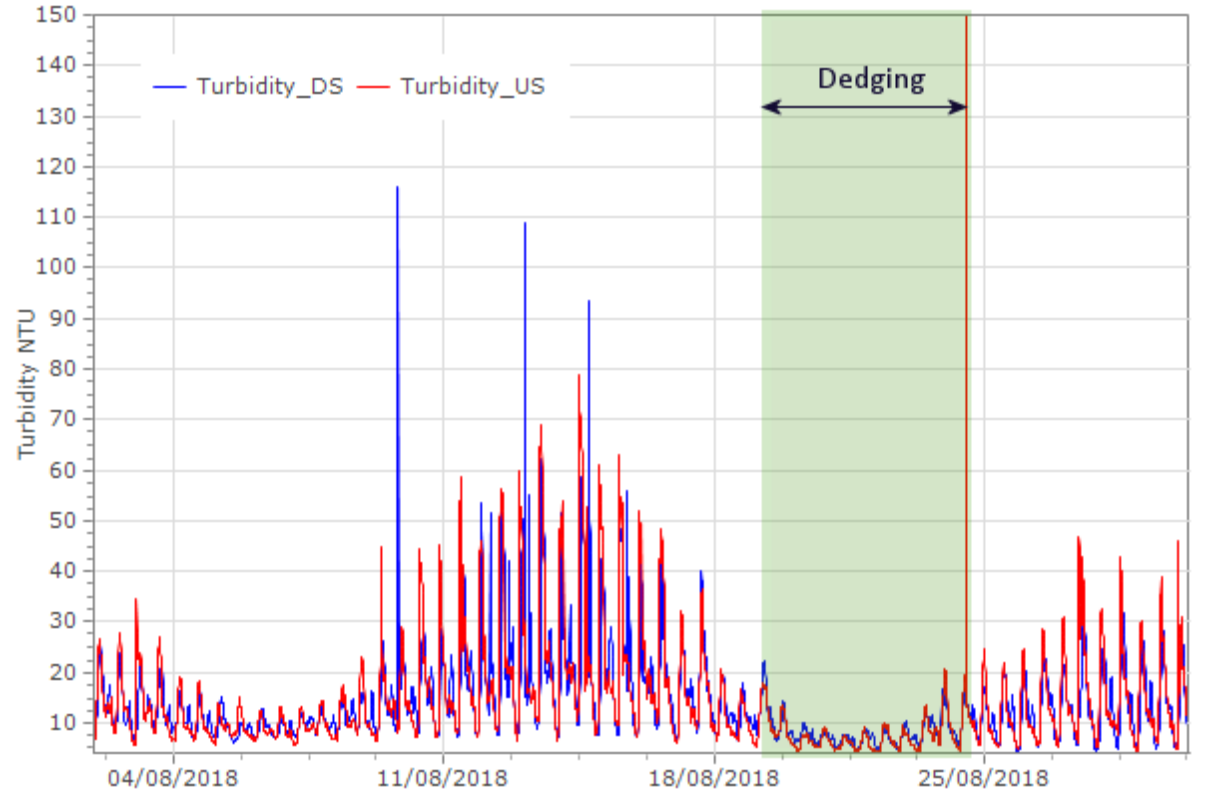

Figure 4: Data from second 2018 dredge period showing pre and post dredging periods

