

Hartley Anderson Limited

Marine Environmental Science and Consultancy

Annex IV Risk Assessment

Dublin Harbour Capital Dredging Project
Foreshore Consent Application Ref. No.
FS007164

Report to
Department of Housing, Local Government
and Heritage



August 2022

TABLE OF CONTENTS

SECTION 1 - INTRODUCTION.....	2
1.1 Background.....	2
1.2 Relevant consultation responses	2
1.3 Legislative context.....	2
SECTION 2 - DESCRIPTION OF PROPOSED WORKS.....	12
2.1 Site location.....	12
2.2 Summary of the capital dredge project.....	12
2.3 Elements of the capital dredge project which require Foreshore Consent under Section 10.....	14
2.4 Elements of the capital dredge project which require Foreshore Consent under Section 3.....	15
2.5 Volume of dredge spoil	15
2.6 Disposal of dredge spoil.....	17
2.7 Characteristics of the material to be dredged.....	17
2.8 Dredging operation.....	17
SECTION 3 - RELEVANT ANNEX IV SPECIES	20
SECTION 4 - RISK ASSESSMENT	26
4.1 Potential impacts associated with dredging programme	26
4.2 Mitigation measures	28
4.3 Conclusion	29
BIBLIOGRAPHY	30

SECTION 1 - INTRODUCTION

1.1 Background

Arup with Hartley Anderson Limited have been commissioned by the Department of Housing, Local Government and Heritage (DHLGH) to conduct an Annex IV Risk Assessment of an application by Dublin Port Company (DPC) for a Foreshore Licence (Reference No. FS007164) for their proposed Dublin Harbour Capital Dredging Project which, in accordance with the Dublin Port Masterplan, brings forward for consent key elements of the capital dredging works required to create the required depth of the navigation channel, basins and berthing pockets. It is proposed to dispose of the dredged sediments at the existing licenced offshore disposal site located at the entrance to Dublin Bay to the west of the Burford Bank.

DPC applied to the Environmental Protection Agency (EPA) for a dumping at sea permit (S0033-01) on 26th August 2021¹ for loading and dumping at sea activities associated with the capital dredging programme. The application is currently under assessment by the EPA in accordance with the requirements of the Dumping at Sea Act 1996 as amended.

1.2 Relevant consultation responses

The licence application was open for public consultation 12th January 2022 to 9th March 2022. Responses relevant to this Annex IV Risk Assessment are provided in Table 1.1.

1.3 Legislative context

The *Foreshore Act 1933* (as amended), requires that a lease or licence must be obtained from the Minister for Housing, Local Government and Heritage for the carrying out of works or placing structures or material on, or for the occupation of or removal of material from, State-owned foreshore.

The 1992 EU Habitats Directive (Council Directive 92/43/EC) and Birds Directive (2009/147/EC) are transposed into Irish law by Part XAB of the *Planning and Development Act 2000* (as amended) and the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended).

In addition to the requirement to consider potential effects of a plan or project on European Sites under Article 6(3) of the Habitats Directive, the Directive requires consideration of the potential effects on species listed under Annex IV of the Directive (termed Annex IV species). Under Article 12, Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. All cetaceans are included in Annex IV of the Directive.

Relevant guidance informing the assessment includes recent NPWS guidance on the strict protection of animal species (Mullen *et al.* 2021).

¹ <https://epawebapp.epa.ie/terminalfour/DaS/DaS-view.jsp?regno=S0033-01>

Table 1.1: Relevant responses from prescribed bodies and public to the consultation

Relevant Responses to Consultation	Applicant's Response
National Park & Wildlife Service (NPWS) The NPWS noted that Dublin Harbour Capital Dredging Project at Dublin Port has been evaluated by a Natura Impact Statement and other documents. The conclusion of the Natura Impact Statement document is that the proposed works are unlikely to pose a significant likely risk to nature conservation interests in the vicinity with the application of mitigating measures. In Section 5.3 of the NIS it indicates that the proponents would apply relevant sections of "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" for works that would occur in applicable areas. National Parks and Wildlife Service request that utilisation of this guidance should be added as a condition of consent. Measures around good environmental practice also contained within this section should also be applied.	The Applicant confirmed that it will adhere to the full suite of mitigation measures and monitoring programmes set out in Chapter 17 of the EIAR which also captures all the mitigation measures set out in the NIS. This includes compliance with NPWS Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters.
Marine Advisor, Environment (DHLGH) The Marine Advisor noted that the proposed works is adjacent to two important Special Protection Areas (SPA), namely the North Bull Island SPA [004006] and South Dublin Bay and River Tolka Estuary SPA [004024]. The former site is of international importance for waterfowl and regularly supports in excess of 20,000 individuals. It holds internationally important populations of three species, Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit and nationally important populations of Pintail and Knot. Also of significance is the regular presence of several species that are listed on Annex I of the E.U. Birds Directive, notably Golden Plover and Bar-tailed Godwit, but also Ruff and Short-eared Owl. The latter SPA, South Dublin Bay and River Tolka Estuary SPA, supports an internationally important population of Light-bellied Brent Goose and nationally important populations of a further nine wintering species. Furthermore, the site supports a nationally important colony of breeding Common Tern and is an internationally important passage/staging site for three tern species. <i>Assessment Process</i>	The Applicant noted that no response was required at this point in the processing of the Foreshore Application. The Applicant undertook to provide detailed responses to any issues which may be raised by the IEC.

Relevant Responses to Consultation	Applicant's Response
The Minister for Housing, Local Government and Heritage, is responsible for carrying out environmental screening and any environmental assessments determined as being required following screening, in accordance with the requirements set out in Directive 92/43/EEC (Habitats Directive), Directive 2009/147/EC (Birds Directive) and Directive 2011/92/EU, as amended by Directive 2014/52/EU (EIA Directive), in respect of applications under the Foreshore Act 1933, as amended. Outside of the Directives, the Minister is also required to consider environmental issues in respect of applications under the Foreshore Act 1933, as amended. <i>Habitats Directive</i> The Appropriate Assessment process (AA) is an assessment of the potential for adverse or negative effects of a plan or project, in combination with other plans or projects, on the conservation objectives of a European Site (Natura 2000 site). The focus of AA is targeted specifically on Natura 2000 sites and their conservation objectives. Article 6(3) and 6(4) of the Habitats Directive place strict legal obligations on Member States to regulate the conditions under which development that has the potential to impact on European Sites can be proceed. It requires that an Appropriate Assessment be carried out of plans or projects, not directly connected with or necessary to the management of a site as a European Site, but which are likely to have a significant effect thereon, either individually or in combination with other plans or projects. An AA Screening assessment is carried out to determine whether a plan or project is likely to have a significant effect on a European Site. Article 6.3 states that: <i>“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the</i>	

Relevant Responses to Consultation	Applicant's Response
<i>integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."</i> Article 6.4 states: <i>"if, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."</i> <i>Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest."</i> In giving effect to the above as a matter of Irish law, the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011, as amended) (Birds and Natural Habitats Regulations) provide as follows:- Regulation 42(1) of the Birds and Natural Habitats Regulations states that: "A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site". Regulation 42(2) provides that: "A public authority shall carry out screening for Appropriate Assessment under paragraph (1) before consenting for a plan or project is given, or a decision to undertake or adopt a plan or project is taken".	

Screening for Appropriate Assessment

Hartley Anderson Limited
August 2022
Page 6

Relevant Responses to Consultation	Applicant's Response
The Birds and Natural Habitats Regulations further provide as follows at Regulation 42 (6) and 42 (7):- 6. <i>The public authority shall determine that an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.</i> 7. <i>The public authority shall determine that an Appropriate Assessment of a plan or project is not required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.</i> Furthermore, under section 42A (13) of S.I. No. 293 of 2021 an Appropriate Assessment, including the specified public consultation, must be carried out before the public authority makes a decision to undertake or adopt the proposed plan or project. <i>Risk Assessment for Annex IV Species</i> Outside of designated Natura 2000 sites, the waters around Ireland's coast are a suitable habitat for a number of species listed under Annex IV of the Habitats Directive (92/43/EEC). Article 12 of the Habitats Directive affords strict protection to those species listed in Annex IV of the Directive wherever they occur. Where necessary a Risk Assessment for adverse effects of the proposed works on Annex IV species must be undertaken and a report produced. This assessment is separate to that undertaken under Article 6.3. The purpose of the Risk Assessment is to examine the possibility that the proposed project either individually or in combination with other plans and projects, may result in the deliberate disturbance or destruction of any of the	

Screening for Appropriate Assessment

Hartley Anderson Limited
August 2022
Page 7

Relevant Responses to Consultation	Applicant's Response
species listed in Annex IV which may be present in the works area. The Risk Assessment should take into account the status (e.g. as indicated in the latest Article 17 reporting for Ireland, NPWS 2019) and sensitivities of relevant Annex IV species to potential impacts associated with the proposed project. The Risk Assessment for Annex IV Species should be precise, with definite findings, mitigation and conclusions removing all reasonable scientific doubt as to the effects of the proposed project on any Annex IV species. <i>EIA Directive</i> In Ireland, in accordance with Directive 2011/92/EU, as amended by Directive 2014/52/EU (hereafter, the EIA Directive), projects that are likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location must be subject to an EIA. Article 4 of the EIA Directive requires that projects listed under Annex I must always have an EIA while projects listed under Annex II shall be subject to an EIA if (i) determined on a case-by-case basis or (ii) they exceed certain thresholds set by each Member State. Thresholds have been set for Annex II projects in Irish legislation. Projects which do not meet the threshold may still require an EIA if the project is likely to have significant effects on the environment. Annex I and Annex II projects have been transposed into Section 5 (Parts 1 and 2) of the Planning and Development Regulations 2001, as amended. Section 13A(1)(b)(i) of The Foreshore Act 1933, as amended, requires that an EIA be carried out for all developments of a class specified in Part 1 or Part 2 of Schedule 5 of the Planning and Development Regulations where the development exceeds the relevant quantity, area or other limit specified in that Part, or where no quantity, area or other limit is specified. Section 13A(1)(b)(ii) of the Foreshore Act states that an EIA shall be carried out when a development is of a class specified in Part 2 of Schedule 5, but does not exceed the relevant threshold (i.e. sub-threshold) and the Minister determines that the proposed development would be likely to have significant	

