

Dublin Port Company
Alexandra Basin Redevelopment Project
Construction Environmental Management Plan
(CEMP)

DOCUMENT CONTROL SHEET

Client:	Dublin Port Company					
Project Title:	Alexandra Basin Redevelopment Project					
Document Title:	Construction Environmental Management Plan (CEMP)					
Document No:	IBE1189					
This Document Comprises:	DCS	TOC	Text	No. of Appendices	List of Figures	List of Tables
	1	1	159	3		

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
V01	Draft CEMP for DPC Comment	Editor R Barr Authors: EIA Specialists	A Barr	A Barr	Belfast	08-09-15
V02	Draft CEMP	Editor R Barr Authors: EIA Specialists	A Barr	A Barr	Belfast	23-09-15
V03	FINAL	Editor R Barr Authors: EIA Specialists	A Barr	A Barr	Belfast	08-10-15

Rev A	Draft Foreshore Conditions and survey methodologies included	Editor R Barr Authors: EIA Specialists	A Barr	A Barr	Belfast	30-03-16
Rev B	Amended Noise and Birds MP, Foreshore Conditions updated Appendix 1 replaced	Editor A McNally Authors: EIA Specialists	A Barr	A Barr	Belfast	17-06-16
Rev B V02	Marine Mammal Plan Revised. General consolidation of sections	Editor A McNally Authors: MM Specialists	A Barr	A Barr	Belfast	20-07-16
Rev C V00	EMS/Public Liaison Section added TMP amended Appendix 2 deleted	Editor AMcNally Authors: PR Specialist DPC; EH&S Specialist DPC	A Barr	A Barr	Belfast	22-08-16
Rev D V01	Project Description and consenting process updated. Dumping at Sea and Industrial Conditions added Dredging Management Plan amended Appendix 3 added.	Editor AMcNally Authors: RB/AGB	A Barr	A Barr	Belfast	26-01-17
Rev E V01	Industrial Emissions Conditions added	Editor AMG Authors: RB/AGB	A Barr	A Barr	Belfast	27-10-17

Rev F	Dredging Management Plan (Section 3.5.12) replaced following monitoring results of ABR Capital Dredge	Authors A Barr A Bell	A Barr	A Barr	Belfast	06-08-18
Rev G	Appointed Contractor Plans added for Phase 1 Treatment IE Licence Appendices 4 to 9 added	Editor AMG Authors: RB/AGB	A Barr	A Barr	Belfast	10-09-19

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1 INTRODUCTION

1.1 OBJECTIVES OF THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

This document comprises a Construction Environmental Management Plan (CEMP) for the Alexandra Basin Redevelopment (ABR) project. It is a 'live' document and will be updated as the project progresses, and as details of specific operational methods and plant become available.

Dublin Port Company (DPC) is the promoter of the ABR Project. DPC seeks to achieve the highest possible standards of environmental management during both the construction and operation of the proposed port infrastructure redevelopment.

The CEMP comprises two main parts

Summary of Mitigation Measures (Chapter 2)

The objective of this part of the CEMP is to capture all mitigation measures put forward within the Environmental Impact Statement (EIS) together with conditions imposed by An Bord Pleanála (ABP) and to provide additional detail in order to develop a practical programme of measures for the Contractor(s) and/or independent Environmental Monitoring team. Mitigation measures put forward within the Natura Impact Statement (NIS) are already captured by the EIS. Conditions imposed by the Foreshore Licence/Lease/Ministerial Consent and the Dumping at Sea Permit are also included.

This element of the CEMP will form part of the specification of the Contract Documents for the construction stage to enable suitably qualified Contractors to price the works required to implement the mitigation measures.

Management of Environmental Impact (Chapter 3)

The objective of this part of the CEMP is to develop a suite of Construction Phase Management Plans which will be prepared in association with the preferred Contractor(s). These Management Plans will be agreed with DPC and the relevant competent authorities in advance of the final Contract being signed.

1.2 PROJECT DESCRIPTION

The Alexandra Basin Redevelopment (ABR) Project is the first major infrastructure project to be brought forward for planning and other consents from DPC's Masterplan 2012 to 2040. It represents approximately one-third of the total extent of the proposed developments within the Masterplan.

