ATTACHMENT A.1 – IMPACT ON THE RECEIVING ENVIRONMENT APPROPRIATE ASSESSMENT

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1. Appropriate Assessment – Haulbowline Naval Base & Port of Cork Dump Site

1.1 Introduction

This screening report has been prepared in accordance with ‘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’ published in 2001.

This report is supported by field surveys conducted as part of a previous application by the Port of Cork DaS License 50013-02.

The purpose of this report is to identify whether the survey plan – either alone or in combination with other plans or projects - is likely to have a significant effect on a European site. This report follows European Commission (2001) guidance which recommends that screening should:

1. Determine whether the plan is directly connected with or necessary to the management of the site.
2. Describe the plan and other plans and projects that in combination, have the potential to have significant effects on a European site.
3. Identify the potential impacts on the European site.
4. Assess the significance of any effects on the European site.

The assessment of likely significant effects of the proposed dredging works and the associated dumping of the dredge material has been assessed based on each Natura 2000 site and its qualifying features. The likelihood of effects would depend on whether there is an opportunity and a pathway for the effect to occur. The significance is taken as the effect on the sites qualifying features deemed at risk. If the effects are deemed to be either significant, potentially significant or if the screening becomes overly complicated then the process must proceed to Stage 2 (AA).

This Screening firstly identifies all Natura 2000 sites within close proximity to both the dredging area and the proposed dump site. A 15km buffer zone around both sites was chosen as a precautionary method. A precautionary approach has been used in this report meaning that unless it can be shown that there will be no likely significant effects on Natura 2000 sites, such an effect must be assumed.
1.2 The Plan

Haulbowline Naval Base is located on Haulbowline Island, Co Cork, and serves as the headquarters of the Irish Naval Service. The flotilla of light ships is berthed in the Naval Area A on the eastern side of Haulbowline Island, and conduct operational patrols around the coastline of Ireland from this location.

It is important that maintenance dredging be conducted in this area every c. 6 years to maintain a navigable water depth to allow clear access for Department of Defence vessels when berthing and departing the Naval Base. Recent survey information indicates that such dredging is now required to maintain minimum depths. The siltation of the Inner Harbour (herein referred to as Area A) and the Approach Channel (herein referred to as Area B) may be occurring through a number of different mechanisms:

- Mud and silt being transported into the Haulbowline Island environment from the nearby Owenboy River in suspension and being deposited in the sheltered areas in Haulbowline where they come out of suspension.
- Ships displacement of nearby mudflat deposits in the narrow Area B resulting in siltation at certain stages of the tide.
- Severe winter storms disturbing the sediment and transporting it into Area A and Area B.
- Propeller and bow thrusters action of the slips on arrival and departure of the Inner Harbour resulting in localised movement of sediments within the area and creating localised areas of high ground.

1.2.1 Previous dredging works

In the previous regime of maintenance dredging, completed in February 2011, the same methodology as is proposed for this application of dredging and disposal was implemented. The appointed dredging contractor UK Dredging Ltd. recorded detailed logs on the loading and dumping activities during each dumping voyage. Pre loading, Intermediate and post loading bathymetric surveys were completed by Hydrographic Surveys Ltd.

The previous loading operations were covered by the DoS Permit No. 50005-01 and involved the loading and dumping of 36,000 tonnes of material. An exclusion zone was specified where dredging would not take place (see table 1). This was due to the presence of heavy metals in samples taken at this location.

<table>
<thead>
<tr>
<th></th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>51°50.5682 N</td>
<td>08°17.9600 W</td>
</tr>
<tr>
<td>ii</td>
<td>51°50.5464 N</td>
<td>08°17.9452 W</td>
</tr>
<tr>
<td>iii</td>
<td>51°50.5209 N</td>
<td>08°17.9833 W</td>
</tr>
<tr>
<td>iv</td>
<td>51°50.5418 N</td>
<td>08°17.9996 W</td>
</tr>
</tbody>
</table>

Table 1: Previous exclusion zone coordinates

An OSPAR report was completed following completion of the dredging works. The Department of Defence was required to keep a record of any incident including details of the nature, extent, and impact of, and circumstances giving rise to the incident. There were no recorded incidents in relation to the works carried out under Permit No. 50005-01. The Department of Defence was also required to keep a record of all complaints of an environmental nature related to the loading and dumping at sea activities. There were no recorded complaints in relation to the works carried out under Permit No. 50005-01.
1.2.2 Proposed Method of dredging

The method of dredging will be a trailer suction hopper dredger (TSHD). The appointed contractor to carry out these works is to be announced. A detailed Method Statement and Risk Assessment will be provided once the contractor for the works has been appointed.