Relevant Responses to Consultation	Applicant's Response
effects on the environment. Therefore, it is necessary to examine such projects on a case-by case basis. In the case of Annex II projects that are determined on a case-by-case basis, or sub-threshold, an EIA screening is required to determine if the project will have significant effects on the environment. Under Article 4(4) the developer (applicant) is required to submit information on the characteristics of the project and its likely significant effects on the environment. The developer may also provide a description of any features of the project and/or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment. Subsequently, in accordance with Article 4(5), the Minister is required to make a determination, which shall be made public, that: 1. Where it is decided that an EIA is required, states the main reasons for requiring such assessment with reference to the relevant criteria listed in Annex III (Schedule 7 of the Planning & Development Regulations 2001) of the EIA Directive; or 2. Where it is decided that an EIA is not required, states the main reasons for not requiring such assessment with reference to the relevant criteria listed in Annex III of the EIA Directive, and, where proposed by the developer, states any features of the project and/or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment. <i>Non-statutory Environmental Report</i> Where projects do not fall under a class that require an EIA or an EIA Screening, and inkeeping with good governance, a Non-statutory Environmental Report assessing the environmental effects of the proposed works on the receiving environment is required. This report will document the current state of the environment in the vicinity of the proposed activity in order to quantify the effects, if any on the environment, and if applicable to highlight how mitigation will be implemented to minimize impacts on the environment. The EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2017) indicates the relevant topics to be covered in this report.	

Relevant Responses to Consultation	Applicant's Response
<i>Independent Environmental Consultants (IEC)</i> Owing to the scale and complexity of the environmental assessment required, and taking account of the available resources within the Department, I recommend that Foreshore Section of DHLGH engage a suitable qualified IEC. The IEC must conduct an independent assessment of the information provided by the Applicant, having regard to the Habitats Directive, the Birds Directive, the Birds and Natural Habitats Regulations, the EIA Directive, Non-statutory Environmental Reports and relevant jurisprudence of the EU and Irish courts. The IEC shall ensure that the Minister has all the environmental assessments required to allow them to make decisions on applications under The Foreshore Act 1933, as amended in accordance with the requirements set out in Directive 92/43/EEC (Habitats Directive), Directive 2009/147/EC (Birds Directive) and Directive 2011/92/EU, as amended by Directive 2014/52/EU (EIA Directive). <i>Conclusion/Recommendation</i> The Marine Advisor noted that in principle he/she had no objections to this application. On completion of the Second Consultation and the work of the IEC, he/she will furnish their final report with determinations, which may include any case specific conditions will follow having regard to the information obtained during public participation.	
A member of the public noted the following: The foreshore licence involves the deepening of berths by 2.2m or removal of material to attain that depth in berths. Sediment samples were taken using a Van-Veen grab which sampled approximately the top 0.2m of seabed material for eco-toxicity prior to issuing of a Dumping at Sea Permit. Therefore the toxicity of sediments which were previously dumped and will going forward continue to be dumped in a Special Conservation Area (SAC) for Harbour Porpoise were assessed based on the top 20cm of sediment. Given that the material is to be dumped in a protected area it should be verified properly to ensure contaminant levels are low. Sediment Chemistry analysis shows a high degree of variability from 2006 to 2020 which may reflect vertical changes in sediment contamination. The reasons for not doing borehole sediment analysis are not been given and why surface sampling	The applicant noted that has examined the submission received in detail. The issues raised in the public submission relate to the adequacy of the Sampling and Analysis Plan (SAP) used to define the nature of the marine sediments to be dredged and their suitability for disposal at sea. The applicant's response was set out as a series of points, for clarity. The Marine Institute issued a Sampling & Analysis Plan (SAP) to DPC on 27th March 2020. The SAP is presented in Appendix 8-1 of the EIAR. DPC appointed Hydromaster Ltd and Aquatic Services Unit, University College Cork to deliver the SAP in full. The sediment chemistry and eco-toxicological results are set out and described in Chapter 8 of the EIAR, Section 8.2.2.2.

Relevant Responses to Consultation	Applicant's Response
alone was deemed sufficient. Therefore this does not appear properly considered especially given the location of the dump site. The decision to perform only surface sampling of sediment needs careful justification prior to dumping in a protected area. The deposition of contaminants in a protected area may have long term effects on the harbour porpoise population which are deemed to be protected. Therefore it is imperative to sample sediment to be dumped and to ensure re-suspension of contaminants that are identified as a result, do not pose a risk to the harbour porpoise population in the SAC. <i>"4.5 Sampling of sediments from the proposed dredging site should represent the vertical and horizontal distribution and variability of properties of the materials to be dredged."</i> (NOAA, no date). This above statement is standard practice in analysis of sediments to be dredged and can be found in other guidelines (OSPAR, 1998 and HELCOM, 2020). Further the Marine Institute guidelines for dumping at sea (Cronin <i>et al.</i> 2006), suggest on page 10 that borehole analysis of granulometry should be part of the submission for a Dumping at Sea Permit. Such borehole information could and should be submitted for contaminant analysis and appears entirely absent. It would appear proper and complete assessment of dredged material in an area where contamination has already been identified must be required prior to dumping in a sensitive protected area. Which at first glance appears a poor choice of location for a dumping site in any case, but reckless if sediments are contaminated.	The results of the granulometry testing, including a visual description of the sediments, are set out in Appendix 8-3 of the EIAR. The results of all the sediment chemistry analysis, eco-toxicological tests and granulometry tests were forwarded to the Marine Institute for their interpretation, in combination with other relevant data held by the Marine Institute. The Marine Institute confirmed that the sediment sampling programmes in April 2020 for sediment chemistry and in October 2020 for eco-toxicity are adequate for a Dumping at Sea permit application assessment. The Marine Institute noted that this assessment would be carried out after the application was submitted (see Chapter 8 of the EIAR, page 8-29). DPC submitted the Foreshore Application to DHLGH on 5th July 2021 (FS 007164). Subsequently, the Marine Institute issued a report to the EPA on 3rd May 2022 with respect to the sediment chemistry for the Dublin Harbour Capital Dredging Project (Dumping at Sea Permit Application Ref S0033-01). The response is publicly available on the EPA Website and presented in Appendix 2 of this document for ease of reference. The Marine Institute's report states that the sediment chemistry is broadly in line with previous results from the area and would be considered reasonable quality for urban port sediment. The Marine Institute conclude that the sediment chemistry of these samples would not preclude dumping at sea, in the absence of a feasible alternative. A detailed assessment of Disposal and Re-use alternatives are set out in Chapter 4 of the EIAR, Section 4.3.2. This assessment concludes that the Disposal at Sea method, in combination with Environmental Enhancement

Screening for Appropriate Assessment

*Hartley Anderson Limited
August 2022
Page 11*

Relevant Responses to Consultation	Applicant's Response
	- Sediment Cell Maintenance technology, has been selected as the disposal final design with no environmentally better alternative.

SECTION 2 - DESCRIPTION OF PROPOSED WORKS

2.1 Site location

The proposed area to be dredged lies entirely on the foreshore of the inner Liffey Channel between the Northern Lands of Dublin Port and the Southern Lands of Dublin Port. It is proposed to dispose of the dredge spoil at a licensed offshore disposal site located to the west of the Burford Bank at the approaches to Dublin Bay. The Great South Wall is located to the southeast of area to be dredged and the North Bull Wall is located to the east of the area to be dredged. The North Bull Wall and the Great South Wall are the eastern limits of Dublin Harbour.

Until recently, Dublin Port's navigation channel and fairway was maintained to a standard depth of 7.8m CD. The main navigation channel between the Western Oil Jetty and Dublin Bay has now been deepened to 10.0m CD under the Alexandra Basin Redevelopment (ABR) Project (ABP Ref. 29N.PA0034, Foreshore consents MB/2016/01723, MB/2016/01725 and FS005699) to enable the safe passage of larger vessels bringing freight and passengers to and from the Port.

2.2 Summary of the capital dredge project

The proposed capital dredge area for which Foreshore and Dumping at Sea consents are sought is defined by the 'red line' application boundary (Figure 2.1). The application site area is 27 ha (excluding the area of the licensed offshore disposal site).

As illustrated on Figure 2.1, the Dublin Harbour Capital Dredging Project consists of the following elements:

- Deepening of the navigation channel from 7.8m CD to 10.0m CD between the North Wall Quay Extension and the Western Oil Jetty, including deepening of riverside Berth 35 (Ocean Pier) to 10.0m CD and widening it to 50m.
- Deepening of Alexandra Basin East from 7.8m CD to 10.0m CD with Berths 36 and the berths pockets widened to 50m and Berths 38, 39 and 40 deepened to 11.0m CD and the berth pockets widened to 50m.
- Deepening of the Oil Basin from 7.8m CD to 10.7m CD with berth pockets at Berths OB1 and OB2 widened to 50m.
- Deepening of the Ferryport Basin from 7.8m CD to 10.0m CD.
- Deepening of riverside Berth 52 to 10.0m CD following construction of the new Berth 52 quay under the MP2 Project (ABP-304888-19).
- Widening of the berth pockets at South Port Berths 42, 43, 44, 45, 46 and 47 to 50m.
- Removal of ridge between the navigation channel and the Poolbeg Oil Jetty (Berth 48) to 10.0mCD.