The Masterplan recognised the need to provide capacity in the Port to cater for 60m (million) gross tonnes of cargo by 2040 and was approved by the Board of DPC in February 2012. It was also subsequently endorsed by Government in its National Ports Policy 2013 in the following terms:

"The government endorses the core principles underpinning the company's Masterplan, and the continued commercial development of Dublin Port Company is a key strategic objective of National Ports Policy".

The ABR Project emanates from ideas presented in the Masterplan and its design is based on an in-depth evaluation of needs (supported by detailed modelling and simulation studies) and a determination of the potential environmental impact of the proposed development during the Environmental Impact Assessment (EIA) process. The EIA process included the review and implementation of the mitigation and monitoring proposals put forward in the Masterplan's Strategic Environmental Assessment (SEA) Environmental Report and Strategic Natura Impact Statement (sNIS).

The ABR Project complements DPC's continuing initiative to, in some cases, regain operational control over port lands and more generally, to influence port operators to increase their utilisation of port lands. These initiatives have included the publication by DPC of a policy document setting out the company's policies regarding the use of port lands and appropriate targets for their utilisation for different types of cargo.

In identifying the engineering options in the Masterplan, DPC recognised significant levels of public concern about the expansion of the Port through further infill in Dublin Bay. The Masterplan confirmed that the Company would continue to develop the Port within its current footprint to the maximum extent possible before any major reclamation works might be considered.

The ABR Project, therefore, focuses on a combination of re-developing existing (and in some cases life-expired) infrastructure and using existing port lands at higher utilisation levels.

Furthermore, to maximise the operational efficiency of the Port, many of the new berths proposed in the ABR Project have been designed to be multipurpose to cater for the needs of a range of ship and cargo types.

Engineering Proposals

The ABR Project comprises a number of engineering proposals set out in the Masterplan document, mainly:

- Works at Alexandra Basin West including construction of new quays and jetties, remediation of contamination on the bed of the basin, capital dredging to deepen the basin and to achieve the specified depths of -10m Chart Datum (CD) at the new berths.
- Infilling of the Basin at Berths 52 & 53 and construction of a new river berth with a double tiered Ro-Ro ramp.
- Deepening of the fairway and approach to Dublin Port to increase the ruling depth from -7.8m CD to -10.0m CD.

This is the most significant infrastructural development planned by DPC in the past 100 years and involves a major capital investment on behalf of the Port. It reinforces the Port's commitment to providing a top level port to the City of Dublin and Ireland as a whole. Ireland is an Island and the importance of being able to import and export goods in and out of the country is a basic requirement and vital to our livelihoods and economy as a whole.

Figure 1.1 below shows the site location plan for the overall ABR Project.

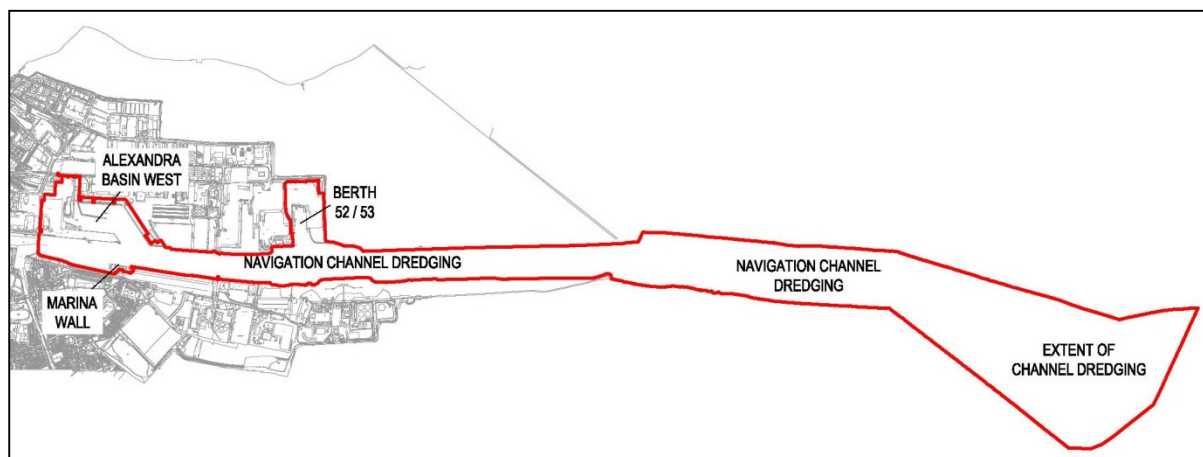


Figure 1.1 Site Location Plan

The proposed development works comprise the following elements, full details of which are included on the planning application drawings which are available on the ABR Project website for download (www.dublinportabr.ie).