A trailer suction hopper dredger is a ship that has a full sailing capacity used to maintain navigable waterways. This is achieved through large powerful pumps and engines able to suck sand, clay, silt and gravel from the seabed into the ship’s hold.

Sea bed sediment is sucked into the ship’s hull through one or more suction pipes attached to the ship’s side. The method is comparable to a vacuum cleaner. Once the hull becomes full with sediment the vehicle proceeds to the designated dump site and the dredge material is released through doors in the bottom of the ship.

The dredging ship requires a velocity over ground in order to maintain dredging. The method is suitable only for soft sediment as will be encountered at Haulbowline Naval Base.

The loading will take place under controlled dredging procedures. No overflow of material from the dredger will be allowed.

The permit holder will be required to adhere to instructions with relation to loading as set out in the DoS permit.

The permit holder will liaise with the Harbour Master of Port of Cork and Department of Agriculture, Food and the Marine with regard to the schedule of loading and dumping prior to commencement of work.

Information related to the loading operations will be recorded including the location of material being loaded.

1.2.3 Bed Levelling

Bed levelling will take place where a bar or blade being pulled behind a suitable tug or work boat. The method will be used to level the sea bed to the desired dredge level. It will also be used to pull away material close to the inner harbour walls where the dredger cannot reach. It may also be used to gather material in order for the dredger to gather more easily.

1.2.4 Total Quantities to be Dredged

The volumes of dredged material have been calculated using bathymetric information collected on 13th January 2015. These are approximate values and are given below.

The actual daily, weekly and monthly amounts will be provided once the dredging contractor is announced.

<table>
<thead>
<tr>
<th></th>
<th>Volume</th>
<th>Tonnage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A: Inner Harbour</td>
<td>14,000m³</td>
<td>22,400t</td>
</tr>
<tr>
<td>Area B: Approach Channel</td>
<td>3,000m³</td>
<td>4,800t</td>
</tr>
<tr>
<td>Total</td>
<td>17,000m³</td>
<td>27,200t</td>
</tr>
</tbody>
</table>

* Tonnage calculated using density values 1.6 tonnes/m³.
1.3 Sampling Report

As part of the Dumping At Sea application process the Department of Defence appointed Hydrographic Surveys Ltd. to undertake and have analysed sediment sampling at Haulbowline Naval Base. The Marine Institute were consulted with regard to the sampling program. This sampling program was based on quantities of 50,000 m$^3$. 7 representative sediment samples were acquired for analysis by RPS Laboratories.

The locations of the recovered samples were designed by the Marine Institute and are indicated on the attached drawing; Drawing HS 01 (see Appendix A). The Marine Institute also recommended the appropriate parameters to be sampled for at the 7 no. locations. Sediment sampling was undertaken on 16th April 2015.

Coordinates were recorded for each sample. The recorded positions of the samples are shown on drawing number Drawing HS 01 and are given below in Irish National Grid Coordinates.

<table>
<thead>
<tr>
<th>Sediment Sample No.</th>
<th>Easting ING</th>
<th>Northing ING</th>
<th>Latitude ('N') wgs84</th>
<th>Longitude ('W') wgs84</th>
<th>Parameters analysed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV1</td>
<td>179263.4</td>
<td>65570.7</td>
<td>51.84343</td>
<td>-8.30162</td>
<td>1, 2, 3, 4a, 4b, 4c, 4f</td>
</tr>
<tr>
<td>NV2</td>
<td>179319.1</td>
<td>65641.7</td>
<td>51.84319</td>
<td>-8.30081</td>
<td>1, 2, 3, 4a, 4b, 4c, 4f</td>
</tr>
<tr>
<td>NV3</td>
<td>179357.9</td>
<td>65610.3</td>
<td>51.8429</td>
<td>-8.30026</td>
<td>1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g</td>
</tr>
<tr>
<td>NV4</td>
<td>179362.3</td>
<td>65592.5</td>
<td>51.84274</td>
<td>-8.30018</td>
<td>1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g</td>
</tr>
<tr>
<td>NV5</td>
<td>179482.1</td>
<td>65537.5</td>
<td>51.84225</td>
<td>-8.29841</td>
<td>1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g</td>
</tr>
<tr>
<td>NV6</td>
<td>179497</td>
<td>65382.6</td>
<td>51.84085</td>
<td>-8.2982</td>
<td>1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g</td>
</tr>
<tr>
<td>NV7</td>
<td>179360.1</td>
<td>65378.9</td>
<td>51.84082</td>
<td>-8.3002</td>
<td>1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g</td>
</tr>
</tbody>
</table>