All berth pockets will be widened to 50m. The existing berth pockets range in width from 24m to 35m wide, as indicated in Table 2.1.

Figure 2.1: Proposed DPC capital dredging project

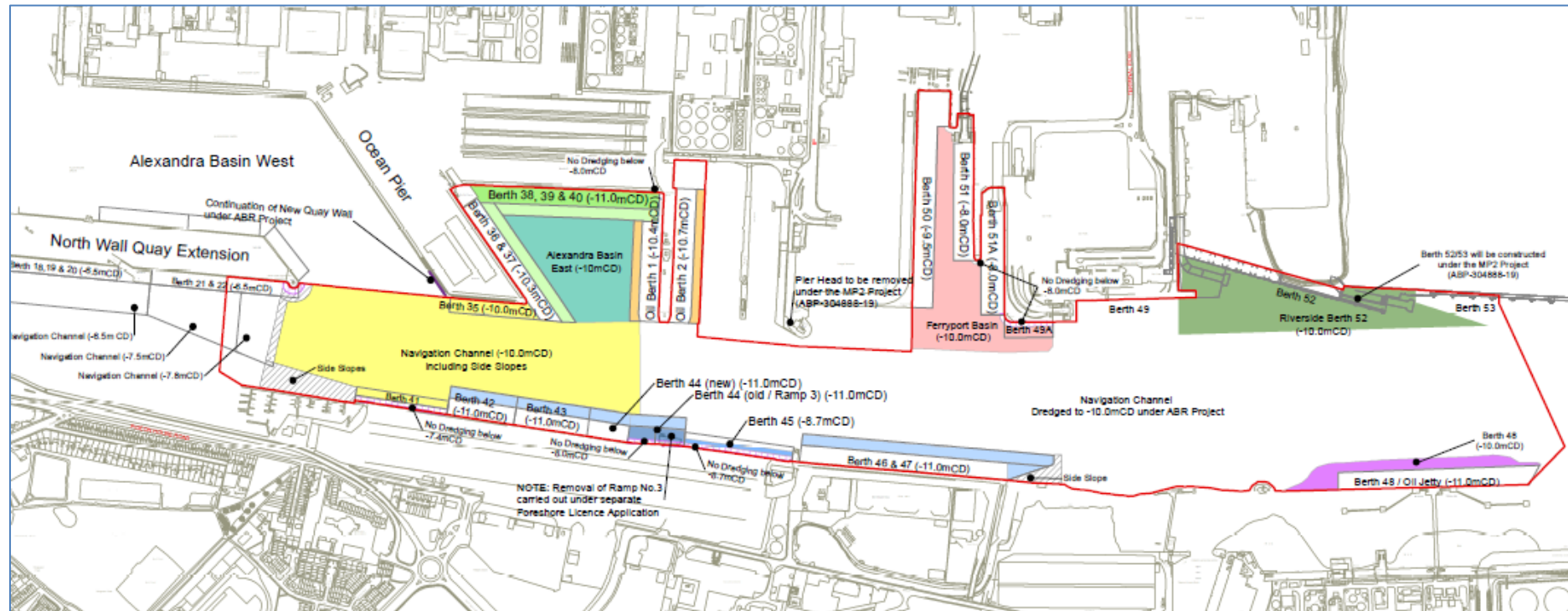


Table 2.1: Proposed widening of berth pockets

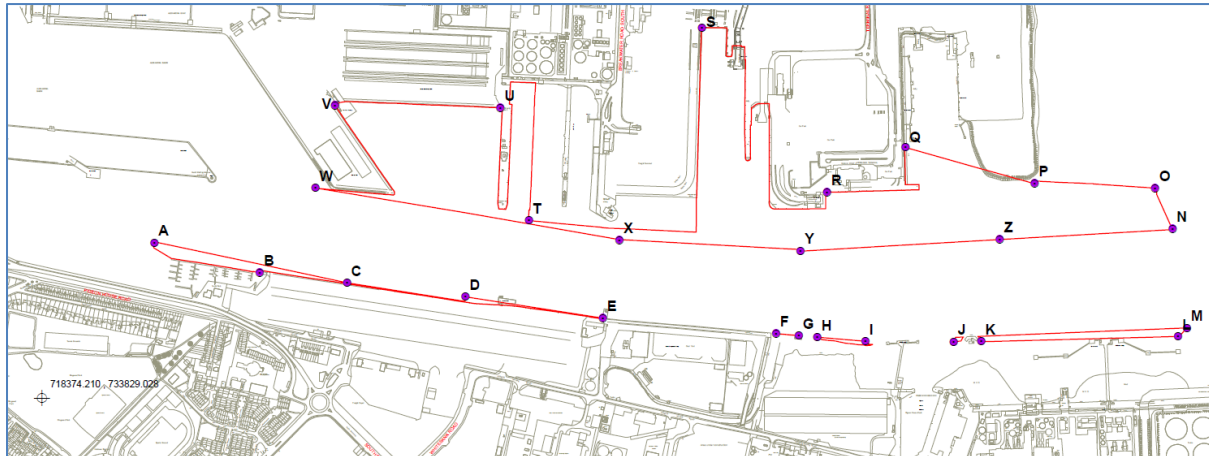
Element of work	Existing design width (m Chart Datum)	Proposed design width (m Chart Datum)
Navigation Channel, Ocean Pier		
Berth 35	25m	50m
Alexandra Basin East		
Berth 36 & 37	30m	50m
Berth 38, 39 & 40	30m	50m
Oil Basin		
Oil Berth 1	30m	50m
Oil Berth 2	30m	50m
South Port		
Berth 42	30m	50m
Berth 43	30m	50m
Berth 44	30m	50m
Berth 45	30m	50m
Berth 46 & 47	30m	50m

2.3 Elements of the capital dredge project which require Foreshore Consent under Section 10

The Applicant has applied for consent under Section 10 of the Foreshore Act 1933, as amended, for the following elements of the DPC Capital Dredge Project (Figure 2.2).

- Deepening of the southern side of the navigation channel from 7.8m CD to 10.0m CD in a narrow strip adjacent to the Poolbeg marina and Berths 41 to 44
- Deepening of Alexandra Basin East from 7.8m CD to 10.0m CD with Berths 36 and the berths pockets widened to 50m and Berths 38, 39 and 40 deepened to 11.0m CD and the berth pockets widened to 50m.
- Deepening of the Oil Basin from 7.8m CD to 10.7m CD with berth pockets at Berths OB1 and OB2 widened to 50m.
- Deepening of the Ferryport Basin from 7.8m CD to 10.0m CD.
- Deepening of riverside Berth 52 to 10.0m CD following construction of the new Berth 52 quay under the MP2 Project (ABP-304888-19).
- Widening in a narrow strip of the berth pockets at South Port Berths 42, 43, 44, 45, 46 and 47 to 50m.
- Removal of a narrow strip of the ridge between the navigation channel and the Poolbeg Oil Jetty (Berth 48) to 10.0mCD.

Figure 2.2: Works to DPC under capital dredging project requiring Foreshore Consent under Section 10



2.4 Elements of the capital dredge project which require Foreshore Consent under Section 3

Capital dredging is proposed in the main navigation channel between the North Wall Quay Extension and the Western Oil Jetty to deepen the channel from 7.8m CD to a standard depth of 10.0m CD (Figure 2.3). This element of dredging will complete the dredging of the navigation channel envisaged by the Alexandra Basin Redevelopment (ABR) Project, originally permitted under Foreshore Licence MB/2016/01725 but which only remains valid to 20th June 2022.

The western limit of the dredging of the navigation channel will be 15m downstream of an existing subsea 220 kV cable crossing of the River Liffey which is located between Poolbeg Marina and the terminus of the North Wall Quay Extension. The cable lies at a depth of circa 10m CD. Terminating the capital dredging 15m downstream of the cable crossing creates a sufficient buffer to ensure it is not affected in any way.

2.5 Volume of dredge spoil

The volume of capital dredging required for each element of the works, as described above, has been calculated from hydrographic surveys undertaken by Hydromaster in Q3 2020. The total dredge volume is estimated to be 500,000m³. This includes a siltation tolerance/contingency to account for material which has settled in Dublin Harbour in the period between successive maintenance dredging campaigns and the commencement of the capital dredging campaign. Table 2.2 provides a breakdown of the expected volume of material to be dredged in the different elements of the project.