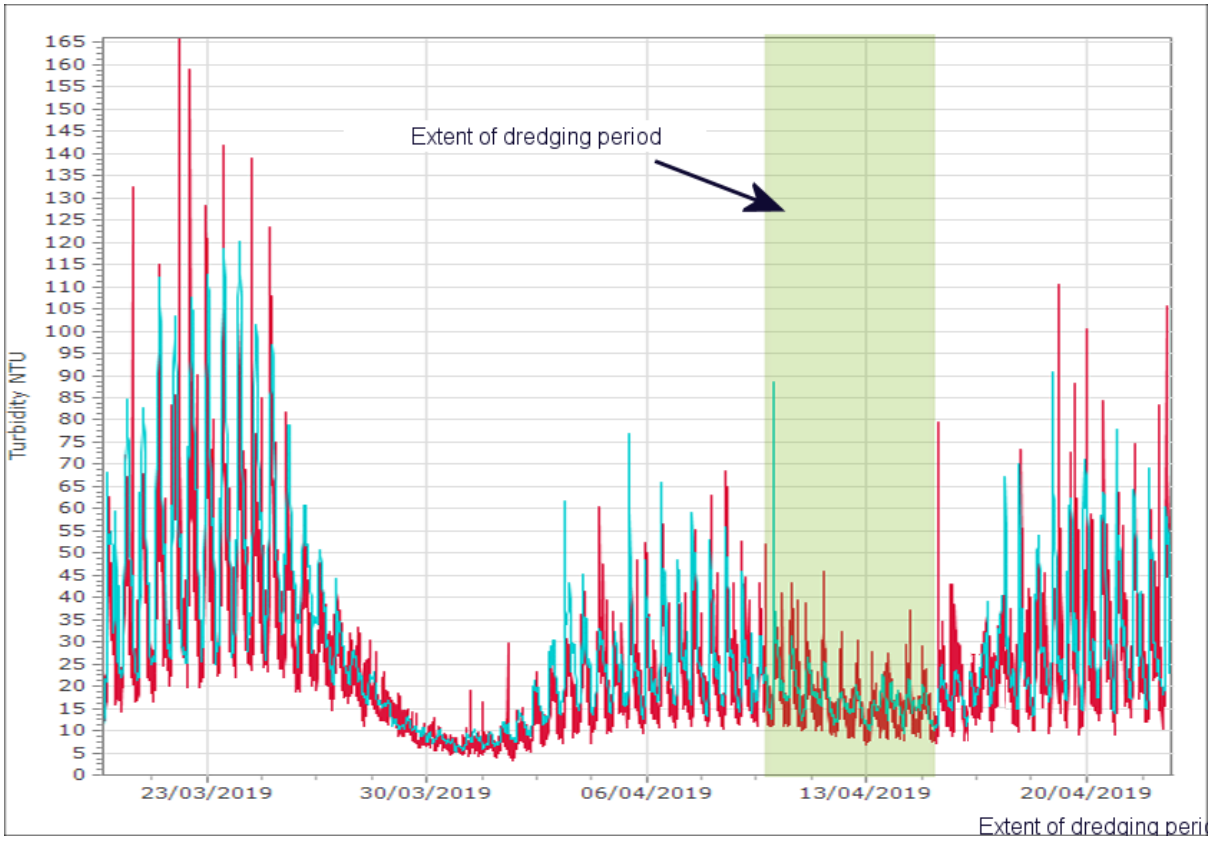

Figure 5: Data from 2019 d*redge period showing pre and post dredging periods(red line is upstream and blue line is downstrea*m

