Dumping at Sea

Dumping Site Selection Guidance Note

A Small Scale Study for the Environmental Protection Agency (Ireland) under the Science, Technology, Research & Innovation for the Environment (STRIVE) Programme 2007 – 2013

Produced by

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On behalf of

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Glossary

Advisory Committee	The Dumping at Sea Advisory Committee consists of the Marine Institute, Inland Fisheries Ireland, Sea Fisheries Protection Authority, the Irish Environmental Network, Dublin Port Company and Cork Institute of Technology.
Appropriate Assessment	Process to establish whether a plan or project can be implemented without having a significant impact on a Natura 2000 site.
BACI	Before-After-Control-Impact
Benthic	Relating to the bottom of a sea or lake and to the organisms that live there.
BIM	Bord Iascaigh Mhara
CEFAS	Centre for Environment, Fisheries & Aquaculture Science
CZMD	Coastal Zone Management Division
DaS	Dumping at Sea
DAFM	Department of Agriculture, Food & the Marine
DCENR	Department of Communications, Energy & Natural Resources
DECLG	Department of the Environment, Community and Local Government
DAHG	Department of Arts, Heritage and the Gaeltacht
EPA	Environmental Protection Agency
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GIS	Geographical Information System
IFI	Inland Fisheries Ireland
IMO	International Maritime Organisation
ITM	Irish Transverse Mercator
IWDG	Irish Whale & Dolphin Group
MLVC	Marine Licence Vetting Committee
MPA	Marine Protected Area
MSO	Marine Survey Office
Natura 2000	In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs).
NIEA	Northern Ireland Environment Agency
NIS	Natura Impact Statement. As defined in Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477 of 2011).
NPWS	National Parks & Wildlife Service

OSPAR	Oslo/Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)
PAD	Petroleum Affairs Division
Pycnocline	Boundary layer separating two liquid layers of different densities.
SAC	Special Area of Conservation
SFPA	Sea Fisheries Protection Authority
SPA	Special Protection Area
SPI	Sediment Profile Imagery
Thermocline	Transition layer in a water body between a mixed warmer layer at the surface and a deeper colder water layer. The definitions of these layers are based on temperature.
UAU	Underwater Archaeology Unit

1. Introduction

Dumping at Sea is regulated under the Dumping at Sea Acts 1996 to 2010. The Coastal Zone Management Division (CZMD) of the Department of Agriculture, Food and the Marine had the responsibility of implementing the provisions of these Acts, i.e. permitting and enforcement of dumping at sea operations, up until the 15th February 2010. The Foreshore and Dumping at Sea (Amendment) Act, 2009 transferred the responsibilities for controlling dumping at sea from CZMD to the Environmental Protection Agency (EPA). The Dumping at Sea Acts 1996 to 2010 provide for a system of regulating the dumping of prescribed material at sea.

The purpose of a Dumping at Sea (DaS) permit is to regulate the dumping of material at sea. The Dumping at Sea Acts 1996 to 2010, provide for the implementation of the requirements of International Conventions regulating the disposal of materials, including dredge material, at sea. Note: the Conventions and subsequent Irish legislation also covered sewage sludge, fish waste from industrial fish processing operations, aircraft and vessels, disused offshore installations and inert materials of natural origin. In practice, most substances are prohibited at this stage and the only material that can currently be permitted to be Dumped at Sea under the DaS Acts are dredged material and 'inert' material of natural origin[1] (See Part 1 of the Second Schedule to the DaS Acts). These Acts outline the criteria as to the granting of permits for dumping at sea. Dump site selection is a fundamental element of any dumping at sea application and these guidance notes aim to provide suitable guidance to applicants to ensure the appropriate characterisation of any proposed dump site prior to submitting an application to the EPA.