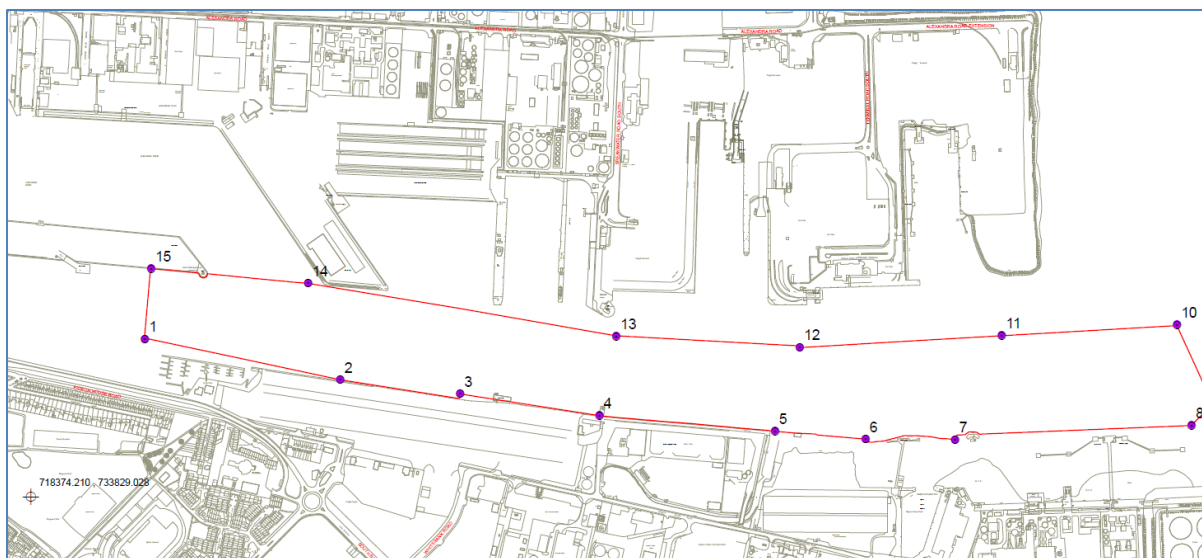
Table 2.2: Capital dredging volumes in Foreshore Consent application

Project element	Estimated dredge volume above design (m ³)
Zone 1 – Navigation Channel	121,008
Zone 2 – South Port Berths	26,146
Zone 3 – Alexandra Basin East	47,020
Zone 4 – Oil Basin	7,842
Zone 5 – Ferryport Basin	27,970

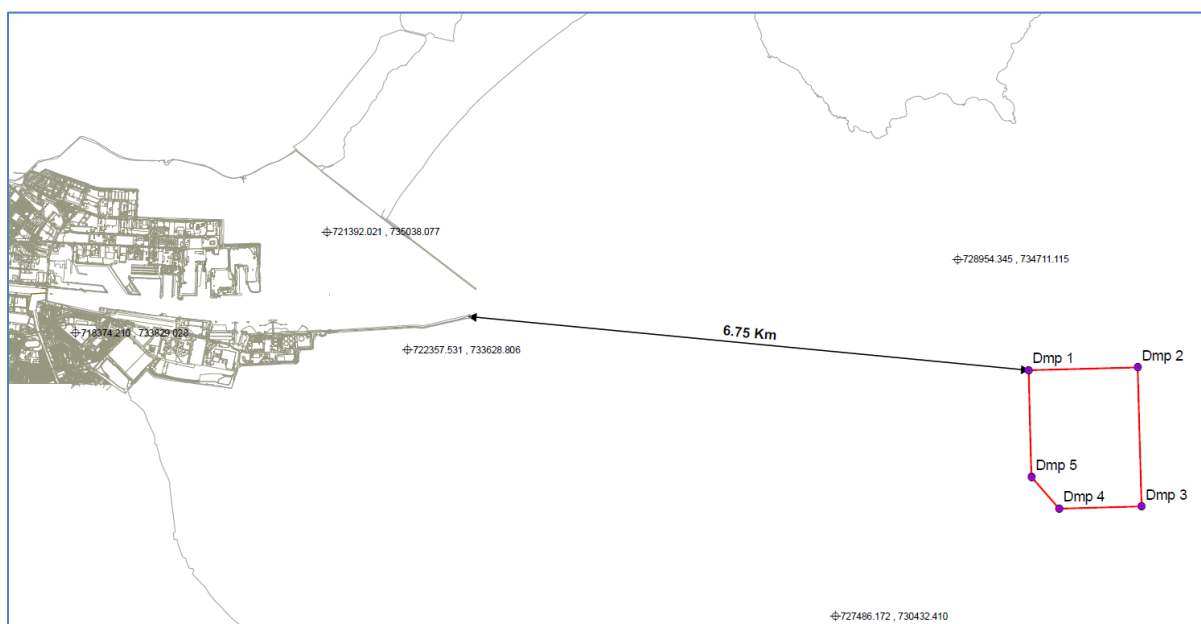
Project element	Estimated dredge volume above design (m ³)
Zone 6 – Riverside Berth 52	127,515
Zone 7 – Poolbeg Oil Jetty (Berth 48)	11,296
Dredge Volume (m ³)	368,797
Siltation / Tolerance / Contingency(m ³)	131,203
Total Dredge Volume (m ³)	500,000

Figure 2.3: Works to DPC under capital dredging project requiring Foreshore Consent under Section 3

a) Loading area



b) Disposal area



2.6 Disposal of dredge spoil

It is proposed to dispose of the dredged material at the licensed disposal site at the entrance to Dublin Bay located to the west of the Burford Bank (Figure 2.3b). The approved dump site is located approximately 7km east of Poolbeg and 3km south of Howth Peninsula, immediately west of the Burford Bank. The dump site covers an area of 2.27 km² and is currently used by Dublin Port to dispose of dredge spoil from licensed capital and maintenance dredging works. The dump site has been in regular use since 1996. A Dumping at Sea Permit will be required for the disposal of the DPC Capital Dredging Project dredged material at this site.

This site is currently being used to dispose of dredge spoil arising from the ABR Project under Dumping at Sea Permit S0024-01 as granted by the EPA in September 2016. The site is also used by DPC for the disposal of dredge spoil arising from maintenance dredging. The site is similarly used for the disposal of dredged spoil from Dun Laoghaire and Howth Harbours.

2.7 Characteristics of the material to be dredged

The material to be dredged comprises clays, silts, sands and gravels with occasional cobbles. No dredging of rock is required.

The DPC undertook sediment chemistry sampling and analysis and eco-toxicity testing in accordance with the Maine Institute's Sediment Analysis Plans (2020). The sediment chemistry and eco-toxicological testing results have confirmed that the material to be dredged is suitable for disposal at sea.

2.8 Dredging operation

2.8.1 Loading operation

The capital dredging works will be carried out using a trailing suction hopper dredger (TSHD) and/or a backhoe dredger.

The TSHD operates by lowering its trailing arm until the dredging head makes contact with the seabed. The sediments on the seabed are then sucked up through the trailing arm into a hopper located within the hull of the vessel (similar in many ways to a giant vacuum cleaner). When the allowed capacity of the hopper has been reached, the TSHD lifts the trailing arm back into its resting position and sets sail to the licenced offshore disposal site to dispose of the dredged material. Computer controlled equipment on board the TSHD accurately sets the depth and track of the dredge head and monitors the quantity of material being dredged. The tracks of the TSHD for each loading and disposal trip are also recorded. No overspill of the hopper will be permitted during the loading operations to minimise the amount of suspended solids within the River Liffey channel during the loading operations. When working within the navigation channel, the TSHD will also work in the direction of flow to avoid any potential of creating elevated levels of suspended solids across the River Liffey.

There will also be a requirement for a back-hoe dredger mounted on a barge on site to carry out small scale elements of the dredging works, notably for areas where the TSHD cannot reach or where the material is too stiff to be removed by the TSHD. This material is either pulled into the track of the TSHD for collection or loaded into a separate hopper barge which is taken directly to licenced offshore sea disposal site to dispose of the dredged material. Alternatively, the dredging contractor may select a back-hoe dredger mounted on a barge, supported by hopper barges, to be the primary means of undertaking the capital dredging

works. Other ancillary equipment will include a bed-leveller to remove peaks and troughs created by the dredger and a survey vessel.

2.8.2 Disposal operation

The disposal operations will be undertaken by the TSHD, or equivalent hopper barge, within the confines of the disposal site. The TSHD has doors at the bottom of the hull which are opened whilst the vessel moves at low speed allowing the dredged material within the hopper to be released. The disposal operation typically takes 10-15 minutes to empty the hopper. The hopper is then washed down with seawater whilst remaining within the confines of the disposal site before returning to the loading area. Each loading / dumping trip typically takes 2-4 hours.

2.8.3 Programme

The Dublin Harbour Capital Dredging Project application is for an 8-year consent. The following programme constraints will apply:

- Capital dredging will be undertaken in the a busy working port. The dredger is likely to require multiple movements to give way to vessels moving to and from the port and vessels berthed at the port.
- Capital dredging of Berth 35 can take place only after the completion of the Ocean Pier redevelopment works permitted under the ABR Project.
- Capital dredging of riverside Berth 52 can only take place after completion of the new quay wall across the entrance to the basin containing existing Berths 52/53.
- Capital dredging of the South Port Berths in the vicinity of Ramp 3 can take place only after the removal of existing Ramp 3 and the demolition of its caisson supports.
- The capital dredging operations will be restricted to the winter seasons (October to March).

The project will be delivered through a series of discrete work packages to minimise disruption to existing port activities. Given the above constraints, the capital dredging programme will need a high degree of flexibility.

Experience of capital dredging at Dublin Port through the ABR Project has shown that circa 1,000,000m³ of material from the navigation channel was removed from the navigation channel each winter season (October to March). The rate of dredging is likely to be slower during the Dublin Harbour Capital Dredging Project because of the additional constraints outlined above. Nevertheless, even as a worst-case scenario if capital dredging is a factor of 4 times slower compared to the ABR Project, the total time, within the 8-year timeframe, that dredging will take place to remove the required 500,000m³ will only be circa 12 months.

2.8.4 Working hours

It is proposed that the capital dredging operations will be carried out on a 24-hour basis, 7 days a week. Noise monitoring will be put in place and adjustments made to the working hours, if required, to ensure compliance with Dublin City Council's standard construction noise limits for day-time and night time working.

2.8.5 Traffic

The Dublin Harbour Capital Dredging Project will be undertaken by specialist dredging vessels arriving by sea and departing by sea. Occasional service vehicles are required for bunkering

and removal of skips of waste. Private car use will be limited to circa 10 dredging contractor staff. Consequently, there will be no perceptible traffic impact on the national road network.

