

Warrenpoint Port Proposed In-Lough Placement Site

Site Characterisation Scoping Report



April 2017



Project Nr
440

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Warrenpoint Harbour Authority
Site Characterisation Scoping Report – In-Lough Placement

Client : Warrenpoint Harbour Authority
Project : Proposed In-Lough Placement Site
Title : Site Characterisation Scoping Report

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*The cover page shows the dredgers *Thor R* and *Njord R* passing in the Turning Circle of Warrenpoint Harbour during the last major maintenance dredging in 2011/2012



1. Introduction

Warrenpoint Port is seeking to identify a new site within Carlingford Lough for the placement of material arising from maintenance dredging. Warrenpoint Port is a Trust Port; it is not owned by Government but operates autonomously and with a high degree of public accountability and a strong public interest ethos. The Port is required to operate in a commercial manner and is an independent statutory body governed by its own legislation.

1.1 Characterisation of a New Placement Site

Guidance from the Department of Agriculture, Environment and Rural Affairs (DAERA) Marine and Fisheries Division states that the following steps are required before a new site for dredged material can be designated:

- The applicant undertakes a characterisation study of the candidate placement site(s);
- The Marine and Fisheries Division consults all interested stakeholders on the new placement site; and
- The Marine and Fisheries Division deem the new site to be acceptable.
(DAERA, 2016)

1.2 Purpose of the Scoping Report

The purpose of this Scoping Report is to identify the issues that will be considered during the characterisation exercise, and to eliminate those that are not of concern. The report describes the approach and methodology that will be applied to assess potential adverse effects, and specifies requirements for technical studies and surveys.

The remainder of this report is divided into the following sections:

- Section 2: Regulatory framework governing the management of dredged material;
- Section 3: Description of the current dredging regime at Warrenpoint Port;
- Section 4: The need for a new site for dredged material;
- Section 5: Site selection and consideration of alternative options;
- Section 6: Description of two potential in-lough placement sites;
- Section 7: Summary of stakeholder engagement to date;
- Section 8: Methodology for assessing adverse effects;
- Section 9: Scope of the Characterisation Report; and
- Section 10: Summary of the scope of the Characterisation Report.

2. Regulatory Framework

The relocation of dredged material at sea requires a marine licence from DAERA under the Marine and Coastal Access Act 2009. When an application is submitted for a marine licence, DAERA decides which licensed site it considers is most suitable to receive the dredged material. If an applicant has proposed a new site, they must undertake an environmental characterisation exercise to identify the sensitive receptors at the site location and to assess



the potential effects of in-lough placement of dredged material. The outcome of this exercise is a Characterisation Report which is submitted to DAERA.

DAERA will consult with stakeholders deemed to have an interest in the potential designation of a new placement site before making a decision on its acceptability. If a proposed site is considered acceptable, DAERA will designate the site as open.

As there are designated conservation sites in the vicinity of the proposed sites, a Habitats Regulations Assessment (HRA) will be required under the Conservation of Habitats and Species Regulations 2010. Further information on the HRA is provided in Section 9.2.5.

2.1 Environmental Impact Assessment (EIA)

The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) apply to marine licences. In July 2016 Anthony Bates Partnership, on behalf of Warrenpoint Port, submitted an EIA Screening Report to DAERA. In February 2017 DAERA confirmed that the designation of a new site for dredged material does not require an EIA (see Appendix A: EIA Screening Opinion).

The Characterisation exercise will, however, follow a very similar process to EIA, encompassing a scoping stage (this report), stakeholder consultation including public advertisement, detailed investigation of potential adverse effects, site-specific surveys (as required) and a comprehensive final report including recommendations for mitigation and monitoring.

3. Current Dredging Regime at Warrenpoint Port

Under its Harbour Act, Warrenpoint Port does not require a marine licence to undertake dredging within its port limits; however, a licence is required for the placement of dredged material at sea. Currently the Port has a multi-year licence for its dredge material management, which is valid until 2019.

3.1 Dredging Methodology

The navigation channels and berth areas are maintained using two types of dredging equipment: the hydraulic Trailer Suction Hopper Dredger (TSHD); and the mechanical Grab Hopper Dredger (GHD) or Backhoe. Further information on these dredging methods is provided in Appendix B.

Table 1 outlines the capital and maintenance dredging undertaken in the Port over the last 12 years, and the volumes that have been placed at the licensed offshore site. At present the primary dredging campaign takes place every 5-6 years, covering all areas of the Port and the approach channel. This is supplemented every 2 years with more localised dredging within the port.



Year	Works Undertaken	Dredging Method	Volume disposed
2016	Maintenance Dredging	Trailer suction hopper dredger (TSHD)	50,000 m ³
2015	Maintenance Dredging	Grab hopper dredger	5,800 m ³
2014	Maintenance Dredging	TSHD	30,000 m ³
2011/12	Maintenance Dredging	TSHD	390,000 m ³
2009	Maintenance Dredging	TSHD	25,000 m ³
2008	Capital Dredging	Backhoe	127,000 m ³
2006	Capital Dredging	Backhoe	20,000 m ³
2005	Capital Dredging	Backhoe	41,000 m ³
2005	Maintenance Dredging	TSHD	268,000 m ³
2004	Capital Dredging	Backhoe	13,000 m ³

Table 1 Dredging undertaken at Warrenpoint Port since 2004

3.2 Dredge Material Management

For all dredging methods detailed in Section 3.1, upon filling its hold the dredger/barge sails to the designated placement site and then slows down to approximately one to two knots. The dredger then opens bottom doors or splits along its hull to allow the release of its contents. The sediments contained within the hopper then either settle in the immediate area or are dispersed by natural tidal flows.

3.2.1 Existing Licensed Placement Site

All dredged materials listed in Table 1 have been placed at a licensed site approximately 26 km from the Port and 11 km outside of Carlingford Lough, as show on Figure 1. This licensed area is a dispersive site with water depths exceeding 30m and reasonably strong currents. The centre of the area is a circle of 0.25 nautical miles centred on the coordinates 53° 57.8'N and 05° 56.5'W.

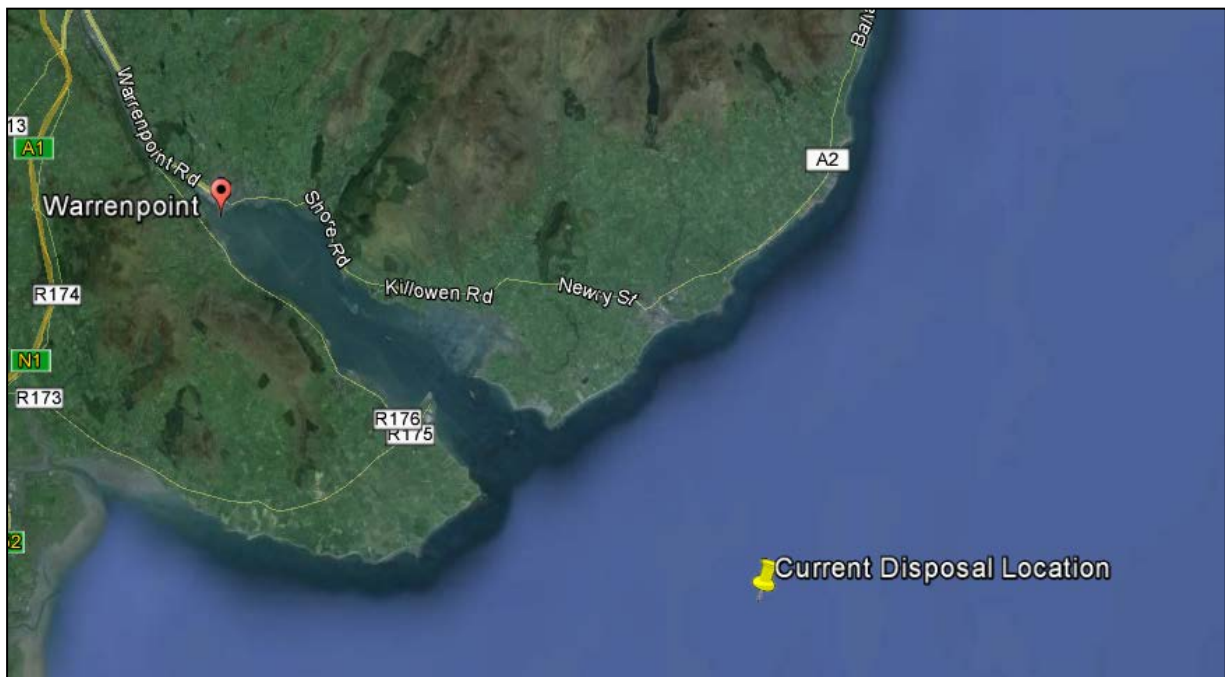


Figure 1 – Currently licensed site

4. Need for a New Site for Dredged Material

The use of external dredging contractors is one of Warrenpoint Port's most significant costs. As detailed in Table 1, a major campaign only occurs every 5-6 years as this is considered to be the only economically affordable option.

During the periods between major dredging campaigns, due to siltation the port operates with severely restricted navigational channels and berths. This impacts on trade significantly, with larger vessels unable to be accommodated (with a loss of potential trade) and the relocation of deeper drafted vessels to anchor during times of low tide (with associated logistical/delay costs). There are navigational restrictions as the channel width is reduced, the turning circle is diminished in diameter and berths are reduced in depth.

The above compromises the competitiveness of the Port significantly. Surrounding larger ports such as Dublin and Belfast are continually developing their facilities, driving costs down through economies of scale and offering greater flexibility on rates and timing. Smaller ports such as Warrenpoint are also pressed to improve the services they offer to remain an economically attractive facility. Recently Foyle Port (previously Port of Londonderry) has acquired a new in-lough site for dredged material to reduce its dredging costs and improve its navigational standard.

With Warrenpoint Port situated on the border between Northern Ireland and the Republic of Ireland, there is a concern that the United Kingdom leaving the European Union will result in a reduction of present trade entering the Port that is destined for the Republic of Ireland. The Port must protect its status in the marketplace, its employees and the local economy of Co



Down and its hinterlands: minimising costs and increasing customer services will aid in this objective.

In recent years most ports have abandoned the operation of their own dredging plant in favour of contract dredging as this has proven to be the most economical solution in most cases. However, the practicality and economics are strongly influenced by the rate of siltation and hence the frequency of dredging that is necessary to maintain navigation levels. Although the unit cost of dredging (cost per cubic metre or tonne of sediment removed) is usually lower with contract dredging, the cost of mobilising and demobilising dredging plant is high, so if frequent dredging is necessary the economic balance may change in favour of self-operation of port-owned dredging plant.

For these reasons, Warrenpoint Port is currently assessing whether to continue with irregular external contract dredging or invest in an in-house dredger. A key factor in the decision-making process is the placement location for the dredged sediment. For in-house dredging to be feasible a less exposed placement site location is required.

In summary, Warrenpoint Port is seeking a new in-lough dredged sediment placement site for the following reasons:

1. Reduce ongoing maintenance costs
2. Reduce delays and logistical costs
3. Maintain current customer base
4. Increase and maintain navigational/berthing standard for access and safety
5. Increase potential trade opportunities
6. Increase competitiveness with regional ports/harbours

To identify potential in-lough placement sites, a site selection exercise has been carried out, which is summarised in Section 5. The proposed site locations and placement methodology is described in Section 6.

5. Site Selection and Consideration of Alternatives

5.1 Site Selection

A site selection exercise has been carried out to identify the most appropriate location(s) for a new in-lough placement site. The full site selection is presented in the EIA Screening Report (Anthony Bates Partnership, 2016) and this section summarises the findings.

5.1.1 Distance to Dredging Areas

The distance from the dredging areas to the placement site is critical for dredging production, overall costs, transport emissions and access in times of inclement weather. Reducing the distance to the placement site is a very important factor in the logistical and economic feasibility of the proposal.



Although the aim is to identify a placement site as close as possible to the dredging areas, re-sedimentation (return of dredged material) must also be considered and assessed to prevent ineffective dredging practices. Hydrodynamic and sediment transport modelling will be carried out during the characterisation phase (see Section 9.2.3), which will identify any re-sedimentation of dredged areas.

5.1.2 Bathymetry and Navigational Safety

Draft determines the minimum depth of water a ship or boat can safely navigate. The larger the dredger, the greater the draft required for safe navigation. The bathymetry of Carlingford Lough restricts a significant area due to insufficient water depth, as shown in Figure 2: only areas showing colours of yellow, green or blue are suitable for dredging craft, primarily for access but also for safety. During placement operations, the dredger's bottom doors are open, reducing manoeuvring control for the vessel. As such, areas with lower tidal current are more favourable to maintain vessel control and prevent damage to the bottom doors. This precludes some areas, particularly at the mouth of the lough.

5.1.3 DAERA Licencing Jurisdiction

Although no formal boundary exists between Northern Ireland and the Republic of Ireland, DAERA can only issue marine licences for sites that are clearly within the northern area of the lough. This eliminates a substantial portion of the lough, with the navigational channel deemed the unofficial boundary.

5.1.4 Designated Sites

There are a number of designated conservation sites within Carlingford Lough, as detailed in Section 9.2.5. These areas were avoided when selecting potential in-lough placement sites.

5.1.5 Aquaculture Sites

There are numerous commercial aquaculture sites located in the lough, as detailed in Section 9.2.9. These sites were avoided when selecting potential placement sites. The effects of turbidity and sedimentation resulting from dispersion of material from the placement site will be considered in the Characterisation Report.

5.1.6 Site Selection Outcome

Taking into account the existing uses and environmental sensitivities of the lough, the potential locations for in-lough placement sites were limited. However, two potential sites were identified, as described in Section 6.

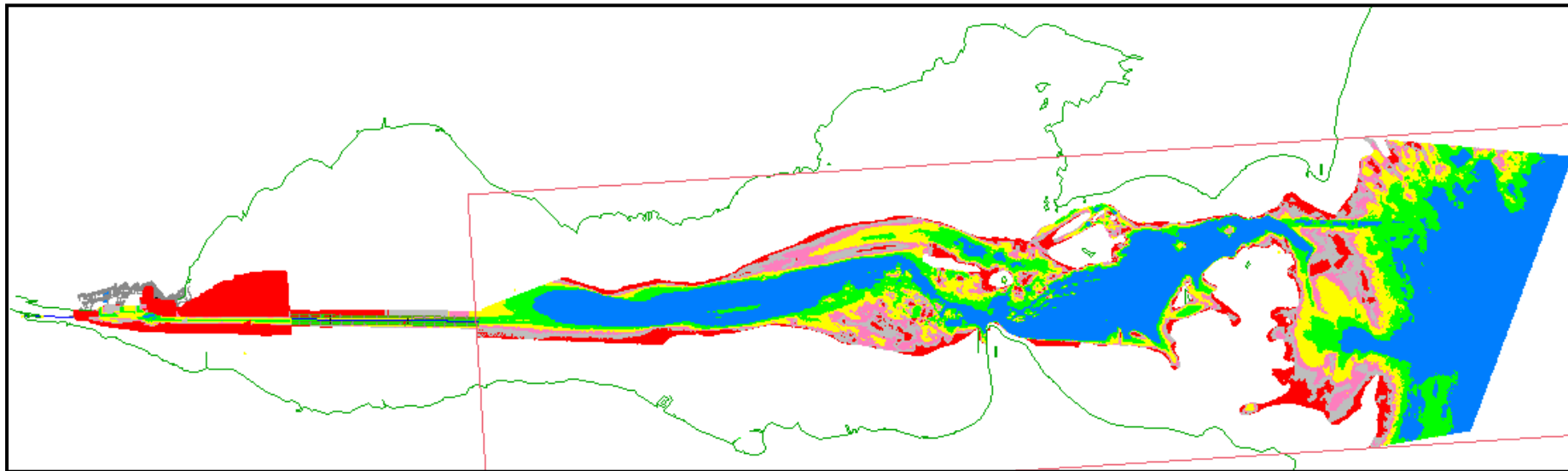


Figure 2 Navigable Area within the Lough

Note: Areas with no colour are only accessible to very shallow drafted craft.