Parameter code:
1. Visual inspection, to include colour, texture, odour, presence of animals etc.
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63μm fraction).
4. The following determinants in the sand mud (< 2mm) fraction *:
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines including HCH (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180).
   e) total extractable hydrocarbons
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Aenaphthene, Acenaphthylene, Anthracene, Benzene (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysen, Dibenz (a,h) anthracene, Dibenzofuran, Dibenzothiophene, Indeno 1,2,3-cd pyrene, Naphthalene.

h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species.

(This requirement will depend on the results of the chemical analyses.)
1.3.5 Sediment Sampling Methodology

Positioning was provided using a Trimble Ag 132 DGPS receiver interfaced with Hypack 2014 survey software. Samples were taken at the surface using a stainless steel Van Veen grab sampler. Once recovered the samples were sealed in specialised sample pots and labelled.

The 7 samples were sealed and dispatched by courier to the RPS Laboratories for analysis in April 2015. The laboratory began analysis on the samples on April 20th 2015. The analysis results were released on May 18th 2015.

1.3.6 Sediment Sampling Summary

From the results of the above sampling survey samples levels above the Irish Upper Levels for zinc were seen at sample locations NV4 and NV6. HCB and g-HCH (Lindane) values were above the Irish Upper Levels at NV3, NV4, NV5 and NV7.

The Irish Lower levels were exceeded at one or more of the sample locations for all parameters apart from mercury and cadmium. Sediment with metal concentrations below the Irish Lower Level represents sediment with "no contamination" (Marine Institute, 2006). However, as Haulbowline Island is historically linked with industrial activity Irish Upper Levels would be expected to be exceeded. As the Lower Level was exceeded in many of the sampling locations, this would indicate the sediment to be marginally contaminated and would not pose a significant threat to the qualifying interests of the SPA or SAC in terms of water quality.

1.3.7 Radiological Assessment

The Radiological Protection Institute of Ireland have previously analysed 1 no. sample taken in the area of proposed dredging (Lat. 51° 50' 28.884"N Lon: 8° 17' 56.227"W). This sample was taken by Hydrographic Surveys Ltd. in December 2003. The sample was analysed using high-resolution gamma spectrometry. The results have been attached in Appendix B.

1.3.8 Previous Sampling Surveys

Sampling has been conducted at Haulbowline Naval Base as part of monitoring for maintenance dredging in June 2003 and again in December 2008. The results of these sampling surveys can be supplied upon request.
1.4 Disposal of Dredge material

The dumping of the material will take place in the designated off shore Port of Cork dump site, used previously by the applicant and amongst others the Port of Cork Company since its establishment in 1978. It is the main disposal site for dredged spoil used by the Port of Cork Company. There is no other nearby disposal sites in this area.

The material will be dumped at sea at the approved Port of Cork Dump Site by Trailer Suction Hopper Dredging. The material will be released through the dredgers bottom doors into the receiving waters with a water depth of generally 30m. The dredger will travel through the dump area so as to evenly spread the load over the area. The dumping area is well out of the way of any confined shipping zone or channel.

1.4.9 Alternatives to Dumping at Sea

It is widely accepted that dredging is essential to maintain the navigability of Ireland’s ports and harbours. To date dumping at sea has been the main form of dredge material (herein referred to as DM) disposal. However there are a number of viable alternatives which are dependent on DM sediment composition and level of contamination.

The Environmental Protection Agency Report - Guidance on the Beneficial Use of DM in Ireland (published 2013) outlines many of Ireland’s most common and practical alternatives to dumping at sea. Each alternative was compared against the current DM composition and contamination level as outlined in Appendix C.

Upon consideration of the dump site as well as all other alternatives, it was established that the Port of Cork Dump Site would be the most favourable option for the removal of dredged material.