2.8.6 Decommissioning

Following completion of the capital dredging phase of the works, any temporary works required to facilitate the capital dredging permanent works will be removed from site such as temporary marker buoys.

There are no plans proposed for the decommissioning of the permanent marine works of the Dublin Port Capital Dredging Project given the nature of the Port development.

SECTION 3 - RELEVANT ANNEX IV SPECIES

Under Article 12 of the Habitats Directive, Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. Those Annex IV species (cetaceans, marine turtles and otters) that could potentially occur in the project area are described below. Section 7.2.2 of the applicant's EIAR provides relevant baseline information with respect to marine mammals.

Field surveys of cetaceans

Dedicated harbour porpoise surveys off County Dublin were first carried out in 2008, when distance sampling was used to calculate density and abundance estimates in North County Dublin and Dublin Bay (Berrow *et al.* 2008, 2014). Subsequent to SAC designation as the Rockabill to Dalkey Island SAC in 2011, surveys of the site were carried out in 2013 and 2016 (Berrow & O'Brien 2013, O'Brien & Berrow 2016).

A number of field studies have been carried out under the ABR Project marine mammal monitoring programme which has led to a significant increase in our knowledge of harbour porpoise in Dublin Harbour, Dublin Bay and in the surrounding area. These include sightings during maintenance dredging campaigns (September 2017, April 2018 and September 2020) and capital dredging campaigns (October- March, 2017-2020) and static acoustic monitoring.

Under the ABR Project, a Static Acoustic Monitoring programme using C-PODs was initiated to better inform on how harbour porpoise use the spoil grounds prior to, and during, the capital dredging campaign and to monitor if any displacement occurred. Data collected during acoustic monitoring as part of the ABR Project was explored to determine the influence of seasonal and diel and tidal patterns on occurrence.

Harbour porpoise

Dedicated porpoise surveys off Co. Dublin were first carried out in 2008, when density estimates of 2.03 porpoises per km² were recorded in North County Dublin and 1.19 porpoises per km² in Dublin Bay (Berrow *et al.* 2008). The densities off North County Dublin ranged from 0.54 to 6.93 and were the highest recorded at any of the eight sites surveyed by Berrow *et al.* (2014), including two cSACs off the southwest which were designated to protect harbour porpoise.

A survey of the Rockabill to Dalkey Island SAC in 2013 resulted in density estimates ranging from 1.13-2.61, with an overall density of 1.44 porpoises per km² which was similar to an overall density of 1.61 for the two sites combined in 2008. A second survey was carried out in 2016 which reported densities between 1.37 and 1.87 porpoises per km² and with an overall density of 1.55 porpoises per km². All these density estimates are very consistent and high compared to other sites in Ireland supporting the conclusion that Dublin Bay, and especially North County Dublin, provide some of the most important habitats for harbour porpoise in Ireland. Calves consistently accounted for around 7% of the porpoises surveyed and porpoise are thought to move offshore to calve in April-May before moving back inshore. The diet of harbour porpoise is poorly known but thought to consist of small benthic or demersal fish such as gobies, sandeels, whiting and other gadoids and pelagic species such as herring and sprat when available (Rogan 2008).

There were 77 sightings (26% of total marine mammal sightings) of harbour porpoise during the first season of the ABR Project capital dredging campaign (2017-2018) and one sighting

of a single bottlenose dolphin. All sightings were outside Dublin Harbour with sightings increasing further east and on the spoil ground (Figure 3.1a).

Between October 2018 and March 2019 during the capital dredging campaign there were 44 sightings of harbour porpoise, which was 33% of all marine mammal sightings. Again all sightings were outside Dublin Harbour with sightings increasing further east and on the spoil ground (Figure 3.1b).

During the 2019 - 2020 campaign there were 84 sightings of harbour porpoise with (27% of all marine mammal sightings) with all sightings at the spoil ground and in the channel outside Dublin Harbour (Figure 3.1c).

A similar pattern was recorded during maintenance dredging campaigns. A total of 35 sightings of harbour porpoise (32% of all marine mammal sightings) were recorded from 14 to 30 September 2017, 29 (16%) between 9 to 22 April 2018 and 37 sightings (53%) 10 to 27 September 2020.

Static Acoustic Monitoring

Four locations were monitored using C-PODs, during the Static Acoustic Monitoring programme under the ABR Project (Figure 3.2). The monitoring is presented in three sections (ABR1: May 2017-April 2018, ABR2 May 2018-April 2019, ABR3: May 2019-April 2020). Generalized linear mixed-effect models (GLMM) were carried out to assess significant differences between monitoring locations, allowing for a detailed but preliminary assessment of fine scale use of the survey area during the dredging campaign by harbour porpoise.

ABR1: May 2017-April 2018

The sampling period varied between 140 and 259 days at each location. Harbour porpoise were the most frequently detected odontocete species, with few confirmed dolphin detections during this deployment and were present on average 97-100% of days monitored. The highest detections were at Buoy 1, with around one-half of these detections at the other sites but early retrieval of the C-POD on Buoy 3 and the loss of the C-POD from Buoy 4, resulted a lower number of monitoring days at these sites.

Modelling showed presence was highest during autumn months at Buoy 3 and during the winter months at Buoys 1 and 2 and during the hours of darkness (incl. dawn and dusk) and a range of tidal cycles and phases.

ABR2: May 2018-April 2019

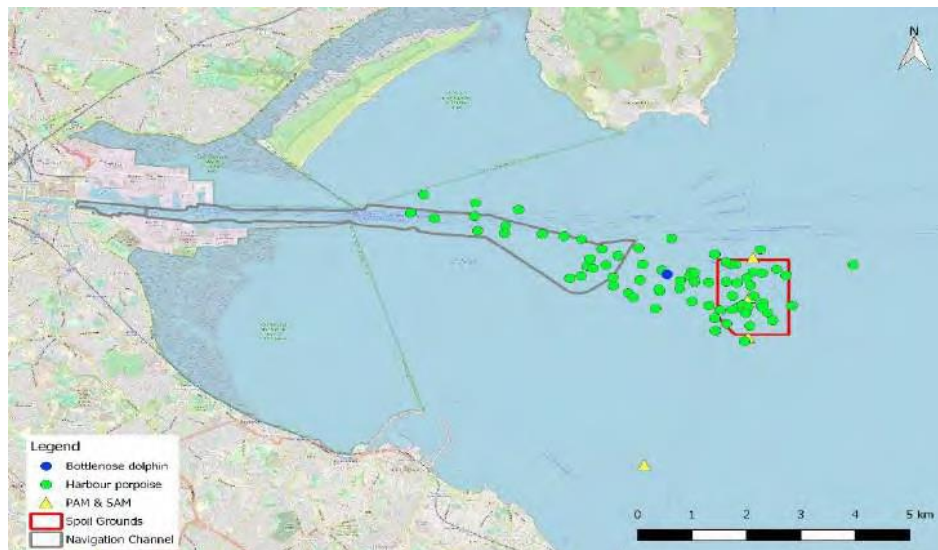
Harbour porpoise were present on 98-100% of days between 2018 to 2019, but detection rate was highest at the control site in Dalkey Bay. Again modelling showed presence was highest during autumn months at Buoy 3 and during the winter months at the other sites and during the hours of darkness (incl. dawn and dusk) and a range of tidal cycles and phases.

ABR3: April 2019-April 2020

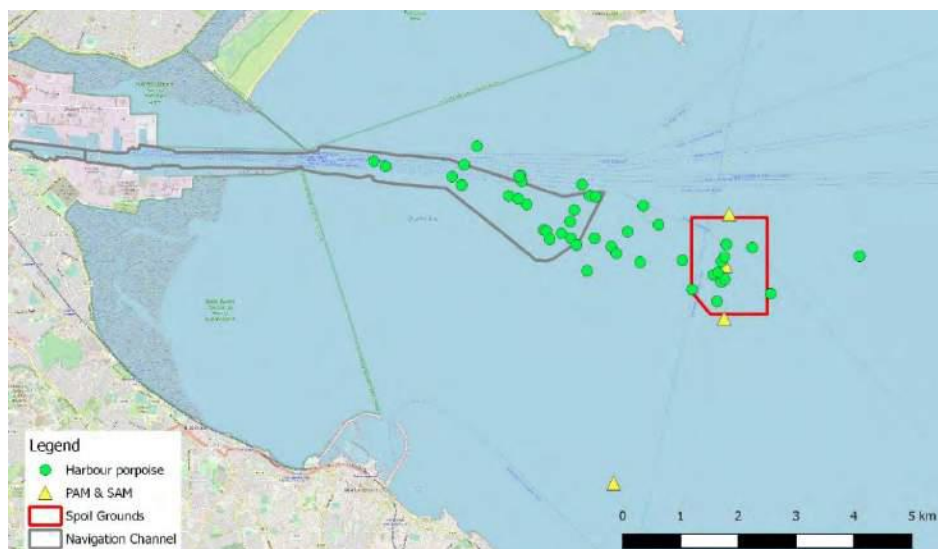
During the 369-day sampling period between May 2019 and April 2020, harbour porpoise were detected on between 77 and 100% of days at all monitoring sites; the lowest 77% at the control site in Dalkey Bay. The highest detections were at Buoy 1, the north site off the spoil ground. Modelling showed presence was highest during autumn months at Buoy 4 and during the winter months at all other buoys and during the hours of darkness (incl. dawn and dusk) and a range of tidal cycles.