5.1 Consideration of Alternatives

Warrenpoint Port has historically investigated potential beneficial uses of its dredged material on an ongoing basis, and formally it produces Best Practicable Environmental Option (BPEO) assessments for its marine licence applications for dredging. Alternative options for use of dredged material (such as beach nourishment, land reclamation and habitat enhancement) will be given further consideration in the Characterisation Report; however, it is not anticipated that significant opportunities of this nature will be available. To date no marine or land-based beneficial use has been identified that could be undertaken in a practical or economical manner. However, in-lough placement of material would maintain the sediment balance locally through sediment cell maintenance. Other alternatives to minimise the amount of dredging required includes the use of water injection dredging, passive nautical depth and/or active nautical depth. These options may be investigated in due course.

6. Description of Proposed Placement Sites

6.1 Proposed Site Locations

As described in Section 5, two potential in-lough placement sites have been identified from the site selection exercise, as shown on Figure 3:

1. Towards the mouth of the Lough between Greencastle and Cranfield Point; and
2. In naturally deep water between Kilowen Bank and Carlingford Bank.

At this scoping stage, Warrenpoint Port is considering both potential sites. It is likely that only one site will be taken forward to the full Characterisation Report due to the costs associated with surveying and assessing two sites. This will depend on the outcome of the scoping stage.

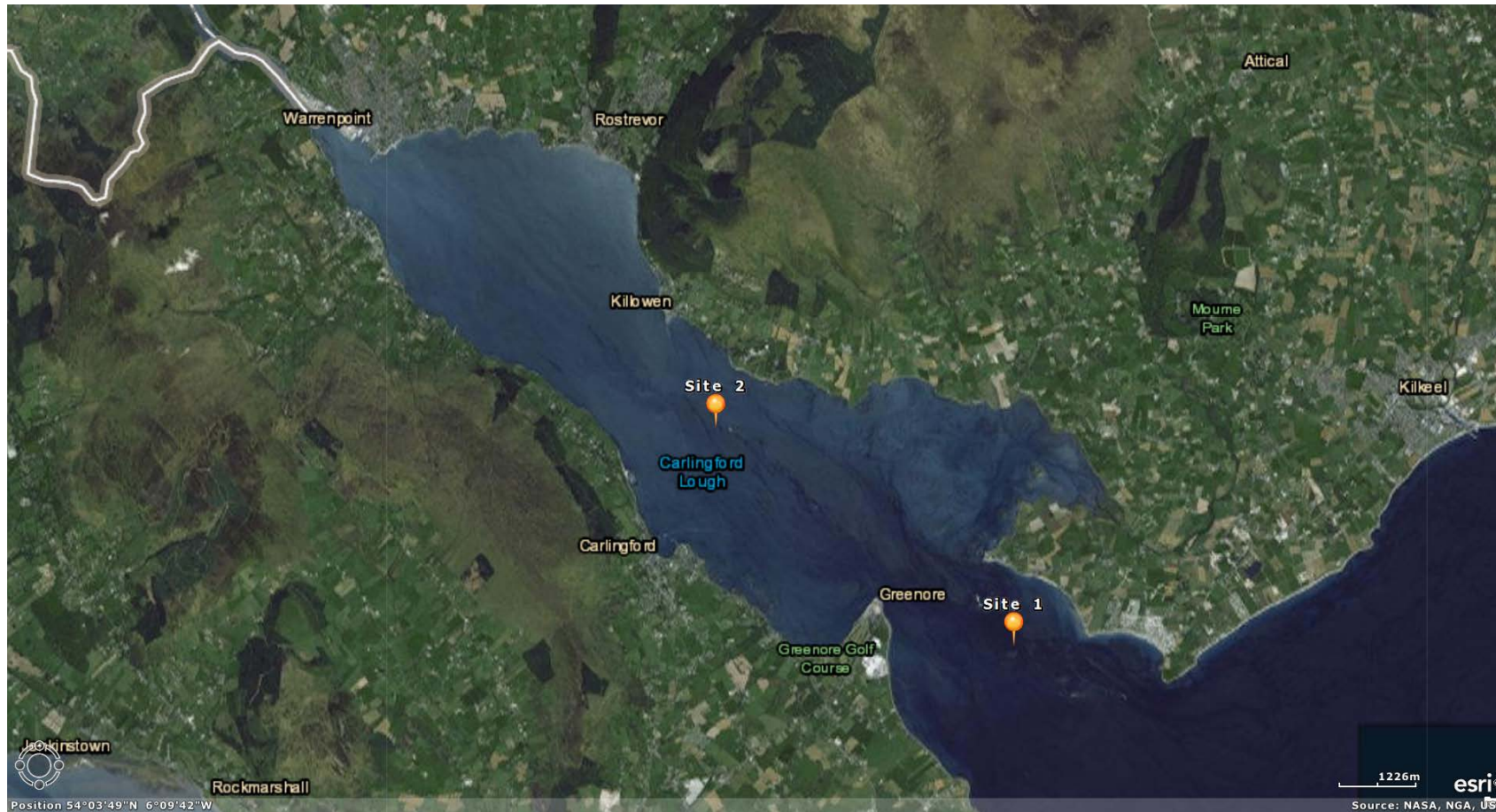
6.2 Proposed Dredging Methodology

The maintenance dredging volumes are unlikely to change significantly from the current licensed practice, as described in Section 3. However, a change in dredging frequency is planned, as described in Section 6.2.1.

Any future capital dredging operations (i.e. to deepen areas of the Port to below their current maintained depths) would be subject to a separate marine licence application and it is likely that the existing placement site shown on Figure 1 would be used for this material.



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Proposed Site	Irish Grid		WGS84	
	Easting	Northing	Latitude	Longitude
1	324598	310420	54° 1.681 N	6° 5.961 W
2	319816	313721	54° 3.527 N	6° 10.259 W

Figure 3 Location of proposed placement sites



6.2.1 Dredging Frequency

The present practice of dredging a large volume over a short period of time would be replaced with a 'little and often' approach. Dredging would be an ongoing process, occurring throughout the year, and the dredger would be operated by Port staff during normal business hours. The dredging plant to be used for in-lough placement is anticipated to be significantly smaller with less power than the current dredging plant. The most likely and efficient form of dredger is a small TSHD (<1,000 m³ hopper volume) which would dispose of material through bottom doors.

Material placed at the proposed in-lough site would disperse gradually by natural tidal currents. This will be examined during the Characterisation Stage using sediment transport modelling (see Section 9.2.4).

The use of navigational dredging schemes which retain dredge arisings within the active sediment budget is widely considered to be favourable, provided the dredged sediments are of suitable chemical quality. This process is known as Sediment Cell Maintenance and has been used at many sites in the United Kingdom, and thousands in the USA, as it has many potential benefits:

- Maintains sediment balance;
- Local erosion rates may be decreased;
- Accretion rates may be reduced, reducing dredging volumes;
- Wetlands are nourished and their hydrology improved; and
- Beneficial use of fine grained dredged material.

7. Stakeholder Consultation

During the site selection exercise (see Section 5) informal stakeholders' consultation meetings were held in 2014 and 2015 to present the Port's plans, the reasoning for them, and to obtain feedback to inform site selection. A copy of the minutes from the 2015 meeting is provided in Appendix C.

In 2016, DAERA formally consulted stakeholders on the EIA Screening Report. Table 2 lists the organisations that were consulted, a summary of their responses and where the issues they raised are addressed in this Scoping Report. Full written responses are provided in the EIA Screening Opinion (Appendix A).



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Organisation	Summary of Response	Where addressed in this Scoping Report
<p>Marine and Conservation Reporting Team: Marine Conservation Team Response</p>	<ul style="list-style-type: none"> • Within Carlingford Lough there are both European and nationally protected sites. In addition to designated sites, assessment also needs to be made on potential impact to both national and European marine protected species. • The impact on the bathymetry must be considered, and any knock-on effects/changes this may have to the surrounding habitats and coastline. This will involve analysis of how the dredged material redistributes within the Lough, and will require hydrodynamic modelling to ascertain dispersion. • Seabed/faunal surveys are requested of both proposed disposal sites to rule out the presence of priority species or habitats. 	<p>Designated sites are considered in Section 9.2.5.</p> <p>Bathymetry is considered in Section 9.2.2.</p> <p>Benthic survey proposals are described in Section 9.2.5.</p>
<p>Marine Conservation and Reporting Team – Marine Archaeology Response</p>	<ul style="list-style-type: none"> • Carlingford Lough is recognised as an area of archaeological and historic potential with numerous documented instances of historic shipwreck. There has been no previous archaeological work conducted, or an appraisal of existing geophysical data, at either proposed disposal location. • Presently there are no recorded designated sites, or known archaeological remains, within the proposed disposal sites but the possibility of remains being present cannot be conclusively discounted without more detailed characterisation of the receiving environment and an archaeological appraisal. 	<p>Maritime archaeology is considered in Section 9.2.10.</p>
<p>NIEA – Conservation Science</p>	<ul style="list-style-type: none"> • Open-water species such as Great Crested Grebe, Scaup, and Red-breasted Merganser are unlikely to be affected by dredging within the harbour or additional vessel movements required for spoil disposal. The shoreline and mudflats between Warrenpoint and Newry support generally small numbers of wintering shorebirds but Redshank numbers can be locally important. Only a small proportion of these would potentially be susceptible to 	<p>Designated sites are considered in Section 9.2.5.</p>



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	<p>disturbance during dredging. Significant displacement from feeding areas is, however, improbable.</p> <ul style="list-style-type: none"> • The suitability of the proposed disposal sites has still to be tested by hydrological modelling. • No data on usage of the open water around the disposal sites by wintering waterbirds are available, so it is unclear if either of the sites is within an important foraging area for these species. ASSI feature species, particularly Great Crested Grebe, Scaup and Red-breasted Merganser, could be subject to disturbance by vessel movements. Foraging by these species might also be disrupted by deterioration of water quality through increased turbidity, pollution or changes to benthic habitats through sedimentation. • Should the dredged material contain any toxic contaminants, sediment drift from Site 2 into the Brent Goose foraging areas in Mill Bay would be a concern. Material from Warrenpoint Harbour has previously been within permitted levels of contamination for offshore disposal. While this appears to suggest that a risk of pollution would be very low, contaminant levels within the dredged material need to be clarified given the context of disposal within a lower energy level estuarine environment rather than the open sea. • The potential benefits to intertidal habitat dynamics (in the absence of pollutants) of retaining the dredged material within the Carlingford Lough sedimentation system are noted. • Site 1 is located in proximity to the tern breeding site on Green Island, which is of concern. Nesting birds may be disturbed by vessel movements close to the island and low-lying nests may be flooded by wash from the dredging vessel. The impact of navigation associated with this project should be assessed in combination with that from existing shipping and the proposed Greencastle – Greenore ferry. • The sea area around Green Island has been identified as an important tern foraging area; there is potentially a risk of degradation of feeding conditions through deterioration of water 	<p>Ornithology is considered in Section 9.2.7.</p> <p>Hydrodynamic and sediment transport modelling is considered in Sections 9.2.3 and 9.2.4.</p> <p>Quality of dredged material is considered in Sections 9.2.1 and 9.2.4.</p>



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Organisation	Summary of Response	Where addressed in this Scoping Report
	<p>quality through increased turbidity affecting visibility, or through pollution or changes to benthic habitats arising from increased sedimentation affecting prey species. Given that any decline in prey availability close to the nesting site would result in energetic costs to terns from obtaining food from more distant sites, this could result in reduced breeding success. Conservation Science therefore recommends that, given the potential for an adverse impact on SPA feature species, a precautionary approach is taken and the eastern disposal site is considered unsuitable.</p> <ul style="list-style-type: none"> • The EIA Screening Report identifies the following issues potentially impacting upon birds as requiring further assessment: <ul style="list-style-type: none"> ○ Water quality ○ Sedimentation ○ Changes in benthic habitats ○ Impact upon protected species <p>Conservation Science concurs that these are the principal areas of concern for the characterisation report.</p>	
<p>NIEA – Conservation, Designation and Protection</p>	<ul style="list-style-type: none"> • It is unclear if either of the sites is within an important foraging area for these species and there is potential for significant disturbance due to the proposed activities. Detailed assessment of the usage of these areas is required. • While it is acknowledged that historical dredging has not yielded significant contamination, contaminant levels within the dredged material need to be clarified given the context of disposal within a lower energy level estuarine environment rather than the open sea. • There is potential for disturbance of nesting birds on Green Island by vessel movements close to the island and a danger of low-lying nests being flooded by wash from the vessel. The 	<p>Designated sites are considered in Section 9.2.5.</p> <p>Ornithology is considered in Section 9.2.7.</p> <p>Quality of dredged material is considered</p>



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Organisation	Summary of Response	Where addressed in this Scoping Report
	<p>impact of navigation associated with this project should be assessed in-combination (as required by the Habitats Regulations) with that from existing shipping and the proposed Greencastle – Greenore ferry.</p> <ul style="list-style-type: none"> The sea area around Green Island has been identified as an important tern foraging area and there is potential for degradation of feeding conditions through degraded water quality. It is recommended that a precautionary approach is taken on the basis of information currently available and the eastern disposal site is considered unsuitable. 	<p>in Sections 9.2.1 and 9.2.4.</p>
<p>Commissioner of Irish Lights</p>	<p>While accepting the rationale behind the proposal it is clear that sediment that once was entirely removed from the Lough will now be preserved in the Lough. If the sediment originates from the land it is assumed that over time this would potentially reduce depths in certain areas of the Lough. As there are many different types of vessel operating throughout the area the disposal site would require ongoing close monitoring of water depths by hydrographic surveying which may in result in changes to the positioning and type of local aids to navigation.</p>	<p>Changes to bathymetry are considered in Section 9.2.2.</p>
<p>Maritime and Coastguard Agency</p>	<p>No comments</p>	
<p>DAERA Sea Fisheries</p>	<ul style="list-style-type: none"> There are a number of licensed aquaculture sites within Carlingford Lough. This proposal could have a detrimental effect on the stock and livelihoods of the operators. As shellfish are filter feeders' and are sensitive to water quality, any dredge spoil disposed within the Lough could have a serious impact upon the licensed sites, which must be assessed in the Characterisation Report. 	<p>Water and sediment quality are considered in Section 9.2.4.</p> <p>Aquaculture is considered in Section 9.2.9.</p>



