MERC Consultants
environmental and conservation services

Screening for Appropriate Assessment

and

Natura Impact Statement

Ballycotton Harbour Dredging

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Contents

1. INTRODUCTION

1.1. Background

Ballycotton Harbour is located approximately 40km (by road) east of Cork city. The harbour is utilised on a regular basis by a number of commercial fishing vessels and is also the base for a Royal National Lifeboat Institution Trent Class All-weather Lifeboat. The harbour is also the landing point for seasonal tours of the adjacent Ballycotton Lighthouse and maintenance access for the Commissioner of Irish Lights.

The harbour is heavily silted which is restricting the usage of the harbour at low tides. There is regular grounding of fishing vessels and the pontoon, and the all-weather RNLI lifeboat is unable to launch, or access the pier and pontoon for casualty removal, at a number of low tides. The harbour was dredged by Cork County Council in 1984 and again in 1998 with the dredging limited to the removal of mud from the channel at the entrance to the harbour. The berthing area of the pier and the head of the breakwater were reinforced with sheet piles in 2006, emergency repairs were completed to the Breakwater in 2011 and a Pontoon and Gangway installed in 2015.

Cork County Council have proposed a project to carry out a capital dredge project of the Harbour to restore it to navigable depths.

1.2. Purpose of this report

Cork County Council have proposed a project to carry out capital dredging of the Harbour to restore it to navigable depths.

All EU Member States are obliged to establish a network of sites of conservation importance known as the Natura 2000 network. The network is made up of Special Areas of Conservation (SACs) established under the EU Habitats Directive (92/43/EEC) and Special Protection Areas (SPAs) established under the EU Birds Directive (2009/147/EC). Under Article 6(3) of the Habitats Directive, Member States are required to consider the potential for likely significant effects of any project or plan on the conservation objectives of a SAC or SPA (European site) before a decision can be made to allow that project or plan to proceed.

Appropriate Assessment (AA) is the process whereby the potential impacts of a project or plan are assessed in view of a European site's conservation objectives. The first step in the process is to conduct AA screening to determine, on the basis of a preliminary assessment and objective criteria, whether the project or plan, alone or in combination with other projects or plans could have significant effects on the conservation objectives of a European site. Where significant effects are likely, uncertain or unknown at the screening stage, Appropriate Assessment is required to enable a consent authority to carry out an appropriate assessment.

Screening for AA was carried out for the proposed works and is presented in section 6 of this report. The Screening assessment concluded that "*it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on the Conservation Objectives of a European site. Accordingly, it is concluded that an Appropriate*

Assessment of the proposed project is required". A Natura Impact Statement (NIS) was subsequently prepared and is presented in section 7 of this report.

2. STATEMENT OF AUTHORITY

This report was prepared by MERC Consultants Ltd. MERC are a specialist marine ecological survey and consultancy firm. Core staff have many years combined experience and specialist knowledge in relation to Irish marine and coastal habitats, species and ornithology as well as assessment and management of conservation interests.

Most recently MERC have completed NPWS national monitoring of marine Annex I habitats for compliance under Article 17 of the EU Habitats Directive. In this context MERC were responsible for the assessment and reporting of marine Annex I habitats in Ireland and were the authors of all Article 17 reports and overarching site monitoring reports.

In addition to their scientific expertise MERC have an in-depth knowledge of Irish and European Environmental legislation and policy. In 2011 MERC prepared the text describing Activities Requiring Consent (ARCs) for inclusion in a handbook detailing the regulatory framework for all developments within designated sites in Ireland on behalf of the National Parks and Wildlife Service. They have also produced numerous Conservation Management Plans for the same department. To-date MERC have conducted in excess of 200 ecological reports in support of Appropriate Assessment under Article 6(3) of the EU Habitats Directive. MERC have also contributed specialist ecological advice for the preparation of a number of Environmental Impact Statements related to a variety of proposed developments in Ireland.

3. METHODS

3.1 Relevant guidelines and legislation

This report has been prepared with reference to the following European Directives, national legislation and guidance on the appropriate assessment of projects and plans with regard to the implementation of the provisions of Article 6(3) and (4) of the EU Habitats Directive 92/43/EEC.

- *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna*. Official Journal of the European Communities.
- *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds* (codified version).
- *European Communities (Birds and Natural Habitats) Regulations 2011*. SI No. 477 of 2011.
- *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission 2018. 7621 final. Office for Official Publications of the European Communities, Luxembourg.
- *Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habits Directive 92/43/EEC*. European Commission, 2002;
- *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. DoEHLG, 2009.*
- *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of Arts, Heritage and the Gaeltacht, 2014*

- Relevant case law.

3.2 Description of the proposed project and its associated scope of works

A detailed description of the proposed project was compiled and is set out in Section 4. The description details all works required to carry out the proposed project.

3.3 Impact assessment approach

The zone of influence (ZOI) of a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. In the context of AA screening, the ZOI is the area over which a plan or project could affect the receiving environment such that it could potentially have significant effects on the conservation status of European Sites. This has the potential to extend far beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.

In the marine environment, zones of influence can be extensive and lead to effects well beyond the construction site (CIEEM, 2018). This is particularly relevant in the case of sediment and nutrient transport and also where highly mobile or migratory species may be present. Within the ZOI those receptors that are sensitive to change must be identified and considered.

To define the ZOI of a project the potential for project related effects on sensitive receptors must first be established. For this purpose, a **Source-Path-Receptor-Consequence (SPRC)** model was applied. The SPRC model is a well-established model frequently applied to the analysis of project related effects on ecosystems and is the one which we have applied to the assessment of the proposed site investigations.

The SPRC model we have applied is summarised below:

1. Identify the Source - The origin of a hazard e.g., noise generation from site investigation equipment.
2. Identify the Pathway - Route that a hazard takes to reach Receptors e.g., through water. A pathway must exist for a Hazard to be realised.
3. Identify the geographical range – The range the source, by way of the identified pathway, could extend.
4. Identify the Receptor - The entity that may be affected (e.g., a marine mammal, a habitat etc.).
5. Assess the Consequence - An effect e.g., hearing damage as a consequence of noise generation.

Using this approach all elements of the proposed project were reviewed to assess potential pathways and receptors which might be affected so that a ZOI could be established for the proposed project. It should be noted that the ZOI may extend well beyond the geographical range of the impact. This is usually the case where mobile species e.g. marine mammals or birds have the potential to be impacted.
This process involved the following steps:

- The identification of sources of potential impacts and their pathways from the proposed project site to species and/or habitats associated with European Sites.
- Consideration of sensitive receptors and their dependent ecosystems within the aforementioned European sites.

- Identifying and characterising project related impacts and their likely effects, direct, indirect and cumulative on the identified sensitive receptors.

Once the ZOI was established, the following steps were taken to assess potential for likely significant effects on sensitive receptors:

1. The scale, scope and type of the site investigations were examined.
2. A desk review of the available literature describing the habitats and species known to occur at the proposed project site and surrounding area was undertaken.
3. Any project related activities likely to affect migratory or highly mobile species was considered.
4. Any use of the proposed project site by mobile species that make regular movements to, from, or across the site was assessed.
5. An assessment was carried out of the key ecological processes and species activity periods including seasonal variations in distribution, abundance and activity.
6. An assessment was carried out of the key hydrodynamic processes, e.g., by refence to Admiralty data for the area at the site, and any seasonal or cyclic variations in these.

3.4 Review of relevant European Sites

Once the ZOI of the proposed project was determined all European sites within this ZOI were documented and an analysis of the sensitivity of ecological receptors therein was conducted. In determining the sensitivity of ecological receptors consideration was given to the scale, scope and location of the proposed project relative to the aforementioned receptors.

3.5 Description of the receiving environment

3.5.1 Desk study

To fully understand the receiving environment, relative to project related effects, the literature consulted included:

- National Parks and Wildlife Service data sources for all European sites within the ZOI of the proposed project. This included the individual site synopsis for each designated area, standard Natura 2000 data forms, conservation objectives and conservation objectives supporting documentation and GIS layers (habitats, species and marine community mapping).
- Irish Wetland Bird Survey (I-WeBS) data.
- European seabird colony data (JNCC).
- Available benthic data (NPWS, Marine Institute and INFOMAR)
- Relevant literature on the impact of noise and other anthropogenic impacts on marine mammals and fish was also reviewed.

3.5.2 Commissioned reports

- Marine Mammal Risk Assessment (Appendix I).
- Breeding bird survey of the project location and environs (Appendix II).
- Sampling for contaminant analysis of dredge area within Ballycotton Harbour according to a schedule of sampling proposed by the Marine Institute.

3.5.3 Field survey

Field surveys were undertaken to further understand the receiving environment. These included a survey of the subtidal and intertidal benthic habitats and coastal habitats as detailed below.

3.5.3.1 Benthic habitats

Subtidal benthic habitat

A survey of the subtidal benthos was undertaken in June 2019. The full results of this survey are presented in Appendix III of this report. In summary, four (4) benthic grab samples were collected using a Day Grab from within Ballycotton harbour and its environs.

Intertidal benthic habitat

A survey of the intertidal benthos was undertaken in June 2019. The full results of this survey are presented in Appendix IV of this report. In summary, three (3) intertidal stations (5 replicates per station) were collected using a standard 20cm hand core from Ballycotton Bay.

3.5.3.2 Coastal habitats

A site walkover was conducted to obtain an overview of the ecology of the coastal and intertidal habitat within Ballycotton Harbour (conducted when low water was <0.6 meters) and environs and within Ballycotton bay during June 2019.

4. DETAILS OF PROPOSED PROJECT OR PLAN

The schedule of works, which comprises a single dredging programme, is summarised below and detailed in sections 4.1.

- Dredge the area outlined in orange in figure 4.1 to bedrock or -3.5m Chart Datum whichever is shallowest.
- Dredge remainder of the harbour outlined in purple to bedrock or -2.5m Chart Datum whichever is shallowest.
- Disposal of suitable dredged materials at the previously used dumping site to the south of Powers Head, 16km southwest of Ballycotton (figure 4.2).
- Dispose of contaminated dredged material outlined in cyan to a licenced landfill facility.

4.1 Construction method statement

This construction method statement is outline only, and subject to change based on the outcome of foreshore and other statutory licence applications as well as the preferred contractor methodology.

4.1.1 Mobilisation

A pre-condition survey of the site will be carried out by the contractor to determine the suitability of the plant proposed. The following will be mobilised to the site for the dredging elements of the works:

- Long Reach back-hoe excavator
- Dredge barge
- 1000m^3 hopper barge
- Tugboat
- Articulated dump trucks
- Safety boat
- Road sweeper

4.1.2 Site Compound

A site compound will be set up upon mobilising to site. Appropriate fencing will be erected around the perimeter of the site where required. The site compound will be minimised to limit obstructions to the normal operation of the port. The compound will incorporate a site office, canteen, welfare facilities and storage.

4.1.3 Existing Swing Moorings

All existing swing moorings will be removed from the seabed before commencing dredging works. All swing moorings will be stored off site in a location agreed with Cork County Council while dredging works take place. Swing moorings will be reinstalled on completion of dredging works.

4.1.4 Dredging Works (Overburden Material)

A bathymetric survey will be carried out to determine exact seabed levels prior to dredging. A dredge barge will be towed to the area to be dredged by a tugboat.

Contaminated Material

A long reach excavator, located on the dredge barge, will use a dig control system to determine dredge level achieved. The excavated material will be placed in a hopper barge. This material will then be later discharged into tipper trucks where appropriate which will transport contaminated material to a suitably licenced facility for disposal.

Uncontaminated Material

Similarly, the excavated material will be placed in a hopper barge and towed to the disposal site, south of Powers Head for disposal at sea. Storage of the material will not take place on the quay. It is likely that dredging activities will take place 24hrs per day, 7 days per week to achieve the maximum production rates within tidal envelopes.

Rock Material

It is not anticipated that there will be any requirement to dredge rock from the harbour.

4.1.5 Disposal of Dredge Arisings

Table 4.1 gives the estimated volumes of dredge materials.

Table 4.1 Dredge volumes

Material to be dredged	**Volume (m^3)**	**Mass (tonnes)**
Silts, Sands & Gravels	19,500	15,000
Assume bulk density is 1,300kg/m^3		

Subject to the quality of material dredged, it is estimated that and 18,000m^3 of gravel, silt and sand will be disposed of at sea. The remaining 1,500m^3 of contaminated gravel, silt and sand will require disposal at a suitably licenced site.

4.1.6 Anticipated Dredge Production Rates

It is anticipated that overburden (gravel, silt, and sand) will have a maximum dredging rate of 500m^3 per 24 hours. It is estimated that the haulage contractor would dispose of overburden material over 12 hours per day.

4.1.7 Programme of Works

Estimated timelines for each element of the proposed programme are given in table 4.2. It is proposed that mobilisation to site will take place in August, which includes removal of swing moorings. Dredging works will take place over 8 weeks between September & October. Demobilisation and reinstalment of pontoon & swing moorings will take place in November.

Table 4.2 Estimated timelines

Event	Time	Time of year
Mobilisation	2 weeks	August
Removal of Existing Swing Moorings	1 week	August
Dredging	8 weeks	September-October
Swing Mooring Reinstallation	2 weeks	November
De-Mobilisation	1 week	November

4.1.8 Additional information

An outline Construction Environmental Management Plan (CEMP) has been prepared for the proposed project. A final CEMP will be prepared prior to the project commencing.

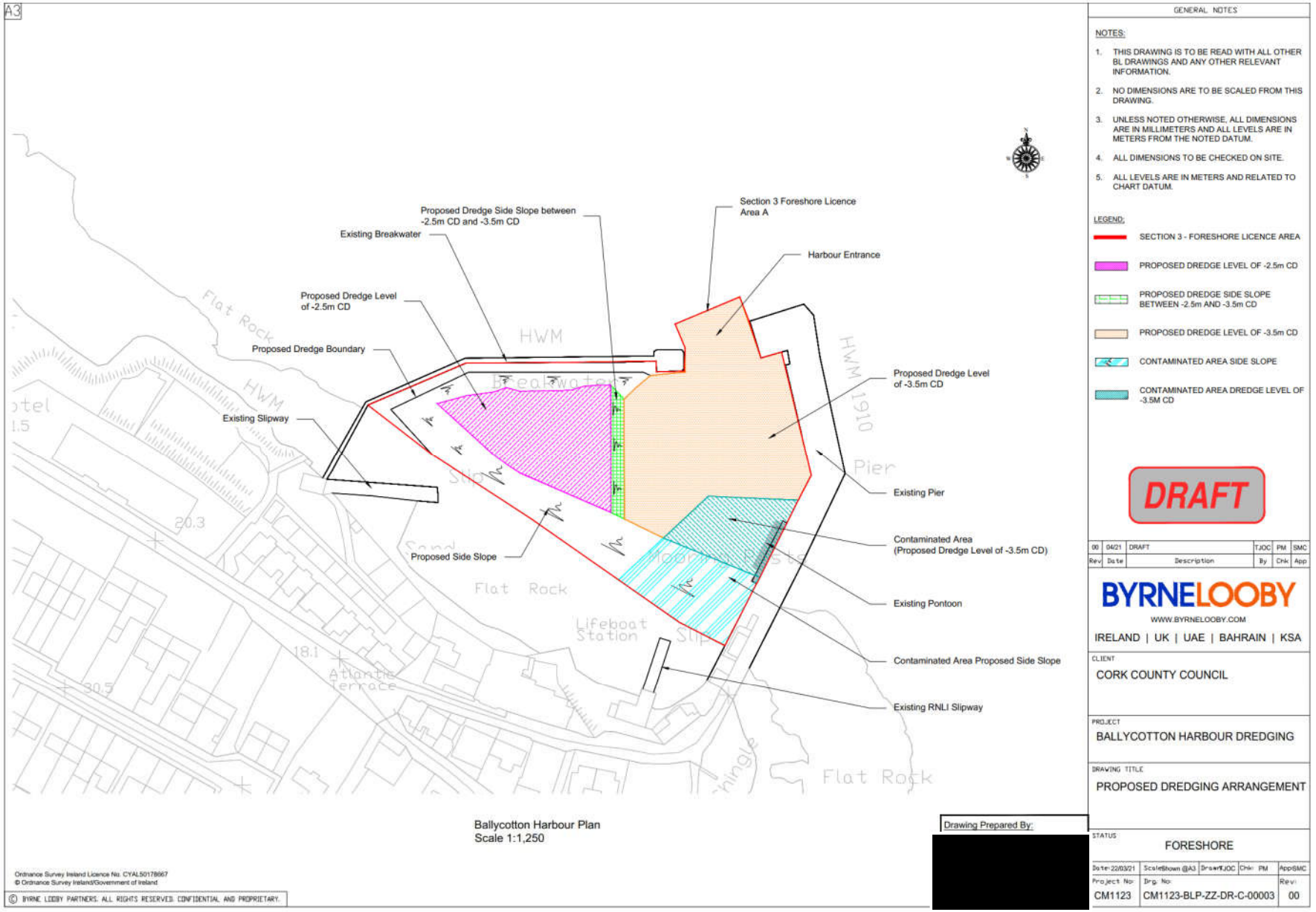

Figure 4.1. Overview of dredging area.

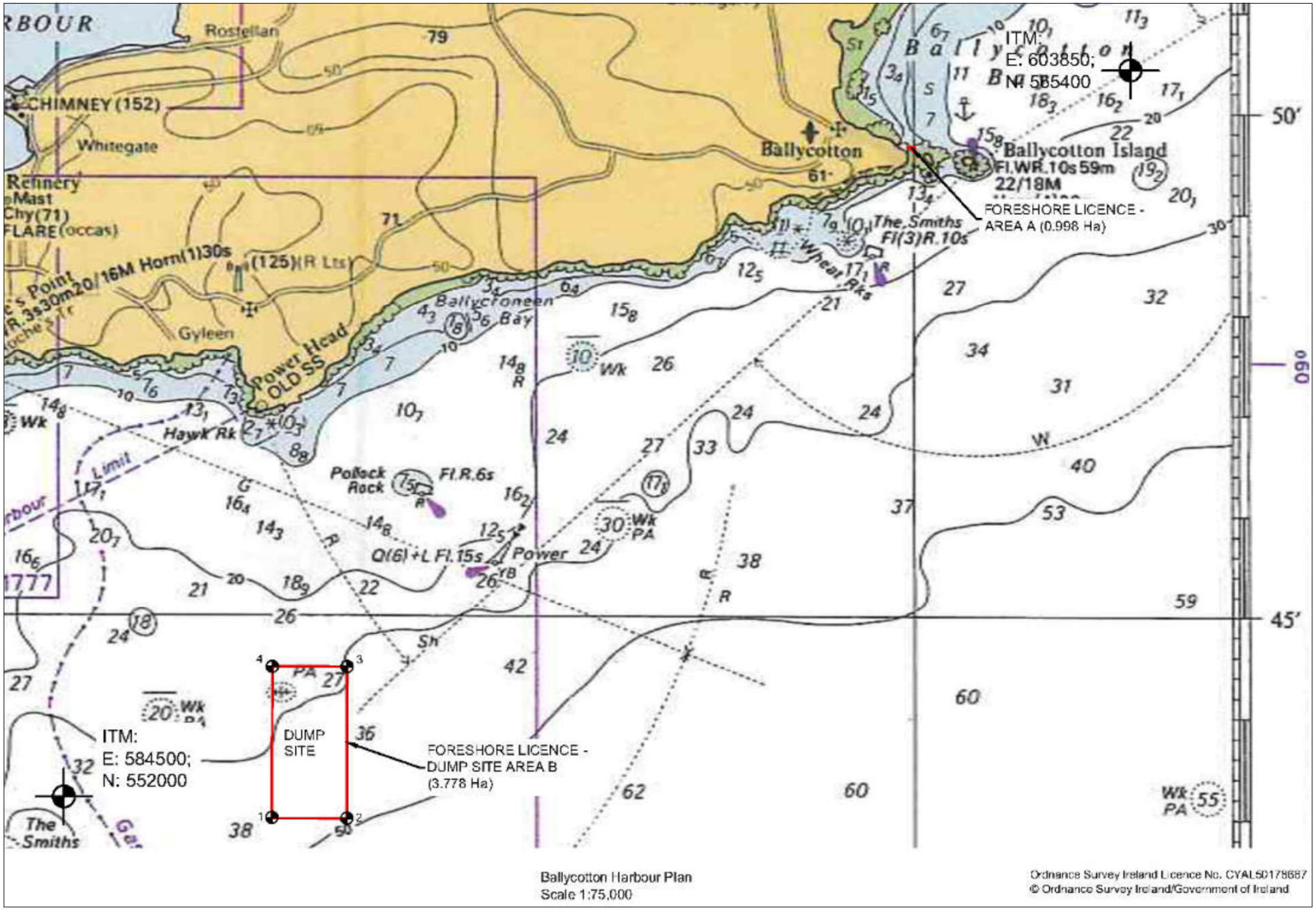

Figure 4.2. Proposed Dump site (Extract from Byrne Looby drawing No. CM1123-BLP-ZZ-DR-C-00005).

5. THE RECEIVING ENVIRONMENT

5.2.1 Overview

Ballycotton is a small coastal village located on the south side of Ballycotton Bay approximately 40km (by road) east of Cork city. The village is approached by the R629 public road, with the harbour situated at the east end of the village at the most south-easterly extent of Ballycotton Bay. The surrounding land use is characterised by improved agricultural grassland. The harbour is utilised on a regular basis by a number of commercial fishing vessels and is also the base for a Royal National Lifeboat Institution Trent Class All-weather Lifeboat. The harbour is also the landing point for seasonal tours of the adjacent Ballycotton Lighthouse and maintenance access for the Commissioner of Irish Lights.

The harbour is set beneath low sea cliffs which have largely been reinforced by stone walling (in the vicinity of the harbour), beneath which an intertidal area comprised of cobble and outcropping bedrock is present. See figure 5.1 and 5.2.

Two islands, Ballycotton Island (small) and Ballycotton Island, lie to the east of the harbour. The former is a continuation of the intertidal area while the latter, which is the location of Ballycotton Lighthouse, is approximately 970 meters due east of Ballycotton Harbour. Both islands are characterised by coastal grassland, on the relatively level summits, surrounded by hard sea cliffs.

Ballycotton Bay, to the northwest of the harbour is characterised by a large shallow bay with extensive sandflats. A number of coastal and marine habitats are represented within Ballycotton Bay including the sandflats together with shingle, sand dunes systems, saltmarsh and intertidal reef.

Figure 5.1 Stone walling along the south western boundary of Ballycotton Harbour.

Figure 5.2 Ballycotton Harbour. View looking north west.

5.2.2 Benthic habitats

5.2.2.1 Subtidal benthic habitat (Ballycotton Harbour and environs)

Based on the results of the benthic grab survey (Appendix III), the subtidal sediment habitat within the dredge areas of Ballycotton Harbour is comprised of Muddy sand (Subtidal stations BCTN1 and BCTN2, Appendix III). The subtidal sediment habitat immediately outside the harbour (BCTN3, Appendix IV) is comprised of Sandy mud, while BCTN 4, to the northwest of the harbour is mud. The characterising biotopes at all of these stations is *Mysella bidentata and Abra spp. in infralittoral sandy mud*. JNCC habitat code: SS.SMu.ISaMu.MysAbr or a variation of this biotope. This habitat is characterised by cohesive sandy mud, sometimes with a small quantity of shell in shallow water and may contain the bivalves *Mysella bidentata* and *Abra* spp. (typically *A. alba* and *A. nitida*). Other characteristic taxa may include *Scoloplos armiger*, *Mya* sp., and *Thyasira flexuosa*. Tube building amphipods are also characteristic of this biotope, in particular *Ampelisca* spp. and Aoridae such as *Microprotopus maculatus*. This biotope is generally found in sheltered marine inlets or sea lochs.

Stations BCTN1 and BCTN2 had elevated numbers of *Mediomastus fragilis*, a possible indicator of anthropogenic impact at this location within the harbour area. While stations BCTN1 and BCTN2 were a variation of the described biotope which has a higher proportion of mud and lower species diversity.

Of the dominant species recorded: *Abra* spp. are opportunistic bivalves, capable of exploiting newly disturbed substratum through larval recruitment. *Mediomastus fragilis* is a polychaete that is likely to recolonise disturbed areas first, although the actual pattern will depend on recovery of the habitat, season of occurrence and other factors.