Navigation Channel (Extent shown on Figure 1.1)

- Dredging of Liffey Channel to -10m CD, from East Link Bridge to Dublin Bay Buoy over a six year period; and
- Construction of a surge protection/retaining wall at Poolbeg Marina.

Alexandra Basin (Extent shown on Figure 1.2)

- Dismantling of infrastructure and removal of infill material;
- Quay wall refurbishment/construction (designed to accommodate future dredging to a level of -15.0m CD);
- Installation of Ro-Ro ramps;
- Ro-Ro jetty construction;
- Dredging of basin and berths to -10.0m Chart Datum (CD);
- Treatment of contaminated dredged material and re-use as infill on site;
- Excavation and restoration of Graving Dock No. 1;
- Infilling of Graving Dock No. 2 with treated dredged material;
- Relocation of ore concentrates loading operations to Alexandra Quay West Extension; and
- Development of cultural heritage interpretative space

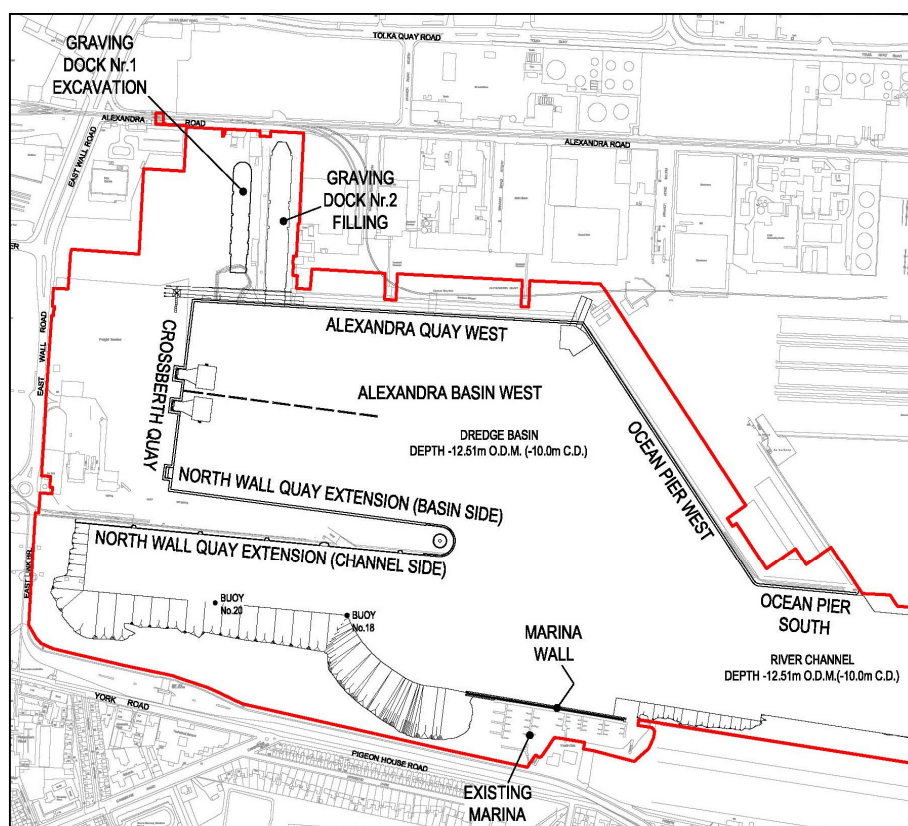


Figure 1.2 Alexandra Basin West Works

Existing Berth 52/53 (Extent shown on Figure 1.3)

- Dismantling and removal of existing infrastructure;
- Infilling of existing Berth 52/53 with treated dredged material;
- Raising of existing surface levels by approx. 1.4m;
- Quay wall construction;
- Mooring jetty construction; and
- Installation of Ro-Ro ramp.