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Organisation	Summary of Response	Where addressed in this Scoping Report
DAERA Marine Strategy and Licensing Shellfish Team	Both proposed sites are within the Carlingford Shellfish Water Protected Area. The potential effects of the disposal operations on the protected area must be considered, both spatially and temporally.	Aquaculture is considered in Section 9.2.9.
Department of Housing, Planning, Community & Local Government Marine Planning & Foreshore Section	No comments	
Ulster Wildlife	<ul style="list-style-type: none"> • The following sensitivities are identified: <ul style="list-style-type: none"> ○ Close proximity to Carlingford Lough Marine Conservation Zone (MCZ) with sea pens being very sensitive to impacts of silting. ○ Close proximity to SPA/RAMSAR sites and possible impacts of silting on wading bird prey species. ○ Close proximity to commercial aquaculture sites and follow on implications for human health and possible commercial impacts. ○ Records of several Northern Ireland priority species in close proximity to the proposed disposal sites, including horse mussel <i>Modiolus modiolus</i>. ○ Records of two OSPAR threatened and/or declining species in close proximity to the proposed disposal sites (Ocean Quahog and Thornback Ray). 	<p>Designated sites are considered in Section 9.2.5.</p> <p>Aquaculture is considered in Section 9.2.9.</p>



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Organisation	Summary of Response	Where addressed in this Scoping Report
UK Hydrographic Office	No comments, other than a request to be informed of the outcome so that navigational charts can be updated if necessary.	
RSPB	<ul style="list-style-type: none"> • The site features of all designated sites should be considered from the outset of the project. • The nearby Carlingford Lough Important Bird Area (IBA), Carlingford Lough RAMSAR site and the Marine Conservation Zone (MCZ), should be considered as priority sites within the characterisation report. RSPB has a considerable interest in the area due to the reserve holdings at Green Island and adjacent to offshore islands. • Potential impacts could include, but are not limited to: <ul style="list-style-type: none"> ○ Disturbance of birdlife, both breeding and wintering ○ Displacement of birds from areas of feeding ○ Temporary or permanent habitat loss or change ○ Pollution ○ Siltation ○ Indirect habitat loss through small-scale changes in sediment structure ○ Degradation of the quality of the surrounding marine environment ○ Noise ○ Increased erosion to Green Island due to wash from vessels. 	<p>Designated sites are considered in Section 9.2.5.</p> <p>Ornithology is considered in Section 9.2.7.</p> <p>Quality of dredged material is considered in Sections 9.2.1 and 9.2.4.</p>
Bord Iascaigh Mhara/Irish Sea Fisheries Board	<ul style="list-style-type: none"> • The proposal to dispose of dredge spoils within Carlingford Lough is extremely likely to have a significant effect on the environment by virtue of the type of material to be disposed (Fine sediments with levels of cadmium, chromium, nickel and zinc above Action Level 1). • The repeated nature of the proposed activity and the location of the project in a transboundary lough adjacent to protected sites and aquaculture operations producing shellfish for human 	<p>Quality of dredged material is considered in Sections 9.2.1 and 9.2.4.</p>



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Organisation	Summary of Response	Where addressed in this Scoping Report
	consumption, underlines the requirement for a detailed environmental assessment and consultation.	Aquaculture is considered in Section 9.2.9.
NIEA Earth Science	<ul style="list-style-type: none">• No direct threats identified to the Earth Science components of the Carlingford Lough ASSI.• The deposition of sediment, particularly at Site 1, could impact geological features at Cranfield Point depending on sediment dispersal.	Geology and morphology are considered in Section 9.2.2.
Royal Yachting Association	<ul style="list-style-type: none">• The assessment should consider any potential effects on the local RYA clubs and training centres (including the local outdoor education centres), along with visiting recreational vessels.• The assessment should consider if the additional vessel movements, changes in hydrodynamics or increased sedimentation may affect the safety or viability of recreational boating activities which take place in the lough, including those such as racing, cruising, anchoring and mooring which commonly take place outside of the shipping channels.	Recreational activities are considered in Section 9.2.12.



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Organisation	Summary of Response	Where addressed in this Scoping Report
Loughs Agency	<ul style="list-style-type: none">• Concerns include potential impacts on the passage of migratory fish, especially Atlantic salmon, Sea Trout and European Eel.• The proposed disposal sites are within close proximity to licensed aquaculture sites, both for Blue Mussel and Pacific Oysters, both in Northern Ireland and Republic of Ireland.• It is an offence under Section 41 of the Foyle Fisheries Act (1952) to cause pollution, which is detrimental to fisheries interests.	Migratory fish are considered in Section 9.2.5.
UK Chamber of Shipping	No comments	

Table 2 EIA Screening Consultation Responses



8. Assessment Methodology

The methodology for assessing potential adverse effects in the Characterisation Report will follow a standard environmental impact assessment approach using impact matrices and significance criteria. Although the Characterisation Exercise will not be a statutory EIA, this assessment methodology is widely recognised and understood. Ultimately, the assessment will rely on professional judgement; however, where possible a quantitative assessment will be applied with reference to standards and thresholds and using calculations to inform this judgement.

As a guide, major adverse effects would necessitate a change to the proposed location of the placement site and/or the methodology implemented; moderate adverse effects would generally require mitigation measures; while minor adverse effects would not usually require any action.

Examples of the standard impact assessment criteria that will be applied are provided below. Significance will be assessed by correlating the magnitude of the effect and the sensitivity of the receptor. Table 3 and Table 4 provide guidelines for determining the magnitude and sensitivity respectively, and Table 5 provides a matrix to translate magnitude and sensitivity into **effect significance**.

The magnitude of the effect takes account of the:

- Spatial extent;
- Duration (long, medium or short term);
- Frequency; and
- Reversibility of the effect.

Magnitude	Definition
No change	No change from baseline conditions.
Negligible	Very slight change from baseline condition. Spatial extent of effect is negligible, of short term duration (e.g. less than 1 year) and reversible.
Low	Minor shift away from baseline. Effect is of limited temporal or physical extent and of short term duration (e.g. less than 2 years).
Medium	Loss or alteration of baseline conditions. Effect is of moderate temporal or physical extent and of medium term duration (e.g. less than 10 years).
High	Effect is of extended temporal or physical extent and of long term duration, and is irreversible.

Table 3 Definition of terms relating to magnitude

The sensitivity of the receptor takes account of the:

- Vulnerability;
- Recoverability; and
- Value/importance of that receptor.



Sensitivity	Definition
Negligible	Receptor is of negligible value with no contribution to local, regional or national interest. Receptor is not vulnerable to effects that may arise from the project and/or has high recoverability.
Low	Receptor is of low value with little contribution to local, regional or national interest. Receptor is not generally vulnerable to effects that may arise from the project and/or has high recoverability.
Medium	Receptor is of minor value with small levels of contribution to local, regional or national interest. Receptor is somewhat vulnerable to effects that may arise from the project and has moderate to high levels of recoverability.
High	Receptor is of moderate value with reasonable contribution to local, regional or national interest. Receptor is generally vulnerable to effects that may arise from the project and recoverability is slow and/or costly.
Very high	Receptor is high value or critical importance to local, regional or national interest. Receptor is highly vulnerable to effects that may arise from the project and recoverability is long term or not possible.

Table 4 Definition of terms relating to sensitivity

Sensitivity of receptor	Magnitude of effect				
	No Change	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

Table 5 Matrix used for assessment of significance showing the combinations of receptor sensitivity and the magnitude of effect



9. Proposed Scope of the Characterisation Report

9.1 Topics Scoped out of the Characterisation Report

The following topics have been ‘scoped out’ of the Characterisation Report because the proposed placement sites are not expected to have any significant effects on these receptors:

- Shipping lanes and anchorages:
The proposed placement sites are located outside of designated anchorages and shipping lanes. They are to the approval of the Harbour Master of Warrenpoint Port and the Carlingford Lough Commissioners.
- Renewable energy sites:
In 2009-10, the Department for the Economy commissioned a Strategic Environmental Assessment (SEA) for the development of an Offshore Renewable Energy Strategic Action Plan. The SEA focused on a number of key locations identified as potential hotspots for the development of offshore wind and marine renewable energy, including areas off Carlingford Lough. Nothing was identified in Carlingford Lough at that time. The Department for the Economy has been consulted is unaware of any change in that position.
- Marine aggregate extraction areas:
DAERA Marine and Fisheries Division has confirmed that there are no marine aggregate extraction areas in Northern Ireland waters.
- Military exclusion zones:
There are no military exclusion zones in Carlingford Lough.
- Terrestrial ecology and terrestrial ornithology:
The proposed placement sites in open water in central locations in the lough. There are, therefore, no mechanisms for effects on terrestrial ecology. Effects on marine ecology are considered in Section 9.2.5.
- Landscape and visual amenity:
A dredged material placement site, by its nature, is not visible at the water’s surface. The proposed sites are in areas subject to regular shipping activity, so the temporary and short-lived presence of a dredging vessel at the site is not anticipated to have adverse effects on landscape or visual amenity.

9.2 Topics Scoped into the Characterisation Report

The following topics are the key issues to be assessed and have therefore been ‘scoped in’ to the Characterisation Report:

- Dredged material characteristics;
- Geology and morphology;
- Coastal processes;
- Water and sediment quality;
- Designated conservation sites;
- Marine ecology;
- Ornithology;



- Marine mammals;
- Commercial and recreational fisheries;
- Maritime archaeology;
- Commercial navigation; and
- Recreational activity.

The proposed scope of the assessment for each of these topics is provided in the remainder of this section. For each topic, a description is given of the proposed approach to characterising the existing environment, assessing potential adverse effects, and any survey requirements. The topics have been divided into the physical, biological and human environments for ease of reference.

As described in Section 6.1, at this scoping stage Warrenpoint Port is considering two potential sites. It is likely that only one site will be taken forward to the full Characterisation Study due to the costs associated with surveying and assessing two sites; this will depend on the outcome of the scoping stage. This section is presented as if one site will be taken forward; however, the scope set out below will be applied to whichever one site (or both) is taken forward to the Characterisation Report.

Physical Environment

9.2.1 Dredged Material Characteristics

Warrenpoint Port has been undertaking maintenance dredging and placement of material at sea for many years, subject to licences granted by DAERA. The licensing regime requires regular physical and chemical analysis of the material to be dredged to determine its suitability. The following parameters are tested:

- Arsenic;
- Cadmium;
- Chromium;
- Copper;
- Lead;
- Nickel;
- Mercury;
- Zinc;
- Dibutyl Tin (DBT);
- Tributyl Tin (TBT);
- Polycyclic aromatic hydrocarbons (PAHs);
- Polychlorinated biphenyls (PCBs); and
- Particle size analysis.

Guidance on Action Levels for contaminant concentrations in dredged material are given by DAERA. The Action Levels, which are provided in Appendix D, are not statutory contaminant standards but are used as part of a weight of evidence approach to decision-making on the relocation of dredged material to sea.



Sampling of the dredged material is carried out regularly; the most recent sampling was undertaken in 2015 and the results were provided in the EIA Screening Report. Levels of cadmium, chromium, nickel and zinc were detected slightly above Action Level 1. No elevated levels of PAHs, organotins (TDT, DBT) or PCBs were observed in any samples. No parameters were observed above Action Level 2. Historical testing results have shown limited elevated levels of some parameters above Action Level 1. All material disposed has been deemed suitable for placement at the designated offshore site by DAERA.

The existing sediment sampling regime carried out in support of the marine licence applications is sufficient to characterise the dredged material, i.e. no additional sampling is considered necessary for the Characterisation Report.

9.2.2 Geology and Morphology

Characterising the existing environment

A range of data sources will be used to characterise the existing environment, including:

- Maps from the British Geological Survey;
- Admiralty Charts;
- The results of the sediment quality survey (see Section 9.2.4); and
- Available Strategic Environment Assessments and Environmental Statements for developments within Carlingford Lough.

Assessment of adverse effects

Like the existing offshore placement site, the proposed in-lough site is intended to be dispersive so only low levels of permanent deposition within the site are anticipated. No gradual build-up of fine material on the bed of the lough is anticipated in the long run. No significant changes to the geology and morphology are predicted.

The assessment will compare the physical characteristics of the proposed site with the dredged material characteristics to ascertain whether there will be any temporary or permanent changes to the nature of the substrate or the morphology of the area. The suitability of the site to receive dredged material will be assessed.

Survey requirements

A multibeam bathymetric survey of both proposed sites has been carried out to support the hydrodynamic model produced for Carlingford Lough (see Section 9.2.3). This will be used to characterise the bathymetry at the placement site and surrounding areas.

As part of the sediment quality survey (see Section 9.2.4), sediment samples will be subject to particle size analysis to determine their physical characteristics.



9.2.3 Coastal Processes

Characterising the existing environment

Carlingford Lough is a cross-border system with an area of approximately 50 km² (15 km in length from the mouth to Warrenpoint and 4 km wide at its widest point). The Newry River upstream from Warrenpoint is the major freshwater source with a flow rate that can vary from 1 m³/s in summer to 9 m³/s in winter. Carlingford Lough is a shallow, well-mixed system with an average depth between 2 and 5 m and a deeper narrow channel along the centre of the lough. In some locations near the seawards part of the lough, the channel is as deep as 30 m below Chart Datum. There is a dredged channel to Warrenpoint Port with a depth of approximately 5.6 m below Chart Datum.

In common with the rest of the Irish coast, tides are regular and semi-diurnal. Historical records measured at Greenore show that the maximum tidal range is approximately 5.5 m on a spring tide and about 1.8 m on a neap tide.

The hydrodynamic regime within Carlingford Lough will be characterised using available data from the following sources:

- The SMILE project (Ferreira *et al.*, 2007), in which hydrodynamic modelling was conducted for various loughs along the Irish Sea including Carlingford Lough;
- In-house data held by the Agri-Food and Bioscience Institute (AFBI); and
- Available Strategic Environment Assessments and Environmental Statements for developments within Carlingford Lough.

Assessment of adverse effects

The relocation of dredged material at the in-lough site is not expected to affect the coastline or the tidal currents within Carlingford Lough, with the exception of minor localised changes at the site itself if material were to remain on the seabed for a period.

A 2D numerical flow model of the waters in the vicinity of the placement site has been developed by AFBI to assess the effects of disposing of dredged material at the site. The modelling software used is Delft3D-FLOW. This is a three-dimensional, finite volume hydrodynamic and sediment transport model which simulates flow and sediment transport resulting tidal and meteorological forcing. The hydrodynamic model solves the Navier-Stokes shallow water equations with hydrostatic and Boussinesq approximations (Deltares, 2010; Lesser *et al.*, 2004).

The Delft3D-FLOW platform has been used for the SMILE project (Ferreira *et al.*, 2007), in which hydrodynamic modelling was conducted for various loughs along the Irish Sea including Carlingford Lough. It has also been used in shallow estuarine conditions under mesotidal forcing. The Delft3D-FLOW model simultaneously calculates the transport of cohesive (mud) and non-cohesive (sand) sediment fractions.

The model will also be used to assess the effects on sediment transport/plume dispersion – as described in Section 9.2.4.



Survey requirements

The hydrodynamic model has been calibrated using historic tide gauge data and acoustic doppler current profile (ADCP) data collected within the lough. No additional data is considered necessary to calibrate the hydrodynamic model.