Initially five surface samples were taken for sediment contaminant analysis from within Ballycotton Harbour. Following a review of the data from this sampling program a further ten samples were collected from the harbour to further assess the levels of copper, lead, TBT/DBT and PAH. These data showed that an area of the harbour, close to the slip way, had elevated levels of these contaminants. This data has been used to inform the project methodology relative to the disposal of dredged sediment.

The wider marine habitat, extending to 20km from Ballycotton harbour is known from Infomar surveys of the area and is described as being dominated by circalittoral rock and biogenic reef with patches of circalittoral sand. Much of the inshore area is unclassified by Infomar, however data collected from similar inshore areas on the south coast as part of NPWS marine monitoring (e.g., Ballymacoda Bay 10km to the north of Ballycotton Harbour) shows the inshore area to be dominated by compact hard sand.

5.2.2.2 Subtidal benthic habitat (Powers Head dump site)

Regular dumping of spoil has been carried out at the Powers Head l site since 1978. An impact hypothesis report (Irish Hydrodata, 2013) described the site based on surveys comprised of sub-bottom profiling and multibeam surveys as consisting mainly of exposed bedrock with patches of sediment. Geophysical survey data from the INFOMAR survey of 2008 shows the sediment thickness to be typically about 1m, occasionally reaching 2m.

A 2004 survey of the area by benthic grab sampling and drop down video (ASU, 2004) describes three different habitats at eh dump site as follows:

- Muddy mixed sediment of muddy sand/mud with shell debris and pebbles.
- Bedrock and boulders
- Muddy plain.

The results of the video surveys indicated that the muddy and sandy habitats did not support an extensive faunal community on the surface. However, there was substantial evidence on the surface that an extensive infaunal habitat was present i.e., burrows and mounds. It was clear from the camera shots in every part of this study area that the seabed comprises a mosaic of many different habitats including jagged, step-like ledged bedrock, low moulded bedrock, gravel, cobbles, boulders and silted coarse sandy gravel and muddy sand or mud over sand. No one habitat predominates within the whole area and most camera drops revealed a range of habitats. Some of the hard substrate areas had a fair dusting of silt, which was thick in places and some areas had extensive mud patches but there was no obvious indication that soft sediment had built up anywhere (ASU, 2004).

The results of the Grab survey indicated that across the 8 stations sampled (P1-P5 inside the site and P6-P8 outside and to the east), a total of 60 taxa were identified. The majority of these were taken to family level, although Nematoda and Nemertea were left as higher taxa. Several burrowing anemones were encountered at several stations; these were identified as *Peachia cylindrica*. This identification must remain tentative, however, as it was based on a single extended individual and it remains possible this taxon belongs to the Edwardsiidae. Most families (and their constituent species) are of widespread occurrence in Irish waters. A notable exception is *Chaetoderma nitidulum* (family Chaetodermatidae), a

rarely recorded burrowing mollusc, whose distribution in Irish waters is uncertain. Although only family level data are presented and analysed, in several cases more than one species per family was present.

This report further notes that "*Although the Dump Site has been in use for several years, and undergoes a disturbance event nearly every year, (the most recent being July of 2003) due to dumping of dredge spoil, it seems that the site is acting as a dispersive site, with little evidence of organic enrichment and prolonged disturbance. Although, high densities of potential organic enrichment indicators (Capitella capitata) were encountered at two replicate grabs from station P1, and although smaller abundances of this species and other taxa which indicate disturbance (esp. Lumbrineridae) were present, it seems plausible that these isolated patches are remnants of past dumping effects, rather than indicative of a more prolonged degradation in community health. This may be supported by the fact that (i) the two replicates in question (P1B and P1C) were only separated by 10m, with the third replica (P1A) harbouring far lower densities (of Capitella) was separated by 50m and (ii) that although disturbance taxa are present at other stations, their numbers tend to be low and highly variable, again indicative of spatial patchiness*".

5.2.2.3 Intertidal benthic habitat: Intertidal sediment

The Intertidal habitat within Ballycotton Bay is characterised by an exposed sandy beach with an easterly aspect. The Killmachahill watercourse drains through the beach area towards the south and the Shanagarry and Monagurra join to enter the beach area further north. Sediment cores taken demonstrated that the intertidal area was characterised by fine and medium grained sand which were characteristic of the Biotope "*Polychaetes in littoral fine sand*. JNCC Habitat Code: LS.LSa.FiSa.Po". The intertidal area is very homogeneous and dominated by rippled sand with frequent worm casts (Appendix IV).

This biotope is characterised by moderately exposed or sheltered beaches of medium and fine, usually clean, sand, though the sediment may on rare occasions contain a small silt and clay fraction. The sediment is relatively stable, remains damp throughout the tidal cycle, and contains little organic matter. It is often rippled and typically lacks an anoxic sub-surface layer. Where an anoxic layer is present, it occurs at a depth below 10 cm and tends to be patchy. The biotope occurs mainly on the lower part of the shore, and relatively frequently on the mid shore. It is only rarely present above mid shore level, except where coastal defences cause backwash onto the upper shore.

5.2.2.4: Intertidal benthic habitat: Intertidal reef

Intertidal reef is present as a band extending for approximately 40 meters from the shore from Ballycotton Harbour to the southern end of Ballycotton Strand. It also occurs in band extending from the south-eastern wall of Ballycotton Harbour to Ballycotton Island small and around the entire perimeter of both islands and along the south coast of the headland.

Within Ballycotton harbour the intertidal reef is dominated by cobble and gravel and outcrops of bedrock. Here the reef is very sheltered and dominated by *Ascophyllum nodosum* and fucoids where stable bedrock is present. The biotope in the area is characteristic of *Fucoids on sheltered marine shores* (LR.LLR.F).

The intertidal area is backed by stone walling and the Invasive Alien Species (IAS) Japanese knotweed (*Reynoutria japonica*) is present along this wall.

The intertidal reef area, outside of the harbour running north of Ballycotton Harbour, is exposed and extends to a maximum width of circa 70 meters from the base of the sea cliffs along this area of the coastline. It is characterised by steeply sloping bedrock and characterised by High energy littoral rock and very species poor (dominated by barnacles: *Chthamalus* spp. and *Semibalanus balanoides* and limpets; *Patella vulgata*).

To the south of the harbour, in the area extending east to Ballycotton Island small (figure 5.2), the intertidal area is more sheltered and level and is characterised by bedrock with areas of cobble and gravels/mixed sediments higher up the shore. Here the dominant species are fucoids with frequent *Ascophyllum nodosum* and patches of ulva. Numerous rock pools with *Osmundea pinnatifida*, *Osmundea hybrida*, *Mastocarpus stellatus*, *Lomentaria articulata and Odonthalia dentata* are present throughout. This habitat extends across to Ballycotton Island (small).

Figure 5.2 Intertidal area extending to Ballycotton Island little.

5.2.3 Coastal habitats

The principle, Annex I, coastal habitats in the vicinity of Ballycotton Harbour and within the ZOI of the proposed project are the salt marsh habitats behind Ballycotton Strand and at Ballymacoda Bay. At Ballycotton strand Salt marshes fringe the flats in the sheltered inlets while at Ballymacoda Bay Atlantic

salt meadows are particularly well-developed and are extending in parts of site. Salicornia and other annuals of intertidal sand and mud flats also occur within this site.

5.2.4 Avifauna

Ballycotton Bay is designated as an SPA (Ballycotton Bay SPA, Site code: 004022) and the site is monitored as part of the IWeBS program of surveys by BirdWatch Ireland. I-WeBS data is available for Ballycotton Bay (Ballycotton-Shanagarry IWEeBS site) and provided in (Appendix V). These data indicate that the bay supports an excellent diversity of wintering waterfowl species, and has nationally important populations of five species: *Anas crecca*, *Pluvialis apricaria*, *Pluvialis squatarola*, *Limosa limosa*, *Numenius arquata*. Formerly it was of importance for *Cygnus columbianus bewickii* but the birds have abandoned the site since the reversion of the lagoonal habitat to estuarine conditions. Numbers of *Charadrius hiaticula*, *Vanellus vanellus*, *Limosa lapponica* and *Arenaria interpres* appear to have declined below the National threshold in recent years. NPWS (NPWS, 2020) data on the quality and importance of the site notes that Ballycotton Bay is also important for wintering gulls, especially *Larus fuscus* in autumn and early-winter. Passage waders, such as *Philomachus pugnax* and *Calidris minuta*, are regular, especially in autumn. The site provides both feeding and roosting areas for the waterfowl species. *Acrocephalus scirpaceus* breeds at the site, which is near the western edge of the range of the species in Ireland.

A summer breeding bird survey was carried out in support of this Screening for Appropriate Assessment Report (Appendix II). This report did not record any breeding birds recorded within Ballycotton Harbour, however it noted that small numbers of secretive species such as Wren and Dunnock may utilise the dense vegetation at the landward side of the harbour for nesting. The smaller Ballycotton Island appears to support at least one pair of breeding Shelduck and Oystercatcher, and may support a small number of breeding Herring Gull. The larger island supports a moderate seabird colony on its steeper eastern and southern (seaward) side consisting of various gulls, Fulmar and Cormorant.

IWeBS data for Ballymacoda Bay (Ballymacoda IWeBS site), which is within the ZOI of the proposed project, approximately 10km north of Ballycotton Harbour (Appendix V). The data for this site indicates that it is of high ornithological importance for supporting an excellent diversity and large number of wintering waterbirds – it is of international importance because it regularly supports an assemblage of over 20,000 birds. The site provides both feeding and roosting areas for the birds.

Golden Plover occurs at this site in internationally important numbers. However, numbers for Black-tailed Godwit, which had been present in internationally important numbers, has declined in recent years. A further four species occur here in nationally important numbers (Bar-tailed Godwit, Little Egret, Grey Plover and Dunlin). The most recent IWeBs data indicates significant declines in a further seven species which had previously been present at this site in Nationally important numbers.

IWeBS data for the Blackwater Estuary (Blackwater Estuary IWeBS site), which is within the ZOI of the proposed project, approximately 18km north of Ballycotton Harbour (Appendix V). The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for an excellent diversity of waterfowl species. The site supports an internationally important population of Black-tailed Godwit and has a further seven species with nationally important populations: Wigeon,

Curlew, Redshank, Shell duck, Little egret, Grey Herron and Green shank. While there have been increases in some of these species in recent years, numbers of other species, which had previously been present in nationally important numbers (Golden Plover, Lapwing and Dunlin) have declined.

5.2.5 Marine mammals

A marine mammal Risk Assessment (MMRA) was carried out in support of this Screening for Appropriate Assessment Report (Appendix I). Full details of the distribution of marine mammals relative to the proposed project locations are given in this report and summarised below. All references supporting the summaries provided below are available within the MMRA.

Bottlenose dolphins (*Tursiops truncatus*)

While Bottlenose dolphins are widespread and relatively abundant off the Irish coast with most sightings along the western seaboard, they are also frequently recorded off Ballycotton Harbour and adjacent to the Powers Head disposal site.

Common dolphin (*Delphinus delphis*)

Common dolphins are distributed around the entire Irish coast but highest concentrations are off the south west and west coasts. However, in the winter large numbers of common dolphins enter the Celtic sea to feed on schools of pelagic fish such as herring and sprat. Common dolphin were sighted throughout the area of interest but almost exclusively during the winter period. They have been reported adjacent to the Powers Head disposal site.

Harbour porpoise (*Phocoena phocoena*)

Harbour porpoise are the most widespread and abundant cetacean in inshore Irish waters, with highest abundances in the Irish Sea. Harbour porpoise were sighted in small numbers throughout the area of interest but with most sightings off Cork Harbour to the west of the disposal site. Sightings (although few) occurred at the proposed dredge site and adjacent to the Powers Head disposal site throughout the year though there were more sightings in winter.

Killer whale (*Orcinus orca*)

Killer whales or Orca in Ireland are widespread and recorded off all coasts but unpredictable. There have been 7 sightings of a total of 14 individuals over the past 20 years in the area of interest but with the proximity to Cork Harbour these are likely to include the three that took up residency in 2001.

Risso's dolphin (*Grampus griseus*)

Risso's dolphins are patchily distributed around the Irish coast but seem to favour islands, especially off west Kerry, Galway and the Saltee Islands. There were two sightings of a total of 20 individuals, both west of the disposal site in the mouth of Cork Harbour.

Fin whale (*Balaenoptera physalus*)

Fin whales were the most frequently record baleen whale, accounting for 11.7% of all sightings. Fin whales are regularly recorded off the south coast of Ireland especially during winter. Photo-identification showed

that it was frequently the same individual fin whales returning each year to the south coast and they stayed in coastal waters for many months. They were recorded offshore along the entire area of interest and adjacent to the disposal site and almost exclusively during the winter from October to February.

Minke whale (*Balaenoptera acutorostrata*)
Minke whales are widespread and abundant in inshore Irish waters from May to October. The summer distribution tends to be concentrated around southwest Ireland. They were recorded within the entire area of interest including adjacent Ballycotton Harbour and within the area of the Powers Head disposal site. They were reported mainly between April and August.

Humpback whale (*Megatera novaengliae*)
Humpback whales are regularly recorded off the south coast of Ireland especially during winter. The same individual humpback whales are recorded each year and spend many months feeding. Sightings of humpback whales were made throughout the area of interest and adjacent to the Powers Head disposal site and were nearly all of single individuals sighted during January and February.

Basking shark (*Cetorhinus maximus*)
Although not currently protected under Irish wildlife law, basking sharks are listed under threatened and/or declining species by OSPAR and are frequently recorded throughout the area of interest largely between April and June.

Harbour Seal (*Phoca vitulina*)
There were no major harbour seal haul-out or breeding sites recorded near Ballycotton during the National Parks and Wildlife Service (NPWS) surveys during 2002 or 2003. A small number of harbour seals (six) were recorded hauled out at Dungarvan to the east and in Kinsale Harbour to the west in 2003 No seals were counted during an August/September 2012 survey using thermal imagery. A repeat survey carried out in 2017/18 also recorded along the south coast. Harbour seals generally forage close to their haul out sites and are unlikely to occur at the dredging or dumping sites.

Grey Seal (*Halichoerus grypus*)
There were no major grey seal haul-out or breeding sites recorded near Ballycotton reported during the National Parks and Wildlife Service (NPWS) surveys since 2003. 6 grey seals hauled out in Kimsale Harbour were reported in August 2003 during an aerial survey for harbour seals. No grey seals east of Saltee Islands and west of Kedge Island to the west during an aerial survey during the moulting period in 2006. No seals between Power Head and Youghal in August/September 2012 were reported during a survey using thermal imagery. A repeat survey carried out in 2017/18 recorded single grey seals hauled out in Ballycotton Bay. Grey seals forage locally and may also range long distances and are likely to be encountered at the dump site and during dredging. Grey seals are typically encountered as individuals when foraging.

Otters
The area at the proposed dredge site does not provide suitable habitat for otter. Freshwater and coastal habitats are used by otters, but otters utilising the marine environment require access to freshwater

habitats to drink and bathe (NPWS, 2013). The nearest watercourse to the proposed dredge site is the Sunville stream, 2 km to the north. The Powers Head dump site is too far from the coast to support otter habitat.

5.2.6 Fish (Annex II species)

Annex II migratory fish species in Ireland include Atlantic salmon, Sea lamprey, River lamprey, Allis shad and Twaite shad. There are currently significant gaps in the knowledge base of the migratory routes taken by these species. The nearest significant river, in terms of spawning habitat to the proposed dredge site is the Munster Blackwater, approximately 18km (hydrologically) from the proposed dredge site. This site is designated for all of the aforementioned Annex II migratory fish species. With due consideration to the lack of detailed knowledge on the migratory routes of these species, and based on the precautionary principle, it is assumed here that all of these species have the potential to migrate through the ZOI of the proposed project.

6. SCREENING FOR APPROPRIATE ASSESSMENT

6.1 Zone of Influence

The first step in screening for appropriate assessment is to identify project related impacts (the source) and the pathway through which they could transmit such impacts to the receiving environment. All of the works described in section 3 were reviewed to establish if a source/pathway existed between them and the various elements of the receiving environment. The second step is to establish the zone of influence (ZOI) over which such impacts could arise.

Table 6.1 summarises the ZOI for each of the sensitive receptors identified in section 4 and the rationale for the assessment is provided in section 5.1.1 to 5.1.5 below.

Table 6.1 Source, path, receptor matrix

Ballycotton Harbour dredge site			
Source	**Path**	**ZOI (km)**	**Receptor**
Dredging: Sediment disturbance & mobilisation	Sediment and water	3	Benthic habitats & associated species, coastal habitats, foraging seabirds, fish
Dredging: Noise	Water	10*	Marine mammals, fish, avifauna
Vessel operations: disturbance/ noise/pollution, IAS	Water and air	20	Marine mammals, fish, avifauna, coastal habitats, benthic habitats
Powers Head Dump site			
Dredge spoil dumping	Sediment and water	3	Benthic habitats & associated species, fish, foraging seabirds

* It is recognised that the ZOI on migratory species may be far greater than that described above. This could be the case if the impact of the project was at a scale which could lead to impacts the receptor at a population level. As such the potential for project relate impacts need to be considered to assess the ZOI. Sections 6.1.3 describes the rationale for our assessment of impacts relative to mobile species.

6.1.1 Sediment disturbance:

Benthic habitats and species

Sediment mobilisation in subtidal and intertidal benthic habitats has the potential to lead to negative effects on a range of benthic habitats and species and fish it can also lead to erosion and or accretion of coastal habitats. The extent to which sediments will mobilise is dependent on the nature of the sediment (coarse sediments settle out rapidly following disturbance), the exposure of the site (sediments in exposed sites will frequently be subject to natural disturbance due to wave action), the tidal regime of the area (tide swept sediments are generally devoid of “fines”). The impact of sediment mobilisation on benthic habitats and their constituent species is dependent on the sensitivity of those species to burial and smothering resulting from sediment mobilisation and transport. The species found in exposed sediments are generally robust specialists capable of withstanding disturbance and smothering while those in more sheltered areas are generally more sensitive to disturbance. The subtidal sediments on the east and south coast of Ireland are subject to a high degree of natural disturbance and mobilisation due to the exposed, shallow nature of the area and the predominantly sandy seabed. As a result, natural turbidity is a common feature of the marine environment on the east and south coast of Ireland.

While the dredged material will be removed from the site in the bucket of the excavator, disturbance of residual mobilised sediment will occur. Depending on the exact location within the harbour where the material is being dredged from a quantity of this will settle out again within the confines of the harbour while the remainder will be washed out of the harbour and will settle out at a location determined by on the nature and direction of the following tide. Given that the majority of the dredged material will be removed from the site it is considered that sediment disturbance and residual settlement would be limited and any sediment would settle out or disperse within a very short time period (days). Sediment mobilisation on this scale does in this area of the Irish coast not have the potential to impact the benthic fauna present either at the site or within the adjacent area. While sediment dispersion modelling for the proposed project is not available, it is considered reasonable to assume that suspended sediment, as a result of mobilisation, would be expected to be remain in suspension for a number of days dispersing over a large area, possible up to 2-3km. However, the sediment load over such a wide area of such an exposed coast would not be considered to be significant except in the immediate vicinity of the dredging operations (up to 1km radius) and for a limited period of time (days).

Coastal habitats

Sediment dredging has the potential to lead to erosion and/or accretion of coastal habitats. The potential for dredging to lead to such impacts is a factor of the location and volume of dredged material and location of the dredge site relative to prevailing tidal currents and exposure. However, given the size, scale and location of the dredged sediment within the confines of Ballycotton Harbour and its subsequent disposal at the Powers Head disposal site the potential for erosion and/or accretion of coastal habitats is not considered possible

Avifauna

The British Trust for Ornithology (BTO) completed a review of the potential impacts of marine aggregate extraction on seabirds (Cook & Burton, 2010). While the impact of aggregate dredging is different to dredging within a harbour, the effects of dredging and disposal are similar. Cook and Burton describe the mobilisation of sediments during dredging which increases turbidity and reduces water clarity. This may affect seabirds which feed by sight such as terns, common guillemot and northern Gannt (Cook and Burton, 2010). An increase in turbidity will also result from dumping at sea. Birds such as sea ducks, divers, grebes and mergansers which forage under water are likely to be similarly affected. The impact of increases in turbidity is considered to be dependent on initial background levels (Cook & Burton, 2010).

Fish

Potential stressors on fish associated with dredging include sediment mobilisation, release of toxic contaminants, hydraulic entrainment and noise. The risk of significant impacts depends on the scale of the particular stressor and the tolerance thresholds of individual species.

Behaviours changes (avoidance) by fish to elevated suspended sediment is well documented in the literature and varies depending on the species and level of turbidity. Recent scientific research (Wenger *et al*, 2017) has demonstrated that among all of the potential stressors associated with dredging, the mobilisation of contaminated sediment leads to greater impacts than that from clean sediment or sound.

This research further demonstrated that early life stages such as eggs and larvae are most likely to suffer lethal impacts. It notes that, while a single event exposure to contaminants realised from sediment may have little impact, repeat maintenance dredging of contaminated sediments will expose resident fish populations to multiple pulses of Suspended Sediments and released toxicants which has the potential to lead to cumulative impacts over time.

The ZOI relative to sediment disturbance is therefore considered to be the direct footprint of the site investigations within the confines of the harbour extending out to a maximum of 3 km distance to allow for dispersion. **In the absence of modelling this ZOI is based on expert opinion and the authors extensive knowledge of the marine habitats off the east coast of Ireland.**

6.1.2 Noise

Fish

Underwater sounds are detectable by fishes and may affect their behaviour, causing them to move away from their migration routes or leave favoured habitats (Normandeau Associates, Inc., 2012).

Hearing range and sensitivity varies considerably among fish species depending on the hearing mechanism of the species e.g., whether a swim bladder is involved in the hearing mechanism or not. Furthermore, within that class, some species with a swim bladder are sound pressure-sensitive at higher frequencies while others having a swim bladder are not e.g., Atlantic salmon (Hawkins & Johnstone, 1978). Lamprey are known to be able to detect sound at low frequencies and behavioural responses from sound, in sea lamprey, at the low frequency range are known from limited studies (Mickle *et al,* 2018). Twaite Shad are known to be able to detect sound at frequencies greater than 1.8Mhz, typically moving away from the sound source (Gregory *et al*, 2007).

However, given the low level of vessel activity associated with the proposed project which requires only the mobilisation of the barge to the dredge area by a tug boat, vessel noise is not considered a significant factor. In view of the fact that the normal vessel activity associated with the harbour will be suspended during dredging operations, noise levels associated with vessel traffic would be lower than normal in the immediate area of the harbour for the duration of the dredging operations.

For this reason, the ZOI resulting from dredging noise for Annex II fish species is considered to be the area of the site investigations extending to 10km from the proposed project site. This is considered to be a highly conservative distance relative to the noise effects on the relevant Annex II fish species (Atlantic salmon, Sea lamprey, River lamprey and Twaite Shad.

Marine mammals

Marine mammal sensory systems are adapted to life in the water or, in the case of seals, both in water and on land. Marine mammals rely on sound to navigate, to communicate with one another and to sense and interpret their surroundings. Behavioural responses of marine mammals to a sound are known to be strongly influenced by the context of the event and individual factors such as the animal's experience, motivation, conditioning and activity (Nowacek *et al*, 2007, Southall *et a*l, 2007 and Wartzok, *et al* 2004).

Healthy new-born and younger animals may have the greatest hearing sensitivity while individual hearing ability declines progressively with age and prior exposure to harmful sound levels, disease, etc. Such features and variability may also require consideration in the case-specific assessment of impact on marine mammals from introduced sound sources (NPWS 2014). Sound waves dissipate through the water with distance from the source. While local oceanographic conditions affect the path of the sound and its transmission.

Dredging operations have been reported to produce low frequency omnidirectional sound of several tens of Hz to several thousand Hz (and up to approximately 20 kHz) at sound pressure levels of 135-186 dB re: 1 µPa3,44,45. Therefore some coastal dredging operations can be detected at received levels (RL) exceeding ambient sound more than 10km from shore. While sound exposure levels from such operations are thought to be below that expected to cause injury to a marine mammal, they have the potential to cause lower-level disturbance, masking or behavioural impacts (NPWS, 2014). The dredging within Ballycotton Harbour will be limited to a period of 8 weeks and limited to backhoe dredging of soft sediments. Therefore, noise levels will be at the lower range of the scale. Nonetheless, dredging may have the potential to lead to behavioural changes in marine mammals if within the area during dredging operations.