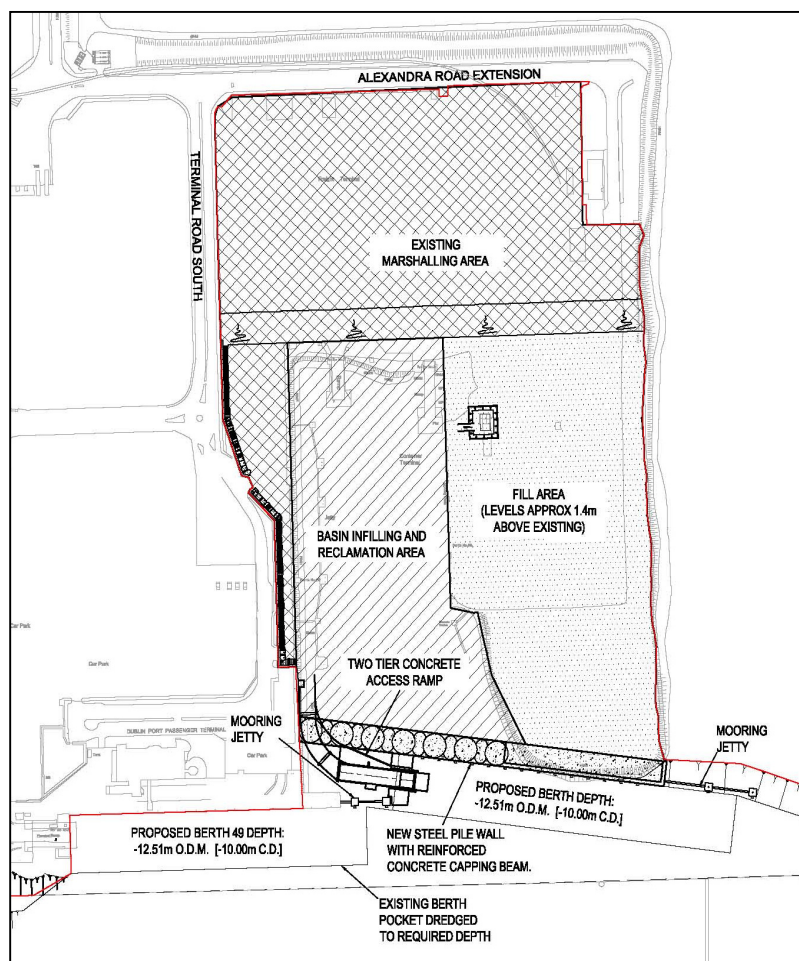


Figure 1.3 – Berth 52/53 Works

Community Gain Proposals

The ABR Project includes a significant community gain proposal comprising the transfer of ownership of a portion of Bull Island from DPC to Dublin City Council and finance to facilitate the provision of information and facilities on the Island.

1.3 ABR PROJECT PLANNING PROCESS

Following consultations under Section 37B of the Planning and Development Act, 2000 as amended, An Bord Pleanála (ABP) served notice to the applicant (DPC) under section 37B(4)(a) which stated that they had decided that the proposed development would be strategic infrastructure within the meaning of section 37A of the Act. Any application for the proposed development must therefore be directly to the Board under Section 37E of the Act.

A planning application was submitted to ABP on 6th March 2014 supported by the following documents, available to download at (www.dublinportabr.ie):

- Planning Report which presented the case for the project as being in the interests of the proper planning and sustainable development of the area;
- Planning Drawings;
- Project level Environmental Impact Statement (EIS) and Natura Impact Statement (NIS); and
- Built Heritage Conservation Strategy.

Consultations with statutory bodies and other stakeholders formed a key role in formulating the scope of the EIS and NIS building on the extensive consultation carried out to develop DPC's Masterplan 2012-2040.

In summary, the consultations comprised interaction with key stakeholders including Dublin City Council, National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Department of Environment, Community and Local Government, National Roads Authority, National Transport Authority, Department of Transport, Fáilte Ireland, Environmental Protection Agency and the Marine Institute.

An extensive programme of public consultation was also undertaken involving:

- Publication of a community newsletter circulated to over 40,000 homes in the areas adjacent to Dublin Port;
- Briefing local public representatives;
- Meetings with local community groups;
- Provision of a dedicated website; and
- An extensive media campaign to publicise the ABR Project which secured wide coverage in national and local print, electronic and online media outlets

The key environmental issues identified are briefly summarised below:

- Potential impact of noise during piling operations on neighbouring communities and potential disturbance to wildlife, including birds, marine mammals and migratory fish;
- Potential impact of the removal and treatment of contaminated sediments within Alexandra Basin West on the marine environment;
- Potential impact of the capital dredging scheme on the coastal processes within Dublin Bay, its benthic ecology and food resource for birds and marine mammals; and
- The potential loss of infrastructure of architectural heritage importance and the potential to uncover previously unrecorded archaeological material during dredging and construction activities.