Figure 3.1: Harbour porpoise and bottlenose dolphin sightings during a) 2017-2018 b) 2018-2019 and c) 2019-2020 capital dredging campaigns

a)



b)



c)

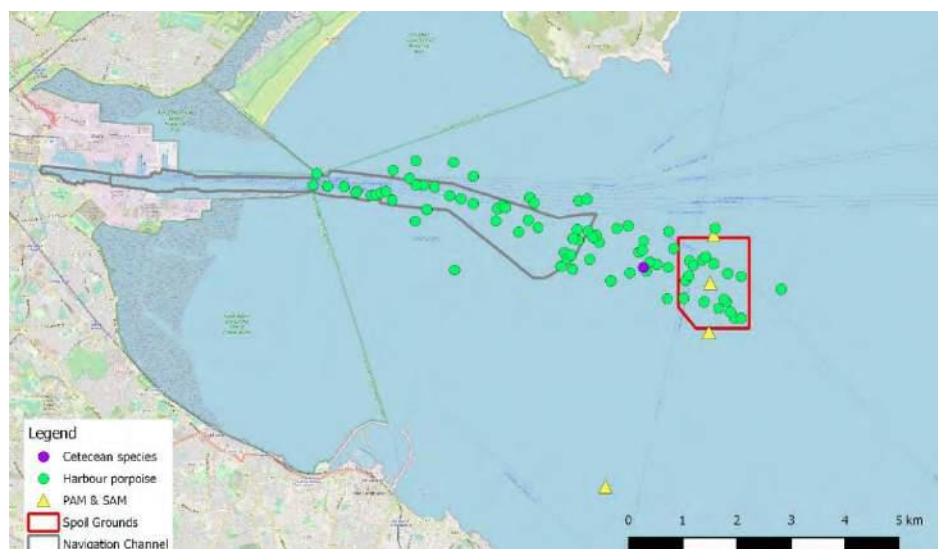
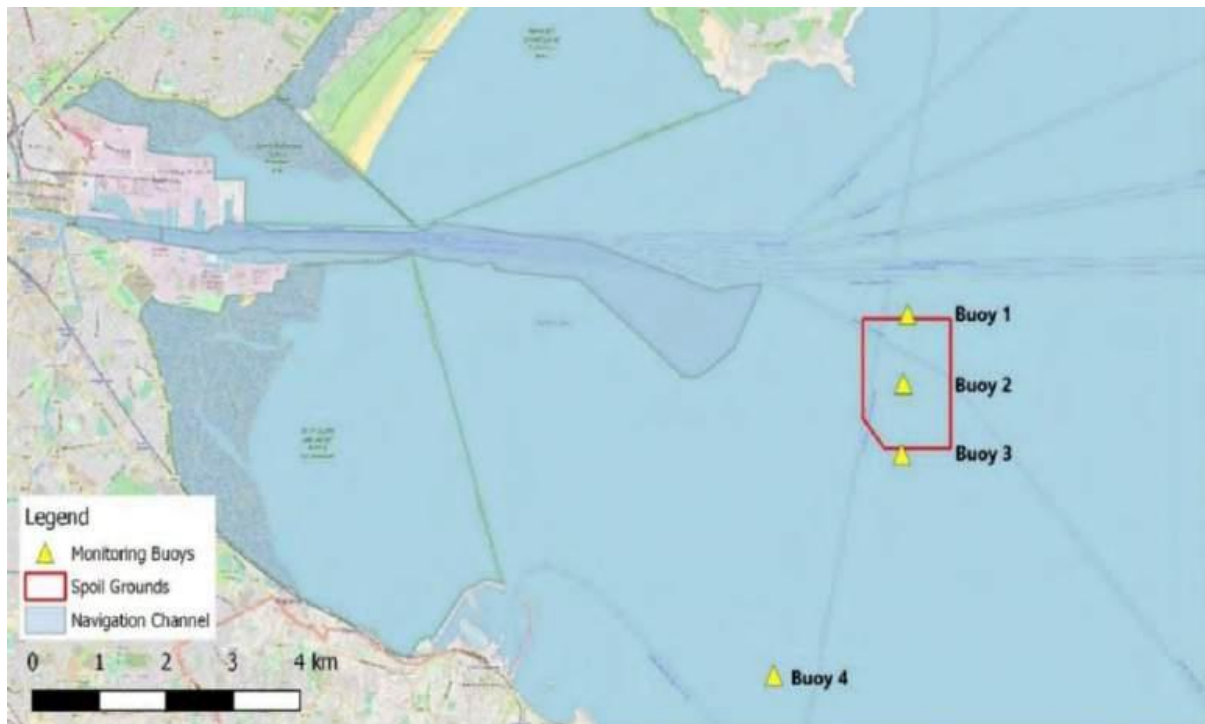


Figure 3.2: Monitoring buoy positions within the spoil grounds and Dublin Bay



Note: Buoy 1: North Spoil Ground, PAM & SAM, Buoy 2: Middle Spoil Ground, PAM & SAM, Buoy 3: South Spoil Ground SAM and Buoy 4: Control off Dalkey, SAM)

There was a clear increase in detections during the winter months while dredging operations were ongoing (Figure 3.3). This was consistent across dredging campaigns. What led to this increase in detections is unclear, whether it is due to increased foraging opportunities or difficulties in navigation but there does not appear to be any displacement from the spoil grounds during disposal of dredged spoil.

The results from this visual and acoustic monitoring show that harbour porpoise do not use the immediate port area and are rarely recorded inside the harbour. Thus harbour porpoise in Dublin Bay will only be affected by dumping of spoil and associated shipping and not to dredging activity inside the harbour.

Other cetaceans

Bottlenose dolphin and minke whale are frequently recorded in, or adjacent to, Dublin Bay. Bottlenose dolphins have been reported throughout the year, though mainly in the summer and from all along the coast, but mainly off Howth Head and especially from Dún Laoghaire and south to Wicklow. Most sightings are of small groups though occasionally large groups of greater than 20 dolphins occur but usually only for short periods. A small group of 3 individual bottlenose dolphins frequented Killiney Bay from August 2010 to August 2012. Bottlenose dolphins off Dublin are part of the highly mobile coastal population which has been recorded all around the Irish coast and some individuals reported off Scotland (O'Brien *et al.* 2009, Robinson *et al.* 2012). Surprisingly, there was no evidence of movement between the east coast of Ireland and Wales, which holds a large number of this species. This highly mobile Irish coastal population is thought to number between 200-400 individuals.

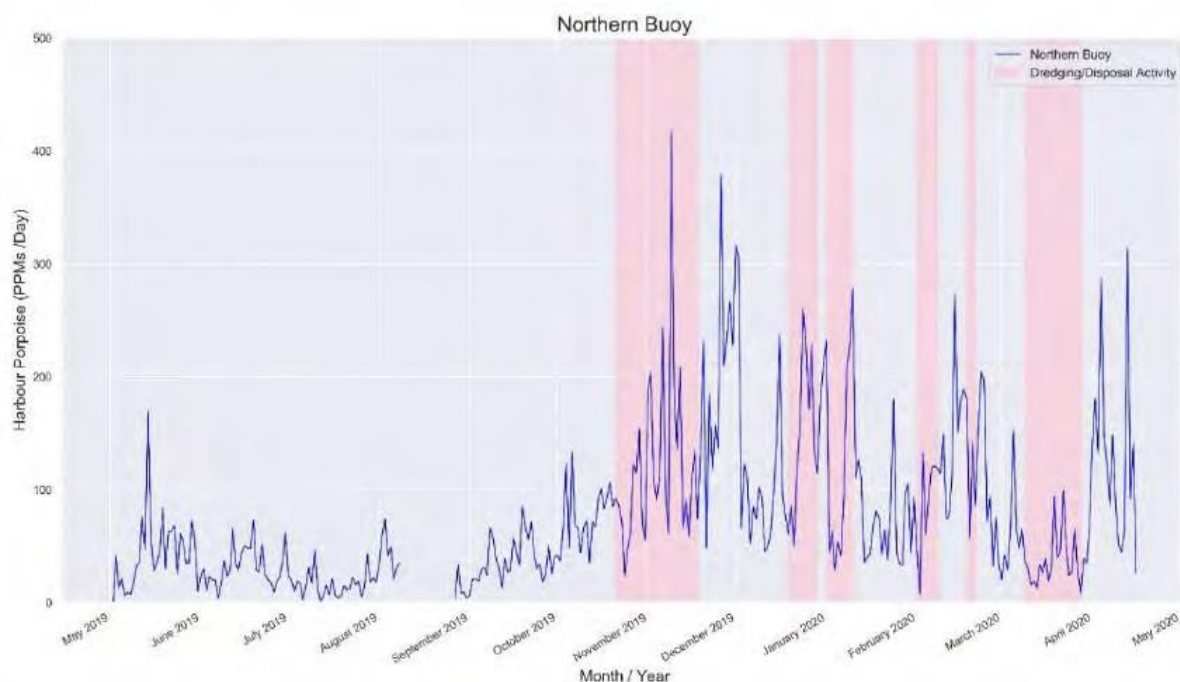
Risso's dolphin were regularly recorded to the south of Dublin Bay, in the spring and early summer for a number of consecutive years from 1999 to 2006 but have not been recorded regularly since 2013. They were likely part of a wider Irish Sea population whose occurrence is associated with the presence of squid, which may be an unpredictable food source.

Minke whales occur seasonally, especially off north County Dublin from Howth Head to Lambay Island and on the Kish Bank. They are usually solitary but up to 5 have been seen foraging in the same area at any one time.

Common dolphin and humpback whales have also been recorded. Common dolphins are thought to be more abundant in the Irish Sea in the summer and tend to occur further offshore than bottlenose or Risso's dolphins. They have been recorded from Rockabill to Dun Laoghaire.