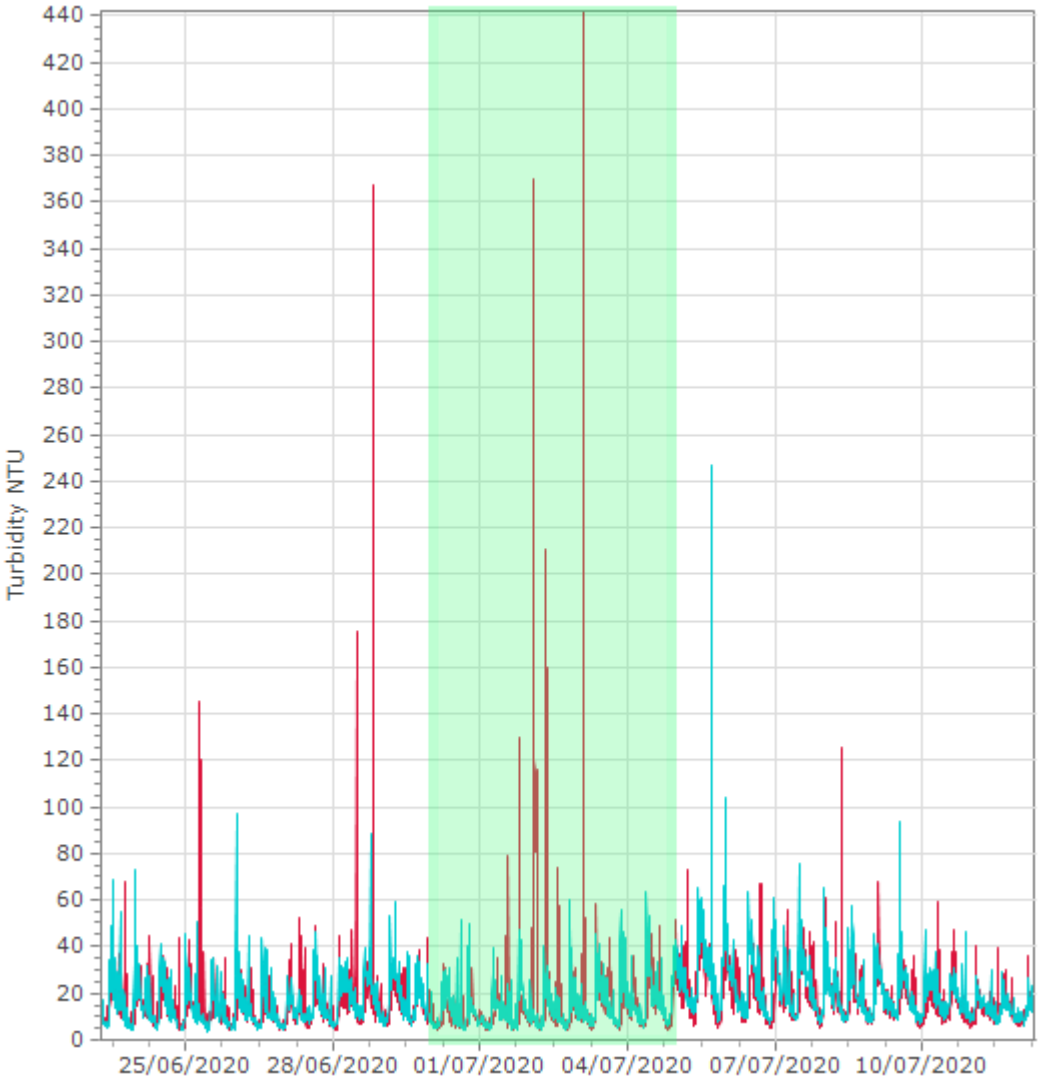

Figure 6: Data from 2020 dredge period showing pre and post dredging periods

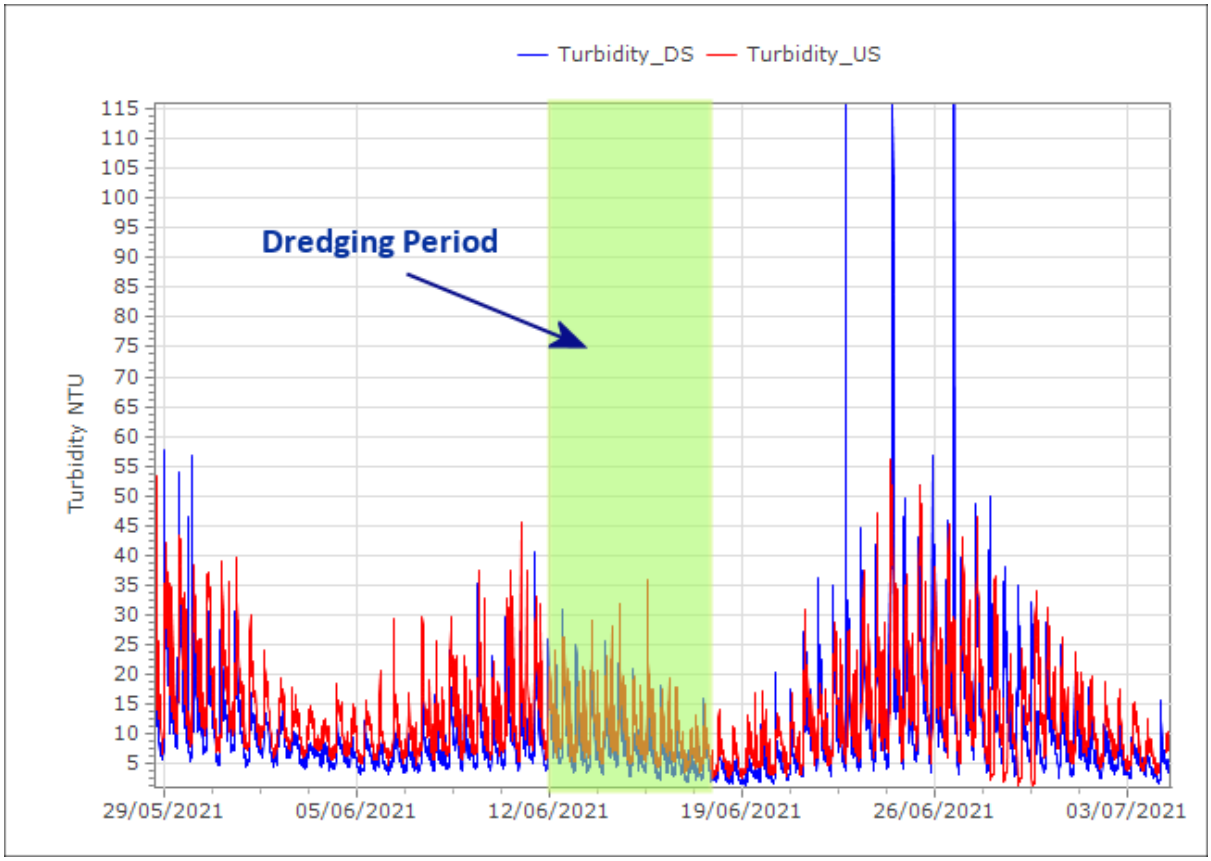

Figure 7: Data from 2021 d*redge period showing pre and post dredging periods(red line is upstream and blue line is* downstream*)*