The ZOI resulting from dredging noise for marine mammals is considered to be the area of the site investigations extending to 10km from the proposed project site. This ZOI is considered to be highly conservative relative to the scale and scope of the proposed dredging operations. It notes that noise related effects from vessels normally accessing Ballycotton harbour will be reduced from normal levels during dredging. While noting that marine mammals are highly mobile species which may be associated with European sites a great distance away from the proposed project area it is considered that noise related impacts on marine mammals will be highly localised and not at a level with the potential to cause any significant impacts to marine mammals should they be present in the area during dredging or dumping operations.

Noise: Avifauna

Impacts of underwater noise on foraging seabirds are poorly understood (Leopold & Camphuysen, 2009). A review by Leopold and Camphuysen proposed that bird species most likely to be vulnerable to underwater sound are those that forage by diving for fish of shellfish. Owing to the nature of the works (dredging within a harbour and dumping at sea) interaction impacts are likely with bird species which forage over open water i.e. divers, seaducks, cormorant, shag, and seabirds (auks, gulls, petrels, terns). **Within this context effects on local bird populations i.e. those within 20km of the proposed project (dredge and dump site) only have been assessed.**

6.1.3 Vessel operations: Benthic habitats, coastal habitats, avifauna, fish, marine mammals

Pollution

Inshore working vessels, jack-up barges (not covered by international regulation) and equipment have the potential to lead to localised impacts on marine and coastal species and avifauna resulting from accidental spillage of hydrocarbons and drilling fluids and the introduction of marine IAS.

While due to the limited use and size of these vessels and platforms the use of hydrocarbons is relatively low, the potential for localised impacts on the marine environment and adjacent coastal habitats exists if not managed correctly. The extent of dispersal of hydrocarbons in marine waters is governed by a number of factors including spreading, drifting, evaporation, dissolution, photolysis, biodegradation and formation of both oil-in-water and water-in-oil emulsions.

Diesel and petrol are light, refined petroleum products with a relatively narrow boiling range, meaning that, when spilled on water, most of the oil will evaporate or naturally disperse within a few days or less. Wave or swell action may lead to some of the oil dispersing into the water column. Oil dispersed in the water column can adhere to fine-grained suspended sediments which then settle out and get deposited on the seafloor. This process is more likely to occur in estuaries and near river mouths where fine-grained sediment is present. It is less likely to occur in open marine settings. Diesel oil is readily and completely degraded by naturally occurring microbes, under time frames of one to two months. In terms of toxicity to water-column organisms, diesel is considered to be one of the most acutely toxic oil types. Fish, invertebrates and seaweed that come in direct contact with a diesel spill may be killed. Diesel spills can affect marine mammals and birds by direct contact (NOAA, no published date). The area of impact of accidental fuel spills will be depended on the volume spilled, weather and dispersion conditions. The volume of such fuel likely to be carried by jack-up barges and small vessels could potentially be in the order of 4-5 tonnes.

For this reason, **the ZOI, relative to potential pollution events, is considered to extend out from the source to a distance of 20km**. This is a considered a conservative approach and takes account of the open waters in the area outside of the harbour area and potential for tidal dispersion.

6.1.4 Invasive Alien Species (IAS)

The risk of IAS introduction is considered very low. The main area of concern is the presence of Japanese knotweed to the back of the intertidal area within the harbour and the potential spread of this species by construction traffic (spoil disposal vehicles) leaving the harbour area. For this reason, **the ZOI, relative to the potential spread of IAS, is considered to include the intertidal area where site investigations are proposed**.

6.1.5 Disturbance

Vessel activity for the duration of works will take place at the dredge site and dump site and transiting to the dump site. Some species of seabird such as gulls may be attracted to vessel activity, while others are disturbed and displaced. Some species are more likely to be disturbed than others. Garthe and Huppop (2004) developed a wind farm sensitivity index for seabirds and as part of this index assessed divers (Great Northern and Red Throated), scoters (Velvet and Common) and cormorant as most sensitive to disturbance by vessels (strong escape/avoidance behaviour and/or large fleeing distance). Cook and Burton (2010) described that terns, shearwaters and grebes are known to activity avoid shipping lanes. Where birds are displaced, this is effective habitat loss. Prolonged vessel activity may create a barrier between breeding and foraging sites or increase the time required to reach alternative foraging sites. However, it is considered that the vessel activity associated with this project is not at a level likely to lead

to significant disturbance/displacement. Vessel activity at the dredge site will be reduced due to the removal of access to the harbour by fishing vessels during works. Transit to, from and at the dump site is considered insignificant above the current background levels.

The effect of vessel operations relative to disturbance effects on marine mammals are described in the MMRA (Appendix 1). The report indicates that vessel disturbance at the dredge site, dump site and while in transit would likely be insignificant.

An ZOI for disturbance related impacts from vessel operations to marine mammals and avifauna is considered to extend to a 1km radius of the proposed project site. This ZOI is considered to be appropriate and proportionate to the scale and scope of the proposed site investigations.

In summary The ZOI of the proposed project was considered to include:

- All European sites off the east coast of Ireland, within 20km of the proposed project site which includes the area of the proposed dumping site and its associated 3km ZOI.

This ZOI is considered **appropriate and proportionate** to the scale and scope of the proposed project and its geographical location. It has considered the exposed nature of the Irish Sea, potential use of the area by mobile species relative to, but not limited to, foraging opportunities, disturbance, displacement, noise including underwater noise.

6.2 European Sites

The project site is not within any European sites but is adjacent (790 meters) southeast of Ballycotton Bay SPA (EU Site code: 004022). The zone of influence of the proposed project has been established to cover an area extending to a maximum 20km for some sensitive receptors (Figure 6.1). All European sites within this ZOI are given in table 6.1.

Table 6.1. All hydrologically linked SACs within the ZOI extending to 20km of the proposed project site.

Site name	Site code
Ballycotton Bay SPA	004022
Ballymacoda Bay SPA	004023
Blackwater Estuary SPA	004028
Cork Harbour SPA	004030
Ballymacoda (Clonpriest and Pillmore) SAC	000077
Blackwater River (Cork/Waterford) SAC	002170
Great Island Channel SAC	001058

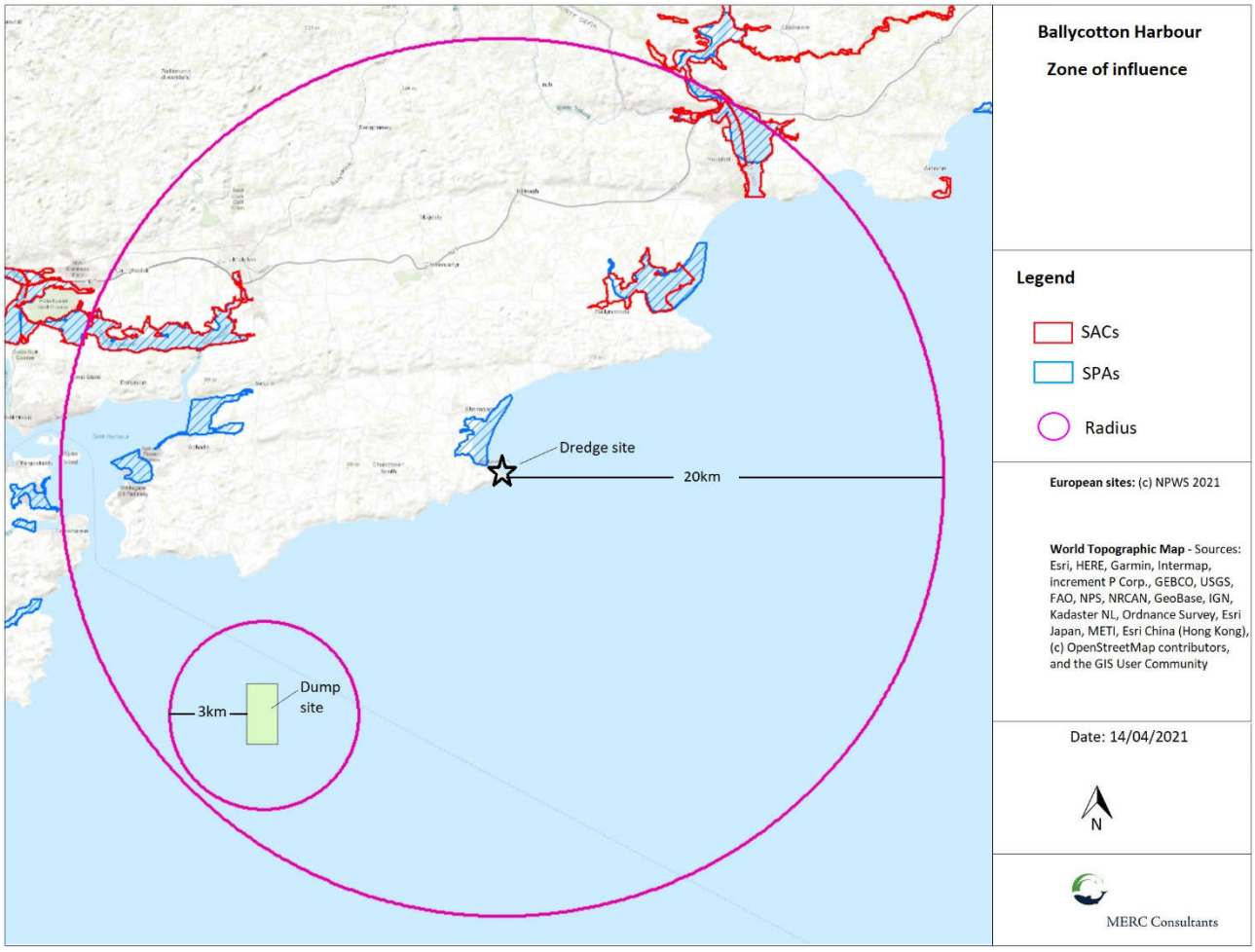

Figure 6.1 All SACs within 20km of the proposed project site. This includes the 3km ZOI surrounding the dump site.

All Qualifying features for European sites within the ZOI of the proposed project are given in table 6.2.

Table 6.2. Qualifying features within the ZOI of the proposed project for which European sites are selected.

Ballycotton Bay SPA (004022)	**Initial screening**	**Rationale**
Teal (Anas crecca) [A052]	Screened in	All QI species are vulnerable to pollution events. QI species most relevant within the context of other potential project interactions i.e. those which forage over subtidal habitats: • Lesser Black-backed Gull (Larus fuscus) [A183] IWeBs data shows the site is also used during the winter months by the following species which forage over subtidal habitats: Eider, Red-throated Diver, Great Northern Diver, Little Grebe, Great Crested Grebe, Cormorant, Shag, Black-headed Gull, Common Gull, Herring Gull, Great Black-backed Gull, Sandwich Tern. While these species are not Qis for Ballycotton Bay SPA, they may breed at sites in Ireland or the UK which are SPA's. Data from the JNCC Seabird Monitoring Database records Black Guillemot along the coastline. The open waters of Ballycotton Bay are likely to be used year-round by foraging seabirds which may be connected to SPAs in Ireland or the UK.
Ringed Plover (Charadrius hiaticula) [A137]		
Golden Plover (Pluvialis apricaria) [A140]		
Grey Plover (Pluvialis squatarola) [A141]		
Lapwing (Vanellus vanellus) [A142]		
Black-tailed Godwit (Limosa limosa) [A156]		
Bar-tailed Godwit (Limosa lapponica) [A157]		
Curlew (Numenius arquata) [A160]		
Turnstone (Arenaria interpres) [A169]		
Common Gull (Larus canus) [A182]		
Lesser Black-backed Gull (Larus fuscus) [A183]		
Wetland and Waterbirds [A999]	Screened in	Wetlands and waterbirds, are vulnerable to pollution events.
Ballymacoda Bay SPA (004023)		
Wigeon (Anas penelope) [A050]	Screened in	All QI species are vulnerable to pollution events. QI species most relevant within the context of other potential project interactions i.e. those which forage over subtidal habitats: • Black-headed Gull • Common Gull • Lesser Black-backed Gull IWeBs data shows the site is also used during the winter months by the following species which forage over subtidal habitats: Eider, Red-breasted Merganser, Red-throated Diver, Great Northern Diver, Little Grebe, Great Crested Grebe, Cormorant, Shag, Mediterranean Gull, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Iceland Gull, Great Black-backed Gull, Sandwich
Teal (Anas crecca) [A052]		
Ringed Plover (Charadrius hiaticula) [A137]		
Golden Plover (Pluvialis apricaria) [A140]		
Grey Plover (Pluvialis squatarola) [A141]		
Lapwing (Vanellus vanellus) [A142]		
Sanderling (Calidris alba) [A144]		
Dunlin (Calidris alpina) [A149]		
Black-tailed Godwit (Limosa limosa) [A156]		
Bar-tailed Godwit (Limosa lapponica) [A157]		
Curlew (Numenius arquata) [A160]		

Redshank (Tringa totanus) [A162]		Tern, Common Tern. While these species are not Qis for Ballymacoda SPA, they may breed at sites in Ireland or the UK which are SPA's. The open waters of Ballymacoda Bay are likely to be used year-round by foraging seabirds which may be connected to SPAs in Ireland or the UK.
Turnstone (Arenaria interpres) [A169]		
Black-headed Gull (Chroicocephalus ridibundus) [A179]		
Common Gull (Larus canus) [A182]		
Lesser Black-backed Gull (Larus fuscus) [A183]		
Wetland and Waterbirds [A999]	Screened in	Wetlands and waterbirds, are vulnerable to pollution events.
Blackwater Estuary SPA		
Wigeon (Anas penelope) [A050]	Screened in	All QI species are vulnerable to pollution events. QI species most relevant within the context of other potential project interactions i.e. those which forage over subtidal habitats: NONE IWeBs data shows the site is also used during the winter months by the following species which forage over subtidal habitats: Red-breasted Merganser, Great Northern Diver, Little Grebe, Great Crested Grebe, Cormorant, Shag, Little Gull, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Sandwich Tern, Arctic Tern. While these species are not Qis for Blackwater Estuary SPA, they may breed at sites in Ireland or the UK which are SPA's. The open waters of Blackwater Estuary are likely to be used year-round by foraging seabirds which may be connected to SPAs in Ireland or the UK.
Golden Plover (Pluvialis apricaria) [A140]		
Lapwing (Vanellus vanellus) [A142]		
Dunlin (Calidris alpina) [A149]		
Black-tailed Godwit (Limosa limosa) [A156]		
Bar-tailed Godwit (Limosa lapponica) [A157]		
Curlew (Numenius arquata) [A160]		
Redshank (Tringa totanus) [A162]		
Wetland and Waterbirds [A999]		Wetlands and waterbirds, are vulnerable to pollution events.
Cork Harbour SPA (004028)		
Little Grebe (Tachybaptus ruficollis) [A004]	Screen in	All QI species are vulnerable to pollution events. QI species most relevant within the context of other potential project interactions ie those which forage over subtidal habitats: • Little Grebe (Tachybaptus ruficollis) [A004] • Great Crested Grebe (Podiceps cristatus) [A005] • Cormorant (Phalacrocorax carbo) [A017] • Red-breasted Merganser (Mergus serrator) [A069]
Great Crested Grebe (Podiceps cristatus) [A005]		
Cormorant (Phalacrocorax carbo) [A017]		
Grey Heron (Ardea cinerea) [A028]		
Shelduck (Tadorna tadorna) [A048]		
Wigeon (Anas penelope) [A050]		
Teal (Anas crecca) [A052]		
Pintail (Anas acuta) [A054]		

Shoveler (Anas clypeata) [A056] Red-breasted Merganser (Mergus serrator) [A069] Oystercatcher (Haematopus ostralegus) [A130] Golden Plover (Pluvialis apricaria) [A140] Grey Plover (Pluvialis squatarola) [A141] Lapwing (Vanellus vanellus) [A142] Dunlin (Calidris alpina) [A149] Black-tailed Godwit (Limosa limosa) [A156] Bar-tailed Godwit (Limosa lapponica) [A157] Curlew (Numenius arquata) [A160] Redshank (Tringa totanus) [A162] Black-headed Gull (Chroicocephalus ridibundus) [A179] Common Gull (Larus canus) [A182] Lesser Black-backed Gull (Larus fuscus) [A183] Common Tern (Sterna hirundo) [A193]		• Black-headed Gull (Chroicocephalus ridibundus) [A179] • Common Gull (Larus canus) [A182] • Lesser Black-backed Gull (Larus fuscus) [A183] • Common Tern (Sterna hirundo) [A193] IWeBs data shows the site is also used during the winter months by the following species which forage over subtidal habitats: Long tailed duck, Eider, Common Scoter, Surf Scoter, Red-breasted Merganser, Black-throated Diver, Great Northern Diver, Little Grebe, Great Crested Grebe, Cormorant, Shag, Mediterranean Gull, Little Gull, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Sandwich Tern, Common Tern, Arctic Tern. While these species are not Qis for Cork Harbour Bay SPA, they may breed at sites in Ireland or the UK which are SPA's. The open waters of Cork Harbour SPA are likely to be used year-round by foraging seabirds which may be connected to SPAs in Ireland or the UK.
Wetland and Waterbirds [A999]	Screened in	Wetlands and waterbirds, are vulnerable to pollution events.
Sovereign Island SPA		
Cormorant (Phalacrocorax carbo) [A017]	Screened in	This is an SPA for Cormorant, a species which may forage within the dump site.
Ballymacoda (Clonpriest and Pillmore) SAC (000077)		
Estuaries [1130]	Screened out	This habitat only occurs behind the spit at Ring Point within Ballymacoda Bay. It is considered that even in the unlikely event of accidental hydrocarbons spillage it would not have the potential to be impacted owing to its location behind the spit and the strong influence of the Womanagh River draining outwards at this location.
Mudflats and sandflats not covered by seawater at low tide [1140]	Screened in	Benthic habitat within the ZOI
Salicornia and other annuals colonising mud and sand [1310]	Screened out	This habitat is present behind the spit at Ring Point within Ballymacoda Bay. It is considered that even in the unlikely event of accidental hydrocarbons spillage it would not have the potential to be impacted owing to its location behind the spit and the strong influence of the Womanagh River draining outwards at this location.

Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Screened out	This habitat is present behind the spit at Ring Point within Ballymacoda Bay. It is considered that even in the unlikely event of accidental hydrocarbons spillage it would not have the potential to be impacted owing to its location behind the spit.
Mediterranean salt meadows (Juncetalia maritimi) [1410]	Screened out	As above
Blackwater River (Cork/Waterford) SAC (002170)		
Estuaries [1130]	Screened in	Benthic habitat within the ZOI
Mudflats and sandflats not covered by seawater at low tide [1140]	Screened in	Benthic habitat within the ZOI
Perennial vegetation of stony banks [1220]	Screened in	Habitat within the ZOI
Salicornia and other annuals colonising mud and sand [1310]	Screened in	Habitat within the ZOI
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Screened in	Habitat within the ZOI
Mediterranean salt meadows (Juncetalia maritimi) [1410]	Screened in	Habitat within the ZOI
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]	Screened out	Habitat outside of the ZOI
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Screened out	Habitat outside of the ZOI
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Screened out	Habitat outside of the ZOI
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	Screened out	Species outside of the ZOI: upstream of a hydrological gradient.
Austropotamobius pallipes (White-clawed Crayfish) [1092]	Screened out	Species outside of the ZOI: upstream of a hydrological gradient.
Petromyzon marinus (Sea Lamprey) [1095]	Screened in	Species within the ZOI
Lampetra planeri (Brook Lamprey) [1096]	Screened out	Species outside of the ZOI: upstream of a hydrological gradient
Lampetra fluviatilis (River Lamprey) [1099]	Screened in	Species within the ZOI
Alosa fallax fallax (Twaite Shad) [1103]	Screened in	Species within the ZOI
Salmo salar (Salmon) [1106]	Screened in	Species within the ZOI
Lutra lutra (Otter) [1355]	Screened out	Species outside of the ZOI
Trichomanes speciosum (Killarney Fern) [1421]	Screened out	Species outside of the ZOI
Great Island Channel SAC (001058)		
Mudflats and sandflats not covered by seawater at low tide [1140]	Screened out	Great Island Channel SAC is located in the extreme northern end of Cork harbour and protected by Great Island to the south. There are only two narrow entrances to the SAC, one of which is protected by means of a hydrological gradient.

		Therefore, even in the unlikely event of accidental hydrocarbons spillage it would not have the potential to reach this habitat.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Screened out	As above

6.3 Assessment of impacts:

This section identifies and considers the likelihood of significant effects; direct and indirect, on the conservation status of the qualifying interests of the European sites considered to be within the ZOI and which also host habitats or species considered to be sensitive receptors relative to the scale, scope and location of the proposed project.

As described in section 3, the ZOI of a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. There is no direct spatial overlap between any element of the proposed project site and any European site. There is a hydrological connection, and potential flight path/suitable foraging habitat link in the case of avifauna, between the proposed project site and a number of European sites which may have the potential to lead to indirect impacts on the conservation objectives of these sites, especially with regard to *ex situ* species.

Following a review of the scope of works the likely sources of impact arising from the proposed site investigations relative to sensitive receptors present have been assessed and are described below.

6.3.1 Benthic habitats (sediments and reef)

The accidental spillage of hydrocarbons from small vessels, jack-up barges and plant operating in the area may have the potential to lead to temporary impacts on benthic habitats in the event of any accidental spillage or leakage. It is considered that this may have the potential to result in significant effects on benthic habitats, including wetland habitat for waterbirds within a 20km zone surrounding the proposed project. For this reason, likely significant effects on the conservation objectives of benthic habitats within All European sites within the identified ZOI (table 6.1) cannot be excluded.

6.3.2 Coastal habitats

Salicornia and other annuals colonising mud and sand*:* This habitat is present within Blackwater River (Cork/Waterford) SAC where it has the potential to be impacted by accidental hydrocarbon spillage, even though, given the distance of the site from the proposed project site, such an impact would be slight.

Saltmarsh: This habitat is also present within Blackwater River (Cork/Waterford) SAC where it has the potential to be impacted by accidental hydrocarbon spillage, even though, given the distance of the site from the proposed project site such an impact would be slight.

Perennial vegetation of stony banks [1220]: This habitat is also present within Blackwater River (Cork/Waterford) SAC where it has the potential to be impacted by accidental hydrocarbon spillage, even though, given the distance of the site from the proposed project site such an impact would be slight.

6.5.3 Marine Mammals

No sites within the ZOI of the proposed project are designated for marine mammals. However, with due regard to the MMRA carried out in support of this project and the highly mobile nature of marine mammals it is considered that the potential for impacts as a result of hydrocarbon spillage and behaviour changes as a result of underwater noise may occur if marine mammals are present with the ZOI during dredging.

6.5.7 Bird species associated with SPAs

Impacts from sedimentation may affect seabirds which feed by sight such as terns, common guillemot and northern Gannt (Cook and Burton, 2010. Birds such as sea ducks, divers, grebes and mergansers which forage under water are likely to be similarly affected. However, Given the short duration of works and once off occurrence significant effects on wintering and/or breeding birds are not considered likely as a result of this project. It is noted that the south coast sea environment is turbulent under natural conditions and any increase in turbidity as a result of the proposed dredging and dumping is not likely to be significant above normal levels.

Vessel activity at the dredge site will be reduced due to the removal of access to the harbour by fishing vessels during works. Transit to, from and at the dump site is considered insignificant above the current background levels.

Underwater noise associated with dredging and dumping operations and vessel activity will be short term and localised. Ambient noise off Ballycotton Harbour is expected to be dominated by environmental noise (e.g. tidal movement of water and sediment, and wind and wave noise) and shipping noise, especially with peaks in noise due to large vessels transiting to Cork and Waterford Harbours. As such the proposed project will not significantly contribute to increased noise levels above ambient.

Oil spillages can have serious implications for seabirds. Cook and Burton (2010) describe that even a small spill can have a serious effect on seabird populations. Oiling rates are higher for species which spend more time swimming, such as Guillemots, Razorbills and also seaducks and divers. For this reason impacts from accidental hydrocarbon spillage have the potential to impact on the conservation objectives of bird species associated with SPAs.

There is no direct spatial overlap with any element of the proposed project and wetland habitat for waterbirds associated with any SPAs. However, five SPAs (Ballycotton Bay SPA , Ballymacoda Bay, Blackwater Estuary SPA, Sovereign Islands SPA and Cork Harbour SPA) are within 20km of the project site and birds using these sites have the potential to be impacted by pollution events associated with the dredging operations.