9.2.4 Water and Sediment Quality

Characterising the existing environment

Water and sediment quality (physical and chemical) in the vicinity of the proposed sites will be characterised using available data sources, for example the INIS-Hydro seabed classification project, and a site-specific sediment sampling survey (see Survey Requirements below).

Water and sediment quality monitoring data from 2005 – 2014 has been obtained from DAERA/Northern Ireland Environment Agency, which will be used to inform the characterisation. Data will also be sought from the Environmental Protection Agency and the Department of Agriculture Food and the Marine in the Republic of Ireland.

Background suspended sediment concentrations will be determined during the sediment transport modelling (see below).

Assessment of adverse effects

Physical parameters

The temporal and spatial changes in suspended sediment concentration (and any associated deposition of sediment on the bed of the lough) resulting from placement of dredged material at the proposed site will be investigated using a sediment transport model, which forms part of the Delft3D-FLOW model (see Section 9.2.3). The key processes and features of the sediment module in Delft3D-FLOW are:

- Cohesive and non-cohesive sediment fractions may be modelled separately and/or simultaneously;
- Suspended and bed load transport of non-cohesive sediments are computed using Van Rijn's (1993) approach;
- The standard Delft3D-FLOW advection-diffusion solver is used for the transport of the suspended sediment;
- The bed-load is adjusted for bed slope effects;
- For cohesive sediment fractions (e.g. mud) the fluxes between the water phase and the bed are calculated from the well-established Partheniades-Krone formulations (Partheniades, 1965); and
- The effect of flocculation of the cohesive sediment on the settling velocity is taken into account.

At the proposed site, most of the material will be transferred to the seabed by convective descent of the sediment mass. Kirby and Land (1991) state that less than 5% of the material disposed will stay in suspension. For the modelling, it will be conservatively assumed that 10%



of the fine sediment (i.e. mud) will initially enter the water column as suspended load, while 90% will be deposited on the seabed. The material deposited on the seabed is likely to subsequently be re-suspended and transported away from the placement site as a turbid plume.

Initial modelling has been carried out by AFBI to investigate sediment transport resulting from placement of dredged material at a number of in-lough sites. This work will be expanded upon in the Characterisation Report to represent the dispersion of sediment during and after use of the in-lough sites. Outputs from the model will include spatial plots that show increases in suspended sediment concentration and fine sediment deposition, and time series plots at sensitive sites. The modelling will investigate whether the placement of dredged material at specific states of the tide has an effect on the dispersion of material.

The modelling results will be compared to data held by AFBI and other available data on background suspended sediment concentrations and existing deposition patterns.

Chemical parameters

The dredged material is deemed suitable for relocation to a designated site by DAERA (see Section 9.2.1). The temporal variation in sediment quality of the dredged material will be investigated further through a review of historic data. However, as there have been no pollution incidents within Warrenpoint Port in recent times in the area that is maintenance dredged, there are no significant adverse effects predicted on the chemical sediment or water quality as a result of the relocation and placement of dredged material.

Water Framework Directive Assessment

The proposed sites are within the Carlingford Lough coastal water body, which was classified as moderate status in 2015 (DAERA, 2015). A Water Framework Directive Assessment will be undertaken to consider whether the placement of dredged material at a site within the lough would cause deterioration in water body status.

Survey requirements

Physical and chemical sediment sampling will be undertaken during the benthic ecological survey (see Section 9.2.5). Sediment samples will be collected in a grid system across the proposed placement site and will be subject to particle size analysis and chemical analysis for metals, organotins, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). The full list of parameters to be analysed along with the proposed detection limits is provided in Appendix D.



Biological Environment

9.2.5 Designated Conservation Sites

Characterising the existing environment

There are several designated conservation sites within Carlingford Lough, as listed below and shown on Figure 4 and Figure 5 (distances are measured at closest points):

- Carlingford Lough Special Protection Area (SPA) and RAMSAR site (Northern Ireland)
 - 0.6 km to Site 1
 - 0.5 km to Site 2
- Carlingford Lough SPA (Republic of Ireland)
 - 1.1 km to Site 1
 - 1.3 km to Site 2
- Carlingford Shore Special Area of Conservation (SAC) (Republic of Ireland)
 - 1.5 km to Site 1
 - 1.5 km to Site 2
- Carlingford Lough Marine Conservation Zone (MCZ)
 - 8.7 km to Site 1
 - 2.9 km to Site 2
- Carlingford Lough Area of Special Scientific Interest (ASSI)
 - 0.6 km to Site 1
 - 0.5 km to Site 2

The areas of Carlingford Lough within Northern Irish jurisdiction have been designated as a Special Protection Area (SPA) for breeding Sandwich and Common Terns and overwintering (non breeding) Light Bellied Brent Geese, an Area of Special Scientific Interest (ASSI), an Area of Outstanding Natural Beauty (AONB) and a RAMSAR site (as designated under the Convention on Wetlands of International Importance (also known as the Ramsar Convention)). The areas of Carlingford Lough within Southern Irish jurisdiction have been designated as a Special Area of Conservation (SAC) for the Annex I habitats Annual vegetation of drift lines and Perennial vegetation of stony banks, and a SPA for overwinter (non breeding) Light bellied Brent Geese. Carlingford Lough is also a designated Important Bird Area.

The Marine Conservation Zone (MCZ) has been designated as it supports the habitat *Philine aperta* (White lobe shell) and *Virgularia mirabilis* (Sea-pen) in soft stable infralittoral mud.

Information will be gathered from the Joint Nature Conservation Committee, DAERA (Northern Ireland) and the National Parks and Wildlife Service (Republic of Ireland), including citations, selection assessment documents and condition assessments for the designated sites.



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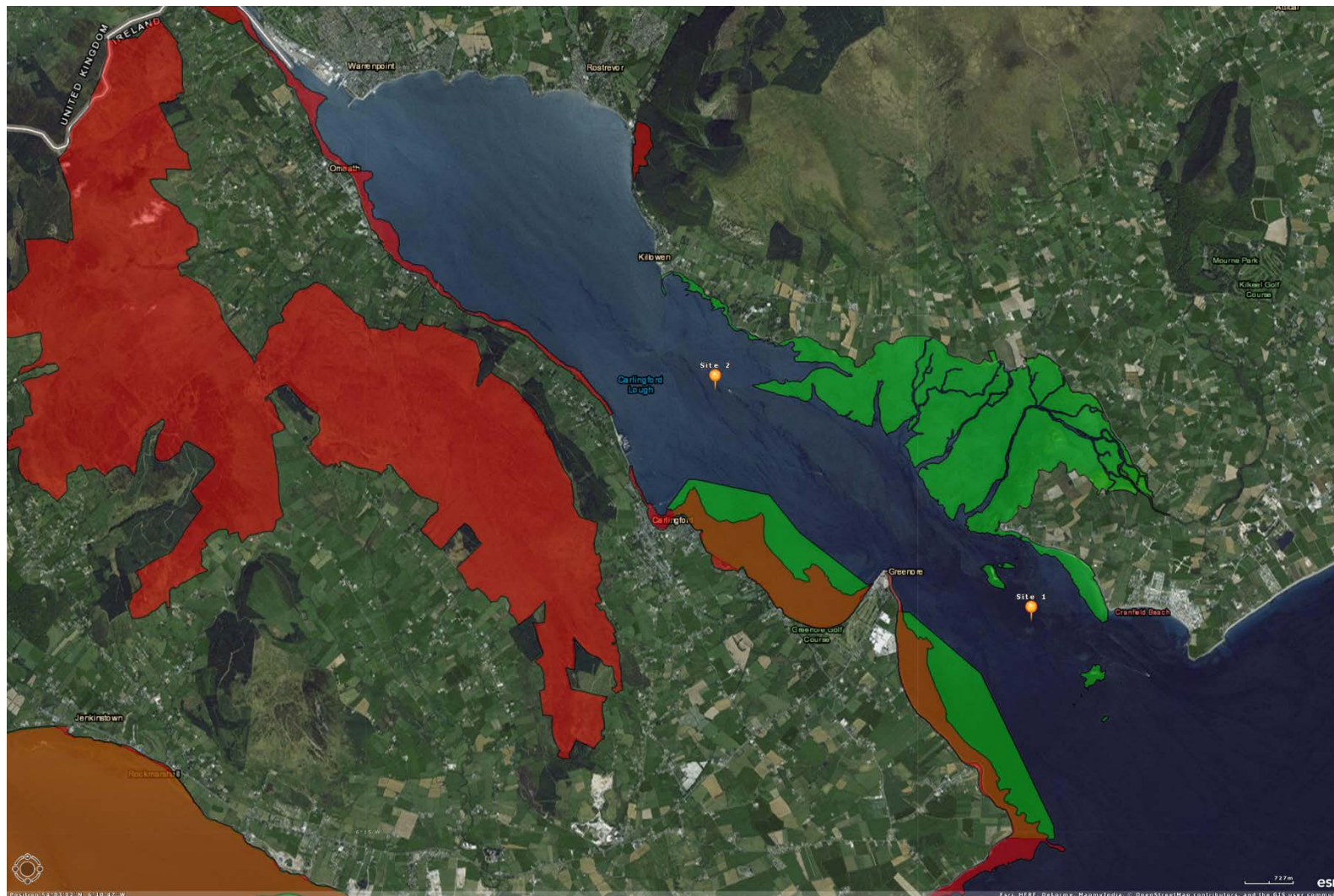


Figure 4 Special Protection Areas (green) and Special Areas of Conservation (red)



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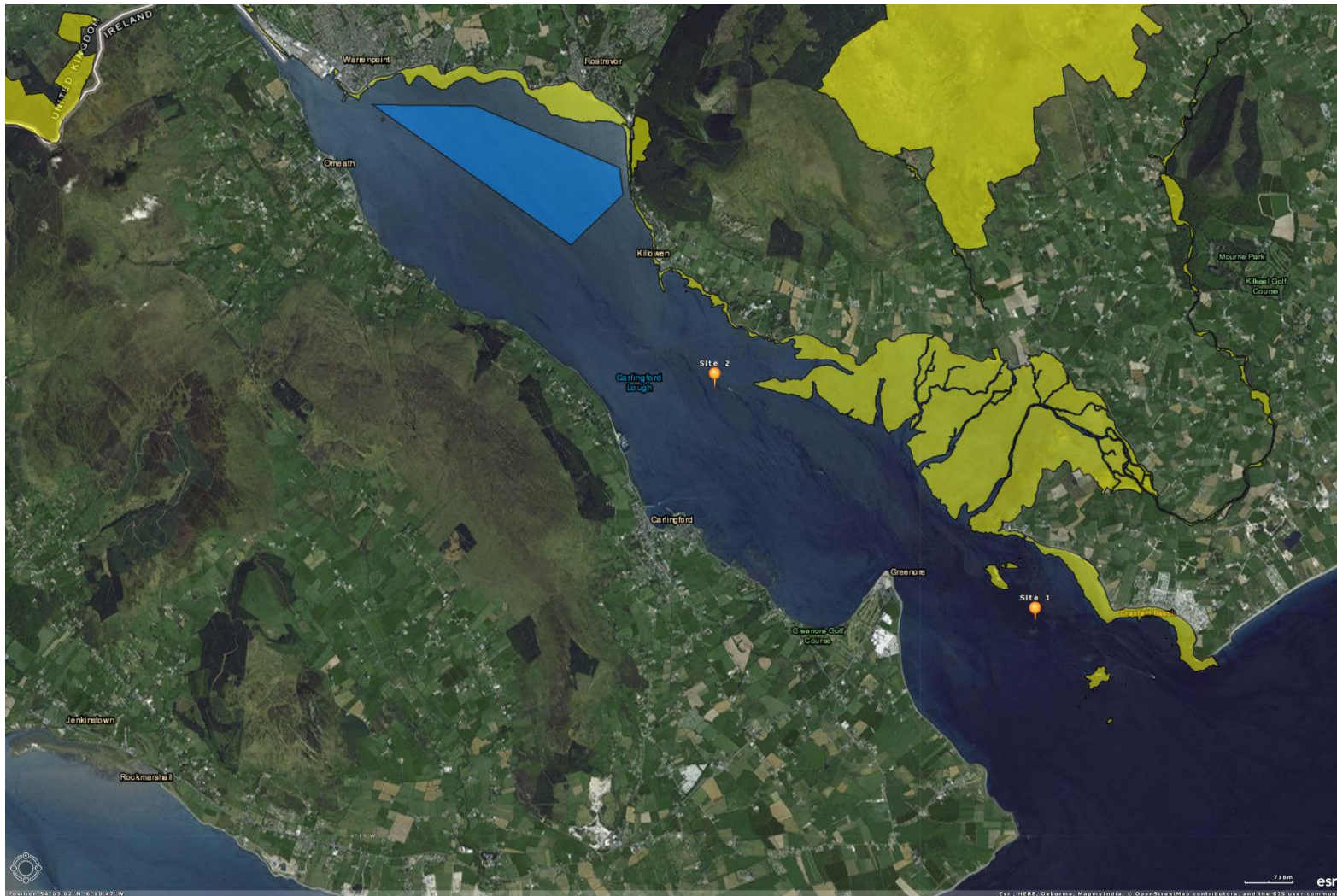


Figure 5 Areas of Special Conservation Interest (yellow) and Marine Conservation Zone (blue)



Assessment of adverse effects

Under the Conservation of Habitats and Species Regulations 2010, to designate a new site (a 'project') within or near to a designated site, a Habitats Regulations Assessment (HRA) will be required.

The first stage of the HRA, Screening/Test of Likely Significance, will be carried out to identify whether the proposed site for dredged material is likely to have a significant effect on the SPAs or SACs listed above, either alone or in-combination with other plans or projects. If this process concludes that it is likely to have a significant effect, an Appropriate Assessment will be required to ascertain whether the proposed placement site will adversely affect the integrity of the designated conservation sites. DAERA will be consulted to ensure that the information required to inform the Appropriate Assessment is included in the Characterisation Report.

A MCZ Assessment will be carried out to assess the potential effects of the dredge material placement site on the interest features and conservation objectives of the Carlingford Lough MCZ.

Survey requirements

There are no specific surveys proposed.

9.2.6 Marine Ecology

Characterising the existing environment

The upper reaches of Carlingford Lough are shallow and dominated by fine muddy sand beds and intertidal mud-flats, whilst the seaward entrance to the lough is a mixture of boulder, cobble and bedrock forming numerous small islands and reefs. There are no known benthic species of conservation interest in or surrounding the proposed placement site(s); however a benthic ecological survey will be carried out (see survey requirements below) to identify benthic habitats and species present.

Migratory fish including Atlantic salmon, sea trout and European eel are present in Carlingford Lough. Juvenile trout and salmon leave the freshwater rivers and pass through Carlingford Lough as smolts during April – June, and after a period at sea return to rivers to spawn during June – September.

Data and information from scientific literature and available Strategic Environment Assessments and Environmental Statements for developments within Carlingford Lough will be examined to extract relevant information on benthic and fish communities.

Assessment of adverse effects

An assessment will be made of the potential adverse effects on habitats and species from the placement of dredged material, including effects resulting from sediment deposition (both at the site and throughout the lough), increased sediment concentrations in the water column, and changes to flows resulting in increased erosion or sedimentation. The results of the hydrodynamic modelling (see Section 9.2.3) and sediment transport modelling (see Section 9.2.4) will be key to the assessment.