The amount of material to be dumped will be minimised by conducting ongoing bathymetric surveys throughout the dredging operations so as to keep over dredge volumes to a minimum.

1.4.10 General Information - Dump Site Characteristics

1.4.10.(a) Distance from nearest shore

The dump site is located approximately 8km to the nearest shoreline.

1.4.10.(b) Average, minimum and maximum depth of water

The following depths for the dump site are taken from the Irish Hydrodata Ltd. publication - “Characteristics of the Dumping Site – Impact Hypothesis Update” published on behalf of the Port of Cork Company as part of Port of Cork Maintenance Dredging Foreshore License Application (FS 006281) and was completed in November 2013 as part of an application in respect of maintenance dredging at various locations around Cork Harbour. These depths were established via a multibeam survey conducted in 2013.

Depth Average = 37m OD Malin
Depth Minimum = 25m OD Malin
Depth Maximum = 49m OD Malin
1.4.10.(c) Sediment characteristics

According to the Irish Hydrotech Ltd., 2013, the seabed at the dump site consists of sand, with some areas of exposed bedrock. Geophysical survey data from the INFOMAR survey of 2008 shows the sediment thickness to be typically about 1m, occasionally reaching 2m.

1.4.10.(d) Seabed habitat characteristics

The Port of Cork Publication - “Video And Benthic Grab Survey And Impact Hypothesis Report”, compiled by Aquatic Services Unit and Seabed Surveys International Ltd as part of the Port of Cork application for DaS Permit Reg. No. 50013-02 shows the dump site as comprising of a mosaic of coarse substrate habitats.

1.4.10.(e) Current/flow/tidal regime

The tidal currents in this area are generally small; with a velocity of less than 0.2m/s.

1.4.10.(f) Previous use of Dump Site

According to the report compiled as part of the Port of Cork application for DaS Permit Reg. No. 50013-02, between 1978 and 2008 a total of c. 5 million m$^3$ of dredge material was dumped at the Port of Cork Dump Site (Irish Hydrotech Ltd., 2013). Dump site site was reduced in Dec 1999 and all dumping since has been accommodated by the smaller site.

Approximately 5 million m$^3$ have been dumped at the Dump Site since regular dumping began.

1.4.10.(g) Current use of the Dump Site

The Port of Cork currently holds a license to dump dredge material on the Port of Cork dump site. A total of 1,136,000m$^3$ of dredge material were dumped in 2014 and are due to be dumped again in 2017 and 2020. The material is being dredged from the City Quays, Trantock, Ringaskiddy and Cobh. The dredge material is noted to have levels of Nickel and Zinc exceeding the Irish Upper Levels. No dumping at the Port of Cork dump site will take place in 2016.

1.4.10.(h) Effect of past dredge material disposal on sediment deposition rates of the Dump Site

In 2008 a comparison was made between a sidescan survey conducted in 1999 and a multibeam survey conducted in 2008. There was an estimated 1 million m$^3$ of dredge material dumped at the site in this 9 year period. The conclusion of the comparison was that no major accumulation of dredge material had occurred at the site during the period (Irish Hydrotech Ltd., 2013).

An additional comparison between bathymetric surveys conducted in 2008 and 2013 showed little or no change in seabed elevation. This indicates that it is a very suitable site for continued disposal of dredged spoil (Irish Hydrotech Ltd., 2013).
1.4.10.(i) Effect of past dredge material disposal on seabed habitats of Dump Site

With relation the effect of dredge spoil on the infaunal benthic environment while there is some evidence of disturbance and organic enrichment at some parts of the site within the infaunal benthic community, diversity levels were not consistent with significant degradation at any of the sites sampled (Aquatic Services Unit and Seabed Surveys International Ltd.; 2004).

The effect of dumping spoils on the site, based on the biology of the key species in the site (e.g. burrowing amphipods, polychaetes, molluscs), is low. This is because most species are shallow burrowing creatures and live within the upper layers of the sediment. Most of these species are adapted to changing sedimentary conditions mimicking the effect of dredge material influx. However, small patches of locally enriched and/or disturbed fauna will remain for longer time periods. Gradually over time these disturbances will be reduced due to the dispersive nature of the site.

Most species in the dump site will not be affected adversely by sediment suspended in the water column with some species even benefiting from the suspended sediment.