Indirect effects

Impacts on benthic habitats may affecting some foraging seabirds. For example, Common Scoter forage in shallow waters to 20m depth for bivalve molluscs (Kaiser *et al*., 2006). Increases in noise and turbidity may lead to the displacement of fish (see section 6.5.8). A number of seabirds are reliant on fish for feeding (e.g. terns, divers). Dredging and dumping may reduce foraging opportunities for these species.

6.5.8 Fish

The conservation objectives for *Salmo salar* (Salmon), *Petromyzon marinus* (Sea lamprey), *Lampetra fluviatilis* (River Lamprey) and Twaite Shad *(Alosa fallax)* are to maintain the favourable conservation condition of these species within the freshwater habitat of SACs where they are designated for these species. These five species have a marine phase in their life cycle and while the conservations objectives

set for these species, in all Irish SAC's, relate to the freshwater phase of their life cycle, the proposed project has the potential to affect these species *ex-situ* during their marine phase by way of pollution in the unlikely evet of hydrocarbon spillage.

Impacts related to the mobilisation of sediment and contaminated sediments in particular is unlikely to represent a significant impact to fish as the ZOI is relatively small (limited to 3km) and the contaminated sediment will be removed to landfill, thereby only providing limited opportunity for the mobilisation of contaminants into the water column. No contaminated sediment will be disposed of at the Powers Head dump site.

Noise has been identified as a source with the potential to have negative impacts on fish (see table 6.1). While there is the potential for temporary changes in the behaviour of the fish species, resulting from the impact of underwater noise, which form a qualifying interest for a number of SACs through which such mobile species may transit it is not considered likely that such temporary changes in the behaviour of fish would lead to significant effects in their migration through the area. The proposed site investigations would be over a short duration of time (weeks) and not considered to be at a scale which could lead to any significant effect on fish migration. However, a risk has been identified from the potential for accidental spillage of hydrocarbons associated with small vessels, jack-up barges and associated plant which may be required to operate in the proposed project area through which these species may migrate.

6.5.9 Summary of potential for impacts

A summary of the potential for effects is given in table 6.8.

Table 6.8 Summary of impact prediction (Direct, indirect and cumulative)

Feature of interest	Description of potential impact	Assessment of impact	Screening assessment
Mudflats and sandflats not covered by seawater at low tide [1140]	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge.	Damage to benthic species and sediments and impact on foraging resource to bird species utilising this habitat.	Potential for likely significant effects.
Petromyzon marinus (Sea Lamprey) [1095]	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge through which this species may pass.	Mortality due to oil spills.	Potential for likely significant effects.
Lampetra fluviatilis (River Lamprey) [1099]	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge through which this species may pass.	Mortality due to oil spills.	Potential for likely significant effects.
Salmo salar (Salmon) [1106]	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge through which this species may pass.	Mortality due to oil spills.	Potential for likely significant effects.
Alosa fallax fallax (Twaite Shad) [1103]	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge through which this species may pass.	Mortality due to oil spills.	Potential for likely significant effects.
All bird species which form a qualifying interest for SPAs within the ZOI including seabirds within foraging range of the dredge site			
All bird species which form a qualifying interest for SPAs within the ZOI including seabirds within foraging range of the dredge site	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge.	Impact to bird species which may be present in this area	Potential for likely significant effects.
Wetland and Waterbirds [A999]: Where this habitat occurs, within the ZOI	Potential for impact from accidental spillage of hydrocarbons associated with small vessels and the jack-up barge.	Damage to benthic species and sediments leading to an impact on foraging resource to bird species utilising this habitat.	Potential for likely significant effects.

6.6 In-combination impacts

While a single development may not in itself cause a significant impact on the conservation objectives of a site, a combination of projects within a localised area may cause a negative impact on a site. Therefore, the cumulative impacts of a project or plan in association with other projects and plans must be taken into consideration when assessing the possible impacts of a project.

The proposed project is entirely marine based. Therefore, only additional projects which have a marine component are considered in relation to the potential for cumulative effects.

Ongoing use of Powers Head disposal site

This site has been used for the disposal of dredge spoil from Cork Harbour since 1978. Impact assessment carried out have not indicated the use of the site for disposal of dredged material has resulted in any significant effects on the receiving environment. Given the relatively low volume of dredge spoil from the proposed Ballycotton Harbour dredging works and the disposal of all contaminated material from the site at a separate on-shore licenced landfill, no in-combination impacts are considered likely.

A search of Foreshore licence applications on the Department of Housing, Local Government and Heritage website and Applications for Statutory Petroleum Consent on the website of the Department of the Environment, Climate and Communications does not indicate any other current projects within the ZOI of the proposed projects

Therefore, no potential for in-combination effects has been identified.

6.7 Appropriate assessment screening conclusions

Following a review of the proposed project, a screening assessment, following the guidelines for the *Assessment of plans and projects significantly affecting Natura 2000 sites* - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC has been conducted.

The conclusion of this assessment is that the proposed project, without mitigation, may have the potential to lead to significant adverse effects, individually or in combination with other plans or projects, on Ballycotton Bay SPA , Ballymacoda Bay SPA, Blackwater Estuary SPA, Sovereign Islands SPA, Cork Harbour SPA, Ballymacoda (Clonpriest and Pillmore) SAC, Blackwater River (Cork/Waterford) SAC.

Accordingly, it is concluded that an Appropriate Assessment of the proposed project is required.

7. NATURA IMPACT STATEMENT

The Screening for Appropriate Assessment, alone and in-combination with other projects and plans, determined likely significant effects to the qualifying interests of a number of European sites within the ZOI. Mitigation measures to ensure the effects outlined in Screening for Appropriate Assessment are fully mitigated are proposed in section 7.1.

7.1 Mitigation

As the proposed project site has been identified as a location used by marine mammals and birds of several species for foraging and other behaviours, and also for a number of habitats and their associated species identified to lie within the potential ZOI of the proposed project activities, it is recommended that suitable mitigation methods be adopted during project activities.

7.1.1 Benthic and coastal habitats

Pollution derived from accidental spillage of hydrocarbons.
To avoid the possibility for accidental spillage of any hydrocarbons associated with the use of plant, machinery or inshore shallow water vessels the mitigation measures set out below will be implemented:

- Vessels should be filled by a licensed operator prior to arriving on-site and no on-site refueling should take place.
- All plant and machinery and vessels will be regularly checked for leaks (fuel, oil and coolant).
- Drip trays will be used underneath mobile plant and drums whilst in use on site.
- All machinery and vessels to have an on-board spill kit.
- A hydrocarbon oil boom to be available at all times onsite in the event of it needing to be deployed.
- If required, generators to be on a hydrocarbon mat at all times.
- The Contractor will prepare a waste management plan to deal with any waste (domestic and industrial) generated. This will include methods for the safe disposal of all such waste.

7.1.2 Invasive Alien Species

To avoid the potential for the spread of IAS the mitigation measures set out below will be implemented:

- No vehicles should enter the intertidal area to avoid the potential for pick up and spread of Japanese knotweed.

7.1.3 Marine Mammals.

NPWS (2014) provides guidance to manage the risk to marine mammals from man-made sound sources in Irish waters. This document provides guidance and mitigation measures to address key potential sources of anthropogenic sound that may impact negatively on marine mammals in Irish waters. The mitigation methods should follow the guidance prescribed by the National Parks and Wildlife Service. These are detailed in the MMRA and summarised below.

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (Appendix 6, NPWS, 2014).
2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, acoustic surveying using the above equipment shall not commence if marine mammals are detected within a 500m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

Pre-Start Monitoring

3. Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.
4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.
5. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.
6. This prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure which should include continued monitoring by the MMO.

Ramp-up Procedure

7. In commencing an acoustic survey operation using the above equipment, the following Rampup Procedure (i.e., “soft-start”) must be used, including during any testing of acoustic sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:
   (a) Where it is possible according to the operational parameters of the equipment concerned, the device’s acoustic energy output shall commence from a lower energy

start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes.

(b) This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.

(c) Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.

8. In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.
9. Once the Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

Breaks in sound output

10. If there is a break in sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.
11. For higher output survey operations which have the potential to produce injurious levels of underwater sound (see sections 2.4, 3.2) as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt a shorter 5–10-minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

Reporting

12. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory
    Authority as outlined in Appendix 6 of NPWS (2014).

7.1.4 Construction Environment Management Plan

All of the above mitigation measures should be documented in the final CEMP.

7.1.5 Implementation of mitigation measures

The project manager should insure all of the aforementioned mitigation measures are implemented and communicated to the on-site supervisor/foreman who should be responsible for ensuring they are fully implemented.

7.2 Summary of impacts with mitigation

It is considered that the mitigation measures detailed in this report are appropriate and sufficient to avoid significant adverse effects on the Conservation Objectives of any European site/s alone or in-combination with other projects and plans. A summary of the potential for impacts, with mitigation, relative to the conservation objectives of Ballycotton Bay SPA , Ballymacoda Bay SPA, Blackwater Estuary SPA, Sovereign Islands SPA, Cork Harbour SPA, Ballymacoda (Clonpriest and Pillmore) SAC, Blackwater River (Cork/Waterford) SAC. is given in table 7.1.

Table 7.1 Summary of potential for impact with mitigation.

Ballycotton Bay SPA			
Attribute	**Measure**	**Target**	**Assessment**
To maintain the favourable conservation condition of the QI species in Ballycotton Bay SPA, as defined by the following list of attributes and targets (NPWS, 2015)			
Population trend	Percentage change	Long term population trend stable or increasing – for each QI species	No potential for impact with mitigation.
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by each QI species, other than that occurring from natural patterns of variation	No potential for impact with mitigation.
To maintain the favourable conservation condition of the wetland habitat in Ballycotton Bay SPA as a resource for the regularly occurring migratory birds that utilise it. This is defined by the following attribute and target:			
Habitat Area	Hectares (ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 281 hectares, other than that occurring from natural patterns of variation.	No potential for impact with mitigation.
Ballymacoda Bay SPA			
As above for Ballycotton Bay SPA but applied to the Qualifying Interests of Ballymacoda Bay SPA (NPWS, 2015).			No potential for impact with mitigation.
Blackwater Estuary SPA			
As above for Ballycotton Bay SPA but applied to the Qualifying Interests of Blackwater Estuary SPA			No potential for impact with mitigation.
Cork Harbour SPA			
Except for Common Tern, the Conservation Objectives are as for Ballycotton Bay SPA but applied to the Qualifying Interests of Cork Harbour SPA (NPWS, 2014).			
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	No potential for impact with mitigation.
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	No potential for impact with mitigation.
Distribution: breeding colonies	Number; location; area (ha)	No significant decline	No potential for impact with mitigation.
Prey biomass available	Kilogrammes	No significant decline	No potential for impact with mitigation.
Barriers to connectivity	Number; location; shape; area (ha)	No significant decline	No potential for impact with mitigation.
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population	No potential for impact with mitigation.

Sovereign Islands SPA			
No detailed conservation objectives are available for this SPA. The following generic objective is listed for the site (NPWS, 2021). Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: Cormorant *Phalacrocorax carbo*			No potential for impact with mitigation.
Ballymacoda (Clonpriest and Pillmore) SAC			
Mudflats and sandflats not covered by seawater at low tide			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	No potential for impact with mitigation.
Community distribution	Hectares	Conserve the following community types in a natural condition: Sandy mud with *Hediste diversicolor* and *Tubificoides benedii* community; Sand with polychaetes and bivalves community complex. As per map 5 (NPWS, 2015).	No potential for impact with mitigation.
Blackwater River (Cork/Waterford) SAC			
Mudflats and sandflats not covered by seawater at low tide			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	No potential for impact with mitigation.
Community extent	Hectares	Maintain the extent of the Zostera and Mytilus edulis dominated communities, subject to natural process	No potential for impact with mitigation.
Community structure: Zostera shoot density	Shoots/m^2	Conserve the high quality of the Zostera-dominated community, subject to natural processes	No potential for impact with mitigation.
Community structure: Mytilus edulis density	Individuals/m^2	Conserve the high quality of the Mytilus edulis-dominated community, subject to natural processes	No potential for impact with mitigation.
Community distribution	Hectares	The following community types should be conserved in a natural condition: Intertidal estuarine sandy mud community complex and sand with polychaetes and crustaceans community complex	No potential for impact with mitigation.
Estuaries			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	No potential for impact with mitigation.
Community extent	Hectares	Maintain the extent of the *Mytilus edulis*-dominated community, subject to natural processes	No potential for impact with mitigation.
Community structure: Mytilus edulis density	Individuals/m^2	Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes	No potential for impact with mitigation.

Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal estuarine sandy mud community complex subtidal estuarine fine sand with *Bathyporeia* spp. Community complex, sand and mixed sediment with polychaetes and crustaceans community complex, Coarse sediment community complex. As per map 5 (NPWS, 2012).	No potential for impact with mitigation.
Perennial vegetation of stony banks			
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession	No potential for impact with mitigation.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes	No potential for impact with mitigation.
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter without any physical obstructions	No potential for impact with mitigation.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitat including transitional zones subject to natural processes including erosion and succession.	No potential for impact with mitigation.
Vegetation composition: Typical species and communities	Percentage cover at a representative sample of monitoring stops	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones	No potential for impact with mitigation.
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	No potential for impact with mitigation.
Salicornia and other annuals colonising mud and sand			
Vegetation composition: negative indicator species: *Spartina angelica*	Hectares	No significant expansion of common cordgrass (*Spartina angelica*) with an annual spread of less than 1%	No potential for impact with mitigation.
Saltmarsh (Atlantic salt meadows (Glauco-Puccinellietalia maritimae)			
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession for sub-site mapped	No potential for impact with mitigation.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes	No potential for impact with mitigation.
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter without any physical obstructions	No potential for impact with mitigation.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes including erosion and succession	No potential for impact with mitigation.

Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	No potential for impact with mitigation.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	No potential for impact with mitigation.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	No potential for impact with mitigation.
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the saltmarsh area vegetated	No potential for impact with mitigation.
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in saltmarsh Monitoring Project (McCorry and Ryle,2009)	No potential for impact with mitigation.
Vegetation composition: negative indicator species: *Spartina angelica*	Hectares	No significant expansion of common cordgrass (*Spartina angelica*) with an annual spread of less than 1%	No potential for impact with mitigation.
***Sea lamprey* (*Petromyzon marinus*)**			
Distribution: Extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	No potential for impact
Population structure of juveniles	Number of age/size groups	At least three age/size groups present.	No potential for impact with mitigation.
Juvenile density in fine sediment	Juveniles/m^2	Juvenile density at least 1/m^2	No potential for impact with mitigation.
Extent & distribution of spawning habitat	M^2 and occurrence	No decline in extent and distribution of spawning beds	No potential for impact
Availability of juvenile habitat	Number of positive sites in 2^{nd} order channels (& greater), downstream of spawning areas	More than 50% of sample sites positive	No potential for impact
***River lamprey* (*Lampetra fluviatilis*)**			
Distribution	% of river accessible	Access to all watercourses down to first order streams	No potential for impact
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	No potential for impact with mitigation.

Juvenile density in fine sediment	Juveniles/m^2	Mean catchment juvenile density of river/brook lamprey at least 2/m^2	No potential for impact with mitigation.
Extent & distribution of spawning habitat	M^2 and occurrence	No decline in extent and distribution of spawning beds	No potential for impact with mitigation.
Availability of juvenile habitat	Number of positive sites in 2^{nd} order channels (& greater), downstream of spawning areas	More than 50% of sample sites positive	No potential for impact.
***Atlantic Salmon* (*Salmo salar*)**			
Distribution: Extent of anadromy	% of river accessible	100% of river channels watercourses down to second order accessible from estuary	No potential for impact.
Adult spawning fish number	Number	Conservation limit (CL) for each system constantly exceeded.	No potential for impact with mitigation.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment wide abundance threshold value. Currently set at 17 fry/15 minute sampling.	No potential for impact with mitigation.
Out-migrating smolt abundance	Number	No significant decline	No potential for impact with mitigation.
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes.	No potential for impact.
Water quality	EPA Q value		
Twaite Shad (Alosa fallax)			
Distribution: Extent of anadromy	% of river accessible	100% of river accessible	No potential for impact.
Population structure - age classes	Number of age classes	More than one age class present	No potential for impact with mitigation.
Extent & distribution of spawning habitat	M^2 and occurrence	No decline in extent and distribution of spawning habitats	No potential for impact.
Water quality – oxygen levels	Mg/l	No lower than $5mgl^{-1}$	No potential for impact.
Spawning habitat quality: Filamentous algae; macrophytes; sediment	occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth.	No potential for impact.

7.3. Residual impacts

No residual impacts of the proposed project have been identified or are considered possible.

7.4. Natura Impact Statement conclusion

This Natura Impact Statement has assessed the implications of the project, alone and in-combination with other projects or plans, on the integrity of European sites in view of the site's conservation objectives.

The potential for significant effects as a result of the proposed site investigations have been mitigated. The NIS therefore objectively concludes that, provided the mitigation measures described in this document are fully implemented, **no adverse effect on the *features of interest* or *Conservation objectives*** of any European site is expected, *i.e.*, the integrity of the sites will not be adversely affected.

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Appendix I Marine Mammal Risk Assessment

MARINE MAMMAL RISK ASSESSMENT OF PROPOSED DREDGING AT BALLYCOTTON, CO CORK AND DISPOSAL AT SEA

[redacted]

IWDG Consulting, Merchants Quay, Kilrush, Co Clare

1 | INTRODUCTION

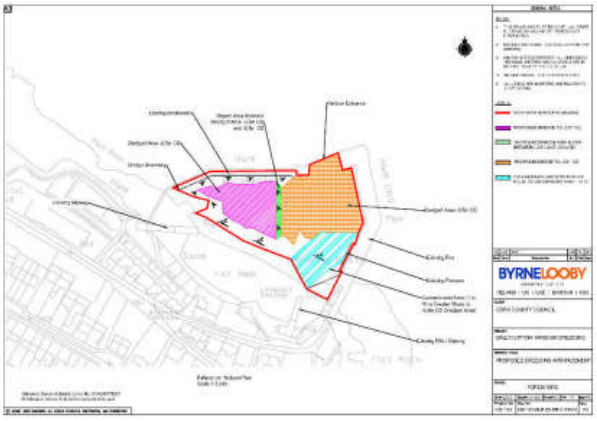
The Irish Whale and Dolphin Group (IWDG) were contracted by the engineering and environmental consultants MERC Consultants to carry out a Marine Mammal Risk Assessment of the proposed dredging operations at Ballycotton, Co Cork and subsequent disposal of dredge material at a proposed dump site located around 16km to the southwest. The proposed works in Ballycotton Harbour will involve the removal of approximately 19,500 m^3 of material.

The proposed dump site is outside of any Special Areas of Conservation (SACs) but is halfway between the Saltee Islands SAC, which includes grey seal as a qualifying interest and Roaringwater Bay and Islands SAC, which includes harbour porpoise as a qualifying interest. The proposed works will take place over 8 weeks at a time informed by this MMRA.

Figure 1. Ballycotton Harbour, Co Cork and adjacent Ballycotton Island

Proposed works

The dredge site is within Ballycotton, Co. Cork and with a dump site at Powers Head, off the Cork coast. The dredge material is comprised of silts, sands and gravels. It is estimated that a total volume of 19,500 m^3 (15,000 tonnes) will be excavated. It is not anticipated that there will be any requirement to dredge rock from the harbour.



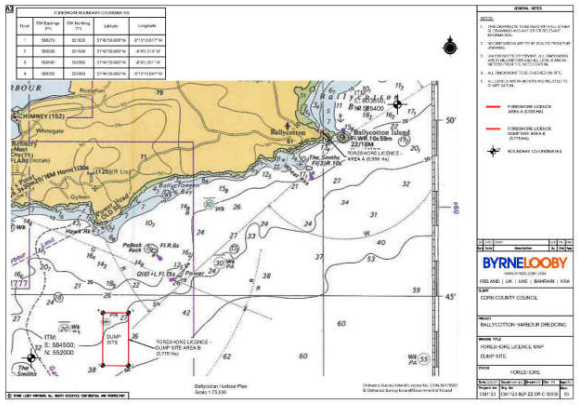


Figure 2a. Areas to be dredged in Ballycotton Harbour **2b. Disposal at Sea disposal site**

2 | METHODS

The risk assessment was based on a review of the available literature and data sources. Maps of the distribution of cetacean sightings adjacent to Ballycotton Harbour were prepared using data from the Irish Whale and Dolphin Group's sightings database (IWDG, accessed April 2021).

3 | LEGAL STATUS

Irish cetaceans and pinnipeds are protected under national legislation and under a number of international directives and agreements which Ireland is signatory to. All cetaceans as well as grey and harbour seals are protected under the Wildlife Act (1976) and amendments (2000, 2005, 2010 and 2012). Under the act and its amendments it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected species (except under license or permit). The act applies out to the 12 nml limit of Irish territorial waters.

All cetaceans and pinnipeds are protected under the EC Habitats Directive. All cetaceans are included in Annex IV of the Directive as species 'in need of strict protection'. Under this Directive, the harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) are designated Annex II species which are of community interest and whose conservation requires the designation of special areas of conservation.

Ireland is also signatory to conservation agreements such as the Bonn Convention on Migratory Species (1983), the OSPAR Convention for the Protection of the Marine Environment of the northeast Atlantic (1992) and the Berne Convention on Conservation of European Wildlife and Natural Habitats (1979).

In 2007, the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht produced a '*Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters* (NPWS, 2007). These were subsequently reviewed and amended to produce '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*'

(NPWS, 2014) which include mitigation measures specific to dredging. The guidelines recommend that listed coastal and marine activities (including dredging) be subject to a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process.

Once the listed activity has been subject to a risk assessment, the regulator may decide to refuse consent, to grant consent with no requirement for mitigation, or to grant consent subject to specified mitigation measures.

4 | BASELINE ENVIRONMENT

4.1 | Ambient Noise Levels

The ambient noise levels at the site are not known with the closest site with data available is Cork Harbour (Sutton et al. 2014). However, as Cork is a busy shipping port, these measurements are not considered relevant to Ballycotton Harbour. Ambient noise off Ballycotton Harbour is expected to be dominated by environmental noise (e.g. tidal movement of water and sediment, and wind and wave noise) and shipping noise, especially with peaks in noise due to small vessels using Ballycotton Harbour and large vessels transiting to Cork and Waterford Harbours.

4.2 | Cetaceans

A review of cetacean (whale, dolphin and porpoise records) submitted to the IWDG during the period 1 January 2000 to 31 December 2020 was accessed on 5 April 2021 and mapped. During this period, 281 validated cetacean records were available. In addition 38 sighting records of basking sharks were also exported and mapped.

Most records were of bottlenose dolphins (106 or 37.7% of all records) followed by common dolphin with 45 records (16%), which were the most abundant species. Another six species including harbour porpoise, fin, humpback, minke and killer whale and Risso's dolphin were also recorded reflected the high species diversity and productivity of this area (Table 1).

Cetacean sightings were made throughout the area of interest with concentrations off Ballycotton (Figure 3).

Table 1. Cetacean sightings (including IWDG downgrades) recorded off Ballycotton Harbour, Co Cork from 2000-2020.

Species	Number of sightings	Number of individuals	% of total sightings
Bottlenose dolphin	106	738	37.7
Common dolphin	45	2943	16.0
Fin whale	33	91	11.7
Minke whale	16	45	5.7
Harbour Porpoise	15	79	5.3
Killer whale	7	14	2.5
Humpback whale	5	111	1.8
Risso's dolphin	2	20	0.8

Dolphin species	18	210	6.4
Large whale	11	23	3.9
Dolphin possibly harbour porpoise	8	91	2.8
Whale species	7	14	2.5
Sei/Fin/Blue	3	7	1.1
Cetacean species	3	34	1.1
Patterned dolphin species	1	3	0.4
Medium whale	1	1	0.4
Total	**281**	**4324**	**100**

Bottlenose dolphin (Tursiops truncatus)

Bottlenose dolphins are frequently recorded off Ballycotton Harbour, Co Cork and adjacent to the disposal site (Figure 3). Bottlenose dolphins are widespread and relatively abundant off the Irish coast with most sightings along the western seaboard (Berrow *et al.* 2010).