Single humpback whales were recorded in July for two consecutive years in 2010 and 2011 off north Dublin and are thought to be increasing in number in Irish coastal waters.

Figure 3.3: Number of harbour porpoise and dolphin species detections per day recorded at site to the north of the spoil grounds



Note: Red transparency columns indicate the dates of the capital dredging campaigns (2019-2020).

Other Annex IV species

Otter

Otters are widespread in Ireland, found in a variety of aquatic habitats, both freshwater and marine. However, they always require access to fresh water.

The Dublin City otter survey conducted over 2018 and 2019 (Macklin *et al.* 2019) indicated that most of Dublin Port featured very high levels of human activity (industrial zone) and was largely unsuitable for otter. The causeway to Poolbeg lighthouse, whilst featuring very high overall levels of human disturbance, supported two regular otter spraint sites at the top of

concrete steps. Three otter holts were recorded (two active, one inactive), located in largely inaccessible areas of habitat on the north side of Dublin Port.

No otter prints, spraints or prey remains were recorded during terrestrial surveys of the Dublin Port MP2 area conducted in 2018 and 2019, and it was considered that the area was of negligible value to local populations of otter.

Marine turtles

Five species of marine turtle have been recorded in the seas around Ireland and the UK: leatherback turtle (*Dermochelys coriacea*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*). The leatherback turtle is the largest of the marine turtles and is the only species of turtle to have developed adaptations to cold water (Goff & Stenson 1988).

A significant majority of turtle sightings recorded in Irish waters are of the leatherback turtle (King & Berrow 2009), which migrates into the waters of the Celtic and Irish Seas in response to the distribution of the gelatinous zooplankton which make up their favoured diet (Doyle *et al.* 2008, Fossette *et al.* 2010). Tagging studies show that they migrate across the Atlantic from the eastern American mainland and the Caribbean (Hays *et al.* 2004, Doyle *et al.* 2008). Sightings in the wider region are concentrated off the south and west of Ireland, the southwest of England and the west coast of Wales but also in the Irish Sea. Most sightings occur in the summer, peaking in August (Penrose & Gander 2016, Botterell *et al.* 2020). The decadal trend of records in the UK and Ireland for leatherback turtles generally increased, peaking in the 1990s from which it has since decreased. Data from the National Biodiversity Data Centre² reflects these patterns with the predominance of sightings in the south and west of Ireland, and relatively few sightings in the Irish Sea, the latest of which was recorded in 2004. Aerial surveys for the ObSERVE project from 2015-2016 recorded a handful of leatherback turtle sightings at the southern limits of Irish offshore waters in summer; none were observed in the Irish Sea (Rogan *et al.* 2018).

² <https://maps.biodiversityireland.ie/Species/128443>

SECTION 4 - RISK ASSESSMENT

4.1 Potential impacts associated with dredging programme

The Dublin Harbour Capital Dredging Project will require the dredging and disposal of 500,000m³ over the life of the project (2022 – 2029). Capital dredging will take place between October and March.

Section 7.2.4 of the applicant's EIAR describes the likelihood of significant impacts associated with the capital dredging programme.

Underwater noise

Marine mammals, especially cetaceans, have well developed acoustic capabilities and are sensitive to sound at much higher frequencies than humans (Richardson *et al.* 1995). They are less sensitive to the 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 by the vessel during dredging and transiting to and from the dump site, the noise generated by dredging and that generated during dumping.

Dredging has been shown to displace bottlenose dolphins from a busy shipping port in Scotland over a prolonged dredging campaign (Pirotta *et al.* 2013). Diederichs *et al.* (2010), through the use of acoustic monitoring with click detectors, showed that harbour porpoises temporarily avoided an area where sand extraction took place off the Island of Sylt, Germany. However, a guidance document by the World Organisation of Dredging Associations (WODA 2013) suggested that sound produced from dredging has the potential to impact on aquatic life and it is assumed that most of these impacts would concern disruption of communication due to masking or alteration of behaviour patterns. However, cumulative and long-term exposure leading to Temporary Threshold Shift has to be considered for marine mammals (Kastelein *et al.* 2012), but Permanent Threshold Shift or other auditory injuries are unlikely.

The capital dredging and disposal operations will span at least eight winter seasons, between 2022 and 2029, with no more than 500,000m³ of spoil being disposed of in total.

Dredging is likely to be carried out by a Trailing Suction Hopper Dredger (TSHD). Previous studies on sound production by a TSHD in silt/mud substrates have found that maximum source levels from the various activities associated with TSHD dredging (including the dredging process, transit to the disposal site, placement, pumping and rainbowing) to be very similar with dredging itself and not producing sounds louder than those produced by the dredger during transit (De Jong *et al.* 2010). This study was carried out on the sound production by seven TSHDs during construction of a 2,000 ha harbour extension of the Port of Rotterdam. More recently, Robinson *et al.* (2011), found that emitted sound levels from TSHDs at frequencies below 500 Hz were similar to a deep-draught cargo ship travelling at a moderate speed.

Noise measurements were taken during maintenance dredging in July 2016 to determine the acoustic noise generated during the dredging and dumping operations (RPS 2016). Underwater noise measurements were carried out using an underwater noise recorder, moored less than 300 m from the dredging activity and approximately 90 m from the dumping activity. Tonal components between 200 Hz and 2 kHz were attributed to the pump with dredging generating more higher-frequency noise than the dumping operation but both showed a significant drop in energy at frequencies above 2 kHz. The 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 μ Pa. The sound level for the dumping operation at a range of 90m was very slightly above the disturbance threshold for harbour porpoise, but this level was still below the general behavioural threshold for marine mammals of 160 dB re 1 μ Pa SPLRMS adopted by NOAA. This study confirms that noise emitted from dredging operations does not significantly impact harbour porpoise at ranges of 213m, but the noise emitted from dumping operations may impact harbour porpoise at close ranges of less than 100m. The impact of dredging and dumping noise is not regarded as likely to have a significant effect while proposed mitigation (Section 4.2), will reduce this potential impact further.

The Dublin City otter survey conducted over 2018 and 2019 (Macklin *et al.* 2019) indicated that most of Dublin Port featured very high levels of human activity and was largely unsuitable for otter. There is the potential for disturbance and displacement of otter which may be transiting through or foraging within the Inner Liffey channel. However with the implementation of mitigation measures (Section 4.2), the potential for significant impact is unlikely.

Available information on potential effects of underwater sound on marine turtles is very limited (Nelms *et al.* 2016). The hearing range of cheloniid species has been estimated as between 50-2,000Hz, with highest sensitivity below 400Hz (Popper *et al.* 2014). For leatherback turtles, measurements made on hatchlings suggested a similar low frequency sensitivity, with sound detection ranging between 50 and 1,200Hz when in water and between 50 and 1,600Hz in air (Dow Piniak *et al.* 2012). Underwater noise generated by dredging may be detectable by leatherback turtles, although their low density and limited seasonal presence in the area dictates that very few individuals are likely to be exposed to noise levels beyond that of the background for the region.

Physical disturbance and collision risk

The risk of injury or mortality is considered extremely low as cetaceans are exposed to considerable vessel traffic on a daily basis and would be aware of their presence. The dredge 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 an Annex IV species is extremely unlikely. The duration of the release of dredged material last around 10-20 minutes and the vessel slows down during spoil release.

Turbidity

Turbidity levels at the disposal site are monitored during and outside of disposal activities (CEMP). The data indicates that there is no sustained or widespread impact on turbidity due to dumping. The short term increase in turbidity caused during the dumping process will have a local impact of short duration and will have no impact on Annex IV species or their preferred prey.

Indirect impacts on preferred prey

No adverse effects on fish species is expected from dredging and disposal operations. SAM data from the ABR project (Russell *et al.* 2019, 2020) has recorded an increase in acoustic detections of harbour porpoise during disposal operations. Increased click detections are concurrent with increased foraging clicks suggesting harbour porpoises may be taking advantage of increased foraging opportunities presented during disposal at Burford Bank.

Cumulative effects

The projects that will potentially have cumulative impacts on Annex IV species in conjunction with the Dublin Harbour Capital Dredging Project are as follows:

DPC Maintenance Dredging (2022-2029)

This falls into the category of regular port management in that it secures navigable depths within the shipping channel, basins and berths of Dublin Port and is repeated as required on a regular basis to allow the port to operate efficiently and safely. This campaign will see a total of up to 2.4million m³ of sediment, mainly sand and mud, dredged from any part of the port as required and disposed of at the licenced dump site. Consent will have several conditions attached in order to minimise potential environmental impact as follows:

1. The annual maximum which can be dredged is 300,000m³, all between April and September each year.
2. No dredging will be permitted upstream of Berth 49 between April 1st and May 14th each year in order to minimise potential impacts on outward migrating salmon smolts.
3. No overspill of the TSHD hopper will be allowed within the inner Liffey channel.

With respect to timing of dredging there will be no activity overlap between the maintenance dredging project and the proposed capital dredging project as the latter will be undertaken from October to March each year. No cumulative impact will therefore occur.

MP2 Project

The MP2 project (described in Section 4.5.2 of the applicant's AA screening and NIS report) will overlap with the 2022-2029 capital dredging as both will see spoil disposal within the October-March window. However, dredging will not run concurrently, i.e., only one dredger will operate at any one time. To put the volumes of spoil into perspective, even if all of the 500,000m³ of the 2022-2029 capital dredging was disposed of in the same year as the 424,644m³ of the MP2 Project³, it would be similar to a single year of the ABR capital dredging just completed (see Section 2.8.3). However, the likelihood is that both projects will be staggered across several years due to considerations related to the associated quayside construction sequencing. Potential cumulative impacts are therefore considered to be *de minimus*.