1.4.10.(j) Conclusion

The Port of Cork Publication – "Video And Benthic Grab Survey And Impact Hypothesis Report", recommended not conducting dumping operations between the months of November and February to avoid herring spawning times.

The Dump Site has been in use for several years, and often undergoes a disturbance event due to dumping of dredge spoil. It would appear that the site is acting as a dispersive site, with little evidence of organic enrichment and prolonged disturbance.

In conclusion, it can be said that the present dumping operations at the site are not having a deleterious effect on the benthos.

Furthermore, following a review of the Dump Site with relation to its proximity to any Natura 2000 sites it can be said that the dumping at the Dump Site will not pose a significant risk or have a permanent effect to any of the qualifying interests of the sites surrounding the Port of Cork.
1.5 Identification of Relevant Natura Natura 2000 Sites and Compilation on Information on their Qualifying Interests

Following guidance from the Department of the Environment, Heritage and Local Government, all Natura 2000 sites within both the Plan area and an area extending 15km around it are considered. They are listed on the following table:

<table>
<thead>
<tr>
<th>Natura 2000 Sites within 15km of the Works Area</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Protection Areas (SPAs)</td>
<td></td>
</tr>
<tr>
<td>Cork Harbour</td>
<td>004030</td>
</tr>
<tr>
<td>Special Area of Conservation (SAC)</td>
<td></td>
</tr>
<tr>
<td>Great island Channel</td>
<td>001058</td>
</tr>
</tbody>
</table>

1.5.11 Site Synopsis of Cork Harbour SPA

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas and Owenacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas Estuary, Inner Lough Mahon, Lough Beg, Whitegate Bay and the Rostellan inlet. As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Area A being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. Oil pollution from shipping in Cork Harbour is a general threat. Recreational activities are high in some areas of the harbour, including jet skiing which causes disturbance to roosting birds. Cork Harbour has is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its population of Redshank. In addition, there are at least 15 wintering species that have populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Qualifying interests in this area may also include seals and cetaceans.

Conservation Objectives:

1. To maintain the species listed on Annex I of the EU Birds Directive for which the SPA has been selected at favourable conservation status: i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern.
3. To maintain the extent, species richness and biodiversity of the entire site.
4. To establish effective liaison with legal users and relevant authorities.

1.5.12 Site Synopsis of Great Island Channel SAC

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red
Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and, compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owenacurra and Dungourney Rivers. The main habitats of conservation interest are the sheltered tidal sand and mudflats and Atlantic salt meadows, both habitats listed on Annex I of the EU Habitats Directive. The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper’s Island and Belvelly-Malinbo Point. Qualifying Interests include approx. 20 species of wildfowl.

Conservation Objectives:

1. To maintain the habitats listed on Annex I of the EU Habitats Directive which the SAC has been selected at favourable conservation status, i.e. sheltered tidal sand and mudflats and Atlantic salt meadows.
2. To maintain the species listed on Annex I of the EU Birds Directive for which the SAC has been selected at favourable conservation status, i.e. Dunlin, Lapwing, Black-tailed Godwit, Redshank and Golden Plover.
3. To maintain the extent, species richness and biodiversity of the entire site.

### 1.5.13 Assessment of Likely Effects

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Cork Harbour SPA</th>
<th>Great Island SAC</th>
<th>Qualifying Interests: (Seals, Cetaceans, Water Fowl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance</td>
<td>Introduction of sound into the marine environment.</td>
<td>Plan dredging area is located 7km from SAC.</td>
<td>Noise impact on waterfowl in the vicinity of the plan area and seals cetaceans at the dump site.</td>
</tr>
<tr>
<td>Water Quality</td>
<td>Suspended particles in the water from possible dredge material overflow.</td>
<td>Suspended particles in the water from possible dredge material overflow.</td>
<td>Suspended solids present in the marine environment before dissipation via currents.</td>
</tr>
<tr>
<td>Water Resource</td>
<td>Dumping of dredged material spoil in the marine environment.</td>
<td>Planned dredging area is located 7km downstream of SAC.</td>
<td>Dredge spoils enter marine environment at dump site.</td>
</tr>
</tbody>
</table>

### 1.5.14 Disturbance Mitigation

Cork Harbour is a very busy international shipping port and there will be no appreciable increase in noise in the marine environment in the plan area due to the dredging operation which may affect Annex II & IV species.