These guidance notes are laid out in a logical step-by-step manner and comprise of the following sections:

- The Legislative Framework & Guidelines

  This section identifies the legislative framework within which all applicants for a dumping at sea permit must operate.
- Material Characteristics and Suitability for Disposal

  In practice the selection of a dumping site is not normally carried out in isolation, it would be conducted as part of the assessment of an application for the disposal of dredge material. Any dredged material planned to be disposed of at sea must first be evaluated to ensure suitability.
- Selection of Dump Site

[1] The Acts do provide for the dumping at sea of disused offshore installations (Part 2 of the Second Schedule), on foot of a ministerial order in accordance with section 5(12)

The section examines alternative disposal options, the need for a new dumping site, the identification of suitable areas, determination of requirements in relation to dredge material characteristics, selection of candidate disposal areas, assessment of potential adverse effects for candidate dumping site(s), the evaluation of the acceptability of potential adverse effects, the comparison of candidate dumping sites and the selection of the dumping site.

- Monitoring

  Following the disposal operation a monitoring programme must be established in order to instigate any mitigation measures that may be in the permit. The scope of the monitoring programme should include pre- and post-dumping bathymetric surveys in order to evaluate the fate of the dumped material. Sediment chemistry, granulometry and benthic faunal monitoring may also be required.

Throughout these guidelines, reference is made to a number of previous DaS applications or case studies. Each case study is summarised briefly in these guidelines and each is accompanied by an EPA Permit Number. All documents associated with these DaS applications can be found on the EPA website www.epa.ie

2. The Legislative Framework & Guidelines

The International Conventions governing disposal of material at sea are:

- The London Convention of 1972 (including the 1996 Protocol) and the
- OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic adopted in 1992.

The London Protocol 1972 (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972) is one of the first global conventions to protect the marine environment from human activities and has been in force in Ireland since 1982. The London Protocol 1996 was agreed to further modernise the 1972 Convention and, eventually, replace it. It has been in force in Ireland since 2006. According to these conventions, all dredged material must be evaluated at least physically and, if deemed necessary, chemically and biologically. The results of the evaluation determine if the material is suitable for marine disposal. The aim of the OSPAR Convention is to prevent and eliminate pollution and to protect the maritime area against the adverse effects of human activities. The Dumping at Sea Acts 1996 to 2010 implement the London and OSPAR Conventions and prohibit dumping at sea other than by permit from the EPA. The Dumping at Sea Acts 1996 to 2010 include the Dumping at Sea Act 1996, the Dumping at Sea (Amendment) Act 2004, the Sea Fisheries and Maritime Jurisdiction

Act 2006, the Foreshore and Dumping at Sea (Amendment) Act 2009 and the European Communities (Public Participation) Regulations 2010.

The principal factors to be considered when selecting a dumping site are listed in Annex III parts 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. These have been incorporated into Parts B and C of the First Schedule of the Dumping at Sea Acts 1996 to 2010 and comprise the following:

- Characteristics of dumping site and method of disposal
    - Location (*e.g.* coordinates of the dumping area, depth and distance from the coast), location in relation to other areas (*e.g.* amenity areas, spawning, nursery and fishing areas and exploitable resources);
    - Rate of disposal per specific period (*e.g.* quantity per day, per week, per month);
    - Method of packaging and containment, if any;
    - Initial dilution achieved by proposed method of release;
    - Dispersal, horizontal transport and vertical mixing characteristics;
    - Water characteristics (e.g. temperature, pH, salinity, oxygen indices of pollution – dissolved oxygen (DO), nitrate, nitrite, ammonia, phosphate and suspended matter);
    - Bottom characteristics (e.g. topography, geochemical and geological characteristics and benthic macro-fauna); and
    - Existence and effects of current and previous discharges and dumping in the area (including accumulative effects).
- General considerations and conditions
    - Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the sea;
    - In applying these provisions the practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the substance or material less harmful for dumping at sea, will be taken into consideration.