Recent genetic evidence (Mirimin *et al.* 2011) suggests the existence of three discrete populations of bottlenose dolphins in Ireland: the Shannon Estuary, an inshore population and an offshore population that ranges from the Bay of Biscay and the Azores (Louis *et al.* 2014). The inshore population is highly mobile and photo-identification has shown individuals recorded off Co Cork to be part of this population (O'Brien et al. 2009). Although the semi-resident dolphins in Cork Harbour (Ryan *et al.* 2010) were attributed to the "Shannon" genetic population (Mirimin *et al.* 2011), it is likely that the dolphins off Ballycotton are part of the inshore population. Bottlenose dolphins have mainly been recorded during spring and summer months. Bottlenose dolphins are listed on Annex II of the EU Habitats Directive but the nearest SAC for this species is the Shannon estuary.

Common dolphin (Delphinus delphis)

Common dolphins are distributed around the entire Irish coast but highest concentrations are off the southwest and west coasts (Berrow *et al.* 2010). However, in the winter large numbers of common dolphins enter the Celtic sea to feed on schools of pelagic fish such as herring and sprat. Common dolphin were sighted throughout the area of interest (Figure 5) but almost exclusively during the winter period. They have been reported adjacent to the disposal site (Figure 6).

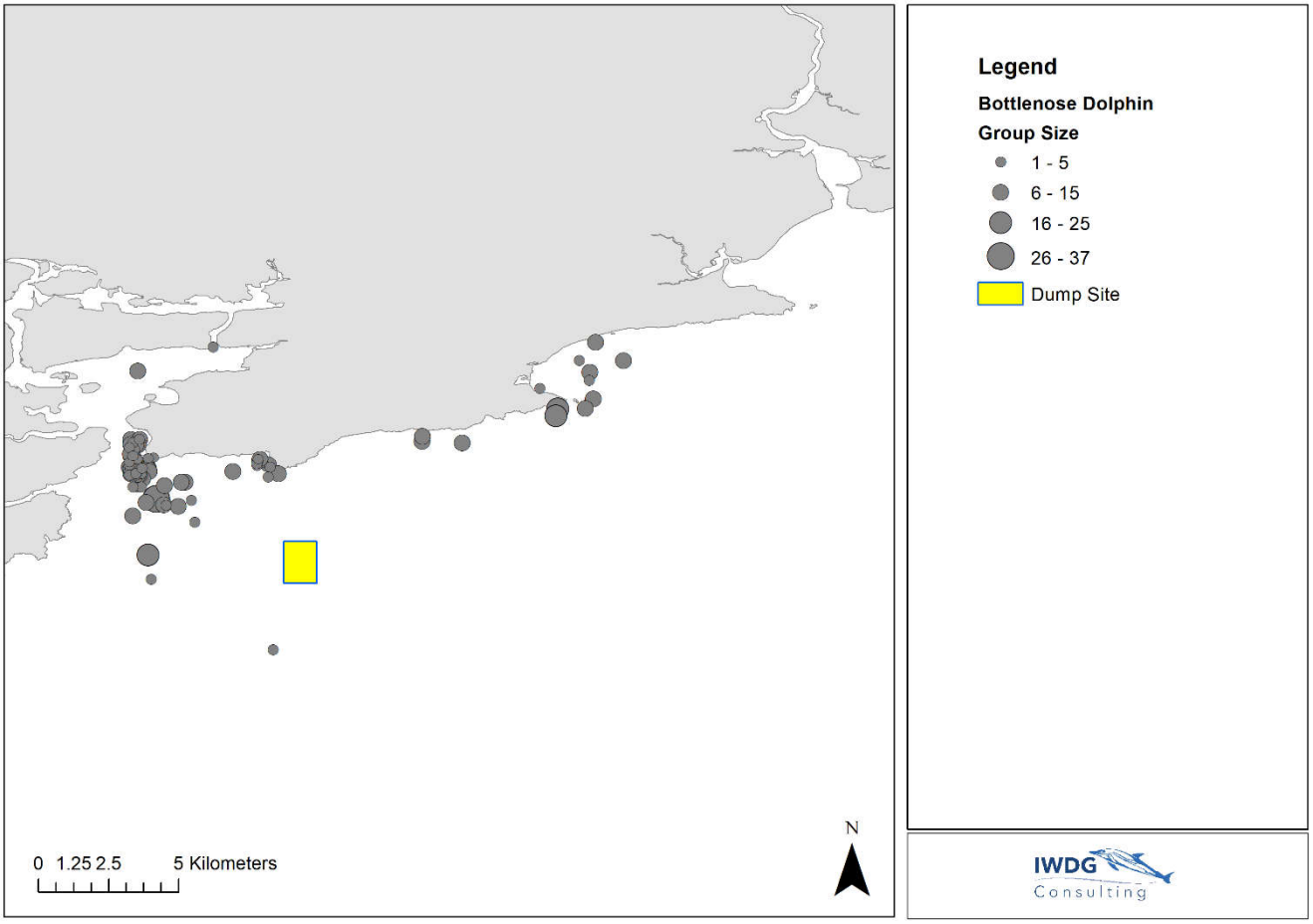


Figure 3. Sighting records of bottlenose dolphins off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

Figure 4. Monthly distribution of bottlenose dolphin sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

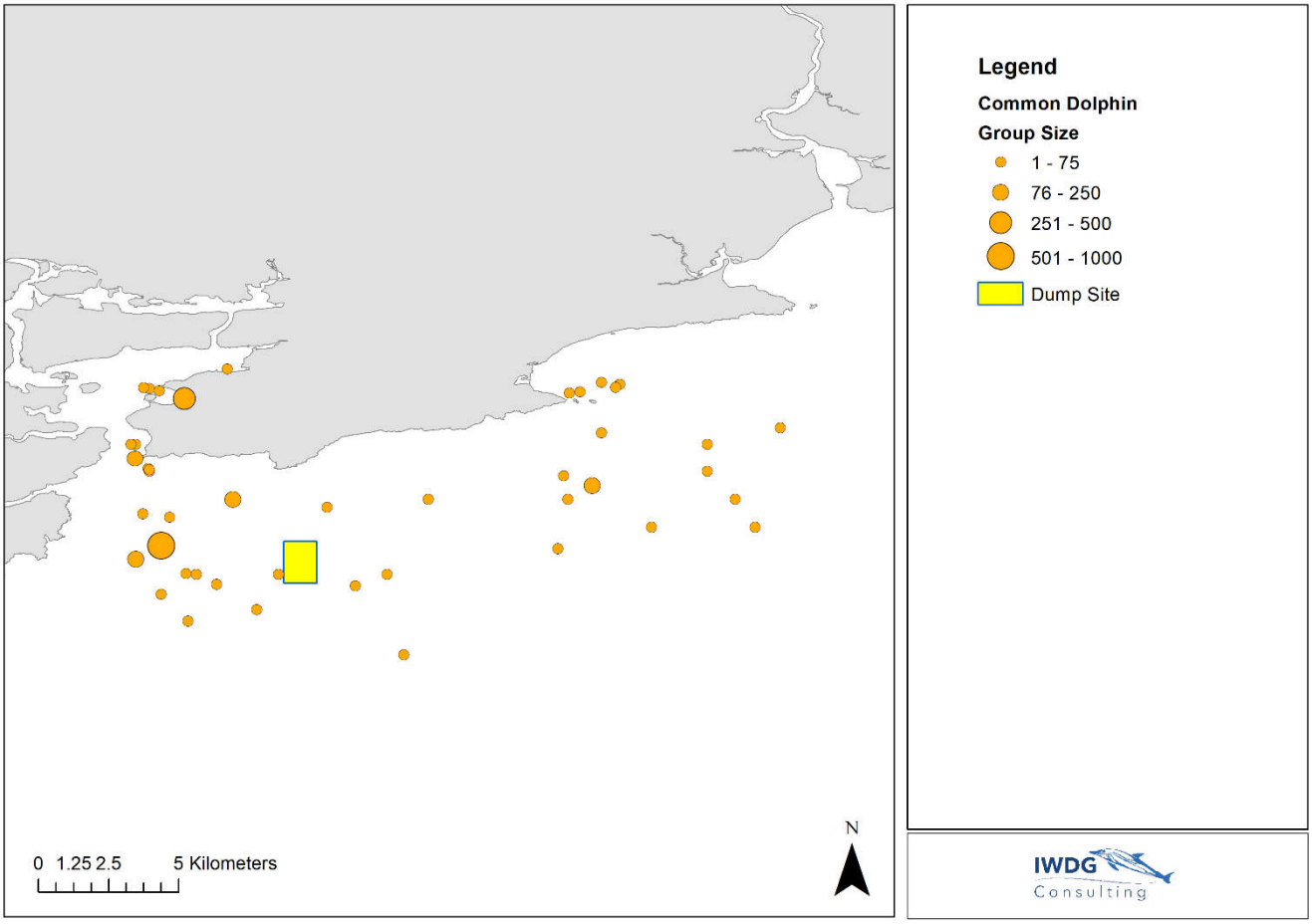


Figure 5. Sighting records of common dolphins off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021

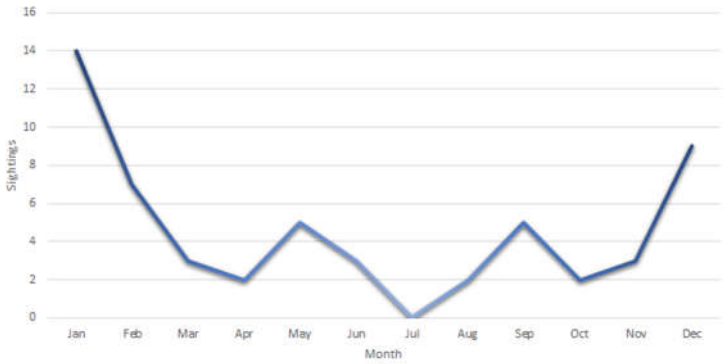


Figure 6. Monthly distribution of common dolphin sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

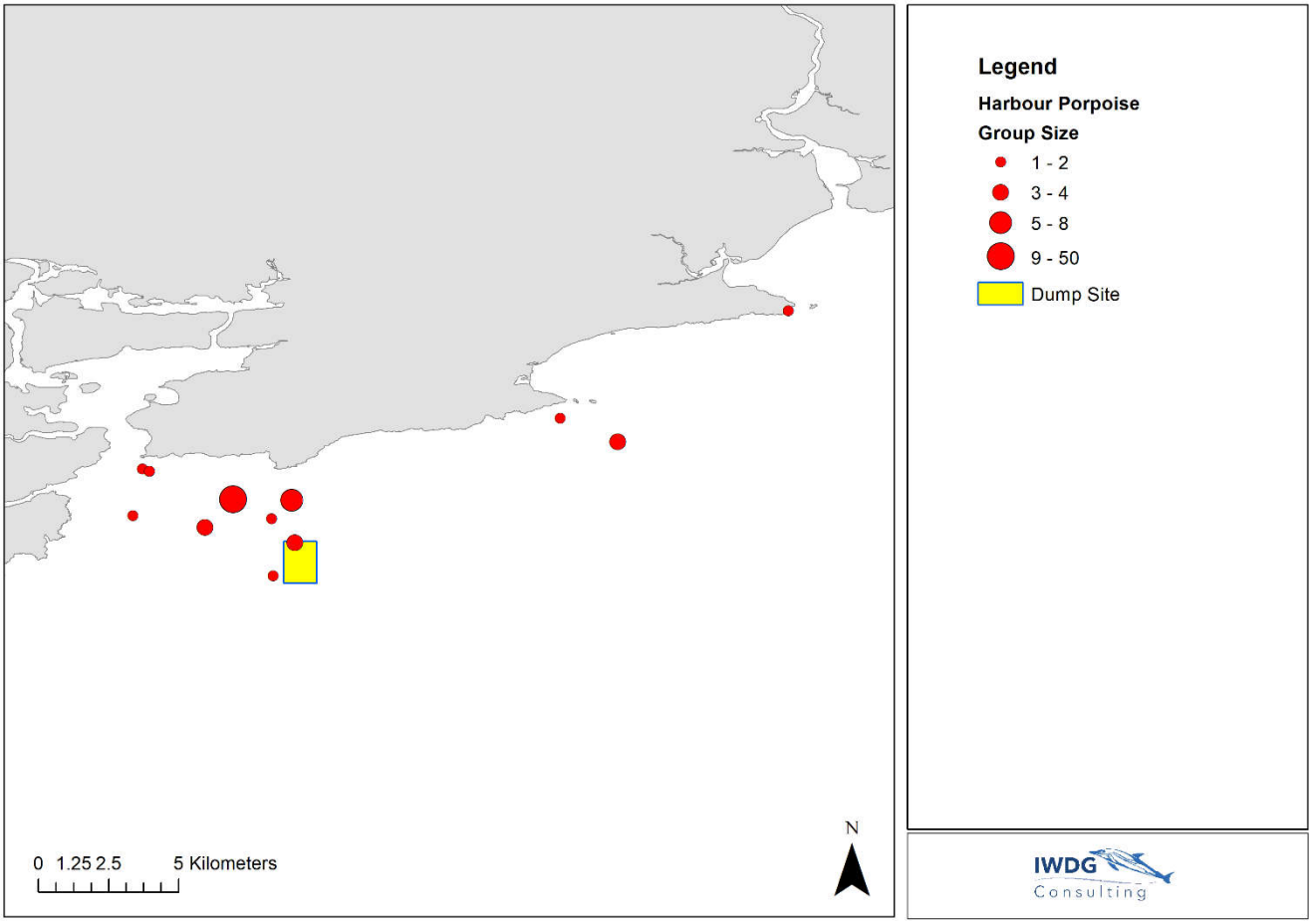


Figure 7. Sighting records of harbour porpoise off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

Harbour porpoise (Phocoena phocoena)

Harbour porpoise are the most widespread and abundant cetacean in inshore Irish waters, with highest abundances in the Irish Sea (Berrow *et al.* 2010). Harbour porpoise were sighted in small numbers throughout the area of interest but with most sightings off Cork Harbour to the west of the disposal site (Figure 7). There were few sightings near Ballycotton Harbour. Sightings occurred at the proposed dredge site and adjacent to the disposal site and throughout the year (Figure 8) though there were more sightings in winter.

Figure 8. Monthly distribution of harbor porpoise sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

Harbour porpoise are known to particularly associate with areas of strong tidal currents and can be regularly seen foraging off Hook Head. Sightings of harbor porpoise have occurred in all months with a peak in numbers during the winter.

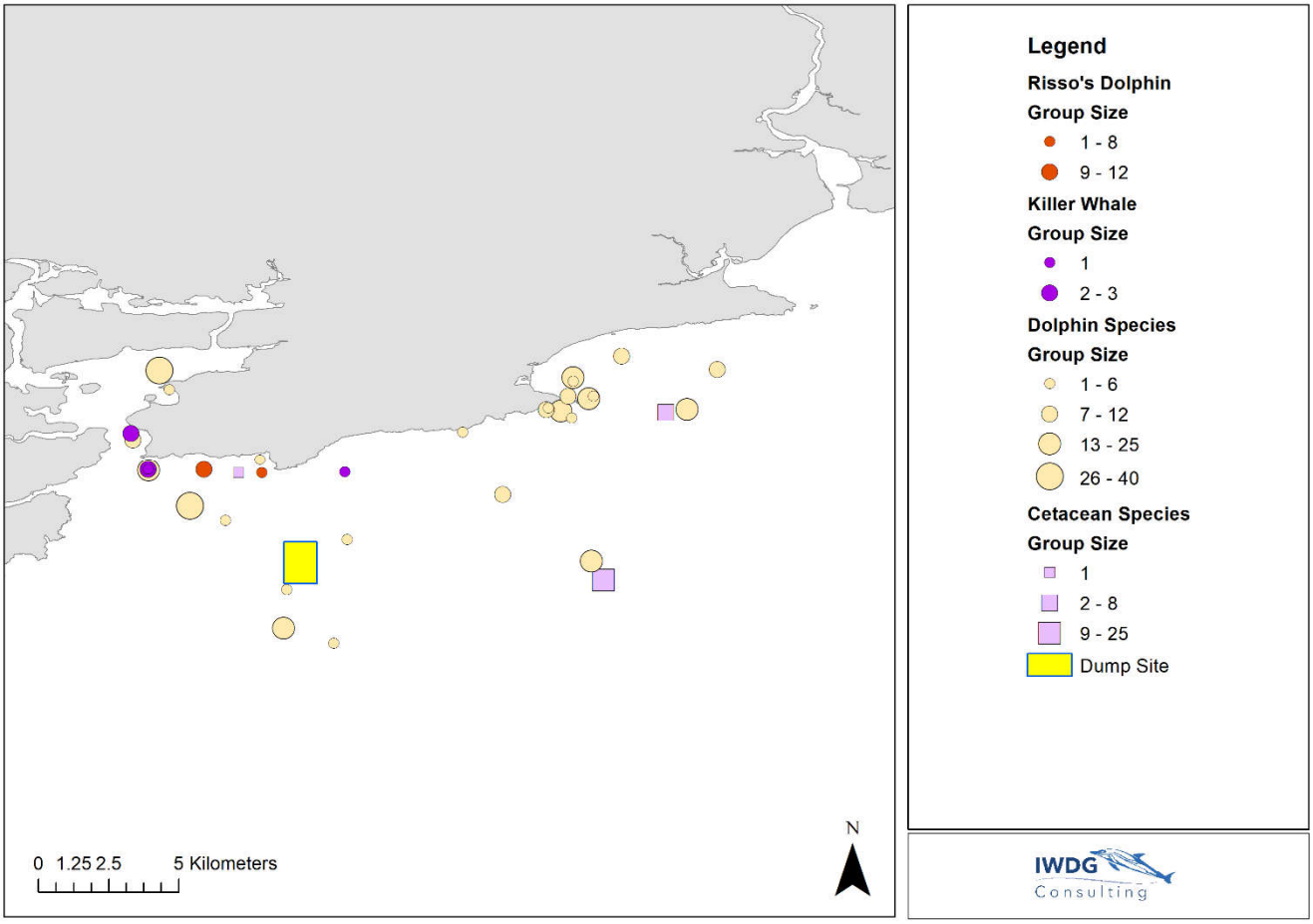


Figure 9. Sighting records of killer whales and dolphins off Ballycotton, Co Cork (from IWDG accessed April 2021)

Killer whale (Orcinus orca)

Killer whales or Orca are widespread in Ireland and recorded off all coasts (Berrow *et al.* 2010) but are unpredictable. There have been 7 sightings of a total of 14 individuals over the past 20 years in the area of interest (Figure 9) but with the proximity to Cork Harbour these are likely to include the three that took up residency in 2001 (Ryan and Wilson 2003).

Risso's dolphin (Grampus griseus)

Risso's dolphins are also patchily distributed around the Irish coast but seem to favour islands, especially off west Kerry, Galway and the Saltee Islands (Berrow *et al.* 2010). There were two sightings of a total of 20 individuals, both west of the disposal site in the mouth of Cork Harbour (Figure 9).

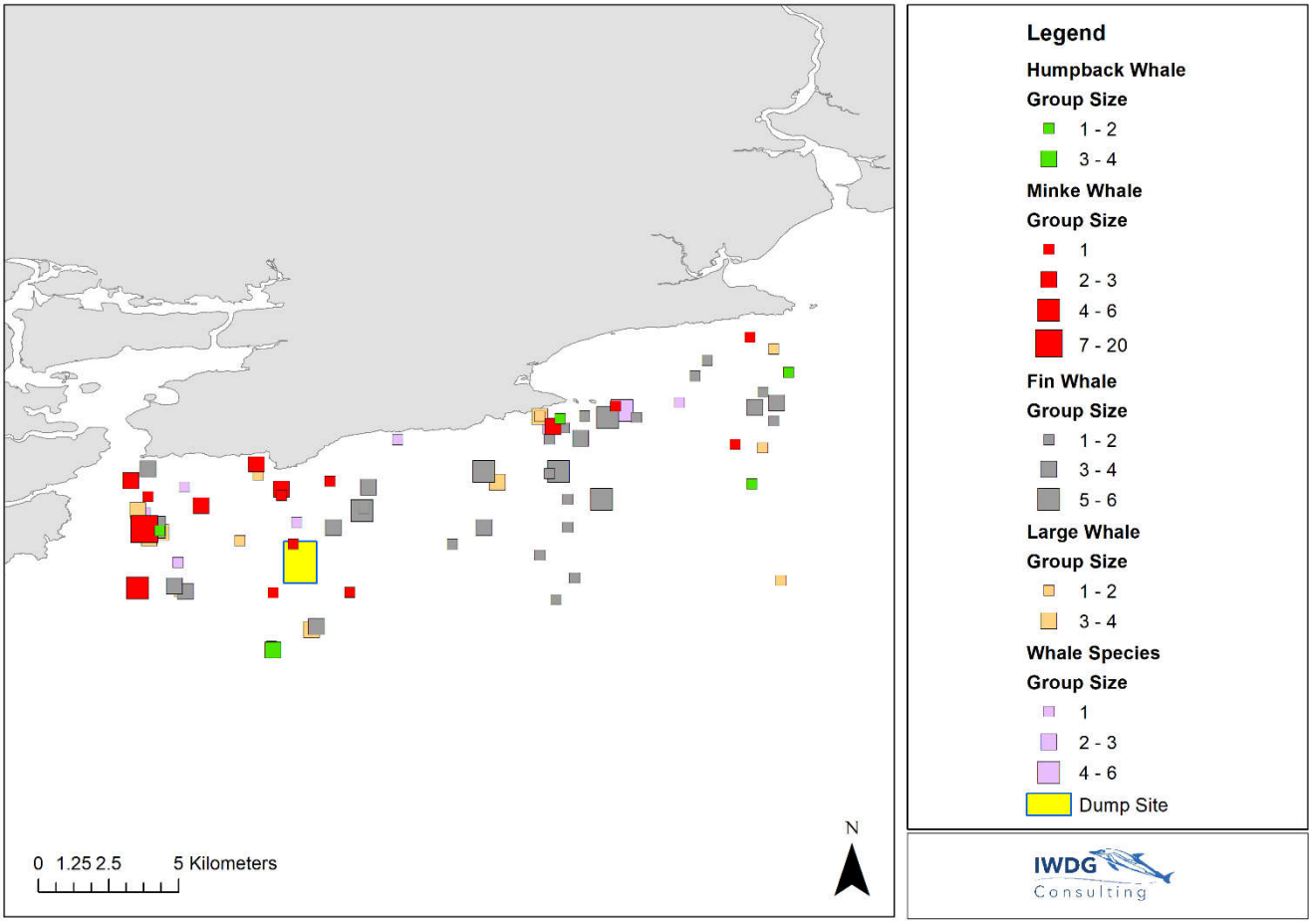


Figure 10. Sighting records of whales off Ballycotton, Co Cork (from IWDG accessed April 2021)

Fin whale (Balaenoptera physalus)

Fin whales were the most frequently record baleen whale, accounting for 11.7% of all sightings (Table 1). They were recorded offshore along the entire area of interest and adjacent to the disposal site (Figure 10) and almost exclusively during the winter (Figure 11) from October to February.

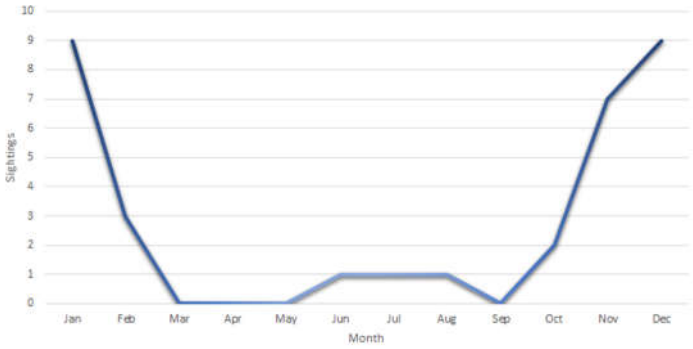


Figure 11. Monthly distribution of fin whale sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

Fin whales are regularly recorded off the south coast of Ireland especially during winter (Berrow *et al.* 2010). Whooley *et al*. (2011) showed using photo-identification that it was frequently the same individual fin whales returning each year to the south coast and they stayed in coastal waters for many months feeding on pelagic schooling fish such as herring and sprat. Timing of their easterly movement through the winter seemed to coincide with herring moving inshore to spawn.