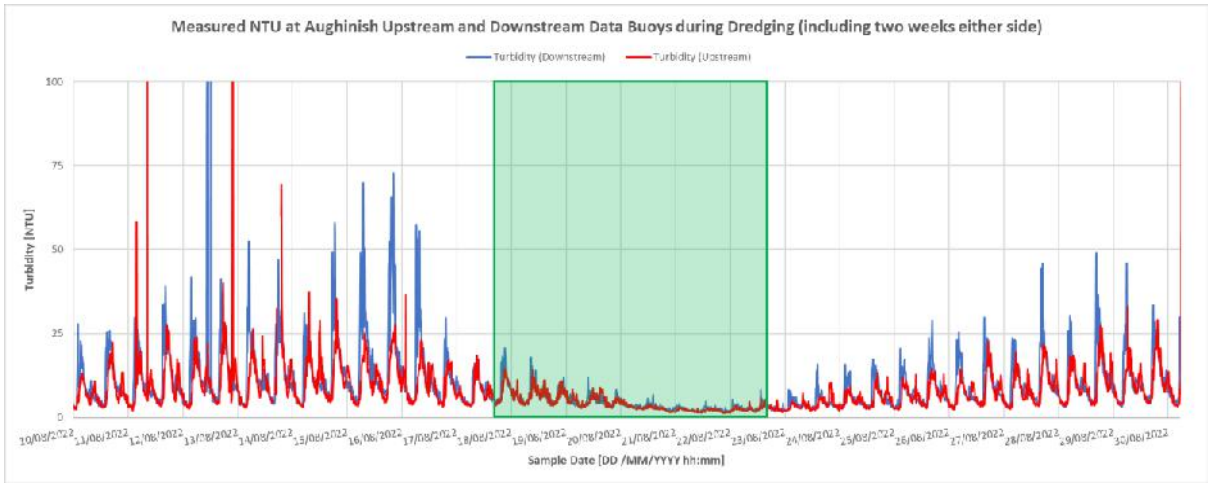

Figure 8: Data from 2022 d*redge period (green box) including two weeks pre- and post-dredging periods.*

Appendix 2

Appendix 2 –A review of dredge related monitoring data at Aughinish Alumina in June 2023 IDS Data Report IDS-DR23-035.