The criteria above form the basis of these guidelines. In addition, a number of guidelines have been consulted in relation to the selection of dump sites:

- Scientific Criteria for the Selection of Waste Disposal Sites at Sea - GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 1982;

- OSPAR Guidelines for the Management of Dredged Material (OSPAR, 2004; 2009);
- Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters (Cronin *et al.,* 2006);
- Guidelines for the sampling and analysis of dredged material intended for disposal at sea (IMO, 2005);
- CEFAS – Case studies to demonstrate the selection of dredged material disposal sites at sea (Birchenough & Vivian, 2009).

3. Material Characteristics & Suitability for Disposal

The First Schedule to the Dumping at Sea Acts, 1996 to 2010 also sets out the criteria which the EPA must consider in deciding whether to grant or refuse a permit for dumping material at sea. These criteria are based on the requirements laid out in Annex III part A of the London Convention 1972 and comprise the following:

1. Amount and composition of the material;
2. Material form, *e.g*. solid, sludge or liquid;
3. Physical properties (especially solubility, specific gravity and density);
4. Chemical and biochemical properties (oxygen demand and nutrients);
5. Biological (viruses, bacteria, yeasts and parasites);
6. Radioactivity;
7. Toxicity;
8. Persistence in the environment (physical, chemical and biological);
9. Accumulation and biotransformation in biological materials or sediments;
10. Chemical and physical changes of the substance or material after release, including formation of new compounds; and
11. Probability of production of taints or other changes reducing marketability of resources (*e.g.* fish & shellfish).

Guidance on the chemical assessment of dredge material for disposal in Irish waters can be found in Cronin *et al.* (2006). These guidelines provide information on the chemical contaminants to be analysed, acceptable limits, analytical procedures and approved analytical laboratories. These criteria are addressed in the current Dumping at Sea Permit Application (EPA, 2011a) and Guidance Note (EPA, 2011b). Based on the results of this evaluation, the EPA determines if the material is suitable for marine disposal.

4. Selection of Dump Site

4.1. Consultation

Consultation regarding the selection of a new dump site is vital. If the requirement for a new dump site is part of a larger project (*e.g*. port redevelopment) that requires an EIA, then consultation regarding the selection of the new dump site can be carried out in tandem with the mandatory EIA consultation. The applicant should consult with some or all of the following, depending on the nature and location of the proposed activity: the EPA, the Department of Agriculture, Food and the Marine, the Department of the Environment, Community and Local Government, the Department of Arts, Heritage and the Gaeltacht (inclusive of the National Parks and Wildlife Service (NPWS) and the Underwater Archaeology Unit (UAU)), the Marine Survey Office (MSO), Bord Iascaigh Mhara (BIM), the Irish Whale & Dolphin Group (IWDG), the Sea Fisheries Protection Authority (SFPA), Inland Fisheries Ireland (IFI), Harbour Masters, local fishermen, aquaculture producers, conservationists, anglers and other recreational users. These consultations, when carried out at an early stage in the planning of the project, can identify potential conflicts with other users, which may be overcome by modification of the project (*e.g.* changing the location of the dump site, carrying out dumping operations only at specified times of the tide or year). In addition, if a proposed dumping site is located close to the border with Northern Ireland, then cross-border consultations must take place *e.g.* the Loughs Agency and the Northern Ireland Environment Agency (NIEA).

4.2. Alternatives to Marine Disposal

Prior to the selection of either a new or existing dumping site for disposal all alternative options for re-use of the material must be explored. There is a wide variety of beneficial uses for dredged or inert material depending on the physical and chemical characteristics of the material and the results of the material evaluation will provide sufficient information to match a material to a possible use such as:

- Engineered uses – land creation and improvement, beach nourishment, coastal protection, offshore berms, capping material and fill;
- Agricultural and product uses – aquaculture, construction material, top soil; and
- Environmental enhancement – restoration and establishment of wetlands, terrestrial habitats, nesting islands and fisheries.

Refer to the guidance note entitled "Guidance on the Beneficial Use of Dredge Material in Ireland" (CIT, in prep.) for more detail in this regard.

4.3. Assessment of the Need for a New Dump Site

An assessment of the need for a new dumping site should be undertaken and include an evaluation of:

1. The short and long term disposal needs of the likely users of the site; and
2. The suitability and capacity of any existing dumping sites that could possibly accommodate the material.