All of the environmental issues identified during the scoping phase are addressed in the EIS in what is termed a “Grouped Format Structure” which examines each topic as a separate section referring to the existing environment, the proposed development, impacts and mitigation measures.

The environmental issues which have potential to have likely significant impacts on Natura 2000 sites, notably the Rockabill to Dalkey Island candidate Special Area of Conservation (cSAC) and the South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) are addressed in the Natura Impact Statement (NIS).

The appraisals set out in the EIS and NIS was supplemented by DPC’s responses to two Requests for Further Information issued by ABP. Moreover, An Bord Pleanála convened an Oral Hearing on the application for planning permission in respect of the ABR Project, which took place in October 2014 and which provided the public and other interested parties a further opportunity to make submissions and observations on the proposal. This included proposals on issues in relation to the potential environmental impacts of the proposed infrastructure development, capital dredging and dredge spoil disposal.

An Bord Pleanála’s planning decision

ABP granted permission for the ABR Project on 8th July 2015. The following extracts from ABP’s Decision to grant Planning Permission demonstrate the extent to which the environmental issues were addressed.

Environmental Impact Assessment undertaken by ABP

The Board considered that the environmental impact statement, supported by the documentation and various further submissions by the applicant, identifies and describes adequately the direct and indirect effects of the proposed development on the environment. The Board completed an environmental impact assessment in relation to the proposed development and concluded that, by itself and in combination with other development in the vicinity, the proposed development would not

be likely to have significant effects on the environment.

Habitats Directive Assessment undertaken by ABP

The Board completed the assessments required under the Habitats Directive, taking into account the Natura Impact Statement, the initial Inspector's report (dated 18th December, 2014) and the supporting specialist report entitled "Review of Coastal Processes Related Issues", and also the Inspector's addendum report (dated 5th June, 2015), the latter having been completed following a request for further information which addressed, inter alia, the removal of the North Wall – Poolbeg 220kv cable and cumulative impacts of the proposed development.

Stage One Screening Assessment

The Board agreed with the screening assessment carried out in the Inspector's reports, which concluded that there are six European sites for which the likelihood of significant effects could not be ruled out at the screening stage:

- Rockabill to Dalkey Island candidate Special Area of Conservation (site code: 003000)
- Lambay Island candidate Special Area of Conservation (site code: 000204)
- North Dublin Bay candidate Special Area of Conservation (site code: 000206)
- South Dublin Bay candidate Special Area of Conservation (site code: 000210)
- North Bull Island Special Protection Area (site code: 004006)
- South Dublin Bay and Tolka Estuary Special Protection Area (site code: 004024)

The Board also concurred with the applicant's appropriate assessment screening exercise in relation to the potential effects arising from the works required to decommission and replace the 220kV cable and was satisfied that there was no requirement to proceed to Stage 2 appropriate assessment on this aspect of the proposed development.

Stage Two Appropriate Assessment

The Board considered the Natura Impact Statement, further information responses received from the applicant on the 18th August, 2014 and the 2nd April, 2015, and all other relevant submissions including those made at the Oral Hearing and carried out a Stage Two Appropriate Assessment of the implications of the proposed development for the six European Sites in view of those sites' conservation objectives. The Board considered that the information before it was adequate to allow the carrying out of a Stage Two Appropriate Assessment.

Having regard to the nature, scale and design of the proposed development, the Natura Impact Statement submitted with the application, the submissions on file and the Inspector's assessment, the Board completed an appropriate assessment of the impacts of the proposed development on the Rockabill to Dalkey Island candidate Special Area of Conservation (site code 003000), the Lambay Island candidate Special Area of Conservation (site code 000206), the South Dublin Bay candidate Special Area of Conservation (site code 000210), the North Bull Island Special Protection Area (site code 004006) and the South Dublin Bay and River Tolka Estuary Special Protection Area (site code 004024). The Board concluded that the proposed development, in itself or in combination with other plans or projects, would not adversely affect the integrity of the European sites in view of the sites' conservation objectives.