A review of dredge related monitoring data at Aughinish Alumina in June 2023

IDS Data Report IDS-DR23-035

Revision 1

Report prepared by [redacted]
Email: [redacted]
Phone: [redacted]

1 Raheen Woods Business Park, Tuamgraney, Co Clare

Contents

Introduction

IDS Monitoring Ltd (IDS) were contracted in the Spring of 2023 by Fastnet Shipping Ltd, on behalf of Aughinish Alumina, to install two turbidity monitoring buoys near the Aughinish Jetty. The purpose for these buoys was to monitor for dispersion of resuspended sediment during a dredging campaign in the vicinity of the jetty.

The brief received by IDS was as follows:

- The buoys were to be deployed at 52˚38.779'N, 09˚04.021'W (downstream buoy) and 52˚ 38.464'N, 09˚02.688'W (upstream buoy);
- The buoys were to be fitted with calibrated nephelometers within 1 m of the surface (Calibration Certificates have been provided separately);
- All turbidity data was to be delivered in Nephelometric Turbidity Units (NTU);
- The instruments should be fitted with an antifouling system (wiper);
- Data were to be collected and reported in 10-minute intervals;
- The systems should be capable of delivering real-time data to the bridge of the Dredge Vessel (Fastnet Sound) and remotely to the Aughinish Environmental Management (AEM) team. IDS installed a monitoring system on the bridge of the Fastnet Sound and implemented a web page so that staff at Aughinish could review the data in real-time. IDS also implemented a system within their control center to monitor data, alerts and provide 24/7 support to the Fastnet Shipping team;
- The alert system implemented delivers messages in near-real-time to the Dredge Master and to AEM appointed staff. IDS were instructed by AEM that an upper threshold of 280 NTU was to trigger an alert;

Figure 1 – IDS DB150 Data buoys similar to those deployed at Aughinish (downstream left, Upstream right)

The buoys were deployed in May 2023 in advance of the dredging campaign, with operations running from 9th June 2023, 13:15 to the 14th June 2023, 13:15. Both buoys were recovered upon completion of the survey in July 2023.

This report summarises the deployment, data collection and includes a review of all significant findings.

The Deployed System

IDS deployed two IDS DB150 data buoys at the locations shown in Figure 2. Both systems were fitted with Ponsel Nephelometers. Calibration data for the instruments have been provided separately to this report. The buoys were solar powered and the data acquisition system is the IDS DataPOD with GSM/GPRS. Both Systems were fitted with an IDS LGWiper for antifouling purposes, and these were programmed to wipe every hour and synchronised so as not to interfere with sampling.

The systems were deployed on 29th May 2023 on a chain mooring with 1.1 Tonne anchor weights. This original mooring design was selected so that the buoys could be deployed from the IDS contracted vessel Ard-Ri.

Figure 2 – Site Map showing position of the deployed buoys and the primary dredge area.

Data were collected for a period before, during and after dredging operations so a full impact assessment of dredging on turbidity levels at the site could be completed. Data were delivered to an IDS Server and then immediately to the IDS DataLink interface deployed on the bridge of the Fastnet Sound. The same information was also available to the AEM team via a web browser. The latency between data sampling and display on the bridge of the Fastnet sound was typically less than 1-minute and 100% of the expected readings were collected and reported.

Automatic quality controls were applied to all incoming data by the DataLink system and outlier thresholds were defined for this deployment as 0 and 500 NTU (i.e., readings below 0 NTU and above 500 NTU were flagged as poor quality not displayed by default). These data are not deleted and can

be viewed via the DataLink interface by the operator. These outlier thresholds were not triggered during the period of deployment including the pre- and post-dredge periods.

A screen grab of the data interface is shown in Figure 3.