Once the need for a new site has been established, information from baseline monitoring studies at existing dumping sites in the area or nearby will be valuable in the site selection procedure described below.

Case Study (EPA Permit Register No. S0016-01)

In order to cater for 1,050,000 tonnes of dredged material generated from Rosslare Europort and adjacent small boat harbour, a new dump site was established approximately 6.5km offshore from Rosslare Harbour in a deep channel east of the Long Bank cSAC. A new dump site had to be selected as there was no existing dump sites in the locality that would have provided a practically, financially and environmentally viable alternative.

4.4. Identification of Suitable Areas for a Dump Site

The first step is to determine an area within which the material can be reasonably transported and disposed of. Within this area, information should be compiled on present and potential uses that may be incompatible with the disposal operation. These can include[2]:

- Areas of special importance for conservation and scientific purpose such as Natura 2000[3] sites and OSPAR Marine Protected Areas (MPA). It should be noted that dumping sites identified from within Natura 2000 sites or sufficiently close so that they may affect the integrity of the Natura 2000 site(s), will require, as per EPA Guidance, an Article 6 Appropriate Assessment to be carried out (See Section 4.7 below).
- Areas designated under the Water Framework Directive (2000/60/EC), the Shellfish Waters Directive (79/923/EEC) and the Bathing Waters Directive (76/160/EEC);
- Fishing and shell-fishing grounds (commercial and recreational);

[2] Refer to Parts B and C of the First Schedule of the Dumping at Sea Acts 1996 to 2010 (See Section 2 of this document).

[3] i.e. candidate Special Areas of Conservation (cSAC) and Special Protection Area (SPA)

- Spawning, feeding and nursery grounds and migration routes of commercially important fisheries;
- Migration routes of marine mammals;
- Aquaculture sites;
- Renewable energy sites such as offshore wind farms and wave and tidal stream devices;
- Engineering uses of the seafloor such as undersea cables and pipelines;
- Seabed mineral extraction areas
- Aggregate extraction areas (*e.g.* gravel)
- Oil and gas Lease/Licence areas
- Military exclusion zones;
- Shipping lanes;
- Marine archaeological interests such as shipwrecks;
- Beaches and other areas used for recreational purposes;
- Areas of natural beauty or significant cultural or historical importance and
- Intake sites for industrial uses such as cooling, desalination and aquaculture.

Some or all of the uses listed above may require a buffer zone around the relevant areas to ensure that they are adequately protected. This information is best presented through Geographical Information Systems (GIS), enabling the remaining areas potentially suitable for dumping sites to be identified.

A number of useful online databases/websites are available to source the above information:

- EPA Envision Map Viewer http://gis.epa.ie/betazone/envision/ ➡ Water Framework Directive Water Bodies, Shellfish Designated Waters and Bathing Waters.
- WaterMaps http://watermaps.wfdireland.ie/NsShare_Web/ ➡ Water Framework Directive Water Bodies, Shellfish Designated Waters and Bathing Waters.
- Marine Institute Inshore Fisheries Web Viewer http://www.maps.marine.ie/inshore/default.aspx ➡ Inshore Fisheries & Aquaculture.
- Marine Institute Wave Energy Web Viewer http://www.maps.marine.ie/wave/default.aspx ➡ Military Exclusion Zones (Dept. Defence Danger Areas), Department of Marine Traffic Separation Exclusion Zones, Navigational Channels, Nearshore Anchorages, Submarine Cables, Wind Farm Licence/Lease Areas.
- NPWS Mapviewer http://webgis.npws.ie/npwsviewer/ ➡ Natura 2000 sites.
- Blue Flag Beaches http://www.beachawards.ie/blue-flag-beaches-2012.php ➡ Recreational Beaches.