Minke whale (Balaenoptera acutorostrata)

Minke whales are widespread and abundant in inshore Irish waters from May to October (Berrow *et al.* 2000). The summer distribution tends to be concentrated around southwest Ireland. They were recorded within the entire area of interest including adjacent Ballycotton Harbour and within the disposal site (Figure 10). They were reported mainly between April and August (Figure 12).

Figure 12. Monthly distribution of minke whale sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

Humpback whale (Megatera novaengliae)

Humpback whales are regularly recorded off the south coast of Ireland especially during winter (Ryan *et al.* 2015). The same individual humpback whales are recorded each year and spend many months feeding on pelagic schooling fish such as herring and sprat. Sightings of humpback whales were made throughout the area of interest and adjacent to the disposal site (Figure 10) and were nearly all of single individuals sighted during January and February.

Basking shark (Cetorhinus maximus)

Although not currently protected under Irish wildlife law, basking sharks are listed under threatened and/or declining species by OSPAR and are frequently recorded throughout the area of interest (Figure 13) largely between April and June (Figure 14)

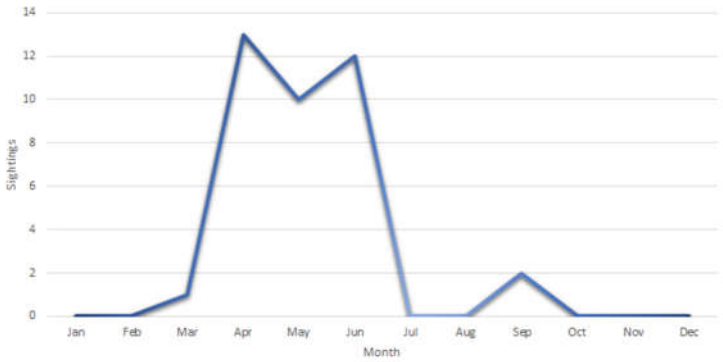


Figure 14. Monthly distribution of basking shark sightings off Ballycotton Harbour, Co Cork (from IWDG accessed April 2021)

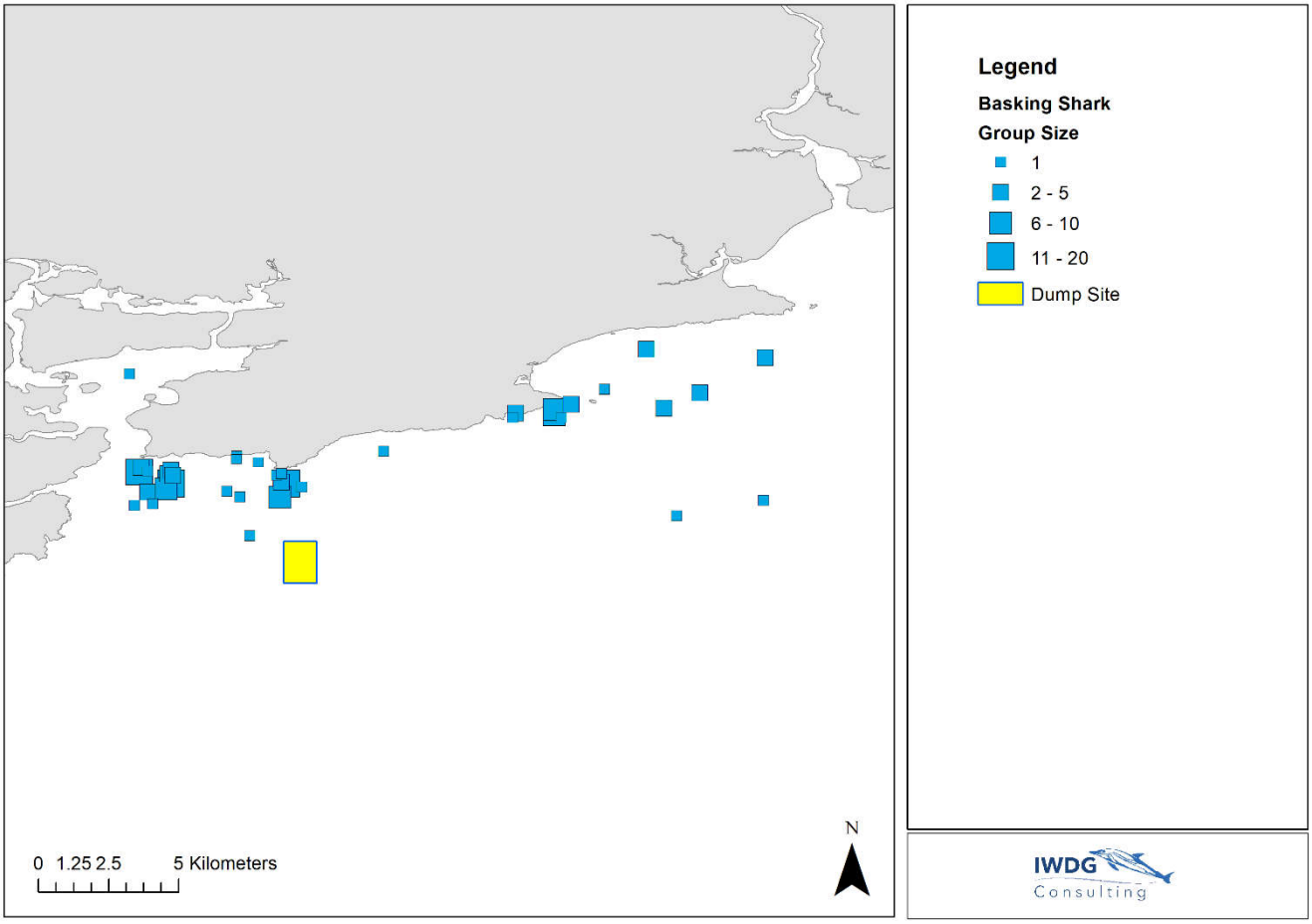


Figure 13. Sighting records of basking sharks off Ballycotton, Co Cork (from IWDG accessed April 2021)

4.3 | Pinnipeds

Grey and harbour seals are distributed around the entire Irish coast with grey seals being more abundant along the western seaboard (Cronin *et al.* 2004; O'Cadhla and Strong 2007; Morris and Duck, 2019).

Harbour Seal (Phoca vitulina)

There were no major harbour seal haul-out or breeding sites recorded near Ballycotton during the National Parks and Wildlife Service (NPWS) surveys during 2002 or 2003. A small number of harbour seals (six) were recorded hauled out at Dungarvan to the east and in Kinsale Harbour to the west in 2003 (Cronin *et al.*, 2004). Duck and Morris (2013) counted no seals during August/September 2012 using thermal imagery. A repeat survey carried out in 2017/18 also recorded along the south coast (Morris and Duck, 2019) (Figure 15). Harbour seals generally forage close to their haul out sites and are unlikely to occur at the dredging or dumping sites.

Figure 15. Map of the locations of groups of harbour seals recorded on the south coast of Ireland, August and September 2017/18 (from Morris and Duck 2019)

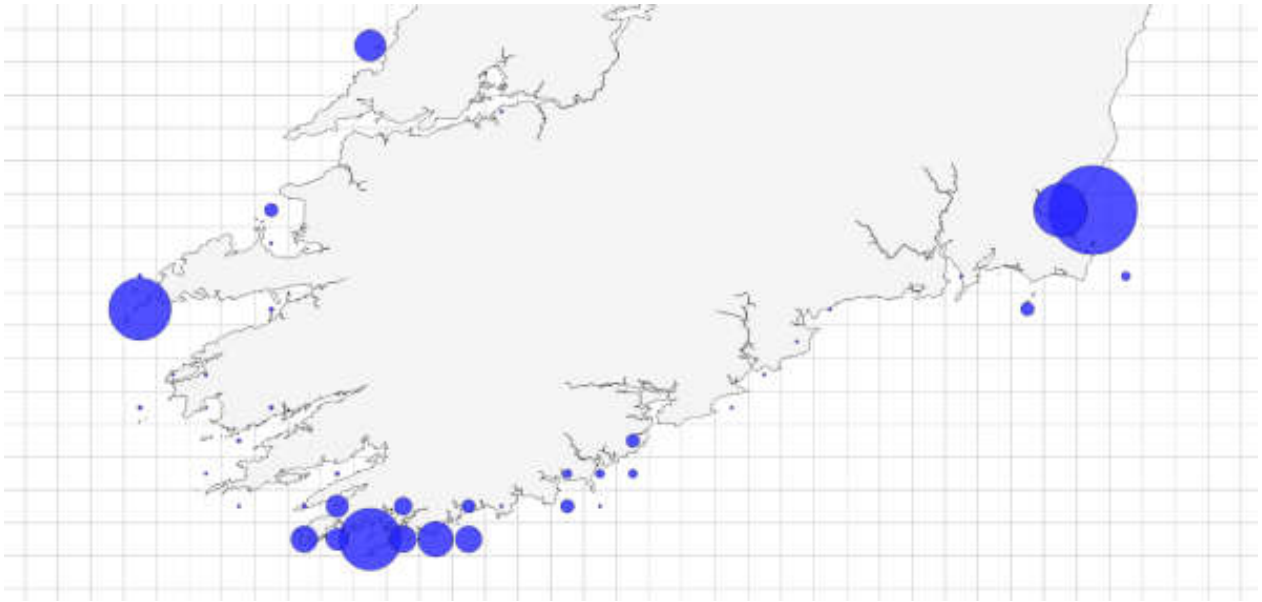


Figure 16. Map of the locations of groups of grey seals recorded on the south coast of Ireland, August and September 2017/18 (from Morris and Duck 2019)

Grey Seal (Halichoerus grypus)

There were no major grey seal haul-out or breeding sites recorded near Ballycotton reported during the National Parks and Wildlife Service (NPWS) surveys since 2003. Cronin *et al.* (2004) reported 6 grey seals hauled out in Kimsale Harbour in August 2003 during an aerial survey for harbour seals. O'Cadhla and Strong (2007) reported no grey seals east of Saltee Islands and west of Kedge Island to the west during an aerial survey during the moulting period. Duck and Morris (2013) reported no seals between Power Head and Youghal in August/September 2012 using thermal imagery. A repeat survey carried out in 2017/18 recorded single grey seals hauled out in Ballycotton Bay (Morris and Duck, 2019) (Figure 16).

Grey seals forage locally and may also range long distances and are likely to be encountered at the disposal site and during dredging. Grey seals are typically encountered as individuals when foraging.

5 | IMPACT ASSESSMENT

5.1 | Description of Activities

As part of the proposed site works the activities likely to impact on marine mammals include:

5.1. Dredging

The dredge site is within Ballycotton Harbour and consists of gravel silt and sand. This will be dredged by long reach back-hoe excavator from a floating barge. An estimated total quantity of 25,000m^3 of material is being dredged. It is likely that dredging activities will take place 24hrs per day, 7 days per week to achieve the maximum production rates within tidal envelopes, and continue for around 8 weeks.

5.2. Dumping

The disposal site is approximately 16km southwest of Ballycotton and 4.81 kms (2.59 nmls) offshore and has been used previously to dispose of dredge material.

The dredged material will be loaded onto a hopper barge with 1,000m^3 capacity and towed to the disposal site with a tug. Therefore it is anticipated around 25-30 loads will be transported to the dump site at a rate of 3-4 loads per week

Typical Dredge Barge, Backhoe Excavator, and Hopper Barge

5.3 Vessel noise

The barge once filled with dredged material will transit to the disposal site. At a speed of 8 nmls and a distance of 12nmls, it will take around 3 hours minutes for a round trip back to Ballycotton harbour and a total of 25-30 trips to dispose of 25,000m^3. This increase in vessel noise is very low and is unlikely to cause any significant disturbance as fishing and other vessels regularly use this area.

The timing of the dredging and disposal at sea is dependent on the recommendations of this Marine Mammal Risk Assessment.

5.2 | Literature Review of Impacts and Mitigation

The NPWS '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014*' recommends that listed coastal and marine activities, undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. It is required that such an assessment must competently identify the risks according to the available evidence and consider (i) direct, (ii) indirect and (iii) cumulative effects of anthropogenic sound (NPWS, 2014).

A risk assessment, following NPWS Guidelines, was conducted based on the published literature, data from the IWDG sightings databases and knowledge of the study area.

Dredging Impacts

Todd *et al.* (2015) provide a very useful review of the state of current knowledge and potential impacts of dredging on marine mammals. Dredging produces continuous, broadband, low frequency sound, below 1 kHz, with sound pressure levels between 168dB and 186dB re 1µPa at 1m (Todd *et al.* 2015). In most cases the noise is continuous in nature.

There have been few studies on the effects of marine dredging (Thomsen *et al*. 2006; Nowacek *et al.* 2007). Richardson *et al*. (1995) identified only two studies on the effects of dredging on marine mammals and both were on large baleen whales (bowhead and northern right whales). Both Odontocetes (toothed whales) and Mysticetes (baleen whales) have been recorded regularly at the proposed dredging and dump site so here we considered the effects on both groups as well as seals.

Baleen whales

Of the baleen whales in the vicinity of the proposed operations, minke whales would potentially be exposed to dredge disposal activity during summer months and fin and humpback whales during winter. Richardson *et al.* (1995) reported on a controlled exposure experiment on Bowhead whales which received broadband levels of <113 – 131 dB re 1 µPa (<11 – 30 dB above ambient) from a suction dredger which lead to weak and inconspicuous avoidance, however he considered the low frequency components were under-represented. Off the southeast coast of the US, Northern Right whales exposed to intensive dredging by noisy hopper dredges apparently show some tolerance of this noise (cited in Richardson *et al.* 1995). The best documented case of long-term change by baleen whales is from Baja California where Gray whales breeding in lagoons subjected to industrial activities, including dredging were virtually absent during years with shipping which led to the suggestion that the constant dredging may have been the main source of disturbance (cited in Richardson *et al.* 1995).

Odontocetes

The effects of dredging on dolphins and porpoise have been poorly studied. Belugas showed less reaction to stationary dredges than moving barges in the Mackenzie estuary, Canada and it was concluded that passage of belugas along a shoreline was temporarily blocked by a dredging operation involving frequent barge traffic but not by a dredging operation with little barge traffic (cited in Richardson *et al.* 1995).

Recently Pirotta *et al.* (2013) carried out the most comprehensive study of the potential effects of dredging on bottlenose dolphins using static acoustic monitoring before, during and after maintenance and capital dredging of Aberdeen Harbour off NE Scotland, where 400,000m^3 of spoil was removed. The Moray Firth is home to a resident group of bottlenose dolphins and they demonstrated a clear avoidance response to dredging at a foraging area despite it being a highly urbanised site. Dolphins spent less time in the harbour as the intensity of dredging increased. Visual monitoring also showed a

lower probability of observing dolphins occurred when dredging boats were present. Group size was not affected suggesting that all individuals in a group were affected equally and were likely to leave the area (Pirotta *et al.* 2013). The mechanism leading to displacement was not clear. The response may have been due to the discontinuous and rarely occurring stimulus, not regularly experienced by dolphins, or due to masking and impacting on communication or foraging. The effect may have been indirect by effecting the dolphins prey within this prey patch.

Diederichs *et al.* (2010), through the use of acoustic monitoring with click detectors, showed that porpoises temporarily avoided an area where sand extraction took place off the Island of Sylt in Germany. The authors found that when the dredging vessel was closer than 600m to the monitoring location, it took three times longer before a porpoise was again detected compared with times without sand extraction. However, all of these studies only considered dredging and not the dumping of dredged material. Tougaard *et al.* (2015) recently reviewed proposed noise exposure limits for harbour porpoises. TTS was previously induced at 164 dB at 4kHz with a single pulse or 164-175 if exposed for longer periods and a range of frequencies. Tougaard *et al.* (2015) suggested TTS could be elicited at SEL of 100-110 dB but this work was really aimed at pulse sounds from pile driving and not continuous sound produced by dredging and shipping. It is clear that of all the odontocetes, harbour porpoise are likely to be most affected by anthropogenic noise due to their high foraging rates as they tend to prey on small fish (Wisniewska *et al.* 2016).

Odontocetes are often quite tolerant of shipping noise, being repeatedly exposed to many vessels, small and large. Thus dredging seems to have less effect on marine mammals than moving sound sources although avoidance behaviour of whales exposed to high levels of activity have been documented. Reactions, when measured have only occurred when received sound levels are well above ambient levels.

Seals

Although there are fewer studies on pinnipeds or odontocetes these animals do tolerate considerable noise from such sources (Richardson *et al.* 1995). Elevated noise from dredging could also affect seals which are sensitive to a lower frequency range (Todd *et al.* 2015). Todd *et al.* (2015) reported on observations of dredging operations in Geraldton, Western Australia between 2002 and 2003, reported that New Zealand fur seals and Australian sea lions showed no sign of disturbance reactions, despite the relative closeness of dredging to popular haul-out sights. Similarly, Hawaiian monk seals showed no adverse reactions to bucket dredgers around Tern Island. Anderwald *et al.* (2013) found that grey seals showed some level of avoidance to high construction vessel traffic in Ireland, although it should be noted that observations were undertaken from a cliff, so animals possibly taking advantage of increased food close to operating dredgers may have been missed by observers.

Pinnipeds may exhibit great tolerance to coastal activities and often haul out on man-made structures where there is considerable human activity. This exposure may lead to some chronic exposure to man-made noise, with which they tolerate. Ecological or physiological requirements may leave some marine mammals with no choice but to remain in these areas and continue to become chronically exposed to the effects of noise. In areas with repeated exposure, mammals may become habituated with a decline in avoidance responses and thus become less sensitive to noise and disturbance (Richardson *et al.* 1995).

Despite these references to the potential effects of dredging on marine mammals there is little consideration of the impact of the actual dumping of dredge material as opposed to removal of material from the site to be dredged. This is either an oversight, or more likely reflects the extremely low impact of the dumping of dredged material on marine mammals, compared to the effects of dredging, which are considered low down the spectrum of impacts of coastal activities on marine mammals. OSPAR (2008) suggested that the dumping of dredge materials are largely irrelevant with

respect to environmental impact and the issue are confined to disturbance due to underwater noise emission during the dumping process and during the transport (ship noise).

5.2.2 Turbidity

A review carried out by Truitt (1988) showed that significantly elevated turbidity levels are generally confined to the lower 15-20% of the water column depth, declining by orders of magnitude toward the surface. Turbidity levels at all depths decline rapidly, approaching background levels within a matter of minutes to tens of minutes, with the bottom levels declining slowest.

Sedimentation and any increases in turbidity are unlikely to affect marine mammals, which use echolocation. Marine mammals often inhabit turbid environments, and many utilise sophisticated sonar systems to sense the environment around them (Au *et al.* 2000). Pinnipeds do not produce sonar for prey detection purposes, however Newby *et al.* (1970) reported apparent blindness in three harbour seals on Gertrude Island, Puget Sound, Washington and found them to appear healthy suggesting their ability to forage was unaffected by blindness. McConnell *et al.* (1999) tracked grey seals in the North Sea and included one blind seal in their study. No significant difference in foraging behaviour was found indicating vision is not essential to pinnipeds' survival or ability to forage.

5.3 Risk Assessment

The total amount to be dredged is estimated at 25,000 m^3 and with a full load of a maximum of 1000 m^3 per operation it is calculated that around 25-30 dumping operations will be carried out. This is a relatively small compared to larger dredging operations in ports along the south coast, including adjacent Waterford and Cork Harbours. The disposal site has been routinely used for the dumping of dredged material, with approximately eight million tonnes of material dumped at this site between 1997 and 2012 at an average rate of around 550,000 m^3 per annum. The site is is 4.81 kilometers (2.59 nautical miles) offshore of Power Head. There is a large diversity and abundance of marine mammals in the area. The risk of a negative interaction is restricted to the potential impact of the dumping of dredged material in the dump zone and the potential for disturbance associated with the dump vessel.

5.3.1 Acoustic disturbance

Noise associated with dredging

The potential for disturbance to marine mammals is greatest when elevated levels of underwater noise are considered. Marine mammals, especially cetaceans, have well developed acoustic capabilities and are sensitive to sound at much higher frequencies compared to humans (Richardson *et al.* 1995). They are less sensitive to lower frequencies but there is still great uncertainty over the effects of sound pressure levels on marine mammals and thus the assessment of its impact. Sources of noise include that generated during dredging and the vessel transiting to and from the disposal site.

Received levels of dredging noise by marine mammals can exceed ambient levels to considerable distances depending on the type of dredger used (Richardson *et al.* 1995). Noise levels emanating from a backhoe dredger operating around the Shetland Islands, UK, were recorded by Nedwell et al. (2008). Using a scaling of 10 log (R/1 m), the back-calculated source level was 163 dB re 1 mPa at 1 metre (bandwidth ¼ 20 Hz–100 kHz). In contrast, Reine et al. (2012) calculated source levels of 179 dB re 1 mPa at 1 metre (bandwidth ¼ 3 Hz – 20 kHz), but the used scaling was different [15 log (R/1 m)], so

results are difficult to compare. McKeown (2016) carried out underwater noise measurements during the 2016 maintenance dredging campaign in Dublin Port. The PSD plots of the dredging operation show some lower frequency tonal components between 200 Hz and 2 kHz were attributed to the pump. The dredging operation has a higher frequency signal in comparison to the dumping operation. Sound levels for the dredging operations at ranges of 213 and 268 m were below the disturbance threshold for harbour porpoise of 140 dB re 1 µPa SPLRMS and 140 dB re 1µPa² s SEL. Noise levels were below the NOAA general behavioural threshold for marine mammals of 160 dB re 1 µPa SPLRMS (McKeown 2016).

Audiograms for bottlenose dolphins show peak sensitivity between 50-60 kHz and no sensitivity below 2 kHz and above around 130 Khz (Richardson *et al.* 1995). Because of rapid attenuation of low frequencies in shallow water dredge noise normally is undetectable underwater at ranges beyond 20-25km (Richardson *et al.* 1995). The effects of low frequency (4-8 kHz) noise level and duration in causing threshold shifts in bottlenose dolphins were predicted by Mooney *et al.* (2009). They found that if the sound exposure levels were kept constant, significant shifts were induced by longer duration exposures but not for shorter exposures.

NPWS (2014) identify increased sound pressure levels above ambient do occur due to TSHD dredging which could be detected up to 10km from shore. These levels are thought to potentially cause masking or behavioural effects but are not thought to cause injury to a marine mammal. There is no guidance on the effects of noise generated by disposal of dredge material on marine mammals.

5.3.2 Noise associated with shipping

Shipping produces low broadband and "tonal" narrowband sounds. The primary sources are propeller cavitation and singing and propulsion of other machinery (Richardson *et al.* 1995). For large and medium vessels, tones dominate up to around 50Hz and broadband components may extend to 100Hz.

Many odontocetes show considerable tolerance to vessel traffic. Sini *et al.* (2005) showed bottlenose dolphins resident in the Moray Firth generally exhibited a positive reaction to medium (16-30m) and large vessels (>30m) and showed some evidence of habituation. Buckstaff (2004) suggested an exposure level of 110-120 dB from vessel noise solicited no observable effect on bottlenose dolphins. A similar exposure level solicited minor changes in orientation behaviour and locomotion changes in minke whales (Palka and Hammond 2001). Harbour porpoise are frequently observed near vessels but tend to change behaviour and move away and this avoidance may occur up to 1-1.5km from a ship but is stronger with 400m (cited from Richardson *et al.* 1995). Seals show considerable tolerance to vessel activity but this does not exclude the possibility that it has an effect.

5.3.3 Disturbance during transit

The presence of a dredger and associated craft in the harbour will lead to a very slight increase in vessel traffic and associated noise. Back-hoe dredgers produce largely low frequency sounds, however, given the use of Ballycotton Harbour by vessels, creating ambient noise already experienced at this site, the presence of an additional vessel and associated noise, is extremely unlikely to be significant. The increased noise above ambient levels generated by the activity will be of relatively short duration (8 weeks).

5.3.4 Disturbance during disposal of dredged material

The disposal site has been used previously for the dumping of dredged material. Increased noise from dredging soft sediment is restricted to <100m from dredging operations during disposal (McKeown

2016), thus increased sound pressure associated with spoil disposal will be above ambient noise levels within a very small area (radius <100m). It might be expected to be slightly higher for sand dredging and disposal.