From a recent MMO Mitigation Report it was concluded that cetaceans are unlikely to be affected by the works. It is therefore considered that mitigation is not necessary in their case. As both grey and common seals are often observed in the harbour and, considering the common seal haul outs on Haulbowline Island, it is recommended that mitigation measures as outlined in Section 4.3.1 of the 2014 ‘Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters’ published by the Department of Arts Heritage and the Gaeltacht (DAHG) be considered for start-up of dredging and for particular days of dredging in Area B, noted on the map attached.
1.5.15 Water Quality

Previous to the submission of this application 7 no. samples were taken in the proposed dredging area. These sediment samples were analysed for both sediment chemistry and sediment granulometry.

In the previous dredging campaign an exclusion zone was enforced for dredging works following an area of high contaminants from sediment sampling. This exclusion zone was enforced so that no contaminated materials should impact upon Annex I habitats and Annex II & IV (seals and cetaceans).

1.5.16 Water Resource

The requirement for restricting overflow from the dredging operation is part of the license application and will mitigate the possibility of suspended solids affecting the water quality in Cork Harbour SPA and Great Island Channel SAC and thereby affecting the relevant qualifying interests.

1.5.17 Screening Conclusion

This screening report finds that the Plan for dredging in the Naval Base has been formulated to ensure that effects arising from permissions based upon this plan shall not give rise to significant effects on the integrity of any relevant Natura 2000 sites or disturbance to Annex I & IV species. Therefore, in accordance with the 'Methodological Guidance on the provision of Article 6(3) and (4) of the Habitats Directive 92/43/EC' it is concluded that the Plan does not require any further assessment to demonstrate compliance with the Directive.
APPENDIX A: Results from Sampling at Haulbowline Naval Base

Drawing HS 01 (scale 1:1000 at A3) is included to show the location of the sampling survey. A table showing the results of the sampling survey with relation to the Irish Action Levels is also given below.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units (dry wt)</th>
<th>Sampling points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NV-1</td>
</tr>
<tr>
<td>Arsenic</td>
<td>mg kg⁻¹</td>
<td>11.4</td>
</tr>
<tr>
<td>Cadmium</td>
<td>mg kg⁻¹</td>
<td>0.29</td>
</tr>
<tr>
<td>Chromium</td>
<td>mg kg⁻¹</td>
<td>65.4</td>
</tr>
<tr>
<td>Copper</td>
<td>mg kg⁻¹</td>
<td>19.6</td>
</tr>
<tr>
<td>Lead</td>
<td>mg kg⁻¹</td>
<td>30.3</td>
</tr>
<tr>
<td>Mercury</td>
<td>mg kg⁻¹</td>
<td>0.1</td>
</tr>
<tr>
<td>Nickel</td>
<td>mg kg⁻¹</td>
<td>25.7</td>
</tr>
<tr>
<td>Zinc</td>
<td>mg kg⁻¹</td>
<td>&lt;0.04</td>
</tr>
<tr>
<td>S TBT &amp; DBT</td>
<td>mg kg⁻¹</td>
<td>n/a</td>
</tr>
<tr>
<td>γ-HCH (Lindane)</td>
<td>mg kg⁻¹</td>
<td>n/a</td>
</tr>
<tr>
<td>HCB</td>
<td>mg kg⁻¹</td>
<td>n/a</td>
</tr>
<tr>
<td>PCB (ICES 7)</td>
<td>mg kg⁻¹</td>
<td>n/a</td>
</tr>
<tr>
<td>PAH (5.16)</td>
<td>mg kg⁻¹</td>
<td>n/a</td>
</tr>
<tr>
<td>Total Extractable Hydrocarbons</td>
<td>g kg⁻¹</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Green = Greater than lower level!**  
**Red = Greater than upper levels**  

Limits as set out in **GUIDELINES FOR THE ASSESSMENT OF DREDGE MATERIAL FOR DISPOSAL IN IRISH WATERS** published by the Marine Institute April 2006.
APPENDIX B: Letter from RPII
15th January 2004

Mr J.B. Jenkins
Hydrographic Surveys Ltd.
The Cobbles
Crosshaven
Co Cork

For the Attn. of: Mr J.B. Jenkins

Dear Mr Jenkins

I attach a copy of the result of the radiological analyses of 1 sample from Haulbowline Naval Base, Cork Harbour. I also enclose Invoice No. TG/1/2004.