1.4 ABR PROJECT FORESHORE LICENSING PROCESS

Dublin Port Company (DPC) submitted a Foreshore Licence Application for the ABR Project to the Department of Environment, Community and Local Government (DECLG) on 1st July 2015 in order to obtain permissions for undertaking works on the Foreshore (below the mean High Water Mark) including the construction of new quays and jetties and undertaking capital dredging operations. This application was supported by the same ABR Project EIS and NIS as the planning application to ABP.

As part of the foreshore licence application process, there was a consultation period of 8 weeks (40 working days) during which members of the public could view the application documentation and make submissions on the application. The consultation period was advertised in the national press and local press on 16th September 2015. The consultation period was also advertised in “The Marine Times” and “The Skipper” publications. The consultation period ended on 11th November 2015.

The application documentation was placed on display in the following four locations over the 8 week period:

- Clontarf Garda Station, 43 Clontarf Road, Clontarf, Dublin 3
- Irishtown Garda Station, 57A Irishtown Road, Dublin 4
- Dublin Central Library, Ilac Shopping Centre, Ilac Centre, Henry St., Dublin 1
- Dublin City Council, Civic Offices, Wood Quay, Dublin 8

In addition, the foreshore application material was available to view and download on the following dedicated website (www.dublinportabrforeshoreconsent.ie) and on the Department's website at (www.environ.ie/en/Foreshore/ApplicationsSubjecttoEIA).

CDs containing the application documentation package were made available free of charge on request from members of the public.

Also at the request of DECLG, the application documentation was made available by DPC to the following prescribed bodies:

- Dublin City Council
- Fingal County Council
- South Dublin County Council
- Dun Laoghaire Rathdown County Council
- Fáilte Ireland
- An Taisce
- The Department of Transport

All prescribed body and public submissions were directed to the Foreshore Unit of DECLG. After the consultation period ended, DECLG collated the submissions received and produced a consolidated version. The consolidated submissions were issued to DPC on 24th November 2015 and DPC submitted their response by the 21st December 2015.

On 15th January 2016 DECLG requested a further response with respect to further observations received from:

- DECLG Water Service Advisor; and
- Inland Fisheries Ireland.

DPC responded to these further observations by 29th January 2016.

DECLG's Foreshore licensing decision

The Minister for DECLG granted a Lease/Licence/Consent under Sections 2(1), 3(1) and 10(1) of the Foreshore Act, 1933 to DPC on 12th May 2016. The following extracts demonstrate the extent to which the environmental issues were addressed:

The Minister confirms that he has had regard to the following matters in determining the application for a Foreshore Lease/Licence/Consent:

- The application for a Foreshore Lease/Licence/Consent together with accompanying documents;
- The submission received during the public consultation procedure carried out in respect of the application which commenced on 16 September 2015 and concluded on 11th November 2015;
- The submissions received from prescribed bodies in respect of the application;
- The submissions received during the public consultation and the applicant's responses; the consent conditions to be attached to the Foreshore Lease/Licence/Consent if granted;
- The nature of the proposal and its purpose;
- The appropriate assessment of the proposed development by the Marine Institute on behalf of the Marine License Vetting Committee (MLVC) under domestic and EU law, including the Birds Directive and the Habitats Directive and its conclusions and recommendations in this regard;
- The environmental impact assessment of the proposed development by the MLVC under domestic and EU law, including the EIA Directive, and its conclusions and recommendations in this regard;
- The MLVC assessment and recommendations including specific conditions; and
- The advice of the Marine Planning and Foreshore Section of the Department of the Environment, Community and Local Government.

Having had regard to the foregoing, and in particular having regard to the consent conditions attached to the Foreshore Lease/Licence/Consent, and having agreed with the recommendation of the MLVC, the Minister is satisfied (i) that the proposed development on the foreshore would not have significant adverse impacts on human health and safety, nor on the marine environment; (ii) that the proposed development on the foreshore would not adversely affect the integrity of any European site; and (iii) that it is in the public interest to grant the Foreshore Lease/Licence/Consent having regard to the nature of the proposal.