- Petroleum Affairs Division (PAD) Exploration Data Viewer http://gis.dcenr.gov.ie/imf/imf.jsp?site=PAD_Seismic ➡ Oil and Gas Wells, Licences and Leases, Submarine Cables & Gas Infrastructure.
- Marine Irish Digital Atlas (MIDA) http://mida.ucc.ie/pages/atlas/atlas.php ➡ PAD Authorisations, Petroleum Licenced Blocks, Submarine Cables, Natura 2000 Sites, Ramsar Sites, World Heritage Sites, Shellfish Fishing Areas, Seal Distributions, Seaweed Distribution, Blue Flag Beaches, Green Coast Award Beaches, Recreational Activities.
- DCENR GIS Datasets Public Viewer http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple ➡ Shipwreck Database
- INFOMAR Public Viewer http://spatial.dcenr.gov.ie/imf/imf.jsp?site=INFOMAR ➡ Bathymetry, Seabed Classification, Backscatter, LIDAR information
- Sea Fisheries Protection Authority (SFPA) www.sfpa.ie ➡ Information on Aquaculture & Fish Landings
- Inland Fisheries Ireland (IFI) www.fisheriesireland.ie ➡ Information on Angling, Fisheries Protection and Management
- Northern Ireland Environment Agency (NIEA) ➡ Information on Northern Ireland's Natura 2000 sites
- The Loughs Agency www.loughs-agency.org Fisheries Management, Shellfish and Aquaculture in Northern Ireland and cross-border Loughs.

4.5. Determination of Dredge Material Characteristics Following Dumping

In addition to the evaluation carried out to determine suitability of material for marine disposal (Section 3), it is important to have an understanding of the physical, chemical and biological characteristics of the dredge material as it is being released from the disposal vessel. This is due to the fact that the method of dredging (*e.g.* hydraulic or mechanical) and disposal (*e.g.* hopper discharge or discharge through pipes) can alter the characteristics of the material. The most important physical characteristics are grain size distribution and the cohesiveness/degree of consolidation.

Important considerations include:

- Dispersion direction and distance of associated plumes: fine fractions of dredged material may remain in suspension in the water column and be transported and threaten sensitive areas or interfere with other users:

- Erodability: once the material reaches the sea floor depending on its physical characteristics, it may remain there or be eroded and moved by currents to affect sensitive areas;
- Shoaling: some material (e.g. consolidated clay) may not move from where it is deposited and shoaling may occur; therefore, it must be determined whether the site can accommodate this and future material without adverse effects, for example, on navigation.

For the purpose of habitat protection, it is advantageous to seek compatibility between the physical characteristics of the dredged material and the sediment type at the dumping site.

An integral part of such a study is the use of mathematical models (*e.g.* COHERENS, TELEMAC or equivalent) that predict the dispersion and settlement of disposed sediments. These models require site-specific measurements of tidal characteristics for calibration and validation purposes.

Case Study (EPA Permit Register No. S0016-01)
As part of the permit application for the disposal of 1,050,000 tonnes of dredged material generated from Rosslare Europort and adjacent small boat harbour, a Hydrodynamic and Solute Transport Model using DIVAST was required to assess the characteristics of the proposed dump site and the impacts of disposal.

Case Study (EPA Permit Register No. S0009-02)
As part of a permit application for the disposal of 1,656,000 tonnes of sand and silt from dredging Limerick and Foynes Ports, a open water disposal model (STFATE) was developed and run to assess the characteristics of three proposed dump site and the impacts of disposal at the three sites.

4.6. Selection of Candidate Dump Site(s)

From the area identified as potentially suitable (Section 4.3 above), where possible, at least 2 candidate dumping sites should be selected to allow comparison of effects from the disposal of dredged material. Coordinates of the candidate site(s) should be provided in Longitude and Latitude and Irish Transverse Mercator (ITM) to the consultees during the consultation process and, once a proposed dumping site has been selected, to the EPA with the permit application.

The size of the disposal area(s) is an important consideration for the following reasons:

- It should be large enough, unless it is an approved dispersion site, to have the bulk of the material remain either within the site limits or within a permissible area of impact after disposal;
- It should be large enough in relation to anticipated volumes for disposal so that it would serve to function for many years; and
- It should not be so large that monitoring would require undue expenditure of time and money.