Marine mammals are tolerant of shipping noise, being repeatedly exposed to many vessels, small and large. Pinnipeds also exhibit much tolerance and often haul out on man-made structures where there is considerable human activity. This exposure may lead to some chronic exposure to man-made noise, with which they tolerate. Ecological or physiological requirements may leave some marine mammals with no choice but to remain in these areas and continue to become chronically exposed to the effects of noise. In areas with repeated exposure, mammals may become habituated with a decline in avoidance responses and thus become less sensitive to noise and disturbance (Richardson *et al.* 1995). Thus, dredging seems to have less effect on marine mammals than moving sound sources although avoidance behaviour of whales exposed to high levels of activity have been documented. Reactions, when measured have only occurred when received sound levels are well above ambient levels.

5.3.5 Physical Disturbance

The risk of injury or mortality is considered extremely low as marine mammals are exposed to considerable vessel traffic on a daily basis and would be aware of their presence. The towing vessel is slow moving and not able to turn quickly thus any animals in the area would have sufficient time to avoid any collisions and thus injury or mortality. The chance of actually releasing dredged material on top of a marine mammal is extremely unlikely. The duration of the release of dredged material is very short (<1 minute) and the vessel slows down during spoil release.

5.3.6 Collision Risk

Collisions are extremely unlikely due to the slow speed of the tug and barge. Dredging is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Todd *et al.* 2015). Sediment disturbance and any increases in turbidity are unlikely to affect marine mammals that use echolocation, or pinnipeds since research indicates that vision is not essential to pinnipeds' survival or ability to forage (McConnell *et al.* 1999). It is unlikely that vessels will encounter many marine mammals during operations and those in the vicinity will have time to avoid the towing vessel and barge.

5.3.7 Indirect impacts on preferred prey

No adverse effects on fish species are expected from dredging and disposal operations.

5.3.8 Potential disturbance to life-cycle

The dumping of dredged material will not cause any adverse effects on cetaceans or seals in the area providing mitigation measures are in place but may affect prey availability. Small shoaling fish that occur regularly in the diet of seals and small cetaceans and are likely to be affected during operations. Any displacement resulting from indirect impacts on available prey will be short-term and local, with fish returning to the area at the completion of dumping activity.

Increased turbidity will result from dumping spoil within the disposal site. Increased turbidity is unlikely to have a direct effect of marine mammals but may have an indirect effect through impacts on prey (Todd *et al.* 2015). There is limited evidence for an effect of increased turbidity on marine mammals. Harbour porpoise use echolocation to navigate and locate prey and thus would not be affected by

increased turbidity. Even when increased turbidity has been shown to substantially reduce visual acuity in seals, which are not known to use sonar for prey detection, there is no evidence of reduced foraging efficiency (Todd *et al.* 2015).

5.3.9. Cumulative Effects

The use of the disposal site by Port of Cork could lead to cumulative effects oif dredging at Ballycotton and in Cork Harbour occurred at the same time. The Port of Cork have recently applied for a Disposal at Sea licence to cover the period 2021 to 2029 for maintenance dredging. The proposed maintenance dredging campaigns may occur throughout the year excluding November and February. This is a change to previous dredging campaigns, which was restricted to the autumn period (September – October). Thus it is important that dreging at Ballycotton does not coincide with dredging campaign in Cork Harbour with both using the same disposal site simultaneously.

6 | Identification of Relevant Natura 2000 sites with marine mammals as a qualifying interest

Marine mammals are highly mobile and range far outside those sites designated to protect them. Grey seals are known to travel up to 75 and 100 km day^{-1} (McConnell et al. 1999). There are two SAC with marine mammals as qualifying interests along the south coast, within approximately 100km of the activity.

Table 2. Special Areas of Conservation, which list marine mammals as a Qualifying Interest, with reasonable foraging range of Ballycotton Harbour and the proposed disposal site

Site	Qualifying Interest			Distance to Dredging Sites	
	Grey seal	Harbour seal	Harbour porpoise	nmls	km
Saltee Islands SAC (Site Code 000707)	X	-	-	54	100
Roaringwater Bay and Islands SAC (Site Code 000101)	X	-	X	58	106

The two closest SACs with grey seals as qualifying interests are presented in Table 2. The Saltees Islands SAC off Co Wexford is an important breeding site for grey seals and occurs 100km to the east of the site, while the Roaringwater Bay and Islands SAC is 106km from the site, in the other direction (west). Despite this distance, individual grey seals from these sites could potentially forage at the dredging and dumping sites (Cronin *et al.* 2016). Roaringwater Bay and Islands SAC is also designated for harbour porpoise and individuals using this SAC are part of a wider population that also occur off east Cork.

The Conservation Objectives of these two SACs (NPWS 2011a; 2011b) are to maintain their favourable conservation condition, which is defined by a number of attributes and targets:

Access to suitable habitat

i) Species range within the site should not be restricted by artificial barriers to site use.

Breeding behaviour

ii) The breeding sites should be maintained in a natural condition.

Moulting behaviour

iii) The moult haul-out sites should be maintained in a natural condition.

Resting behaviour

iv) The resting haul-out sites should be maintained in a natural condition.

Population composition

v) The grey seal population occurring within this site should contain adult, juvenile and pup cohorts annually

Disturbance Level of impact

vi) Human activities should occur at levels that do not adversely affect the grey seal population

The only attribute which could potentially be impacted is attribute vi) disturbance. It is extremely unlikely that any disturbance associated with dredging or disposal of spoil would lead to any likely significant effects and thus this conservation objective will not be compromised.

No artificial barriers will be created and disturbance, if it occurs at all will be temporary and very local and have no significant effect on seals or harbour porpoise or the conservation objectives of either SAC.

5 Mitigation Measures

Potential mitigation measures during the dumping operation are limited. Similar activities both nationally and internationally have been monitored through the provision of a Marine Mammal Observer (MMO) who ensures that there are no marine mammals within a pre-agreed distance prior to dredging and disposal during daylight hours. The MMO can also record any reaction to the dumping operation. However, this mitigation measure will only be effective during daylight hours and in favourable weather conditions.

The National Parks and Wildlife Service recommend a distance of 500m radial distance of the dredging sound source in water depths of <200m (NPWS 2014) on commencement. If a significant negative change in behaviour is recorded such as rapid movement away from vessel or distress then the MMO should have the authority to cease operations. If marine mammals enter the buffer zone during dredging. Marine mammals should not be within 50m of the dredger when it is dumping.

6.1 Disturbance

The most effective way of mitigating the potential effects of disturbance is through the provision of an MMO ensuring no marine mammals are present within an agreed buffer zone.

6.2 Collision, injury and mortality

The most effective way of mitigating the potential effects of collision, injury and mortality is through the provision of an MMO ensuring no marine mammals are present within an agreed buffer zone.

6.3 Disruption of normal behaviour

Dredging activity is of short duration and displacement will be short term. Pre, during and post dredge monitoring would allow for an assessment of any disruption and if it is evident then the level can be quantified. Post-dredge monitoring would also provide a means to establish if disruption occurred and how long it takes for animals to return to an area and resume site usage.

While sound exposure levels from such operations are thought to be below that expected to cause injury to a marine mammal, disturbance, from the noise generated by dredging, from the physical presence of the dredger, and associated vessels, and possibly from the increased water turbidity in the area of operations have the potential to cause, for example, low level disturbance, masking or behavioural impacts (NPWS, 2014). The activities of a long reach excavator will lead to a very localised increase in noise levels and the use of seagoing vessels such as barges to a very slight increase in vessel traffic and associated noise. Small work vessels produce low frequency sounds (Table 2). The presence of an additional small vessel and the associated noise produced, is very unlikely to have a significant impact on marine mammals, though it may discourage seals from using the immediate area of the operations.

Table 2. Estimated noise emissions from small workboat / tug (Wyatt, 2008)

Vessel Type	Displacement Tonne	Length m	Propulsion	Activity	Measurement	Measurement band kHz	Extrapolation dB re 1 µPa m peak to peak	Reference
Tug with Barge[55]	Tug Gross tonnage 104	19.5 (64 ft)	Main engine 1095 hp diesel	Unloaded Speed 7.4 knots	173 dB re 1 µPa @ 1 m Source level	0.01 to 20	182 Broadband 10 to 2500 Hz with broad peak between60 and 600Hz	(Zykov and Hannay 2006)

5.3 | NPWS Assessment Criteria

1. Do individuals or populations of marine mammal species occur within the proposed area?

There are a variety of marine mammal species recorded in the area, especially bottlenose and common dolphin, harbour porpoise and minke, fin and humpback whales. All are part of a larger population and very mobile.

2. Is the plan or project likely to result in death, injury or disturbance of individuals?

The project will not cause injury or death but could lead to local disturbance, from noise associated with the project.

Noise Impact

The activities proposed during this project consist of dredging and disposal operations. It is extremely unlikely any noise generated will be capable of causing permanent or temporary hearing injury to a marine mammal. Localised disturbance to marine mammals in the works area may occur during operations, but is limited by:

- The location of the dredging site, within and adjacent to Ballycotton harbour. Any marine mammals in the harbour will be accommodated to human activities. Noise transmission to the wider bay is very unlikely.
- The very shallow nature of the dredging site.
- The regular transit of fishing and recreational vessels.
- The relatively short duration of the planned activity of 8 weeks
- If dredging takes place during summer months the species most likely exposed to disturbance include bottlenose dolphin, harbour porpoise and minke whale while dredging and disposal during winter will expose common dolphin and fin and humpback whales. Then breeding and pupping seasons for grey seals lies between August to November.

Physical Impact

The risk of injury or mortality is considered low as marine mammals in the in the immediate vicinity of the site are exposed to human activity on a daily basis and would be accommodated. The dump vessel is slow moving and thus any animals in the area would have sufficient time to avoid any collisions and thus injury or mortality.

3. Is it possible to estimate the number of individuals of each species that are likely to be affected?

No abundance estimates for cetaceans are available but it's likely that the numbers in the area for each species are <50. Great Saltee Island may have up to 300 seals hauled out during the grey seal pupping season and moult period and up to 150 grey seals in the Roaringwater Bay and Islands SAC.

4. Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?

The proposed works are recommended to be carried out between March and August. This avoids the grey seal pupping and breeding season and the peak period for common dolphin and fin and humpback whales.

5. Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?

There are no data to suggest that any particular seal or cetacean gender or age group predominates in the around Ballycotton Harbour and adjacent disposal site. Both adult and juvenile grey seals have been recorded on the Saltee Islands and in Roaringwater Bay as it is a pupping and breeding site. All ages of harbour porpoise have been recorded in the Roaringwater Bay and Islands SAC (O'Brien and Berrow 2020).

6. Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?

While bottlenose and common dolphins, harbour porpoise and grey seals frequently and regularly occur in the area in small numbers, there may be temporary disturbance to these but they are accommodated to human activities and are likely to not be affected. Large baleen whales occur during winter and roam over a much wider area during this period.

7. How quickly is the affected population likely to recover once the plan or project has ceased?

While there may be temporary disturbance all marine mammals in the area are accommodated to human activities and are likely to recover from any temporary disturbance within hours or days.

5.4 | Mitigation

Timing of Dredging and Disposal at Sea

Both grey seals and bottlenose dolphins, and to a lesser extent harbour porpoise, can potentially be affected by the proposed operations and are listed on Annex II of the EU Habitats Directive. Harbour porpoise are considered as being particularly sensitive species to noise from demolition and dumping operations. Baleen whales are more sensitive to the low frequency noise generated by an additional vessel and dredging in the area.

If dredging takes place during summer months, the species most likely exposed to any temporary disturbance include bottlenose dolphin, harbour porpoise and minke whale while dredging and disposal during winter will potentially expose common dolphin and fin and humpback whales. The breeding and pupping seasons for grey seals lies between August to November. Given the proximity of the SAC for grey seals and the presence of fin and humpback whales, both species considered Endangered under the IUCN Conservation status criteria, dredging and dumping outside of the seal breeding season and winter period for baleen whales and takes place between March and August would result in less exposure of marine mammals to potential dredging and dumping impacts. To accommodate dredging at all times of year we recommend adoption of the NPWS Guidelines for minimising impacts of man –made sounds in Irish waters.

Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters

The mitigation measures recommended by the NPWS are for the presence of a trained and experienced Marine Observer (MMO) and the use of “ramp up” procedures for noise and vibration emitting operations. The proposed mitigation measures (Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters) recommended by the Department of Arts, Heritage and the Gaeltacht in 2014 are designed to mitigate any possible effects.

The following mitigation measures are proposed to minimise the potential impacts on marine mammals and to allow animals move away from the area of dredging operations:

1. All personnel will be appropriately trained about environmental issues prior to the start of the operation.
2. All equipment will be in good condition to avoid spillage or discharge of oil, smoke and excessive noise.
3. Refuelling will be carried out by competent and trained people away from any environmentally sensitive areas; and dredger to be moored up securely.
4. An appropriate waste container will be placed to collect waste before the final disposal by authorised company and hazardous material storage areas will be identified, labelled, and properly marked and fitted with spill containment systems;
5. Excavators and barges will be checked for any fuel / oil leaks on a regular basis by the crew.
6. Any spills we be reported immediately to the site agent/authorities
7. In the event of a major spill due to damage to the dredger. Locate and isolate, inform harbour authorities, Project manager and environmental agency.
8. A dedicated Marine Mammal Observer will conduct a 30 minute watch for marine mammals within 500m of the excavator prior to start up. If a seal or cetacean (or otter) is sighted within

100m of the excavator, start-up must be delayed until the animals is observed to move outside the mitigation zone or the 15 minutes has passed without the animal being sighted within the mitigation zone.

9. A dedicated Marine Mammal Observer will conduct a watch for marine mammals prior to disposal at sea. If a seal or cetacean (or otter) is sighted within 50m of the vessel once it has reached the dump site, disposal must be delayed until the animal(s) are observed to move outside this mitigation zone or the 15 minutes has passed without the animal(s) being sighted within the mitigation zone.
10. The excavator will be started at lowest revs of the pump, with pump revs increased over a 15 minute period to allow wildlife an opportunity to move further away from the vessel prior to the pumps reaching full power.

5.5 | Residual Impacts

With implementation of the above mitigation measures, it is very unlikely that there will be negative residual impacts from the proposed dredging works on marine mammals in the area. It is also very unlikely that any animals will be injured or killed as a result of the proposed works. Seals using the area are likely to be tolerant of vessel noise and any animals which might be displaced from the vicinity of the excavator or barge can be expected to quickly re-establish use of the area following cessation of the works.

6 | SUMMARY

The waters around Ballycotton Harbour are important for marine mammals including the regular occurrence of bottlenose and common dolphins, harbour porpoise and minke, fin and humpback whales as well as being within foraging range of SACs for breeding grey seals. Dredging between March and August would result in less exposure to more sensitive species.

We recommend the NPWS Guidelines to minimise the acoustic impacts of dredging be implemented to enable a dredging campaign to be carried out at any time of year, which will result in no significant impacts to marine mammals.

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Appendix II Breeding bird survey

BALLYCOTTON HARBOUR PROPOSED DREDGING WORKS

BIRD SURVEY REPORT

July 2019

Doc Ref: 1914

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Table of Contents

1. Introduction

Byrne Looby are currently providing engineering consultancy services for Cork County Council in relation to the proposed dredging works at Ballycotton Harbour. The report details the results of a Bird Survey undertaken by EirEco Environmental Consultants at Ballycotton Harbour and the surrounding environment to determine the presence of nesting birds which could be subject to direct or indirect impact during the proposed dredging operations of the harbour. Ballycotton Harbour is immediately adjacent to the Ballycotton Island proposed Natural Heritage Area (001978) and is approximately 800m from the Ballycotton Bay Special Protection Area (004022). This assessment will inform the Appropriate Assessment Screening Report and Natura Impact Statement for the proposed works.

It is anticipated that dredging activities will be undertaken outside of the wintering period to avoid the potential disturbance of bad weather and the limitations of short daylight working hours. As a result, the proposed works should have a limited potential for impact on wintering waterbirds within the Ballycotton Bay SPA. There is a good body of data available from Irish Wetland Bird Survey counts (IWeBS) for Ballycotton Bay which should provide ample material to enable an assessment of the potential impacts of dredging activities on the SPA within the AA process. On this basis, the proposed survey has focused on the breeding birds in the immediate vicinity of Ballycotton Harbour and within the Ballycotton Island pNHA.

2. Methodology

Surveys were undertaken on the 7th June 2019 in accordance with standard seabird methodology (Walsh et al. 1995) using a single visit during the mid-incubation period (defined as late May to early June). The survey aimed to identify any nesting seabirds or other species at or in the immediate vicinity of Ballycotton Harbour and surrounding environment that would be potentially at risk directly or indirectly as a result of the proposed dredging works. The survey aimed to establish total number of apparently occupied sites (AOS) by observation from appropriate vantage points. This approach is suitable both for colonies on cliffs (visible from the cliff-top) and for small ground-nesting colonies which can be viewed well from a distance (i.e. without many nests likely to be hidden by tall vegetation or undulations in terrain). While the counting unit is the apparently occupied nest (AON), where actual nests are obscured by vegetation, but sitting birds are visible, these will be recorded as well as presenting the overall count of AONs.

The survey was undertaken between 0900 and 1600, during a period of mild weather with temperatures of approximately 20°C and winds of Force 2-3. Cloud cover was variable with occasional showers. Access to the Ballycotton Islands was undertaken by sea kayak which allowed for a circumnavigation to identify sea cliff nesting colonies. The survey was undertaken by two people for Health and Safety requirements.

3. Results

3.1 Designated Conservation Areas

Ballycotton Harbour is immediately adjacent to the Ballycotton Island proposed Natural Heritage Area (001978) and is approximately 800m from the Ballycotton Bay Special Protection Area (004022). Ballycotton Bay is also a Ramsar Convention site and part of the Ballycotton Bay SPA is a Wildfowl Sanctuary. Ballymacoda (Clonpriest and Pilmore) SAC (000077) lies approximately 10km to the northeast of the harbour.

Designated conservation areas in the vicinity of Ballycotton Harbour are detailed in Table 1 and shown in Figure 1.

Table 1. Designated Conservation Areas in the vicinity of Ballycotton Harbour.

Site Name	Status	Distance to site
Ballycotton Island	pNHA (Site Code 001978)	Adjacent (high water mark)
Ballycotton Bay	SPA (Site Code 004022)	800m west
Ballymacoda (Clonpriest and Pilmore)	SAC (Site Code 000077)	10km north east

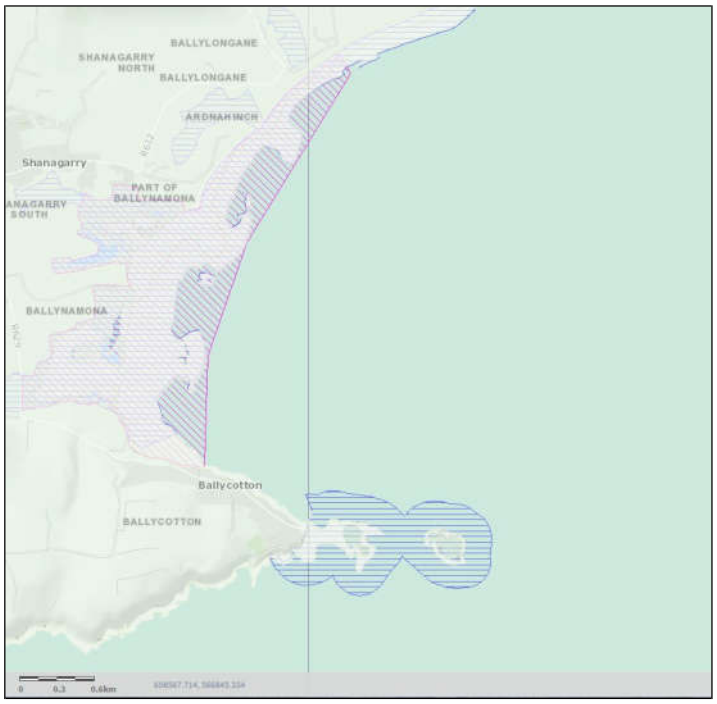

Figure 1. Designated Conservation Areas in the vicinity of Ballycotton Harbour. (*Source: OSI GeoHive*).

The main interest of the Ballycotton Islands pNHA lies in the colonies of seabird species that it holds: Cormorant (70 pairs, pre-1990), Herring Gull (60-80 pairs, pre-1990, 500 pairs in the 1970s), Great Black-backed Gull (11-12 pairs, pre-1990), Lesser Black-backed Gull (1-2 pairs in 1989), Fulmar (1-2 pairs, pre-1990) and Shelduck (1-2 pairs, pre-1990). Several non-seabird species also breed on the islands including Rock Dove (15-16 pairs, pre-1990), Rock Pipit (10-15 pairs, pre-1990) and Chough (1 pair, pre- 1990).

Ballycotton Bay SPA is of importance for its wintering waterbirds and supports nationally important populations of eleven species, of which two, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive.

3.2 Habitats and Vegetation in the vicinity of Ballycotton Harbour

Ballycotton Harbour is located at the north eastern tip of the headland forming the southern side of Ballycotton Bay (Figure 2). A dog-legged pier wall extends along the western side while a breakwater extends from the mainland to form protection from the north and forms a narrow (c25m wide) entrance to the harbour. East of the pier exposed bedrock forms a reef (partially drying at low water) to connect to the smaller of the two islands which lies c300m offshore. This island is low lying with a maximum height of just under 7m ASL. The larger Ballycotton Island which supports the lighthouse is located just under 1km offshore and rises to a height of c35m ASL. The main vegetation of both islands consists of grassland, that on the larger island being dominated by Red Fescue (*Festuca rubra*), that on the smaller by Yorkshire-fog (*Holcus lanatus*). The flora and vegetation of these islands appear to be fairly typical of such maritime

situations, with sea-spurrey (*Spergularia* spp.), Sea Campion (*Silene uniflora*) and Sea Mayweed (*Tripleurospermum maritimum*) accompanying the dominant grass species. Areas in the east and south of the main island which hold most of the breeding seabirds are rather sparsely vegetated. In consequence the flora of the smaller island shows greater diversity than that found on the main island.

The landward (southern) side of the harbour is comprised artificial retaining walls of various materials (concrete, natural stone and stone-filled gabion baskets) and vintages, with some exposed bedrock in the lower sections (Figure 3). There are parts which are heavily vegetated with a mixture of salt tolerant plants including fuchsia (*Fuchsia magellanica*), sycamore (*Acer pseudoplatanus*), hebe (*Hebe* sp.), elder (*Sambucus niger*) and ivy (*Hedera helix*). A stand of Japanese knotweed (*Reynoutria japonica*) occurs along the base of the wall along with three-cornered leek (*Allium triquetrum*) and monbretia (*Croccismia X croccosmiflora*) (Figure 4). Both Japanese knotweed and three-cornered leek are listed under Part 1 of the Third Schedule of SI 477 of 2011, The European Communities (Birds and Natural Habitats) Regulations 2011, as invasive plant species. Another non-native species not listed under SI 477; seaside daisy (*Erigeron glaucus*) is growing on the seaward side of the harbour pier.

Figure 2. Ballycotton Harbour and Islands.
(*Source: OSI Geohive*)

Figure 3. Artificial walls along the inner harbour.

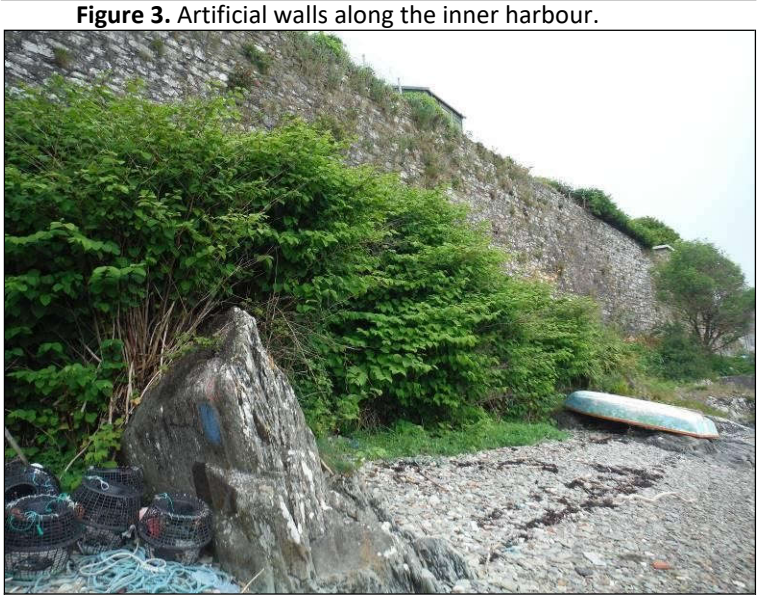

Figure 4. Japanese Knotweed along the shoreline of the inner harbour**.**

3.3 Breeding Birds at Ballycotton Harbour and the surrounding environment

There were no breeding birds recorded within Ballycotton Harbour. The harbour pier and breakwater do no support cavities that would be used by species such as Black Guilemot. The retaining walls at the rear of the inner harbour does have cavities and a range of ledges which could provide nesting habitat for various species of seabird and passerines, though no evidence of nesting activity was recorded during the vantage point watches undertaken. It is possible however, that small numbers of secretive species such as Wren and Dunnock utilising dense vegetation for nesting went unobserved during the survey.