1.5 ABR PROJECT DUMPING AT SEA PERMITTING PROCESS

Following the granting of Planning Permission from ABP on 8th July 2015, DPC submitted a Dumping at Sea Permit application for the ABR Project to the EPA on 13th July 2015. This application was supported by the same ABR Project EIS and NIS which included detailed environmental appraisals of the proposed capital dredging scheme which is an integral part of the overall Project.

As part of the Dumping at Sea Permit application process, there was a consultation period of one month in which members of the public could view the application documentation and make submissions on the proposal. The Dumping at Sea Permit application documentation was available to view and download on the EPA website (www.epa.ie).

All prescribed body and public submissions were made directly to the EPA and were published on the EPA website. After the consultation period ended, the EPA forwarded a total of 759 submissions to DPC.

On 15th December 2015, the EPA issued a request for further information to which DPC issued a response on 12th February 2016.

DPC's response to the request for further information was subject to a second period of public consultation. The public consultation was advertised by the EPA on 22nd February 2016. The EPA also directly notified all those who had made a previous submission. A period of one month was allocated for this second round of public consultation.

A total of 21 submissions were received by the EPA in connection with this second phase of public consultation. The 21 submissions were placed on EPA website and also forwarded to DPC. DPC subsequently sent a response to the issues raised by the submissions on 30th May 2016.

EPA's Dumping at Sea permitting decision

The EPA granted a Dumping at Sea Permit to DPC on 13th September 2016. The following extracts from the EPA's Decision to grant a Dumping at Sea Permit demonstrate the extent to which the environmental issues were addressed:

The Environmental Protection Agency is satisfied, on the basis of the information available, that subject to compliance with the conditions of this permit, the loading and dumping activities will comply with and will not contravene any of the requirements of Section 5 of the Dumping at Sea Act 1996 as amended.

The Agency also considers that the activities will not adversely affect the integrity of any European Site and has decided to impose conditions for the purposes of ensuring that they do not do so. It has determined that the activities, if managed, operated and controlled in accordance with the permit, will

not have any adverse effect on the integrity of any of those sites.

The Agency has accordingly decided to grant a permit to Dublin Port Company to carry on the activities listed in Part I Schedule of Activities Permitted, subject to the conditions set out in Part III Conditions.

Habitats Directive Assessment undertaken by the EPA

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the proposed activities, individually or in combination with other plans or projects is/are likely to have a significant effect on any European Site. In this context, particular attention was paid to the European Site(s) at Rockabill to Dalkey Island SAC, North Bull Island SPA, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC.

The proposed activities are not directly connected with or necessary to the management of any European Site and the Agency considered, for the reasons set out below, that it cannot be excluded, on the basis of objective information, that the proposed activities, individually or in combination with other plans or projects, will have a significant effect on any European Site and accordingly determined that an Appropriate Assessment of the proposed activities was required and for this reason determined to require the applicant to submit a revised Natura Impact Statement. This determination is based on the location of the proposed dumping activity within Rockabill to Dalkey Island SAC and in close proximity to a number of other European Sites (North Bull Island SPA, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC), the scale and characteristics of the proposed loading and dumping activities and their potential to give rise to significant effects on the qualifying interests of the European Sites.

The Agency has completed the Appropriate Assessment of potential impacts on these sites and has made certain that, (based on scientific knowledge of the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats Directive), the proposed activities individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site, in particular Rockabill to Dalkey Island SAC, North Bull Island SPA, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC, having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with this permit and the conditions attached hereto for the following reasons:

- A Marine Mammal Observer will be employed to monitor, record and protect marine mammals including Harbour Porpoise, in accordance with NPWS guidelines for the duration of the loading and dumping activities (Condition 4.5);
- The loading and dumping activities will be confined to the winter months (1st October to 31st March)(Condition 3.2), thereby avoiding any impacts on the foraging activity of birds during the breeding season and the calving and breeding season for Harbour Porpoise;
- Sediment transport modelling indicates that there will no significant impact on the protected reef habitat; and
- Conditions included in this permit to reduce impacts on water quality (Conditions 3.3, 3.4 and 3.5) will result in an avoidance of any potential indirect impacts on the qualifying interests of the European Sites

The Agency is satisfied that no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of those European Sites Rockabill to Dalkey Island SAC, North Bull Island SPA, North Dublin SAC, South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC.