In order to assess the capacity of a site(s), the following should be taken into consideration:

- The anticipated loading rates per day, week, month or year;
- The dispersive characteristics of the site; and
- The reduction in water depth over the site because of the mounding of material.

The size and capacity of any new dumping site must be evaluated on a case-by-case basis as hydrodynamics, water depth, quantity of dredge material etc will vary between locations and projects.

4.7. Assessment of Potential Adverse Effects for Candidate Dumping Site(s)

The candidate site(s) should be evaluated to determine the potential adverse effects of the disposal of dredge material. The evaluation must consider the near- and far-field fates (spatial effects) of the material and its constituents and also the short- and long-term effects (temporal effects) on marine resources in the marine environment.

The assessment of the potential effects should lead to a concise statement of the expected consequences of the disposal of the dredged material *i.e*. an 'Impact Hypothesis'. This provides the basis for deciding whether to approve or reject the proposed site(s) and is also essential for informing the design of appropriate mitigation measures and monitoring programmes.

The Impact Hypothesis should integrate information on the type, characteristics and quantity of the dredge material involved, the dumping site conditions, the type of dredging and dumping operations being proposed and any associated mitigation measures designed to minimise impacts. Information on the baseline conditions at the Candidate Dumping site(s) must be obtained. Prior consultation with the EPA will guide the applicant on which surveys are required for each particular area as each site is unique and the requirements of each site are different. Boyd *et al.* (2005) and Davies *et al.* (2001) provide technical details on survey methodologies. What follows is a

comprehensive list of the types of baseline information required for assessing areas for the disposal of dredge material, these include:

- Physical Characteristics:
  - Bathymetric data;
  - Oceanographic data – current speed and direction (surface, mid-water and off-bottom) and tidal elevation (during spring and neap tides);
  - Wave climate;
  - Sediment type – grain size analysis; geochemical and geological characteristics; and
  - Water – temperature, possible existence of a pycnocline/thermocline, suspended matter.
- Chemical Characteristics
  - Sediment granulometry analysis; and
  - Water quality – salinity, temperature, dissolved oxygen. The need for this type of information may be very limited if the dredged material is predicted to settle rapidly to the bottom.
- Biological Characteristics
  - Benthic faunal analysis ;
  - Fisheries resources (including aquaculture), spawning, feeding and nursery grounds and migration routes of important fisheries both recreational and commercial;
  - Birds; and
  - Mammals (including migration routes and breeding)
- Other Uses
  - Areas of special importance for conservation and scientific purpose such as Natura 2000 sites and OSPAR Marine Protected Areas (MPA);
  - Prior disposal activities in the area;
  - Renewable energy sites such as offshore wind farms and wave and tidal stream devices;
  - Engineering uses of the seafloor such as undersea cables and pipelines;
  - Seabed mineral extraction areas *(e.g.* aggregate, oil, gas *etc*);
  - Military exclusion zones;
  - Shipping lanes;
  - Marine archaeological interests such as shipwrecks;
  - Beaches and other areas used for recreational purposes;
  - Areas of natural beauty or significant cultural or historical importance; and
  - Intake sites for industrial uses such as cooling, desalination and aquaculture.

The oceanographic and bathymetric data are typically used to develop a hydrodynamic model to determine the water and sediment movements for the area(s) in question. By factoring in the physical information on the dredged material (Section 3), the method of disposal, the quantities to be disposed and the disposal frequency, the model can be used to determine the fate of the dredged material in the candidate dump site(s). The fate of the dredged material is very important in determining the overall impact of dredge material disposal at any given location. The impact of the disposal must be assessed with regards to all of the bullet points mentioned above.

In addition to gathering all of the above baseline information, consideration must be given to the cumulative impacts arising from the selection of a disposal site i.e. interactions with other users / other plans or projects and the cumulative impacts of using the site over a prolonged period of time. It should be noted however, that any in combination effects arising from the selection of a new disposal site on an existing use, plan or project must be carefully considered.