Survey requirements

A benthic ecological survey will be carried out to characterise the biological communities. Grab samples will be collected in a grid system within the proposed placement site and a 0.5 km buffer around the site. Samples will be analysed for biological characterisation as well as physical and chemical analysis (see Section 9.2.4). The survey scope will be agreed with DAERA.

9.2.7 Ornithology

Characterising the existing environment

As described in Section 9.2.5, Carlingford Lough has been designated as a SPA under the EU Birds Directive because of its internationally important wintering population of Light-bellied Brent Geese and breeding populations of Common Terns and Sandwich Terns. The Carlingford Lough ASSI also holds nationally significant numbers of wintering Great Crested Grebe, Shelduck, Scaup, Red-breasted Merganser, Oystercatcher, Dunlin and Redshank.

Information on the importance of the proposed site's area for birds will be collated during a desk-based literature review of available data sources. Ornithological records will be requested from the following sources:

- Wetland Bird Survey (WeBS)
- Irish Wetland Bird Survey (I-WeBS)
- RPSB annual reserves count data
- Seabird Monitoring Programme database

The Joint Nature Conservation Committee (JNCC), RPSB, British Trust for Ornithology, and local wildlife and bird groups will be consulted to establish any additional data sources available. Other data and information from scientific literature and available Strategic Environment Assessments and Environmental Statements for developments within Carlingford Lough will be examined to extract relevant information on ornithology.

Assessment of adverse effects

The majority of bird roosting, breeding and nesting activity takes place on land or in shallower waters and intertidal areas around the lough. As the proposed placement site is in open water, only those birds which are commonly found feeding and resting in open water areas or on nearby islands have the potential to be affected by the placement of dredged material.

Potential adverse effects on birds may include: disturbance from dredging vessels whilst sailing to and disposing at the site; reduced visibility for diving birds due to increased suspended sediment concentrations; and disturbance of feeding habitats for birds. These are not expected to be significant issues in an area of open water that is subject to regular vessel movements. The results of the sediment transport modelling (see Section 9.2.4) will be used to assess the effects of reduced visibility.



A number of consultees on the EIA Screening Report (see Section 7) expressed concerns about increased erosion and disturbance to birds on Green Island due to wash from vessels. This is unlikely to be an issue for the relatively small and slow-moving dredging vessel that would be used for in-lough dredging operations; further information will be provided in the Characterisation Report.

Survey requirements

As good spatial baseline data exists for birds, there are no specific surveys proposed.

9.2.8 Marine Mammals

Characterising the existing environment

DAERA's Conservation and Reporting Team has provided information on marine mammal activity within Carlingford Lough.

Harbour porpoise and bottlenose dolphin are known to be present in Carlingford Lough. The lough is an important site for seals and has a large population of harbour seal; grey seals are also present. Although seals are not a site designation feature for Carlingford Lough they are protected at the individual animal level through the Wildlife (Northern Ireland) Order 1985 (as amended). There are a number of seal haul-out sites within Carlingford Lough.

DAERA has provided reports from aerial seal surveys of the Northern Ireland coastline conducted in 2002, 2005 and 2011. Further marine mammal records will be requested from the Sea Mammal Research Unit (SMRU). Data and information from available Strategic Environment Assessments and Environmental Statements for developments within Carlingford Lough will be examined to extract relevant information on marine mammal distribution.

Assessment of potential adverse effects

Regular small-scale placement of dredged material is unlikely to result in significant adverse effects on marine mammals. Potential effects could include disturbance of seals at haul-out sites (although this is unlikely to be significant due to the slow-moving nature of the dredging vessel in areas that are subject to regular vessel activity), and effects on feeding behaviour due to increased suspended sediment concentrations. The results of the sediment transport modelling (see Section 9.2.4) will be used to assess the significance of this effect.

Survey requirements

There are no specific surveys proposed.



Human Environment

9.2.9 Commercial and Recreational Fisheries

Characterising the existing environment

There are numerous commercial aquaculture sites located in Carlingford Lough, as shown in Figure 6. Aquaculture sites licensed for bottom culture of shellfish (predominantly the blue mussel *Mytilus edulis*) cover approximately 931 hectares of the subtidal area of Carlingford Lough, and approximately 194 hectares of the intertidal area of the Lough is licensed for the off-bottom (trestle) culture of Pacific oyster *Crassostrea gigas*. The total area of Carlingford Lough (both intertidal and subtidal) is estimated to be approximately 4,890 hectares (as calculated in ArcGIS by AFBI); therefore, licensed aquaculture beds cover approximately 23% of the total area of the lough.

DAERA Fisheries and Environment Division is the regulator of these activities in Northern Ireland, with the Department of Agriculture, Food and the Marine (DAFM) regulating the activity in the Republic of Ireland. There are 52 licensed sites in the Lough (see Figure 6). However, not all of these sites are active, and of those sites that are active not all of the licensed area is presently utilised for shellfish cultivation.

Sea angling is popular in Carlingford Lough, and commonly fished species include pollack, ray, mackerel, sea trout, dogfish and spurdog (Loughs Agency, 2017). Charter boat services are available from several locations including Warrenpoint, Carlingford, Greencastle and Greenore (Fishing in Ireland, 2017).

The commercial and recreational fisheries characterisation exercise will review readily available information and data held by DAERA, the Loughs Agency, the Department of Agriculture Food and the Marine, Inland Fisheries Ireland and other fisheries management bodies, as well as on-site and telephone consultations with operators.

Assessment of adverse effects

Due to the mid-lough location of the proposed placement site, direct interactions between the dredging vessel and aquaculture sites are not predicted. The key potential adverse effect on aquaculture sites is the alteration of productivity due to increased suspended sediment concentration and/or deposition of material within the sites.

The sediment transport modelling (see Section 9.2.4) will predict areas of increased suspended sediment concentrations and accumulation of material on the seabed. As part of the marine ecology assessment (see Section 9.2.6), the effects of increased SSC and sediment accumulation on fish and shellfish species will be assessed to determine any likely changes in the health, productivity or behaviour of these species.

The data and information gathered during the characterisation phase will enable qualification and, as far as possible, quantification of potential operational and economic impacts that the businesses reliant on shellfish and sea angling resources may experience as a result of the placement of dredged material at the proposed site.



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Figure 6 Licensed aquaculture sites within Carlingford Lough



9.2.10 Maritime Archaeology

Characterising the existing environment

Potential maritime archaeological receptors may include seabed prehistory, maritime archaeology (shipwrecks etc.) and aviation archaeology. Archaeological receptors may be buried within seabed sediments, or may rest upon the seafloor, either with or without height. DAERA's Maritime Archaeologist has provided the following GIS datasets:

- Northern Ireland Known Wrecks: database of known wreck remains (ships, aircraft and finds - anchors, cannons etc.) on the seabed in Northern Ireland waters. Based on information from multiple sources including the UK Hydrographic Office, sport divers; Centre for Maritime Archaeology, Ulster University records, and the ongoing work of the Marine and Fisheries Division. Locations of wrecks have been checked against high resolution marine geophysical data (collected post-2008) where possible. Positional accuracy is variable but generally reasonable; the precise location of many of the entries is accurately recorded.
- Northern Ireland Wrecks: database of historically recorded wrecking incidents for Northern Ireland waters from the Maritime Archaeology Project in the 1990s. The sources of information used in compiling the register were largely documentary, supplemented by the Wilson archive, cartographic material, oral evidence and divers' reports. The positional accuracy of these records is highly variable. In many cases the documentary sources provide limited information concerning the location of wrecks and only the broad general area is recorded. However, approximate positions have been assigned to all wrecks enabling the production of a general distribution map of wreck sites in Northern Ireland inshore waters. It is, therefore, not a precise record of exactly where shipwrecks are but gives a general indication of the likelihood of shipwrecking.

An archaeological appraisal will be carried out to determine whether there are any known areas of archaeological interest within the footprint of the placement site, utilising the following datasets:

- Northern Ireland known wrecks (as described above)
- Northern Ireland wrecks (as described above)
- Modern maps and charts
- Historic maps and charts
- UKHO wrecks and obstructions

The multibeam bathymetric survey described in Section 9.2.2 will be reviewed for evidence of any unknown wrecks within or adjacent to the boundary of the proposed site.

Assessment of adverse effects

The placement of dredged material can both adversely (i.e. cover up) and beneficially affect (i.e. preserve) artefacts. The assessment of adverse effects will comprise of the following elements:



- Identify the known and potential archaeological heritage using existing information available;
- Identify past impacts on the proposed site(s) and surrounding area;
- Carry out a desk-based assessment of the potential adverse effects of the proposed site on the archaeological heritage; and
- Evaluate the risk of disturbing any unknown sites.

Survey requirements

Intrusive site investigation is not considered necessary.

9.2.11 Commercial Navigation

Characterising the existing environment

Carlingford Lough is a shallow, well-mixed system with an average depth between 2 and 5 m below Chart Datum and a deeper narrow channel along the centre of the lough, as illustrated in Figure 7. In some locations near the seawards part of the lough, the channel is up to 30 m below Chart Datum. There is a dredged channel up to Warrenpoint Port with a depth of approximately 5.4 m below Chart Datum.

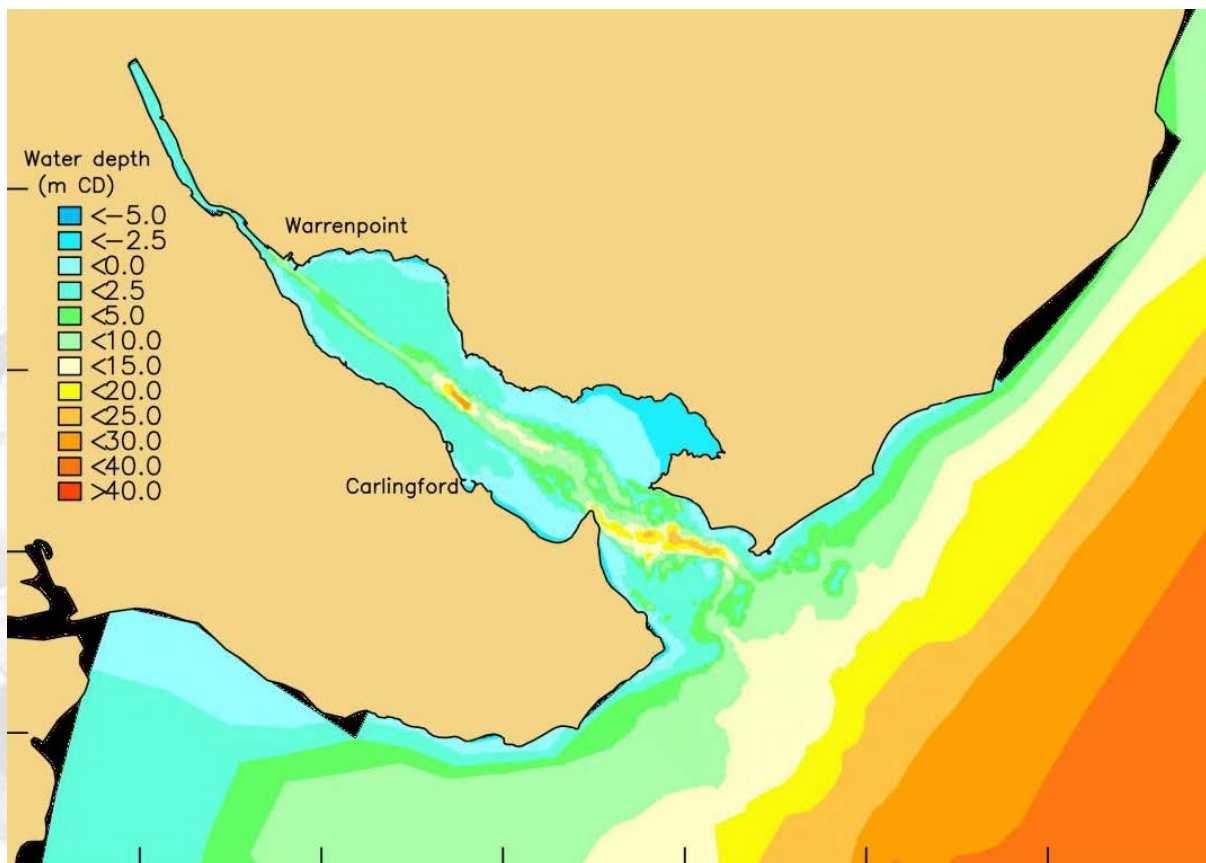


Figure 7 Bathymetry in Carlingford Lough (produced by AFBI)



The characterisation exercise for commercial navigation will draw on the work carried out for the site selection exercise (as described in Section 5.1.2), which identified that large areas of the lough are not suitable for a placement site because of their limited depth.

Assessment of adverse effects

Potential adverse effects on commercial navigation are associated with the presence of a dredger at the proposed site during placement operations. The Warrenpoint Port Harbour Master has been consulted on the locations of the two proposed placement sites for dredged material and is satisfied that they will not interfere with commercial navigation.

Significant deposition of dredged material to an extent that navigable depths are reduced could have an adverse effect on navigation. Whilst it is not expected that significant quantities of dredged material will be permanently deposited on the seabed, the results of the sediment transport modelling (see Section 9.2.4) and bathymetric survey monitoring (see survey requirements below) will be analysed to determine whether water depths will be reduced.

The Warrenpoint Port Harbour Master and the Maritime and Coastguard Agency (MCA) will be consulted during the characterisation stage to establish any potential adverse effects. Due to the relatively short duration that dredging vessels will be present at the site, there are not anticipated to be any significant effects.

Survey requirements

As described in Section 9.2.2, a multibeam bathymetric survey of the proposed site and surrounding area has been carried out to support the hydrodynamic modelling, which has established the baseline bathymetry and water depths. Further surveys would be carried out following placement to measure any accumulation of material, at a frequency to be agreed with DAERA through the marine licensing process.

9.2.12 Recreational Activity

Characterising the existing environment

Recreational activities in Carlingford Lough include: dinghy/yacht racing, cruising, anchoring and mooring (which commonly take place outside of the shipping channels); motor cruising; diving; and outdoor education. Recreational fishing is addressed in Section 9.2.9.

Admiralty charts will be examined and recreational groups such as the Royal Yachting Association and Carlingford Lough Yacht Club will be consulted to establish the current use of the area in the vicinity of the proposed placement site for recreational activities.

Assessment of adverse effects

Any potential adverse effects on recreational activity are expected to be similar to those identified for commercial navigation in Section 9.2.10. Discussions will be held with the Warrenpoint Port Harbour Master, the Royal Yachting Association, Carlingford Lough Yacht Club and other key recreational groups to establish any potential effects. The assessment will consider whether the additional vessel movements, changes in hydrodynamics or increased



sedimentation may affect the safety or viability of recreational boating activities which take place in the lough.

Survey requirements

As described in Section 9.2.2, a multibeam bathymetric survey of the placement site and surrounding area has been carried out.