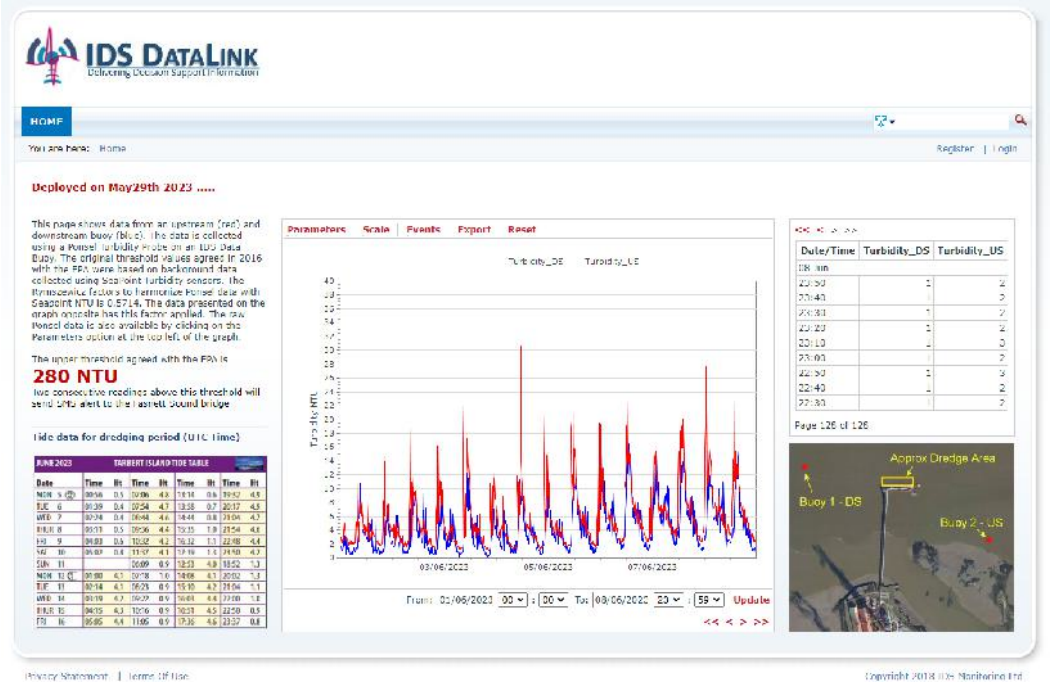

Figure 3 – Data Management Software on Fastnet Sound Bridge and available to all other users.

IDS provided instruction to the Fastnet Sound team prior to dredging and introduced the system to the AEM team. IDS setup alerts as required, and these are monitored by IDS.

Data Review

Data are considered under the headings of threshold compliance, system performance and metrics.

Threshold compliance

There were no readings that exceeded or came close to exceeding the upper threshold of 280 NTU during the dredging period. Figure 4 shows the turbidity readings collected for the dredging period as well as one weeks pre- and post-dredging. The green box in Figure 4 highlights the dredging period itself, which is shown in detail in Figure 5. No single turbidity reading above 17 NTU was recorded during the dredging period. As such, the dredging operations, in terms of impact on suspended sediment, was compliant and operated within the terms of the dredging licence.

Albeit well within the dredging licence exceedance values, there was a single spike of approximately 50 NTU in the measured downstream turbidity on 16th June 2023. (after the dredging period). A singled measurement spike of this nature is consistent with biofouling on the Nephelometer (e.g., seaweed blockage), which then cleared very quickly (within the next 10-minute sample period) as the flow of water cleared the blockage.