The use of dispersive sites for the disposal of dredged material with low levels of contamination is not devoid of environmental risk and requires consideration of the fate and effects of the dispersed material. There is however evidence to suggest that the disposal of fine-grained material at dispersive sites within and close to estuaries can have beneficial effects for habitats and species by maintaining sedimentary budgets within an estuary (Birchenough & Vivian, 2009).

Appendix 1 details survey requirements for the baseline parameters listed above.

An Appropriate Assessment to at least Stage 1 Screening must be carried out if a proposed dump site is located within or close to a Natura 2000 site. Guidance on Appropriate Assessments can be found in 'Appropriate Assessment of Plans & Projects - Guidance for Planning Authorities' (DoEHLG, 2009 http://www.npws.ie/media/npws/publications/codesofpractice/AA%20Guidance%2010-12-09.pdf). Where it cannot be excluded, on the basis of objective scientific information, following screening for Appropriate Assessment, that an activity, either individually or in combination with other plans or projects, will have a significant effect on a European Site, the applicant shall provide a NIS, as defined in Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477 of 2011). Where based on the screening it is considered that an Appropriate Assessment is not required, a reasoned response should be provided.

Case Study (EPA Permit register No. S0017-01)

An Appropriate Assessment was carried out for the maintenance dredging of 54,261 tonnes of material from Wicklow Harbour to be disposed of in an existing dump site located approximately 1.5km east of the harbour.

Case Study (EPA Permit Register No. S0016-01)

As part of the permit application for the disposal of 1,050,000 tonnes of dredged material generated from Rosslare Europort and adjacent small boat harbour the following surveys were required to assess the characteristics of the proposed dump site and the impacts of disposal: Archaeological Report, Bathymetric Survey of dumpsite, Tidal Stream Survey and Benthic Survey.

4.8. Site Selection

An initial evaluation of the acceptability of the potential adverse effects of the candidate site(s) must be undertaken by the applicant. Sites with unacceptable impacts can be eliminated at this stage. If no sites are acceptable then the parameters of acceptance need to be reconsidered or additional mitigation measures / pre-treatment steps (e.g. dewatering) need to be proposed or no site can be designated for sea disposal in the area of interest.

If two or more candidate sites have been identified as acceptable then a comparison needs to be carried out to evaluate the differences between the sites (i.e. size, physical characteristics, dispersive qualities etc) in order to determine the relative potential adverse effects of dredge material disposal at each of the sites. These should include quantitative and qualitative evaluations of the perceived risks of disposal at each site.

If a dumping site is found to be acceptable then the EPA may permit the site to be used. Where two or more sites prove to be equally acceptable then the regulators may take account of additional criteria to choose between them *e.g*. proximity to dredging area or ease of access to shipping lanes.

5. Monitoring

Following the selection of a dumping site, a comprehensive monitoring programme must be proposed in order to document the fate and effects of the disposed dredged material. The monitoring programme is also useful to verify that the predictions made during the site selection process were correct and to validate the dispersion model. A report by Bolam *et al.* (2011) reviews dump site monitoring around the coast of England.

The Impact Hypothesis should form the basis for defining the monitoring, by ensuring that there are clearly defined objectives and that the monitoring is focussed appropriately.

At a minimum, the monitoring should include pre- and post-dumping bathymetric surveys of the dumping site (plus the surrounding area) in order to evaluate the fate of the dumped material after e.g. 10 days, 6 months, 1 year etc. If necessary, sediment image profiling may be required (e.g. for capping projects). Grab samples for sediment chemistry / granulometry may be required and analysis of benthic fauna may be required in order to determine the rate of recolonisation and the long-term impacts on the resident infaunal communities and their ability to cope with disposal operations. Boyd *et al.* (2005) and Davies *et al.* (2001) provide technical details on survey methodologies. In addition, the dredging vessel should be fitted with a marine recorder so that the start and end points of each dump can be determined.