10. Summary of Scope of the Characterisation Report

Section number	Topic	Characterising existing environment	Assessment of adverse effects	Survey requirements
9.2.2	Geology and morphology	Literature review	Compare dredged material and placement site physical characteristics	Multibeam bathymetric survey
9.2.3	Coastal processes	Literature review	Numerical flow model to assess changes	Numerical flow model
9.2.4	Water and sediment quality	Literature review	<ul style="list-style-type: none"> • Compare dredged material and placement site chemical characteristics (Action Levels) • Sediment transport model 	<ul style="list-style-type: none"> • Site-specific sediment quality survey • Sediment transport model
9.2.5	Designated conservation sites	Review of citations and other relevant supporting data	Habitats Regulations Assessment (Screening)	None proposed
9.2.6	Marine ecology	Literature review	Assessment of effects of sediment deposition on known habitats and species	Benthic ecological survey
9.2.7	Ornithology	Literature review	Assessment of effects on seabirds commonly found feeding and resting in open water areas and islands	None proposed
9.2.8	Marine mammals	Literature review	Assessment of effects of physical disturbance and sediment deposition on known species	None proposed



Warrenpoint Harbour Authority
Site Characterisation Scoping Report – In-Lough Placement

Section number	Topic	Characterising existing environment	Assessment of adverse effects	Survey requirements
9.2.9	Commercial and recreational fisheries	<ul style="list-style-type: none">• Literature review• Interviews with industry and regulators	Qualification and, where possible, quantification of potential operational and economic impacts	<ul style="list-style-type: none">• Site surveys• Potential observer trips
9.2.10	Maritime archaeology	Literature review	Evaluation of risk of disturbing unknown sites	Multibeam bathymetric survey
9.2.11	Commercial navigation	Obtain available data from Warrenpoint Port and MCA	Detailed discussions with Warrenpoint Point Harbour Master and MCA	None proposed
9.2.12	Recreational activity	<ul style="list-style-type: none">• Review of Admiralty Charts• Consultation with Royal Yachting Association and other key recreational groups	Detailed discussions with HHA Harbour Master, Royal Yachting Association and other key recreational groups	None proposed



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Appendix A: EIA Screening Opinion

Environment, Marine & Fisheries Group
Marine & Fisheries Division



Department of
**Agriculture, Environment
and Rural Affairs**

www.daera-ni.gov.uk

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Date: 20 February 2017

Dear Mr. Sheehan,

**Warrenpoint Harbour Authority proposed dredged material new disposal site within
Carlingford Lough – Environmental Assessment Requirements**

I am writing in relation to the Warrenpoint Harbour Authority proposal for a new maintenance dredge disposal site in Carlingford Lough.

The Marine Works (Environmental Impact Assessment) (EIA) Regulations 2007 (as amended) transpose the provisions of the Environmental Impact Assessment (EIA) Directive (97/11/EC) into UK Law. The Marine Works (EIA) Regulations apply to activities, which require a marine licence, under Part 4 of The Marine and Coastal Access Act 2009.

The Department carried out a consultation process under the Marine Works (EIA) Regulations 2007 (as amended), to determine if the proposal would require an EIA to support the marine licence application. The consultation responses are attached to this letter as Appendix I.

As you are aware, the Marine Management Organisation recently determined that the designation of a new dredged material disposal site did not require an EIA, because the designation of a new disposal site is not listed on Annex I or Annex II of the EIA Directive (85/336/EC).

Therefore, in line with this determination, the Department is content that the proposal by Warrenpoint Harbour Authority does not require a full EIA to be carried out. However, Part 4, chapter 1, section 67 (4) of the Marine and Coastal Access Act 2009 (MCAA) states:

‘The appropriate licensing authority may require an applicant –

- a) To supply such information
- b) To produce such articles, and
- c) To permit such investigations, examinations and tests

as in the opinion of the authority may be necessary or expedient to enable it to determine the application’.

Therefore, Warrenpoint Harbour Authority will be required to submit to the licensing authority, such information as required to support the proposal for a new dredged material disposal site within Carlingford Lough. The factors to be considered when selecting a disposal site are listed in Annex III Part B and C of the London Convention 1972. These have been further refined in the Waste Specific guidelines that supplement Annex 2 of the 1996 Protocol, of which the UK Government is a signatory.

Information on the disposal of dredged material at sea can be found in the OSPAR guidelines:

<http://www.ospar.org/work-areas/eiha/dredging-dumping>

Section 9 of the OSPAR guidelines for the management of dredged material at sea also includes useful information on the selection of a sea disposal site and what should be considered when selecting a new disposal site for dredged material:

<http://www.dredging.org/documents/ceda/downloads/environ-ospar-revised-dredged-material-guidelines.pdf>

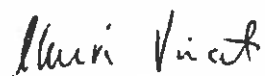
Warrenpoint Harbour Authority will be required to carry out additional assessments and studies to support their proposal. This should take the form of a ‘Site Characterization Report’. A characterization exercise will be carried out, which will be of a similar nature to the EIA process. This will include a scoping exercise, stakeholder consultation (including public advertisement), investigation of potential adverse effects, survey and mitigation requirements and also the final ‘Site Characterisation Report’. A Habitats Regulations Assessment will also be required to support the final marine licence application

Therefore, the next step will be for Warrenpoint Harbour Authority is to complete a ‘site characterisation’ scoping report. The Department will then carry out a consultation exercise on the scoping report to determine potential environmental (and any other) impacts of the proposal. This consultation will follow the similar timelines as those set out in the Marine Works (Environmental Impact Assessment) (EIA) Regulations 2007 (as amended).

Once this scoping stage is complete, the Department will then be in a position to further advise Warrenpoint Harbour Authority what should be included in the final ‘Site Characterisation Report’.

If you have any further questions please do not hesitate to contact me.

Yours sincerely



Claire Vincent
Marine and Fisheries Division
Head of Marine Strategy and Licensing Team

Appendix One – Consultation Responses

1. Marine and Conservation Reporting Team – Marine Conservation Team Response

I have assessed the application and the associated documentation for this proposal. It is the opinion of MCR that an EIA will be required for this project. The primary reasons for this are detailed as follows, however they are all related:

- An Environmental Statement is required to demonstrate that in-Lough placement of dredged material will not negatively impact on the ecology of the Lough. Within Carlingford Lough there are both European and nationally protected sites. Please note the pMCZ has not been listed in section 3.2.4.
- In addition to designated sites, assessment also needs to be made on potential impact to marine protected species, this should include both national and European protected species. Unlike assessment made under the HRA which looks at impact at the population level, under the legislation for protected species, it is the individual animal which is protected. Further information can be found at: <https://www.daera-ni.gov.uk/articles/marine-wildlife-licensing>
- The Environmental Statement will also need to explore the impact on the bathymetry and the knock-on effects changes to this may have to the surrounding habitats and coastline. This will involve analysis of how the dredged material redistributes within the Lough. As suggested in the report this will require hydrodynamic modelling to ascertain dispersion.
- At this stage I am not in a position to say how the proposed disposal locations will impact on either the pMCZ or intertidal ASSIs. The report itself states that hydrodynamic modelling would be required to determine the dispersion and fate of the disposed material.
I also feel that we should request seabed/faunal surveys of both disposal sites in order to rule out the presence of priority species or habitats which would need assessment in a Northern Ireland context before permitting smothering by the dredge material.
I also question whether or not the reference to NE's policy on management of estuaries applies in the case of Carlingford Lough which is clearly a sea lough, not an estuary (as determined by salinity regime and water depths)

I am somewhat confused as to what the bulk of the report, namely the pages and pages of sediment analysis are trying to tell us. A simple summary table detailing which (if any) parameters exceed EQS's

Given the above uncertainties I believe that further work is required in order to determine that protected species, habitats and sites will not be impacted by the proposal for in-lough disposal.

2. Marine Conservation and Reporting Team – Marine Archaeology Response

Although Carlingford Lough is recognised as an area of archaeological and historic potential with numerous documented instances of historic shipwreck there has been no previous archaeological work conducted, or an appraisal of existing geophysical data, at either proposed disposal location.

Presently there are no recorded designated sites, or known archaeological remains, within the proposed disposal site(s) but the possibility of remains being present cannot be conclusively discounted without more detailed characterisation of the receiving environment and an archaeological appraisal.

Therefore, before a decision can be made with regard to the necessity of an EIA on archaeological grounds an archaeological appraisal of the receiving environment is necessary in order to exclude potential damage or burial to hitherto unrecorded historic wreck sites. This archaeological appraisal should form part of any further more detailed characterisation work at each of the proposed disposal sites.

3. NIEA – Conservation Science

- Warrenpoint Harbour Authority proposes to implement a revised dredging regime within Warrenpoint Harbour. This would involve more frequent dredging operations than at present but would use a smaller vessel which would remove a smaller volume of material on each occasion. The Harbour Authority also proposes to dispose of dredged material within Carlingford Lough, rather than at the currently used open sea site which is located at a point approximately 10km south-east of Cranfield Point.
- Carlingford Lough has been designated as a Special Protection Area under the EU Birds Directive because of its internationally important wintering population of Light-bellied Brent Geese and breeding populations of Common Terns and Sandwich Terns. The Carlingford Lough Area of Special Scientific Interest also holds nationally significant numbers of wintering Great Crested Grebe, Shelduck, Scaup, Red-breasted Merganser, Oystercatcher, Dunlin and Redshank.
- The proposed dredging site lies outside the boundary of the Carlingford Lough SPA and the area is relatively unimportant for any of the feature species. The harbour is also located adjacent to, but outside the ASSI.
- Amongst the ASSI feature species, open-water species such as Great Crested Grebe, Scaup, and Red-breasted Merganser are unlikely to be affected by dredging within the harbour or additional vessel movements required for spoil disposal. The

shoreline and mudflats between Warrenpoint and Newry support generally small numbers of wintering shorebirds but Redshank numbers can be locally important. Only a small proportion of these would potentially be susceptible to disturbance during dredging. Significant displacement from feeding areas is, however, improbable.

- Two potential sites for the disposal of dredged material have been identified within Carlingford Lough on the basis of distance from the dredging site, water depth, tidal current strength and proximity to designated sites and areas used for aquaculture. The suitability of the proposed disposal sites has still to be further tested by hydrological modelling, however.
- Both proposed disposal sites are located outside the Carlingford Lough SPA. The western site (319816, 313721) is approximately 560m from the SPA boundary at Mill Bay, which is the principal foraging area for Light-bellied Brent Geese. The eastern site (324598, 310420) lies between Green Island and Blockhouse Island, approximately 620m from the SPA boundary at the former. Green Island is the only breeding site for Common and Sandwich Terns in Carlingford Lough.
- No data on usage of the open water around the disposal sites by wintering waterbirds are available. It is therefore unclear if either of the sites is within an important foraging area for these species. There is a possibility that ASSI feature species, particularly Great Crested Grebe, Scaup and Red-breasted Merganser, could be subject to disturbance by vessel movements. Foraging by these species might also be disrupted by deterioration of water quality through increased turbidity, pollution or changes to benthic habitats through sedimentation. This requires detailed assessment.
- Should the dredged material contain any toxic contaminants, sediment drift from the western disposal site into the Brent Goose foraging areas in Mill Bay would be a concern. It is noted, however, that the screening report indicates that material from Warrenpoint Harbour has previously been within permitted levels of contamination for offshore disposal. While this appears to suggest that a risk of pollution would be very low, contaminant levels within the dredged material need to be clarified given the context of disposal within a lower energy level estuarine environment rather than the open sea. CS notes the potential benefits to intertidal habitat dynamics (in the absence of significant pollutants) of retaining the dredged material within the Carlingford Lough sedimentation system.
- CS has substantial concerns regarding use of the eastern disposal site. This is located in proximity to the tern breeding site on Green Island. There is therefore potential for disturbance of nesting birds by vessel movements close to the island and a danger of low-lying nests being flooded by wash from the vessel. The impact of navigation associated with this project should be assessed in combination with that from existing shipping and the proposed Greencastle – Greenore ferry. The sea area around Green Island has also been identified as an important tern foraging area (Allen & Mellon 2015). Consequently, there is potentially a risk of degradation of

feeding conditions through deterioration of water quality through increased turbidity affecting visibility, or through pollution or changes to benthic habitats arising from increased sedimentation affecting prey species. Given that any decline in prey availability close to the nesting site would result in energetic costs to terns from obtaining food from more distant sites, this could result in reduced breeding success. CS therefore recommends that, given the potential for an adverse impact on SPA feature species, a precautionary approach is taken and the eastern disposal site is considered unsuitable.

- The screening report identifies the following issues potentially impacting upon birds as requiring further assessment:
 - Water quality
 - Sedimentation
 - Changes in benthic habitats
 - Impact upon protected species

Conservation Science concurs that these are the principal areas of concern and recommends that a full Environmental Impact Assessment be carried out..

Reference:

Allen, D. & Mellon, C. (2015) *Validation of selected tern foraging areas associated with breeding colony SPAs*. Unpublished report to Northern Ireland Environment Agency, Allen and Mellon Environmental Ltd

4. NIEA – Conservation, Designation and Protection

The proposed application sites are located approximately 560m (western site location-Mill Bay) and 620m (eastern site-between Green Island and Blockhouse Island) from Carlingford Lough SPA, Carlingford Lough. CDP Based on the information provided it would not be possible to determine that there would be no impacts on the features of the Carlingford Lough SPA/ASSI and further information is required as follows:

- Usage data relating to the open water around the disposal sites by wintering water birds is not held by the Department. It is therefore unclear if either of the sites is within an important foraging area for these species and there is potential for significant disturbance due to the proposed activities. Detailed assessment of the usage of these areas is required.
- While it is acknowledged that historical dredging has not yielded significant contamination, contaminant levels within the dredged material need to be clarified given the context of disposal within a lower energy level estuarine environment rather than the open sea. Information in relation to contamination levels should be provided/clarified in relation to the proposed disposal location.
- Given the comments by NIEA Conservation Science Ornithology Team (CS), the eastern disposal site is located in proximity to the tern breeding site on

Green Island. There is therefore potential for disturbance of nesting birds by vessel movements close to the island and a danger of low-lying nests being flooded by wash from the vessel. The impact of navigation associated with this project should be assessed in-combination (as required by the Habitats Regulations) with that from existing shipping and the proposed Greencastle – Greenore ferry. The sea area around Green Island has also been identified as an important tern foraging area and there is potential for degradation of feeding conditions through degraded water quality. In agreement with CS it is recommended that a precautionary approach is taken on the basis of information currently available and the eastern disposal site is considered unsuitable.

CDP is content to be re-consulted in regard to any future submission.

5. Commissioner of Irish Lights

While accepting the rationale behind the proposal it is clear that sediment that once was entirely removed from the Lough will now be preserved in the Lough. If the sediment originates from the land one would assume that over time this would potentially reduce depths in certain areas of the Lough. As there are many different types of vessel operating throughout the area we would conclude that this proposal would require ongoing close monitoring of water depths by hydrographic surveying which depending on the findings may in result in changes to the positioning and type of local aids to navigation.

6. Maritime and Coastguard Agency

This agency has no comment on the need or otherwise for an EIA regarding this proposal.

7. DAERA Sea Fisheries

We have a number of licensed aquaculture sites within Carlingford Lough, this proposal could have a detrimental effect on the stock and livelihoods of the operators.

As shellfish are filter feeders' and are sensitive to water quality, any dredge spoil disposed within the Lough could have a serious impact upon our licensed sites - this is why we would request an EIA.

8. DAERA Marine Strategy and Licensing Shellfish Team

Both proposed sites are within the Carlingford Shellfish Water Protected Area (see attached map).

We would therefore advise that a full Environmental Statement is prepared by the applicant to examine the potential effects of the disposal operations both spatially and temporally on the protected area.