4.2 Mitigation measures

The likelihood of impacts without mitigation are low and the effects also low. However, mitigation is recommended, in line with best practice and long term acoustic monitoring. Proposed mitigation, through the implementation of NPWS (2014) Guidelines and appropriate Mitigation Zone will reduce this potential impact further.

The following precautionary measures will be undertaken to minimise the risk of injury or disturbance to marine mammals in the area of operations in line with National Parks and Wildlife Service (NPWS) Guidelines (2014):

- A trained and experienced Marine Mammal Observer (MMO) will be put in place during dredging and dumping operations. The MMO will scan the surrounding area to ensure

³As part of the MP2 foreshore licence application and in response to a request for information from the EPA, in relation to the Dumping at Sea permit application S0024-02, Dublin Port Company provided a supplement application to increase the volume of material to be dredged at Berth 53 by 243,673m³ to 403,268m³. The total volume of material proposed to be dredged as part of the MP2 Project was therefore revised to 668,317m³.

no marine mammals are in a predetermined exclusion zone in the 30-minute period prior to operations. The NPWS exclusion zone is 500m for dredging activities.

- Noise-producing activities will only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring is not possible, the sound-producing activities will be postponed until effective visual monitoring is possible. Visual scanning for marine mammals (in particular harbour porpoise) will only be effective during daylight hours and if the sea state is WMO Sea State 4 (≈Beaufort Force 4 conditions) or less.
- If there is a break in dredging activity for a period greater than 30 minutes then all pre-activity monitoring measures and ramp-up (where this is possible) will recommence as for start-up.
- Once normal operations commence, there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate, nor if marine mammals occur within a radial distance of the sound source that is 500m for dredging activities.
- Any approach by marine mammals into the immediate (<50m) works area will be reported to the National Parks and Wildlife Service.
- The MMO will keep a record of the monitoring using a 'MMO form location and effort (coastal works)' available from the National Parks and Wildlife Service (NPWS) and submit to the NPWS on completion of the works.

As an additional mitigation measure for harbour porpoise, a Static Acoustic Monitoring (SAM) programme, first established during the ABR Project, will continue for duration of the Dublin Harbour Capital Dredging Project. These stations will be monitored pre-dredging, during dredging and for a minimum of two years post-dredging in line with best international practice.

4.3 Conclusion

The potential for injury or disturbance to occur to Annex IV species as a result of the proposed capital dredging project is considered to be low. This risk will be further reduced by the implementation of mitigation, as outlined in Section 4.2. It is concluded that the proposed capital dredging project will not give rise to significant impacts to species listed under Annex IV of the Habitats Directive.

BIBLIOGRAPHY

Berrow SD, Hickey R, O'Brien J, O'Connor I & McGrath D (2008). Harbour Porpoise Survey 2008. Report to the National Parks and Wildlife Service. Irish Whale and Dolphin Group, 35pp.

Berrow S, Hickey R, O'Connor I & McGrath D (2014). Density estimates of harbour porpoise (*Phocoena phocoena*) at eight coastal sites in Ireland. *Biology and Environment* **114B**: 19-34.

Berrow SD & O'Brien J (2013). Harbour Porpoise Survey 2013. Report to the National Parks and Wildlife Service. Irish Whale and Dolphin Group, 34pp.

Botterell ZLR, Penrose R, Witt MJ & Godley BJ (2020). Long-term insights into marine turtle sightings, strandings and captures around the UK and Ireland (1910–2018). *Journal of the Marine Biological Association of the United Kingdom* **100**: 869–877.

De Jong CAF, Ainslie MA, Dreschler J, Jansen E, Heemskerk E & Groen W (2010). Underwater noise of Trailing Suction Hopper Dredgers at Maasvlakte 2: Analysis of source levels and background noise – TNO-DV 010 C335.

Diederichs A, Brandt M & Nehls G (2010). Does sand extraction near Sylt affect harbour porpoises? Wadden Sea Ecosystem, 199-203. EC. 2010. Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters. Brussels: European Commission.

Doyle TK, Houghton JDR, O'Súilleabháin PF, Hobson VJ, Marnell F, Davenport J & Hays GC (2008). Leatherback turtles satellite tagged in European waters. *Endangered Species Research* **4**: 23-31.

Dow Piniak WE, Eckert SA, Harms CA & Stringer EM (2012). Underwater hearing sensitivity of the leatherback sea turtle (*Dermochelys coriacea*): Assessing the potential effect of anthropogenic noise. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Herndon, VA. OCS Study BOEM 2012-01156. 35pp.

Evans PGH (2000). Marine mammals in the English Channel in relation to proposed dredging scheme. Unpublished Report by the SeaWatch Foundation. 21pp.

Fossette S, Hobson VJ, Girard C, Calmettes B, Gaspar P, Georges J & Hays H (2010). Spatio-temporal foraging patterns of a giant zooplanktivore, the leatherback turtle. *Journal of Marine Systems* **81**: 225-234.

Goff GP & Stenson GB (1988). Brown adipose tissue in leatherback sea turtles: a thermogenic organ in an endothermic reptile? *Copeia* **1988**:1071-1075.

Hays GC, Houghton JDR & Myers AE (2004). Pan-Atlantic leatherback turtle movements. *Nature* **429**: 522

Kastelein RA, Gransier R, Hoek L & Olthuis J (2012). Temporary threshold shifts and recovery in a harbor porpoise (*Phocoena phocoena*) after octave-band noise at 4kHz. *Journal of the Acoustical Society of America* **132**: 3525–3537.

King GL & Berrow SD (2009). Marine turtles in Irish waters. Special Supplement to the Irish Naturalists' Journal, 30pp.

Macklin R, Brazier B & Sleeman P (2019). Dublin City otter survey. Report prepared by Triturus Environmental Ltd. for Dublin City Council as an action of the Dublin City Biodiversity Action Plan 2015-2020, 84pp.

Mullen E, Marnell F & Nelson B (2021). Strict protection of animal species. Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a Public authority. National Parks and Wildlife Service Guidance Series 2, 71pp.

Nelms SE, Piniak WED, Weir CR & Godley BJ (2016). Seismic surveys and marine turtles: An underestimated global threat? *Biological Conservation* **193**: 49-65.

NPWS (2014). Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014. National parks and Wildlife Service, 7 Ely Place, Dublin 2.

O'Brien J & Berrow S (2016). Harbour porpoise surveys in Rockabill to Dalkey Island SAC, 2016. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group, 24 pp.

- O'Brien JM, Berrow SD, Ryan C, McGrath D, O'Connor I, Pesante P, Burrows G, Massett N, Klötzer V & Whooley P (2009). A note on long-distance matches of bottlenose dolphins (*Tursiops truncatus*) around the Irish coast using photo-identification. *Journal of Cetacean Research and Management* **11**: 71-76.
- Penrose & Gander (2016). British Isles & Republic of Ireland Marine Turtle Strandings & Sightings Annual Report 2015, 27pp.
- Pirotta E, Laesser BE, Hardaker A, Riddoch N, Marcoux M & Lusseau D (2013). Dredging displaces bottlenose dolphins from an urbanised foraging patch. *Marine Pollution Bulletin* **74**. 396-402.
- Popper AN, Hawkins AD, Fay RR, Mann DA, Bartol S, Carlson TJ, Coombs S, Ellison WT, Gentry RL, Halvorsen MB, Løkkeborg S, Rogers PH, Southall BL, Zeddies DG & Tavalga WN (2014). Sound exposure guidelines for fishes and sea turtles: A technical report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.
- Richardson WJ, Greene CR, Malm, CI & Thomson DH (1995). Marine Mammals and Noise. Academic Press.
- Robinson KP, O'Brien JM, Cheney B, Mandleberg L, Eisfeld S, Ryan C, Whooley P, Oudejans MG, O'Donovan M, Berrow SD, Costa M, Haberlin D, Stevick PT & Thompson PM (2012). Discrete or not so discrete: Long distance movements by coastal bottlenose dolphins in UK and Irish waters. *Journal of Cetacean Research and Management* **12**: 365-371.
- Robinson SP, Theobald PD, Hayman G, Wang LS, Lepper PA, Humphrey V & Mumford S (2011). Measurement of underwater noise arising from marine aggregate dredging operations – MEPF report 09/P108.
- Rogan E (2008). The Ecology of Harbour Porpoise (*Phocoena phocoena*) in Irish waters: what stranding programmes tell us ? In: S Berrow & B Deegan (Eds.). Muc Mhara – Ireland's smallest whale. Proceedings of the 2nd Irish Whale and Dolphin Group International Whale Conference, 19-21 September 2008, Killiney, Co Dublin.
- Rogan E, Breen P, Mackey M, Cañadas A, Scheidat M, Geelhoed S & Jessopp M (2018). Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017. Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.
- RPS (2016). Underwater Acoustic Emissions Dublin Port Report on July 2016 Dredging and Dumping Operations. Published Report 19pp.
- Russell C, O'Brien J & Berrow S (2019). Marine Mammal Annual Report Alexandra Basin Redevelopment Project: 2018-2019. Dublin Port Company. Unpublished report from the Irish Whale and Dolphin Group. 109pp.
- Russell C, O'Brien J & Berrow S (2020). Marine Mammal Annual Report Alexandra Basin Redevelopment Project: 2019-2020. Dublin Port Company. Unpublished report from the Irish Whale and Dolphin Group. 120pp.
- WODA (2013). Technical Guidance on: Underwater Sound in Relation to Dredging. World Organisation of Dredging Associations. Radex Building, Rotterdamseweg 183c, 2629 HD Delft, The Netherlands