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

The Department of the Marine (Mr Daniel Shine) has been informed and if you have any queries, please do not hesitate to contact me for assistance.

Yours sincerely

Barbara Rafferty
Principal Scientific Officer
REPORT ON THE ANALYSES OF SEDIMENT SAMPLE FROM HAULBOWLINE CO. CORK  DECEMBER 2003

Date: 14th January 2004

Client: Mr. J.B. Jenkins
Hydrographic Surveys Ltd.
The Cobbles
Crosshaven
Co. Cork

Description of Samples: Sample of sediment from proposed dredging area at Haulbowline Naval Base.

Date Received: 3rd December 2003

Report Prepared by: Mary Fegan M.Sc.
Scientific Officer

Sampling

The Radiological Protection Institute of Ireland received a sample of sediment from Hydrographic Surveys Ltd. taken from the area of the proposed dredging at Haulbowline in Cork Harbour.

Analysis

On arrival in the RPII's laboratory, the sample was registered in the laboratory management system and issued with an individual bar code.

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

Stephanie Long
Manager, Environmental Laboratory
Radionuclides in Sediment Sample from Haulbowline Cork Harbour
December 2003

<table>
<thead>
<tr>
<th>RPII Reference</th>
<th>Easting</th>
<th>Northing</th>
<th>Nuclide</th>
<th>Activity Concentration (Bq/kg, dry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT0302567</td>
<td>179445</td>
<td>65438</td>
<td>K-40</td>
<td>631 ± 68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I-131</td>
<td>Less than 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cs-134</td>
<td>Less than 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cs-137</td>
<td>12.2 ± 1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ba-226</td>
<td>Less than 75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>U-235</td>
<td>Less than 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>U-238</td>
<td>42 ± 14</td>
</tr>
</tbody>
</table>

Note:
(1) Quoted uncertainties are ±1 SD counting statistics.
APPENDIX C: Alternatives to Dumping at Sea

It is widely accepted that dredging is essential to maintain the navigability of Ireland’s ports and harbours. To date dumping at sea has been the main form of dredge material (herein referred to as DM) disposal. However, there are a number of viable alternatives which are dependent on DM sediment composition and level of contamination.

The Environmental Protection Agency Report - *Guidance on the Beneficial Use of DM in Ireland* (published 2013) outlines many of Ireland’s most common and practical alternatives to dumping at sea. Each alternative was compared against the current proposed DM composition and contamination level as outlined in Attachment B.

The alternatives to dumping at sea are broken down into engineering alternatives, environmental enhancement alternatives and agricultural/product use alternatives.

A.1.1) Engineering Alternatives

A.1.1.1) Beach Nourishment / Land Reclamation

Beach nourishment is a viable option where DM is slightly coarser grained than the beach sediment where nourishment is planned. Beach nourishment also needs to be occurring within a reasonable proximity of the survey works for this method to be economically viable. Due to the fine-grained nature of the DM (average 70% particle size <63μm) and the fact that beach nourishment is not occurring in close proximity to the proposed works, this method of disposal has been excluded as a suitable alternative.

Land reclamation/improvement are not viable options due to the very low structural strength properties of the fine-grained nature of the sediments.

A.1.1.2) Landfill Cover

Use of the DM as a cap for landfill site can be considered where the material is suitable to act as an alternative to traditional natural clays which act as a capping material on a daily, intermediate or final layer basis.

The DM is not suitable for landfill cover due to the saline nature of the material; desalination would be needed to make the material suitable.

A.1.1.3) Offshore Berm Creation

DM has been previously used to create submerged berms in areas of high rates of coastal erosion in order to moderate the onshore wave climate, thus, reducing the loss of beach material.

Fine to medium sand is considered the optimum grain size for nearshore feeder berms. Fine and medium sand make up an average of 14% dry weight (8% min, 20% max) of the DM. As 70% of the material is very fine grained (average 70% particle size <63μm) the majority of the spoil, and contamination within, would be subject to erosion and dispersion in the nearshore environment.

A suitable offshore berm creation project is not in existence in close proximity to the proposed works.
A.1.1(ii) Coastal Protection

Fine grained DM, as is seen in the proposed works area, may be dewatered using geotubes and used as a method of coastal defence.