In accordance with the DaS application form, the applicant is required to submit information on the scope and frequency of monitoring.

6. References

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Appendix 1

Guidance on Survey Methodologies

Survey	How	What for	When	Monitoring
Bathymetry	Acoustic, single beam (line interval ≤50m)	Bottom topography	Pre-Disposal (site characterisation stage)	10 days, 6 months and 1 year post dumping
Borehole Survey	Drill boreholes	Geochemical and geological characteristics of areas planned to be excavated for the disposal and capping of dredged material	Pre-Disposal	
Oceanography	Recording current meter (deployed at mid-depth ≥ 15 days over spring and neap tides. The meter should record at 20 minute intervals). Alternatively, a direct reading current meter may be used (over spring and neap tides and record at 20 minute intervals). A Tide or pressure gauge should record tidal height for the duration of current measurements. Drogue tracking (during spring and neap tides; surface, mid-water and bottom drogues should be used and positions fixed at 20 minute intervals. Release drogues at high	Current speed and direction, tidal elevation, predict fate of dumped material.	Pre-Disposal	

Survey	How	What for	When	Monitoring
	water and low water and at mid-tide to cover the time of strongest current. Tracking should continue through to the following slack water.			
Wave Climate	Wave meter/Desk-based	Wave characteristics for site accessibility purposes	Pre-Disposal	
Water Quality	Turbidity meter, Temperature/Salinity Probe, Water sampler	Suspended solids (if there is a sensitivity to it in the locality), Salinity, Temperature, Dissolved oxygen	Pre-Disposal	
Hydrodynamic Model	3 dimension Hydrodynamic model *e.g.* COHERENS, TELEMAC or equivalent	Evaluate the spatial and temporal effects of the dredged material disposal	Pre-Disposal	
Benthos (fauna and sediment)	Grab sampling plus adequate control sites (≥3 replicate samples), Sediment Profile Imagery (SPI).	Baseline description of the existing faunal and sediment characteristics.	Pre-Disposal	10 days, 6 months and 1 year post dumping
Fisheries/Aquaculture	Consultation with BIM, SFPA, IFI & Marine Institute, Desk-based assessment	Fisheries resources, spawning, nursery grounds, migration routes, recreational & commercial activities, aquaculture sites	Pre-Disposal	
Birds	Consultation with NPWS and BirdWatch Ireland. Surveys/desk-	Presence of rare/threatened species, usage of the area	Pre-Disposal	

Survey	How	What for	When	Monitoring
	based assessment			
Mammals	Consultation with NPWS and IWDG. Surveys desk-based assessment	Presence of rare/threatened species, usage of the area, migration routes and breeding	Pre-Disposal	
Conservation Areas	Consultation with NPWS, Desk-based	Presence of habitats/species of conservation importance or special scientific interest (including potential areas)	Pre-Disposal	
Archaeology	Consult with Underwater Archaeology Unit of NPWS. Side-scan, Magnetometer, Desk-based	Shipwrecks	Pre-Disposal	
Cables/pipelines	Desk-based		Pre-Disposal	
Aggregate Resources	Desk-based	Areas licenced for oil, gas or aggregate extraction (including potential areas)	Pre-Disposal	
Renewable Resources	Desk-based	Areas licenced for wave, wind or tidal devices (including potential areas)	Pre-Disposal	
Shipping	Consultation with MSO, Desk-based	Usage of the area by shipping	Pre-Disposal	
Military Zones	Desk-based	Presence of any exclusion zones	Pre-Disposal	
Munitions Dump	Desk-based	Locations of existing or historic dumps	Pre-Disposal	
Tourism	Desk-based	Value of the area for recreational activities including importance of the area as an area of natural beauty or	Pre-Disposal	

Survey	How	What for	When	Monitoring
		significant cultural/historical importance		
Intake Pipes	Consultation with the EPA, Desk-based	Industrial use of the area	Pre-Disposal	

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