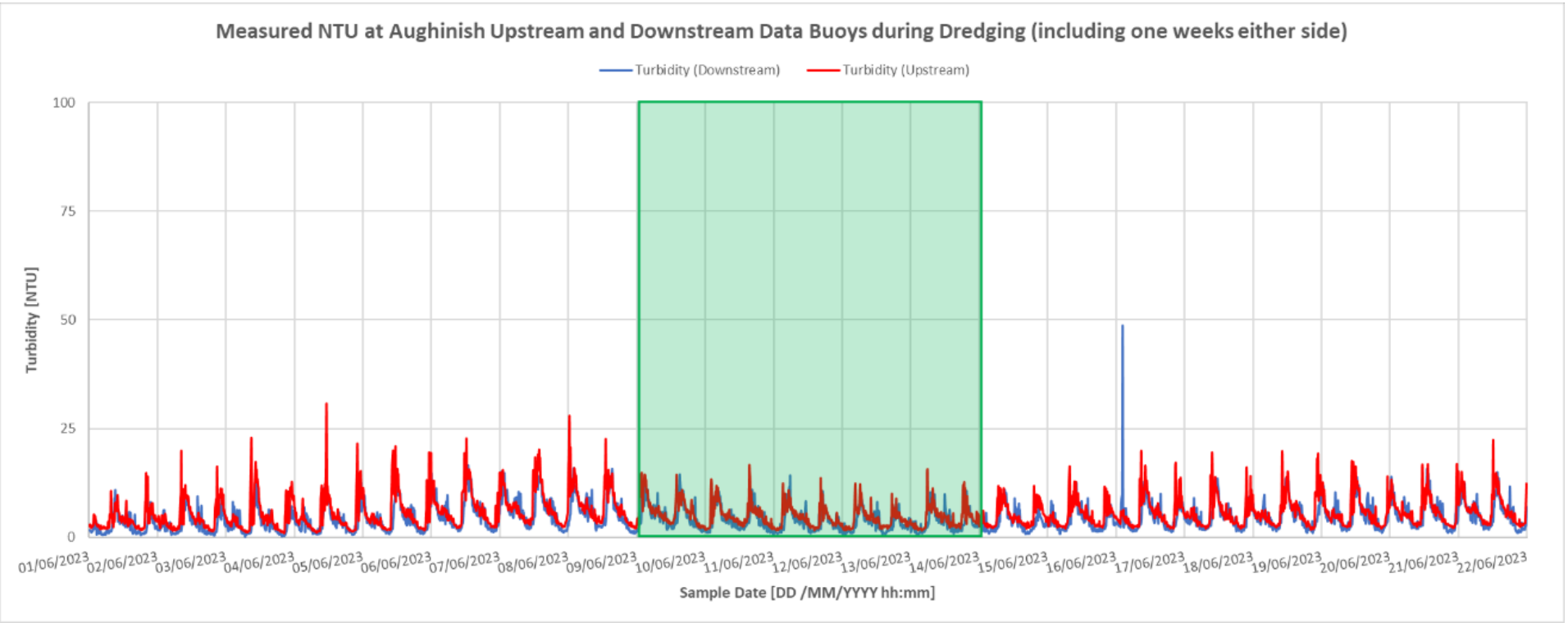

Figure 4 – Data from Dredge period (green box) including one weeks pre- and post-dredging periods.