The Small Ballycotton Island is a low-lying island with a grass-dominated vegetation, and as stated above, is accessible from the mainland during periods of low water. The island supports at least one pair of Shelduck (which appear to be breeding) along with Oystercatcher (presumably breeding also). The low shoreline does not support any nesting seabirds, though it is possible a small number of breeding Herring Gull.

The larger island has a moderate seabird colony on its steeper eastern and southern (seaward) side. The species diversity is limited to Gulls (Great black-backed, Herring and Lesser black-backed), Fulmar and Cormorant. Chough, listed under Annex I of the EU Birds Directive, were recorded as breeding in the past (pre-1990's) though they do not appear to have bred there over the last decade. Both Rock Dove and Rock Pipit breed on the island also.

The Ballycotton Bay SPA is of importance for its wintering waterbirds and supports nationally important populations of eleven species, of which two, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive. A summary of the Irish Wetland Bird Survey (IWeBS) data for the period 2006 to 2016 is presented in Appendix 1. The site is also of special conservation interest for Teal, Ringed Plover, Grey Plover, Lapwing, Black-tailed Godwit, Curlew, Turnstone, Common Gull and Lesser Black-backed Gull. The site is likely to support small numbers of breeding Ringed Plover and Oystercatcher on areas of shingle, with Mallard and Teal in the salt marsh fringes of the sheltered inlets.

4. Potential Impacts on Dredging on Breeding and Wintering Birds

The dredging will be confined to within the harbour and the immediate vicinity of the harbour mouth. There are no breeding birds recorded from within the vicinity of the harbour, with the possible exception of secretive passerine species such as Dunnock and Wren in the vegetation on the landward side of the harbour. The proposed dredging would not have any direct or indirect on any of the breeding birds on

the Ballycotton Islands, not on any species that may nest within the Ballycotton Bay SPA. The works are not expected to result in any significant disturbance greater than normal activities associated with the marine traffic activity at the harbour. While some silt is expected to be generated as a result of the dredging activity, which may result

in reduced water clarity at a local level, this would not be expected to interfere with the foraging success of any seabirds breeding on the Ballycotton Islands, which are likely to forage over a considerable distance from the islands, and primarily within the open ocean environment, though the gull species will scavenge in the vicinity of the harbour when fishing vessels are off-loading their catch.

5. Conclusions

There were no breeding birds recorded within Ballycotton Harbour, though small numbers of secretive species such as Wren and Dunnock may utilise the dense vegetation at the landward side of the harbour for nesting went unobserved during the survey. The smaller Ballycotton Island appears to support at least one pair of breeding Shelduck and Oystercatcher, and may support a small number of breeding Herring Gull. The larger island supports a moderate seabird colony on its steeper eastern and southern (seaward) side consisting of various gulls, Fulmar and Cormorant.

The extent of proposed dredging at Ballycotton Harbour will be confined to within the harbour and the immediate vicinity of the harbour mouth. The proposed dredging would not have any direct or indirect on any of the breeding birds on the Ballycotton Islands, not on any species that may nest within the Ballycotton Bay SPA. The works are expected to result in any significant disturbance greater than normal activities associated with the marine traffic activity at the harbour.

6. References

National Parks and Wildlife Service (2009). *Ballycotton Islands proposed Natural Heritage Area (001978) Site Synopsis.*

National Parks and Wildlife Service (2015). *Ballycotton Bay Special Protection Area (004022) Site Synopsis.*

Appendix III Subtidal benthic survey results

Table 1. Station locations and Environmental data

Sample ID	BCTN 1	BCTN 2	BCTN 3	BCTN 4
Easting (ITM)	599863.186	599925.993	599908.049	599818.698
Northing (ITM)	563976.638	563981.498	564039.445	564096.644
Date	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Location	Ballycotton Harbour	Ballycotton Harbour	Ballycotton Harbour	Ballycotton Harbour
Time	19.09	19.25	19.59	20.18
Depth (m)	5.5	5.0	3.0	2.5
Field description	Muddy sand	Muddy sand	Sandy Mud	Mud
Folk: 1954	Muddy sand	Muddy sand	Sandy Mud	Mud
Layering (cm)	Yes, 5cm	Yes, 5cm	None evident	None evident
Smell	Yes, Anoxic	Yes, Anoxic	Yes, Anoxic	Yes, Anoxic
Colour	Grey/Brown	Grey/Brown	Grey/Black	Black
Weather	Calm/Fair	Calm/Fair	Calm/Fair	Calm/Fair
Sea state	F 1-2	F 1-2	F 1-2	F 1-2
Boat anchored	No	No	No	No
Company name	MERC Consultants	MERC Consultants	MERC Consultants	MERC Consultants
Sampler type	Day grab	Day grab	Day grab	Day grab
Sieve Size	1mm	1mm	1mm	1mm

Table 2. Sediment classification and % Organic matter

Sample ID	BCTN 1	BCTN 2	BCTN 3	BCTN 4
>8 mm	0	0	0	0
4-8 mm	0	0	0	0
2-4 mm	0.08	0.06	0.11	0.04
1-2 mm	0.21	0.87	0.11	0.05
500-999 µm	3.29	5.37	0.27	0.39
250-499 µm	15.32	14.52	2.22	0.66
125-249 µm	24.88	32.69	5.84	0.56
63-125 µm	18.74	18.17	5.15	0.87
< 63 µm	37.49	28.32	86.29	97.43
% Organic Matter (by LOI)	1.44	1.59	0.63	5.57
Folk Ward classification	Muddy Sand	Muddy Sand	Sandy Mud	Mud

Table 3. Fauna.

	Species	Notes	BCTN 1	BCTN 2	BCTN 3	BCTN 4
D0422	*Dynamena pumila*					
D0433	*Sertularia*					P
D0491	*Campanulariidae*					
D0662	*Actiniaria*		1			
D0759	*Edwardsiidae*					1
G0001	*Nemertea*		2			
G0034	*Tubulanus polymorphus*		21	26		
P0025	*Polynoidae*		2	1		

P0092	*Pholoe baltica*		3	3		
P0104	*Sigalion mathildae*					
P0145	*Phyllodoce mucosa*		1			
P0176	*Paranaitis kosteriensis*			1		
P0256	*Glycera alba*			1		
P0265	*Glycera tridactyla*		4	7		
P0271	*Goniada maculata*		3			
P0318	*Podarkeopsis*		1	3		
P0498	*Nephtys cirrosa*					
P0499	*Nephtys hombergii*			1	8	13
P0672	*Scoloplos armiger*			5		
P0776	*Pygospio elegans*					
P0783	*Scolelepis (Scolelepis) squamata*					
P0791	*Spio martinensis*					
	Spio symphyta	?	1			
P0794	*Spiophanes bombyx*			2		
P0804	*Magelona alleni*		3	2		
P0805	*Magelona filiformis*		2	6		
P0807	*Magelona mirabilis*					
	Magelona johnstoni			1		
P0810	*Chaetopteridae*			1	2	
P0823	*Aphelochaeta*			1		
P0906	*Capitella*	Species complex				
P0919	*Mediomastus fragilis*		91	293		1
P0920	*Notomastus*		3	1		
P0964	*Euclymene oerstedii*			1		
P0971	*Praxillella affinis*		1			
P1093	*Galathowenia oculata*		1	1		
P1124	*Melinna palmata*		3	1		
P1195	*Lanice conchilega*		1	5		
P1235	*Polycirrus*		11	9		
P1490	*Tubificoides benedii*			2		
R2412	*Ostracoda*					
S0131	*Perioculodes longimanus*			1		
S0427	*Ampelisca brevicornis*		5	8		
S0451	*Bathyporeia*					
S0452	*Bathyporeia elegans*					
S0454	*Bathyporeia guilliamsoniana*					
S0456	*Bathyporeia pelagica*					
S0464	*Gammaridae*					
S0871	*Lekanesphaera rugicauda*					
S1142	*Tanaopsis graciloides*		2			
S1188	*Cumopsis goodsir*					
S1203	*Iphinoe trispinosa*		1	6		
S1380	*Crangonidae*			1		

S1385	*Crangon crangon*					1
S1569	*Portunidae*			1		
W1028	*Cylichna cylindracea*		5	1		
	Philine quadripartita		1	1		
W1569	*Nucula nitidosa*		1			
W1829	*Lucinoma borealis*		1			
W1902	*Tellimya ferruginosa*			2		
W1906	*Kurtiella bidentata*		6	2		
W2006	*Phaxas pellucidus*		1	1		
W2012	*Macomangulus tenuis*					
W2019	*Fabulina fabula*					
W2041	*Donax vittatus*					
W2059	*Abra alba*		2	16	32	10
W2061	*Abra nitida*				28	7
	Chamelea striatula			1		
W2144	*Mya*	Juveniles		1		
W2157	*Corbula gibba*				1	
Y00125	*Hypophorella expansa*					
ZA0003	*Phoronis*		1			
ZB0164	*Amphipholis squamata*			1		
ZB0223	*Echinocardium cordatum*			2		
ZB0292	*Leptosynapta bergensis*			1		
ZG0455	Gobiidae	? Gobius niger			1	

Appendix IV Intertidal Benthic Survey

Table 1. Station locations and Environmental data

Sample ID	BCTN1	BCTN2	BCTN3
Easting (ITM)	598617	598713	598753
Northing (ITM)	564634	564920	565542
Date	14/06/2019	14/06/2019	14/06/2019
Location	Ballycotton Bay	Ballycotton Bay	Ballycotton Bay
Time	10:00:00	10:15:00	10:40:00
LW Time	10:10:00	10:10:00	10:10:00
LW Height	0.6	0.6	0.6
Field description	Rippled sand with frequent worm casts	Rippled sand with frequent worm casts	Rippled sand with frequent worm casts
Folk: 1954	Fine Sand	Fine Sand	Medium Sand
Layering (cm)	None evident	None evident	None evident
Smell	None	None	None
Colour	Grey	Grey	Grey
Weather	Fair	Fair	Clear/Sunny
Sea state	F 1	F 1	F 1
Company name	MERC Consultants	MERC Consultants	MERC Consultants
Sampler type	20cm core (5 reps/station)	20cm core (5 reps/station)	20cm core (5 reps/station)
Sieve Size	1mm	1mm	1mm

Table 2. Sediment classification and % Organic matter

	BCTN 1 INT	BCTN 2 INT	BCTN 3 INT
>8 mm	0	0	3.67
4-8 mm	0.07	0	4.59
2-4 mm	0.03	0	6.88
1-2 mm	0.10	0.07	6.04
500-999 µm	0.57	0.31	7.62
250-499 µm	0.84	0.95	18.59
125-249 µm	71.80	75.82	43.88
63-125 µm	25.11	21.51	7.64
< 63 µm	1.48	1.34	1.11
% Organic Matter (by LOI)	0.88	0.67	4.28
Folk Ward classification	Fine Sand	Fine Sand	Medium Sand

Table 3. Fauna and number of individuals

		BCTN 1A	BCTN 1B	BCTN 1C	BCTN 1D	BCTN 1E	BTCN 2A	BTCN 2B	BTCN 2C	BTCN 2D	BTCN 2E	BTCN 3A	BCTN 3B	BCTN 3C	BCTN 3D	BCTN 3E
D0422	*Dynamena pumila*				P											
D0491	*Campanulariidae*				P											
P0104	*Sigalion mathildae*					1										
P0498	*Nephtys cirrosa*			2		2	2	1		1		2	2			
P0499	*Nephtys hombergii*		2		1	1									1	1
P0776	*Pygospio elegans*															1
P0783	*Scolelepis (Scolelepis) squamata*							1								
P0791	*Spio martinensis*											1				
P0794	*Spiophanes bombyx*								1							
P0807	*Magelona mirabilis*				1											
P1195	*Lanice conchilega*	3														
R2412	*Ostracoda*												1			
S0131	*Perioculodes longimanus*															
S0451	*Bathyporeia*												1			
S0452	*Bathyporeia elegans*				1											
S0454	*Bathyporeia guilliamsoniana*					1										
S0456	*Bathyporeia pelagica*	1					1					1				
S0464	*Gammaridae*									1						
S0871	*Lekanesphaera rugicauda*											1				
S1188	*Cumopsis goodsir*									1						
S1385	*Crangon crangon*				1							6	4	1	1	
W2012	*Macomangulus tenuis*	2		2	1	1	1	1	1		1	2	2	1		
W2019	*Fabulina fabula*				1	1			1							
W2041	*Donax vittatus*					1				1						
Y00125	*Hypophorella expansa*				P											

Appendix V I-WeBS Data

Table 1A: Ballycotton Bay

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Mean
Mute Swan	90	100								1			0
Canada Goose			12	14		14	10	9					2
Barnacle Goose	160	810							1				0
Light-bellied Brent Goose	350	400	162	69		251	214	48	105	86	112	126	95
Feral/hybrid Goose											3	2	1
Shelduck	100	2500	43	52	1*	34	39	16	25	34	23	57	31
Wigeon	560	14000	501	432	177*	225	204	327	233	333	345	225	293
Gadwall	20	1200	1										0
Teal	360	5000	417	553	250*	585	551	340	416	614	457	577	481
Mallard	280	53000	95	84	117*	91	72	88	34	74	56	54	61
Pintail	20	600									1		0
Shoveler	20	650		2									0
Eider	55	9800	1										0
Red-throated Diver	20	3000	2			6		10					2
Great Northern Diver	20	50	1	1		2	5	2	2	1	2	5	2
Little Grebe	20	4700	1										0
Great Crested Grebe	30	6300	3	2	4*	1	1	4	3	16	2	12	7
Cormorant	110	1200	16	13	14*	17	12	13	13	10	17	10	13
Shag												1	0
Little Egret	20	1100	13	14	14*	11	15	15	11	18	33	12	18
Grey Heron	25	5000	12	8	12*	11	9	15	7	14	16	9	12
Water Rail					1*				2	3	1	2	2
Moorhen			4	2	1*	4	6	4	3	3	1	1	2
Oystercatcher	610	8200	211	196	275*	307	348	236	188	195	227	321	233

Ringed Plover	120	540	112	100	128*	55	71	61	103	102	138	106	102
American Golden Plover					1*								0
Golden Plover	920	9300	5100	41	1*	141	1740	3250	2880	2650	891	1106	2155
Grey Plover	30	2000	55	50	3*	76	53	31	33	22	34	39	32
Lapwing	850	72300	1104	960	305*	704	744	675	693	614	596	351	586
Knot	160	5300	43	3		1		16	39	78	4	12	30
Sanderling	85	2000	63	131	1*	44	71	76	92	108	96	101	95
Little Stint								3					1
Pectoral Sandpiper					1*								0
Curlew Sandpiper			6		4*	1							0
Dunlin	460	13300	132	160	154*	195	264	143	425	114	238	327	249
Buff-breasted Sandpiper			1										0
Ruff			10	1	1*	1			1			2	1
Jack Snipe				2		1	2	3	2	1	2	2	2
Snipe			33	57	14*	17	23	45	35	23	31	31	33
Black-tailed Godwit	200	1100	230	62	76*	173	177	152	207	235	135	270	200
Bar-tailed Godwit	170	1500	31	53	29*	32	42	46	72	45	43	60	53
Whimbrel			1		1*	1				1		1	0
Curlew	350	7600	414	288	153*	476	406	370	404	394	379	389	387
Green Sandpiper							1						0
Greenshank	20	3300	9	14	15*	10	11	11	15	15	14	11	13
Redshank	240	2400	83	88	106*	87	94	86	103	126	92	95	100
Turnstone	95	1400	78	89	53*	80	77	63	71	63	73	53	65
Unidentified wader sp.							1						0
Mediterranean Gull				1	1*	3	14			1	1	1	1
Black-headed Gull			1620	1823	668*	440	571	377	814	1015	560	736	700
Common Gull			496	1204	153*	375	210	531	258	168	192	83	246
Lesser Black-backed Gull			6697	2250	223*	1035	3037	1277	2210	773	761	425	1089
Herring Gull			365	432	324*	193	239	396	181	136	191	120	205
Iceland Gull											1		0

Glaucous Gull				1			2						0
Great Black-backed Gull			150	400	381*	118	172	264	425	165	137	206	239
Sandwich Tern			1	13	19*	96	128		2	4	1		1
Kingfisher			2							1	1		0

Table IB: Ballymacoda

Species	**1% National**	**1% International**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**Mean**
Mute Swan	90	100		7*	5*	16	17		23	22*	4	9*	7
Whooper Swan	150	340					3				4	1*	1
Greenland White-fronted Goose	100	190									2		0
Greylag Goose	35	980				2				1*			0
Light-bellied Brent Goose	350	400		4*		755	347		177	2*	315	59*	123
Shelduck	100	2500			6*	70	7		94		44	4*	34
Wigeon	560	14000		141*	82*	622	405		471	81*	783	148*	314
Teal	360	5000		215*	107*	549	411		524	166*	436	282*	240
Mallard	280	53000		51*	95*	68	105		164	30*	171	44*	84
Pintail	20	600				1			2		33		9
Shoveler	20	650				2	11		1		1		0
Scaup	25	3100					1				2		0
Eider	55	9800				2							0
Red-breasted Merganser	25	860				6	3						0
Red-throated Diver	20	3000									8		2
Great Northern Diver	20	50					2		1		2	6*	1
Little Grebe	20	4700		2*		6	2		4	2*	8	2*	3
Great Crested Grebe	30	6300				6	7		4		6	2*	2
Cormorant	110	1200		15*	24*	24	34		21	18*	36	31*	14

Shag						17	44				1	1*	0
Little Egret	20	1100		18*	30*	32	23		42	36*	44	21*	22
Grey Heron	25	5000		6*	18*	13	7		15	5*	11	6*	6
Water Rail					1*						1	1*	0
Moorhen					11*		9		1		1		0
Oystercatcher	610	8200		522*	396*	466	436		475	436*	535	284*	252
Ringed Plover	120	540		86*	103*	127	325		204	152*	207	157*	103
American Golden Plover					1*								0
Golden Plover	920	9300			98*	8561	3200		8400	1*	9250	4200*	4412
Grey Plover	30	2000		51*	52*	375	61		257	56*	249	50*	126
Lapwing	850	72300		11*	4*	1465	747		1239	53*	585	174*	456
Knot	160	5300		21*	44*	313	79		101	29*	166	30*	67
Sanderling	85	2000		84*	114*	194	195		185	49*	117	182*	76
Little Stint					12*								0
Curlew Sandpiper					3*	9					1		0
Dunlin	460	13300		88*	868*	958	369		1089	213*	2277	433*	842
Buff-breasted Sandpiper				1*	2*								0
Ruff						3	2					2*	0
Snipe				3*	2*	87	34		22	3*	33	11*	14
Black-tailed Godwit	200	1100		572*	398*	1404	629		1068	135*	1040	434*	527
Bar-tailed Godwit	170	1500		30*	44*	627	598		547	50*	472	158*	255
Whimbrel				2*	3*	3	1		2	1*	1		1
Curlew	350	7600		145*	393*	508	367		485	457*	553	516*	260
Common Sandpiper						2			2		1		1
Spotted Redshank						1					1		0
Greenshank	20	3300		8*	21*	11	14		10	14*	16	8*	6
Redshank	240	2400		168*	258*	188	344		284	252*	191	248*	119
Turnstone	95	1400		25*	73*	182	148		174	2*	83	87*	64

Mediterranean Gull					1*	5							0
Black-headed Gull				115*	286*	880	1920		1105	665*	780	504*	471
Common Gull				326*	170*	275	1280		344	387*	330	144*	168
Lesser Black-backed Gull				15*	367*	2100	3570		4960	351*	749	483*	1427
Herring Gull				48*	136*	88	250		109	64*	198	95*	77
Iceland Gull						1			2				0
Glaucous Gull									1				0
Great Black-backed Gull				72*	163*	268	382		315	127*	174	98*	122
Sandwich Tern				31*	19*	155	2		450	3*	46	3*	124
Common Tern						3			20			1*	5
Kingfisher													

Table IC: Blackwater Estuary

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Mean
Mute Swan	90	100	2	1	4*	3	6	5	4	5			3
Light-bellied Brent Goose	350	400	147	187		295	557	227	74	234	101	196	166
Brent Goose (Black Brant)										1			0
Shelduck	100	2500	108	79	8*	132	156	198	120	94	97	68	115
Wigeon	560	14000	440	390	351*	311	420	404	521	472	1006	711	623
Gadwall	20	1200					2						0
Teal	360	5000	247	319	110*	335	369	451	274	290	349	315	336
Mallard	280	53000	131	176	214*	123	93	90	65	143	117	36	90
Feral/hybrid Mallard type											12	10	4
Pintail	20	600	5			2		1		2	1	1	1
Shoveler	20	650		2		2	1				1	1	0
Tufted Duck	270	8900				1							0
Goldeneye	40	11400	1	1									0
Red-breasted Merganser	25	860	4	3		3	2	3					1
Great Northern Diver	20	50	1	1			2	3	1	2		2	2
Little Grebe	20	4700	1	1			1		2				0
Great Crested Grebe	30	6300	10	5	1*	6	8	11	10	9	11	7	10
Slavonian Grebe									1				0
Cormorant	110	1200	100	56	70*	62	47	67	118	60	69	49	73
Shag						1	41	34	3	7		2	9
Little Egret	20	1100	69	41	39*	17	19	40	36	54	49	33	42
Grey Heron	25	5000	33	21	25*	16	12	38	42	17	26	10	27
Moorhen			3	2		4	3	2	1	1	3		1

Oystercatcher	610	8200	246	452	388*	434	524	546	342	427	445	240	400
Ringed Plover	120	540	17	18	2*		40		4		1		1
American Golden Plover											1		0
Golden Plover	920	9300	1150	281	14*	29	22		33	214		180	85
Grey Plover	30	2000	11	6	6*	3	6	6	4	1	5	2	4
Lapwing	850	72300	1894	793	178*	1490	665	893	198	389	222	529	446
Knot	160	5300	19	10		44	8	14	3	47	7	4	15
Sanderling	85	2000					27						0
Little Stint											1		0
Curlew Sandpiper						1							0
Dunlin	460	13300	477	247	439*	596	231	266	91	252	303	49	192
Jack Snipe										1	1		0
Snipe			35	10	5*	7	16	4	4	7	10	12	7
Black-tailed Godwit	200	1100	1285	509	407*	378	525	815	634	5150	568	1147	1663
Bar-tailed Godwit	170	1500	36	73	8*	58	44	38	8	8	134	9	39
Whimbrel				1		2	1	1	1	1	2	1	1
Curlew	350	7600	413	435	891*	466	605	1072	598	701	517	565	691
Common Sandpiper			1						1	2	2		1
Green Sandpiper			2			1					1		0
Spotted Redshank			1		1*	1							0
Greenshank	20	3300	29	29	33*	24	24	64	33	24	18	34	35
Redshank	240	2400	368	431	583*	338	435	331	288	265	266	320	294
Turnstone	95	1400	38	58	25*	63	61	8	15	16	28	29	19
Mediterranean Gull			1	1			1		1	2			1
Black-headed Gull			5216	4355	350*	836	762	817	705	530	594	571	643
Common Gull			515	557	167*	712	461	239	244	150	374	201	242
Lesser Black-backed Gull			4603	6510	566*	2931	198	321	209	224	224	146	225
Herring Gull			372	306	250*	208	76	159	122	150	175	132	148

Yellow-legged Gull			1	1									0
Iceland Gull				1				1				1	0
Glaucous Gull			1					2					0
Great Black-backed Gull			315	175	465*	182	118	195	261	77	158	85	155
Sandwich Tern			3	29	7*	17	46	117	108	20	9	3	51
Arctic Tern						2							0
Kingfisher			1	1	1*	1	1	1	1	1	1	1	1