9. Department of Housing, Planning, Community & Local Government Marine Planning & Foreshore Section

I wish to acknowledge receipt of your email and enclosures dated 29 September last in connection with Warrenpoint Harbour Authority - EIA Screening Consultation for new in-lough disposal site within Carlingford Lough.

The Department has no comments to make on this matter as it appears that the main issues are potential impacts on aquaculture activities on the southern shore, which is a matter for consideration by the Department of Agriculture, Food and Marine. It is noted from your correspondence that you have already sought a response to the consultation from that Department.

10. Ulster Wildlife

Thank you for contacting Ulster Wildlife in relation to the proposed new dredge disposal site in Carlingford Lough. Ulster Wildlife recommend that an EIA is a requirement to be carried out.

This decision is based on:

- Close proximity to proposed MCZ with sea pens being very sensitive to impacts of silting.
- Close proximity to NI SPA/RAMSAR sites and possible impacts of silting on wading bird prey species.
- Close proximity to commercial aquaculture sites and follow on implications for human health and possible commercial impacts.
- Records of several NI priority species in close proximity to the proposed dredge spoil dumping sites, including *Modiolus modiolus*.
- Records of two OSPAR threatened and/or declining species in close proximity to the proposed dredge spoil dumping sites (Ocean Quahog and Thornback Ray).

Please see the attached graphic for overlaid CeDar data. Please do not hesitate to contact us for further information or discussion.

11. UK Hydrographic Office

Regarding the EIA screening consultation for proposed in lough disposal sites within Carlingford Lough:

The UK Hydrographic Office has no comment to make on this proposal, other than to request we are informed of the outcome so that navigational charts can be updated if necessary.

12. RSPB

The two proposed disposal sites are located within the Carlingford Lough proposed marine extension Special Protection Area (SPA). Additionally, the two sites are less than a kilometre from the current Carlingford Lough SPA/ASSI, as well as close to Carlingford Shore Special Area of Conservation (SAC) and Carlingford Lough SPA in the Republic of Ireland. Due to the location of the proposal, we would consider that this project has the potential to result in adverse environmental impacts and would thus deem that an EIA is necessary for this application. We recommend that the site features of all designated sites are considered from the outset of the project.

The nearby Carlingford Lough Important Bird Area (IBA), Carlingford Lough RAMSAR site and the future proposed Marine Conservation Zone (MCZ), should also be considered as priority sites within any EIA in order to fully assess all potential impacts from the proposed development. It should also be noted that RSPB has a considerable interest in the area in the vicinity of the proposal due to the presence of our reserve holdings at Green Island and adjacent to offshore islands.

Potential impacts could include, but are not limited to:

- Disturbance on birdlife, both breeding and wintering
- Displacement of birds from areas of feeding
- Temporary or permanent habitat loss or change
- Pollution
- Siltation
- Indirect habitat loss through small-scale changes in sediment structure
- Degradation of the quality of the surrounding marine environment
- Noise
- Increased erosion to Green Island due to wash from vessels.

We recommend that the consultants appointed to carry out the EIA, contact us at the scoping stage. We can then provide information on data requests, site features, expected level of bird survey and mitigation. Therefore as much information as possible regarding the timing and phasing of works and the construction methods should be provided at this preliminary stage.

13. Bord Iascaigh Mhara/Irish Sea Fisheries Board

The proposal to dispose of dredge spoils within Carlingford Lough is extremely likely to have a significant effect on the environment by virtue of the type of material to be disposed (Fine sediments with levels of cadmium, chromium, nickel and zinc above Action Level 1). Also the repeated nature of the proposed activity and the location of the project in a transboundary lough adjacent to protected sites and aquaculture operations producing shellfish for human consumption, underlines the requirement for sufficient environmental assessment and consultation. Thus, we feel that a full EIA is required in this instance.

14. NIEA Earth Science

I have looked through the Warrenpoint Harbour EIA screening report and although I can see no direct threat to the Earth Science components of the Carlingford Lough ASSI there is the possibility that deposition of sediment, particularly at location 1 (P. 13), could impact geological features at Cranfield Point depending on sediment dispersal. It would be useful to see the results of hydrodynamic modelling.

15. RYA

The RYA has no comment to make on whether an assessment is undertaken within or outside of the EIA regulations. However, we would expect that any assessment considers any potential effects on the local RYA clubs and training centres (including the local outdoor education centres), along with visiting recreational vessels. The assessment should consider if the additional vessel movements, changes in hydrodynamics or increased sedimentation may affect the safety or viability of recreational boating activities which take place in the lough, including those such as racing, cruising, anchoring and mooring which commonly take place outside of the shipping channels.

16. Loughs Agency

Carlingford Lough and its surrounds consist of several designated sites, the proposed project does not require a mandatory EIA, however, due to the sensitive nature of the receiving environment, likely significant effects cannot be ruled out without further more detailed assessment. The Loughs Agency would be in favour of an Environmental Impact Assessment in this case due to the proximity of the proposed disposal sites to these protected sites.

The Loughs Agency would have concerns regarding potential impacts on the passage of migratory fish, especially Atlantic salmon, Sea Trout and European Eel.

Furthermore, the proposed disposal sites are within close proximity to licensed aquaculture sites, both for Blue Mussel and Pacific Oysters, both in NI and ROI. There is also an existing proposal for a Marine Conservation Zone under the Marine Act.

The applicant should also note that it is an offence under Section 41 of the Foyle Fisheries Act (1952) to cause pollution, which is detrimental to fisheries interests.

17. UK Chamber of Shipping

UK Chamber of Shipping has no particular comments to make on this proposal.



Appendix B: Details of Dredging Methods



B1 Trailing Suction Hopper Dredger (TSHD)

Trailing suction hopper dredgers (TSHD) are hydraulic dredgers that can fill their own holds by sucking material from the seabed using a pipe, or pipes that trail over the seabed as the ship sails. TSHDs can operate independently of any other equipment and are able to transport the dredged material over long distances. They are the most commonly used dredger for maintenance dredging internationally.

A TSHD operates as follows:

To start the dredging operations, the TSHD sails to the area to be dredged. Once in the vicinity of its dredging area, the TSHD lowers its draghead(s) to the bed and dredging can commence. The draghead loosens the bed material, if required, by ripping (with teeth) and/or high pressure water jets. The dredge pump, usually installed inside the dredger, sucks up a mixture of water and sediment through the draghead and suction pipe and pumps the mixture into its hold, known as a hopper. The sediment settles in the hopper and, if appropriate, the surplus water is discharged through an adjustable overflow system. When the draught of the vessel reaches the dredging loading mark, or when circumstances do not allow for further loading, dredging is ceased and the draghead and suction pipe are hoisted back inboard. The dredger fills the hopper as efficiently as possible prior to sailing to the placement site where the sediment load is discharged, usually via bottom opening doors in the hopper.

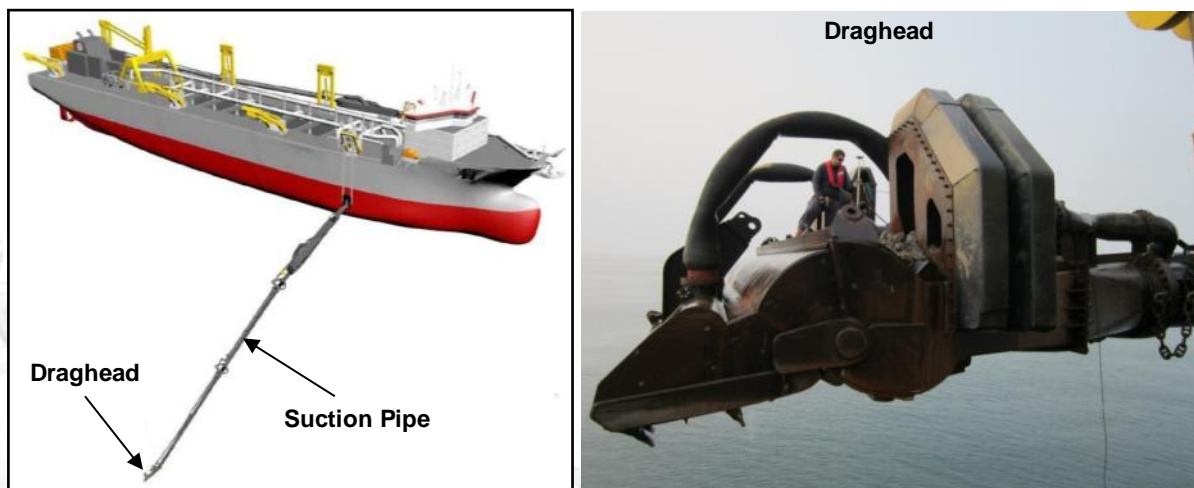


Figure B1 A TSHD draghead and suction pipe in operation and detail of a large draghead

The size of TSHD is generally stated by their hopper capacity and can range from 400m³ up to 46,000m³. The larger dredgers are generally used for large land reclamation projects where material dredged has to be transported over large distances that are not suitable for pipeline transport. For maintenance dredging small to medium dredgers are generally used as draught restrictions of the vessels must be considered. TSHD are generally the most efficient form of bulk dredging over a large area. However, they do have restrictions in terms of accessibility due to their limited manoeuvrability relative to their size and can also find harder materials such as consolidated clays and rock difficult to remove.



B2 Mechanical Dredger

B2.1 Backhoe Dredger

Mechanical dredging involves excavation at subsurface level by the use of a Backhoe (using a bucket) on a crane. It consists of dislodging material and raising it to the surface where it can be transported via a suitable method. Mechanical dredgers offer the advantage of removing the sediment at practically the same solids content as the in situ material. The mechanical plant used floats on a pontoon, which is fixed in position with either spuds or anchors. Although these types of dredgers can have their own hopper, in general they fill an adjacent barge with the dredged material (see Figure B2).



Figure B2 Typical Backhoe and Barge Combination

When full the barge sails to a designated site or placement area and deposits the sediment through doors on the bottom of the hull. When the distance to the placement site is large more than one barge may be required to ensure that the dredger always has a barge to fill and is not waiting for returning barges for extended periods.

A backhoe dredger has the advantage of applying direct pressure on the seabed and hence has significant breakout force. This allows the dredger to recover almost all forms of sediment, with the exception of unfragmented rock where pre-treatment may be required. However, this form of dredger is restricted in the depths it can operate, with greater depths reducing the bucket size used and breakout forces. Thus, the size of a backhoe is generally based on a combination of its available power and bucket size capabilities (0.5m³ to 40m³). A Backhoe Dredger does not operate well in exposed waters, but requires reasonably calm conditions to function.



Figure B3 Example of large Backhoe Bucket

B2.2 Grab or Clamshell Dredger

The grab may be operated from a lattice jib crane, or from a hydraulic excavator. The crane or excavator is usually mounted on a pontoon and loads into hopper barges moored alongside, but may alternatively be mounted on a self-propelled vessel with an internal hopper to which the dredged sediment is loaded for discharge at a remote site. Occasionally a grab may be operated from a crane on a quay, in which case the dredged soil must be loaded into a hopper barge, or into suitable trucks.



Figure B4 Self-propelled grab hopper dredger (GHD) with hydraulic grab

The grab dredger has the advantages of: simplicity; modest capital cost; modest operating costs; removal of sediment at approximately the same density as in situ and good tolerance of sea bed debris relative to suction methods. Disadvantages include: low production and low accuracy, both vertically and horizontally.



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If the grab is mounted on the bow of a self-propelled hopper vessel with bottom discharge capability, the dredger is a reasonably versatile self-contained unit. The fall from popularity has been due to a combination of the disadvantages described and high operating costs in relation to the production level, but a few UK ports continue to use self-propelled grab hoppers including Dover and ABP. Large pontoon mounted grabs remain popular in the USA and in the Far East.



Appendix C: Minutes of Site Selection Consultation Meeting

MINUTES OF MEETING



Project Nr:	440	Project:	Warrenpoint Port Maintenance Dredging Strategy
Location:	NIEA Offices, Belfast	Date & Time:	3/6/2015 13:30
Subject:	Potential In-Lough Modelling Sites		

Present:

Colm Sheehan (CS)	Anthony D Bates Partnership LLP (ADBP)
Hugh Forrester (HF)	Warrenpoint Port
Barry Fox (BF)	Loughs Agency
Claire Vincent (CV)	DOENI
Cara Lavery (CL)	DOENI
Tim Mackie (TM)	DOENI
Joe Breen (JB)	DOENI
Nichola Connery (NC)	DOENI
Matthew Service (MS)	AFBI
Adele Boyd (AB)	AFBI
Gareth Fullerton (GF)	DARD
Joanne Gaffney (JG)	Bord Iascaigh Mhara (BIM)

Distribution:

Present plus

Ciaran Cunningham (CC)	Warrenpoint Port
Kieran Grant (KG)	Warrenpoint Port
Martin Maloney (MM)	ADBP
John Gunn (JG)	ADBP

Item	Minute	Action
1	Introductions CS thanked everyone for taking the time and interest to attend. Each attendee introduced themselves and detailed their position.	
2	Purpose of the Meeting CS detailed that the meeting was organised to provide background information and ensure all stakeholders are suitably informed regarding the current proposal and to facilitate feedback and opinions on the provisional sites proposed for modelling.	