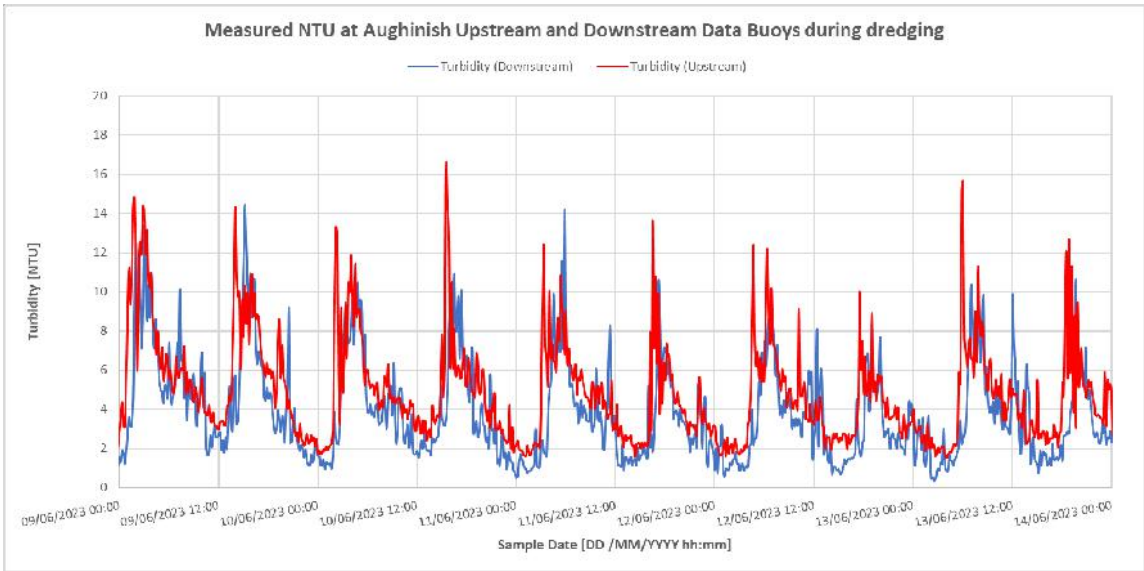

Figure 5 – Turbidity data for the dredge period, green box in Figure 4.

The turbidity values reported during the dredging period were consistent with those seen on previous measurement campaigns. The diurnal variation in ranges over the period in Figure 4 is due to the spring and neap tidal cycle, where more material is naturally resuspended during spring tides. This is as previously seen at this, and many other, sites.

System Performance and Data Metrics

In terms of system performance of both buoys, 100% of the required data was collected and reported.

Conclusions

The following conclusions are made in respect of these data:

- The data set is complete and is understood to meet the requirements of the dredging licence;
- Examination of the overall data set for the period shows good correlation between both the upstream and downstream stations with a natural variability associated with the tide. The range of variation is consistent with what would be expected at this site; and
- A single, short-lived spike, in turbidity at the site following completion of dredging was attributed to localised biofouling such as seaweed and is, therefore, of no concern for operations at the site.

Appendices – Calibration Certificates

These were provided previously with the deployment report.

Appendix 3

Appendix 3 – Laboratory Test Report High Resolution Gamma Spectrometry. August 2023.

Laboratory Test Report

Report Date: 3rd August 2023

Samples Tested on Behalf of: MERC Consultants Ltd

Laboratory Analysis: High Resolution Gamma Spectrometry with appropriate density correction

Sample Type: Marine Sediment

Date of Receipt: 28th April 2023

Date of Analysis May - July 2023

Results:

ORM Reference	Client Reference	Coordinates	Nuclide	Activity Concentration (Bq/kg, dry)[1]
CT2300114	Aughinish 1	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Ra-228 U-235 U-238	337 ± 7 nd nd 2.9 ± 0.1 < 0.3 19.1 ± 1.0 19.1 ± 0.9 1.1 ± 0.1 33.1 ± 1.7
CT2300115	Aughinish 2	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Ra-228 U-235 U-238	348 ± 7 nd nd 2.9 ± 0.1 0.7 ± 0.1 17.5 ± 0.9 16.9 ± 0.8 1.1 ± 0.1 29.8 ± 1.5

CT2300116	Aughinish 3	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Ra-228 U-235 U-238	176 ± 4 nd nd 1.1 ± 0.0 < 0.3 12.1 ± 0.7 10.7 ± 0.5 0.7 ± 0.1 18.1 ± 1.0

Note:
(1) Quoted uncertainties are ±1 SD counting statistics
(2) Nd = not detected

The Office of Radiation Protection and Environmental Monitoring received three grab sediment samples from Aughinish. These samples were taken in support of application for a Capital/Maintenance Dredging Permit.

The samples were prepared by placing an aliquot in a well-defined counting geometry and then measured on a high-resolution gamma spectrometer. Appropriate density corrections were applied to the resultant spectra to take account of the differences in sample density. Dry to wet weight ratio was determined for the sample. Results are quoted on a dry weight basis.

The results indicate that dumping of these materials at sea will not result in a radiological hazard.

[redacted]

Laboratory Manager

Notes:
- This report relates only to the samples tested.
- This report shall not be reproduced except in full, without the approval of the Agency
- The following scientific officers may sign test reports on behalf of the laboratory manager: [redacted]
- Where applicable, the number following the symbol ± is the combined standard uncertainty and not a confidence interval.