The geotube fill material used is generally sand based where the DM should consist of a minimum of 40% solids (i.e. sand) when used for marine structures (Sheehan, 2012). There is an average 30% solids (particle size >63μm) in the DM making it unsuitable for geotube use for coastal protection.

A.1.1.1 Environmental Enhancement Alternatives

A.1.1.1(i) Wetland Habitat Creation / Enhancement

DM has been used to establish new wetland areas, to nourish and enhance existing habitats or to provide stability to eroding wetlands.

Studies have shown that matching the properties of the DM with that of the existing wetland increase the chances of successful restoration/creation of the wetland habitat. Due to the level of contamination within the DM this method of DM disposal would not be suitable as an alternative to dumping at sea.

A.1.1.1(ii) Sediment Cell Maintainance

Sediment cell maintenance involves the placement of DM in tidal estuary systems potentially reducing the erosion of tidal mudflats, banks and saltmarshes and also potentially improving both shallow sub-tidal and intertidal habitats (Van der Wal et al., 2010).

This method of disposal typically applies to maintenance dredging projects where sediment contaminant levels are typically very low or entirely absent. For this reason this method is not suitable as an alternative.

A.1.1.1(iii) Fill of Abandoned Mines / Quarries

Backfill of abandoned mines / quarries can be a viable alternative where a suitable site is located nearby to the proposed works. According to the Environmental Protection Agency, (2013). Guidance on the Beneficial Use of DM in Ireland Report there is no mine / quarry where DM would be suitable for disposal in close proximity to Cork Harbour.

This is shown below in Figure 1 (image taken from Environmental Protection Agency, (2013). Guidance on the Beneficial Use of DM in Ireland Report). Figure 1 shows the major mining sites in Ireland as well as Ireland's main ports where dredging occurs. General locations where the main ports and mine are in close proximity are indicated.
A.1.III) Agricultural / Product Use

A.1.III.(i) Concrete Manufacture

The basic raw materials for the production of concrete include aggregate sand, making it an alternative use for DM. In the past where DM is mainly a coarse sand material it has been used to supplement concrete production. This alternative is a suitable option for capital dredging programs where construction costs can be reduced by utilising the DM for concrete manufacturing.

Due to the fact that there is very little sand in the current DM and the fact that there is no construction aspect to the proposed works this alternative is not suitable.

A.1.III.(ii) Road Sub-base Material

Coarse and fine DM can be used in different aspects of road construction, including both as a structural material and as a general fill for the construction of road embankments and roadworks.

The material property standards used for road sub-base construction in Ireland are outlined by the National Road Authority (NRA, 2007) in the “Specification for Road Works” guidelines as a Series 800 (Road Pavements – Unbound Materials) material.

To make the DM suitable for use as a sub-base material in needs to be dewatered and cleaned. In general coarse DM is more easily integrated into road construction than fine grained sediment.

Studies have shown that the high salinity of seawater has a negative effect on the development of mechanical strength, which may hinder its use in road construction (Kujala et al., 1996; Kaushik and Islam, 1995). For this reason this method of reuse has been excluded as a suitable alternative.
A.1.III.(iii) Production of Bricks Cement

The lack of a brick/ceramic manufacturing plant in close proximity to the site rules this option out as a suitable alternative.

A.1.IV) Logistical Requirements at Haulbowline Island

With relation to the above alternatives removal by land transportation is a factor in most of the methods of disposal. Removal via land transportation would involve a different dredging plant to the proposed methodology. To remove DM via on land transportation an anchored or moored dredging plant would be necessary. This method would be unsuitable for Haulbowline Naval Base as it is a 24hr operational site and access would be restricted by this stationary dredging plant.

Removal by land transportation would also involve the use of continuous vehicular movements on a 24 hr basis through Rinearkiddy town and beyond. This would increase the likelihood of environmental disturbances such as increased traffic, increased exhaust emissions and possible spillage.

The advantages of the Port of Cork Dump Site, as outlines in Attachment E.1, include that it has been used previously by the applicant and is under continued use by the Port of Cork Company. It's proximity to the loading site is also advantageous for this project.

A.1.V) Conclusion

Overall, having considered the dump site as well as all other alternatives, it has been established that the Port of Cork Dump Site would be the most favourable option for the removal of dredged material.

The amount of material to be dumped will be minimised by conducting ongoing bathymetric surveys throughout the dredging operations so as to keep over dredge volumes to a minimum.

References