MINUTES OF MEETING



Item	Minute	Action
3	<p>Warrenpoint Navigational Channels CS displayed a map of Carlingford Lough and detailed the current navigational channels. There are two outer approach channels, Cranfield and Greenore, were cut through rock and due to the currents in the area are self-flushing so no dredging is required. The inner approach channel consists of a 60m wide channel over 4km. This is dredged but primarily in the upper reaches, with little or no dredging required at the South East end.</p>	
4	<p>Lough Bathymetry CS overlaid the bathymetry of the Lough over the displayed map and detailed the areas of natural depressions and accessibility for marine craft.</p>	
5	<p>Warrenpoint Dredging History CS detailed the various areas of the inner Port and their present design levels for safe navigation. The bathymetry after the previous major maintenance campaign in 2011/12 was displayed to show the quality of finished achieved. CS showed a table detailing the dredging history over the past decade. Historically a major maintenance campaign is required every 5 to 6 years using a Trailing Suction Hopper Dredger. A video was shown detailing how this type of dredger operates. The volume of maintenance material has varied between 270,000m³ and 390,000m³. The volume has increased in part due to several capital dredging campaigns between 2005 and 2008. The frequency of maintenance campaigns is not by choice but rather by economics, with the Port requiring adequate time to save for the required works before they can be instigated. During this period the Port have a poor product, resulting in restricted access to the Port, removal of trade vessels to anchor at low tide and in some cases the rejection of larger trade vessels. The dredging itself is closely monitored and controlled. Turbidity and Dissolved Oxygen levels are recorded before, during and after the works and benthic sapling is also undertaken. The dredging method is also controlled with restrictions to overflowing and water jets, in place, to minimise suspended sediments. The sediment at Warrenpoint is silty sand. However, the sand content is very fine in nature and is not conducive to increase the hopper load through overflowing. Therefore upon filling the hopper the mixture has a very low density, sometimes referred to as black water. The current disposal site is approximately 26 kilometres from the port, 11km outside of the Lough entrance. This results in actual dredging only being carried out for a fraction of the time onsite, with most associated with the transport and disposal operation. When this distance is taken into conjunction with the low density of the sediments in the hopper production is quite poor. This makes the dredging very expensive.</p>	

MINUTES OF MEETING



Item	Minute	Action
6	<p>Maintenance Dredging Strategy</p> <p>CS stated that due to the establishment of a Deep Water Pocket (DWP) in 2008, which is deeper than the surrounding areas, and poor overall product the Port has between dredge campaigns has resulted in a review of the dredging policy. ADBP are assisting the Port with developing a long term maintenance dredging strategy. This includes examining whether a port purchased and operated in-house dredger would be more economic and provide a more consistent product than external contracting. If continuing with external contracting it is envisaged that the DWP will required maintenance every two years, with the larger overall campaigns remaining every 5/6 years. This would increase costs. As an alternative CS detailed that ADBP were examining in-house options, to maintain the berths only or all areas. However, as this dredging is likely to be ongoing and rate of both dredging and disposal will be a fraction of an external dredge. The type of dredger required would be very small. This would prevent access to the present disposal site, due to exposure to the Irish Sea wave climate. Due to this an in-lough location is required for this option to be progressed. Modelling is a key aspect in establishing the viability of this proposal and has been arranged through AFBI.</p>	
7	<p>Present Status of Modelling</p> <p>MS detailed</p>	
8	<p>Proposed Modelling Sites</p> <p>CS detailed the proposed modelling sites, one located within a natural depression at the end of the inner approach channel and another close to the lough entrance and about 2.5km to the East of the Greenore headland. These sites were displayed on the projected map of the Lough.</p>	

MINUTES OF MEETING



Item	Minute	Action
9	<p>Lough Characteristics and Considerations</p> <p>In developing the proposed sites CS stated that a number of site characteristics and restrictions had been considered.</p> <p>The bathymetry of the lough restricts a significant area of the Lough due to insufficient water depth for safe navigation.</p> <p>Although no formal boundary exists between Northern Ireland and the Republic of Ireland the DOENI stated previously that they could only consider licensing sites that were clearly within the northern area of the Lough. This eliminates a substantial portion of the Lough.</p> <p>Natura 2000 sites are also present. A UK SPA is located on the northern shore and an SAC and SPA on the southern coastline.</p> <p>Aquaculture sites are wide spread though the Lough and licensed by DARD in the North and DAFM in the South.</p> <p>The currents in the area, both on the flood and ebb tide have been provided by AFBI. These are important to consider when making an initial assessment regarding potential dispersion patterns.</p> <p>The existing navigation channels are important as any additional dredging requirement due to increased sedimentation must be avoided. This is not deemed a significant risk due to the fine nature of the material and dynamic nature of the site.</p> <p>Navigational safety is also an important factor for transiting and disposal events. Areas of lower tidal current are more favourable for disposal operations due to the method of unloading. The opening of bottom doors of a dredger in high currents could lead to significant damage.</p> <p>The distance to the Port is important as the greater the distance the greater the transport time, and consequent cost.</p> <p>When all of these issues were considered the potential areas for selection were limited. However, the proposed sites are selected based on the optimum locations when considering all criteria.</p>	

MINUTES OF MEETING



Item	Minute	Action
10	<p>Discussion Feedback</p> <p>CS welcomed discussion on the background information presented and any feedback or concerns that were obvious with regard to the proposal put forward and the reasoning for the modelling sites proposed. CV suggested that the inner proposed site was not sufficiently to the North to be clearly in Northern Ireland Waters. JG stated that the aquaculture sites are not to be used as a border but that the proposed inner site was in “no man’s land” at the moment. CV stated that any licensed aquaculture site has been licensed clearly within its own international waters. CS stated that he had met with the regulator in the South the Environmental Protection Agency who did not object to the positioning of either of the currently proposed sites for potential licencing. JG stated that it was more an issue for the Department of Foreign Affairs. JB stated that a separating line had previously been provided from the department but that this may have no legal standing. CV stated there is no formal agreement between the two jurisdictions but that this line represents what DAF deem is their territory. JB stated he does not know what this line is based on. All of DOENI were of the opinion that the inner proposed disposal site was not clearly within their jurisdiction. CS stated that, being pragmatic about the situation, it was unlikely to receive a timely formal response regarding jurisdiction as it is a much bigger issue than just disposal licensing and that relocation of the inner disposal site to a more suitable location would be prudent.</p> <p>MS queried if the EPA expressed any interest in where the dredged material dispersed to upon release. CS stated that the EPA had requested to be a formal consultee to any potential application for in-lough disposal and would make their own assessment on the submission provided.</p> <p>MS stated that while the aquaculture areas were present and important there was also fishery and particularly intermittent seed mussel fishery adjacent to the natural depression close to the proposed inner disposal site. BF stated that this has not happened in a while but the potential is still there. CS stated that initial discussion was carried out regarding a site in much shallower waters to the North, however, the currently proposed inner site was proposed by a prominent fisherman in the area. BF stated that each fisherman will have their own interests within the lough. CS stated that due to the extent of sites licensed/protected in this area only a minor degree of adjustment is possible but the inner site is only proposed for a very low rate of disposal. JG stated that she had shown the map of the proposed modelling sites around internally within BIM and while they would await the modelling results the initial feedback was that this was not a proposal that they could support.</p> <p>CS stated he will review the matter and circulate a revised inner disposal site with all restriction displayed for comment.</p>	CS

MINUTES OF MEETING



Item	Minute	Action
	<p>CV raised the possibility of moving the existing offshore disposal site closer to the coastline. There is a serious coastal erosion issue to the north of the lough entrance. The northern longshore drift in the area may aid in negating this aspect. CS stated that if the current proposal was deemed infeasible than it may be considered. However, even coastline areas are quite rough in times of inclement weather and utilisation of such a site by an in-house dredger would not be possible for a large portion of the year. Furthermore, while costs savings would be made due to a reduced cycle time for external dredging the associated costs with establishing a new disposal site, albeit on the coast, where similar to an in-lough site and substantial. GF was of the opinion that the maintenance dredgings would be too fine to have any impact on the present erosion. CS agreed. MS pointed out that there was a disposal site located closer to the Lough entrance previously. However, he also stated that at such a site there may be a different set of concerns such as static fishing gear. These could be moved in the short term so this is a possibility. CS stated that currently the Port is focusing on the in-lough sites. The modelling being undertaken is for several different disposal rates. The modelling results will provide information regarding the relationship between disposal rate and dispersion/impact. Furthermore, each site will be assessed on both a flood and ebb tide to determine if the effects of a particular tidal state are more favourable. As no one lough disposal site may be ideal for every occasion a combination of sites may prove the optimum solution, however the modelling process is likely to be iterative with further round(s) required to establish the acceptable degree of use for any particular site. The present disposal site could also be utilised if external contracting is determined to be the most economic form of dredging for the open areas of the port (channel and basin).</p>	
	<p>CV stated that if modelling is going ahead regarding this proposal that it should also be compared to the ongoing activity of mussel dredging during harvesting which can stir up a lot of sediment. MS stated that this can be put in context. CV said this would be interesting when comparing the frequency of both events. CS stated that while it is common knowledge that mussel dredging produces suspended sediments he was not aware of any available data regarding the turbidity produced. MS confirmed that AFBI have undertaken such a monitoring programme. A long term monitoring buoy is situated in the area of the proposed inner site. Oysters are prominent in the northern half of the lough while mussels are more prominent on the southern half.</p>	
	<p>With reference to the proposed outer site CV pointed out that there is a live application for the Greenore to Greencastle Ferry. Planning approval is close to being granted but a marine license is still required. CS stated that initially the environmental assessment would take priority over navigation issues and while the dredger would cross the ferries route while transiting to the outer proposed disposal site it would be similar to any other trade vessel. This is a common occurrence at other ports ADBP manage and sufficient communication is normally adequate to ensure safe passage. CV said the ferry application has had a HRA and navigation risk assessment completed but that obviously this proposal has not been included.</p>	

MINUTES OF MEETING



Item	Minute	Action
	<p>JG queried that if this proposal was to progress to a formal application what environmental assessments would be required. CV stated that a full baseline survey would be required prior to any disposal site being used to assess any impacts as per the OSPAR guidelines. As regards an EIA a screening would be needed to establish whether an EIA is required. However, the sensitivity of the location would point towards and EIA being required. TM pointed out that the SPA in the North is also a Ramsar Site.</p>	
	<p>Although there is no clear legal standpoint, CS queried if all present were happy with the position of the outer disposal site and that it was sufficiently in northern waters to be used for modelling purposes and potentially a license application. There was no objection to this position. JG said she was aware that there is interesting water flows in the area of the outer site, particularly around Greenore, and this leads to good aquaculture productivity. MS stated that the ADCPs were in the water in this region of the Lough.</p>	
	<p>CV asked if modelling was being undertaken at both sites. CS confirmed this was the case. Both proposed sites would be modelling with varying rates of disposal to identify a potentially acceptable rate of disposal. CV asked if this was the case even with JG, on behalf of BIM, stating that they would not be supportive. BF stated that it was hard to make a judgement until at least the initial modelling has been completed. JG stated she has shown the proposal to her environmental and technical staff who did not respond positively. However she recognised that this was a first instinct and it was unfair to judge until more scientific data was available. CS stated that due to the currents and the nature of the material, dispersion rather than retention was likely. This may benefit a low disposal rate in a dynamic area as the material is widespread and any deposition may be indiscernible. JG stated that mussels can deal with high turbidity events in a short period like storms/harvesting but that continuously high turbidity events may affect the long term viability. CS stated that once the modelling results are available and reviewed if the scheme does not look favourable it may be adjusted or abandoned. However, if it is deemed justifiable, due to negligible impacts, it is likely that the proposal will proceed. CS stated he understood the position of BIM currently but that the Port would only move forward if the scheme was feasible, reasonable and had a scientific basis for approval.</p>	
	<p>JG queried the cost difference between an small in-house dredger as proposed and one that could be capable of utilising the present disposal site. CS stated that the costs were like chalk and cheese. A new small to medium ocean going vessel could cost up to £60m to attain but that this was not the only consideration. Maintenance cost area higher, there is a larger crewing requirement, insurance, fuel, etc. It also requires particular certification. In comparison a small vessel, requiring modification, could cost in the region of £600,000. This aspect is not being examined currently until the in-lough disposal option has been assessed.</p>	

MINUTES OF MEETING



Item	Minute	Action
	<p>JB queried if an onshore dewatering option could be considered. CS stated that the costs would significantly increase. If dredging hydraulically dewatering lagoons would be required onshore to receive the material pumped from the TSHD. This would require substantial infrastructure (area, berms, pipelines etc) to be established. JB asked if mechanical dewatering could not be undertaken within the harbour. CS stated that if dredged mechanically, without any other onshore processes, the costs would triple or quadruple as this form of dredging is much less productive than hydraulic means. There is also the issue of demand for the resulting saline marine sediments of a fine structure. Only a few ports in the world have these facilities, such as Antwerp, Hamburg and Rotterdam. There is no instance within the UK of this occurring with maintenance dredging.</p>	
	<p>CV asked if the rates and volumes have been calculated. CS stated that this has been done based on historical survey data for each area of the port.</p>	
	<p>BF stated that no one can form a valid option until the modelling results are available. CS agreed and that today's meeting was purely to show the proposed sites, the reasoning behind them and highlight any concerns.</p>	
	<p>MS queried if vibrocoring had been completed recently. CS stated gravity coring has been completed and 45 samples had been acquired over the dredging area. The chemical sampling being undertaken currently will give a good picture of the distribution of each chemical parameter. CS stated the dredged material is relatively homogenous, overlaying gravel and cobbles.</p>	

MINUTES OF MEETING



Item	Minute	Action
	<p>NC stated that the mussel beds closer to Warrenpoint are a lot more vulnerable, particularly to contaminants such as hydrocarbons (PAH). Due to this the inner site would cause her a significant degree of concern. CV stated that the PAH results after the last major dredging campaign went up substantially within Narrow Water from the dredging activity as all other areas in the Lough showed no impact. CS queried if the levels had reduced since significant dredging had not been undertaken since. CV stated that levels are still high. CS asked if the high PAH levels were solely attributed to the Port's activity. CV said no and that historic contamination was likely to be the cause but dredging activity releases the contamination. MS said that the levels of PAH are high all the way up Narrow Water right up to the Canal and that this may have been due to historic coal burning residues. CV stated that while the sediments being dredged are suitable for sea disposal that is a very different case to where there are live aquacultures present. CS stated that from previous turbidity monitoring it is apparent that the majority of sediment dredged that comes into the harbour is from the Lough rather than a fluvial source. BF said he have encountered sand coming down the river previously. NC stated that even if there was not a level exceedance she was concerned about a cumulative effect from the disposal operation if levels started to creep up slowly to a chronic level. CS stated that if any site was selected and trials undertaken a monitoring plan would be put in place. For example for the in-lough disposal site in Lough Foyle turbidity monitoring and regular bed sampling was undertaken. NC stated that the aquaculture sites close to the proposed outer site are oysters which are sold fresh to London so the quality is very important. JG stated that the sites to the west of Greenore are the most productive sites and that she is aware of the various contaminants within the sediment of Carlingford Lough. There is also organic material beneath the organisms released during mussel dredging that should be considered.</p>	
11	<p>CS thanked everyone for their attendance and recognised the process being undertaken is not a simple one. A revised modelling site plan will be distributed for comment shortly. Once modelling is completed and the results assessed and disseminated a further meeting is proposed to receive feedback and assess the viability of in-lough disposal.</p>	
	Meeting Concluded 15:00	



Appendix D: Sediment Quality Action Levels

Contaminant.	Existing Action level 1 mg.kg⁻¹ (ppm) (Dry Weight)	Existing Action level 2 mg.kg⁻¹ (ppm) (Dry Weight)
Arsenic (As)	20	50-100
Cadmium (Cd)	0.4	5
Chromium (Cr)	40	400
Copper (Cu)	40	400
Mercury (Hg)	0.3	3
Nickel (Ni)	20	200
Lead (Pb)	50	500
Zinc (Zn)	130	800
Tributyltin (TBT,DBT,MBT)	0.1	1.0
Polychlorinated Biphenyls (PCBs)	0.02	0.2
Polyaromatic Hydrocarbons		
Acenaphthene		
Acenaphthylene		
Anthracene		
Fluorene		
Naphthalene		
Phenanthrene		
Benzo[a]anthracene		
Benzo[b]fluoranthene		
Benzo[k]fluoranthene		
Benzo[g]perylene		
Benzo[a]pyrene		
Benzo[g,h,i]perylene		
Dibenzo[a,h]anthracene		
Chrysene		
Fluoranthene		
Pyrene		
Indeno(1,2,3cd)pyrene		
Total hydrocarbons	100	
Booster Biocide and Brominated Flame Retardants *	-	-

BASED ON UK FIGURES FROM OSPAR CONVENTION FOR THE PREVENTION OF MARINE POLLUTION
OF THE NORTH-EAST ATLANTIC

MEETING OF THE WORKING GROUP ON THE ENVIRONMENTAL IMPACT OF HUMAN ACTIVITIES (EIHA)
LONDON: 25 -27 NOVEMBER 2003

CONTRACTING PARTIES' NATIONAL ACTION LEVELS FOR DREDGED MATERIAL