Class 2 sediments

The EPA excluded from the Dumping at Sea Permit, the loading and dumping of Class 2 sediments present in the upper reach of the navigation channel (between East Link Bridge and the West Oil Jetty). DPC are currently evaluating engineering options for the safe disposal of this material.

1.6 ABR PROJECT INDUSTRIAL EMISSIONS LICENSING PROCESS

Following the grant of Planning Permission from ABP on 8th July 2015, DPC also submitted an Industrial Emissions (IE) License Application for the ABR Project to the EPA on 17th July 2015. This application was supported by the same ABR Project EIS and NIS which included detailed environmental appraisals of the proposed treatment of contaminated sediments from Alexandra Basin West and their re-use as fill material to existing Berths 52 / 53, being an integral part of the overall Project.

Three requests for further information were issued by the EPA to DPC during the IE Licensing Process to which DPC provided technical responses. This cumulated in the issuing of a Proposed Determination on the IED licence application by the EPA on 27th October 2016. The Proposed Determination was subject to a period of 28 day public consultation to which no objections were made.

EPA's Industrial Emissions licensing decision

The EPA granted an Industrial Emissions (IE) Licence to DPC on 29th November 2016. The following extracts from the EPA's Decision to grant an IE License demonstrate the extent to which the environmental issues were addressed:

The Environmental Protection Agency is satisfied, on the basis of the information available, that subject to compliance with the conditions of this license, any emissions from the activity will comply with and will not contravene any of the requirements of Section 83(5) of the Environmental Protection Agency Act 1992 as amended.

The Agency also considers that the activity will not adversely affect the integrity of any European Site and has decided to impose conditions for the purposes of ensuring that they do not do so. It has determined that the activity if managed, operated and controlled in accordance with the licence, will not have any adverse effect on the integrity of any of those sites.

The Agency has accordingly decided to grant a license to Dublin Port Company, Port Centre, Alexandra Road, Dublin Port, Dublin 1 to carry on the activities listed in Part I, Schedule of Activities Licensed, subject to the conditions set out in Part III, Conditions.

No objection having been received to the proposed determination, the license is granted in accordance with the terms of the proposed determination.

Habitats Directive Assessment undertaken by the EPA

The Agency notes that a Natura Impact Statement was submitted by the applicant on 17th July 2015. The Agency has completed the Appropriate Assessment of potential impacts on these sites and has made certain, based on best scientific knowledge in the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats Directive, that the proposed activities, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site, in particular South Dublin Bay and River Tolka Estuary SPA (Site code: 004024), South Dublin Bay SAC (Site code: 000210), North Dublin Bay SAC (Site code: 000206), North Bull Island SPA (Site code: 004006) and Rockabill to Dalkey Island SAC (Site code: 003000), having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with this license and the conditions hereto for the following reasons:

- The license specifies emission limit values in Schedule B.2: Emissions to Water, of this licence for relevant parameters in the waste water discharge, which are set to ensure compliance with the requirements of the European Communities Environmental Objectives (Surface Water) Regulations 2009;
- The results of coastal process modelling presented in the NIS conclude that there will be no impact on the intertidal habitats that support the species designated as qualifying interests.
- The results of the modelling presented in the NIS of waste water and storm water discharges from the treatment area conclude that there will be no measureable impact on the environment;
- The drainage system on site will maintain a separation between the clean storm water and runoff which has the potential to be contaminated, which will be treated onsite before discharge;
- Schedule C: Control & Monitoring of this license of the licence provides for control and monitoring of storm water emissions and emissions to surface water from the installation;
- Conditions in the license require that all drainage from bunded and waste storage areas be treated as contamination, (Condition 3.7.3), while visual inspections and proper maintenance are also provided for (Condition 6.11);
- A Marine Mammal Observer will be engaged during licensed activities and activities associated with licensed activities at the installation that may cause disturbance impacts on the Harbour Porpoise, which is highly mobile within its habitat (Condition 6.16.3); and
- Noise-producing activities will only take place during daylight hours where visibility provides for effective monitoring (Condition 6.16.4).

The Agency is satisfied that no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of those European Sites South Dublin Bay and River Tolka Estuary SPA (Site code: 004024), South Dublin Bay SAC (Site code: 000210), North Dublin Bay SAC (Site code: 000206), North Bull Island SPA (Site code: 004006) and Rockabill to Dalkey Island SAC (Site code: 003000).

2 SUMMARY OF MITIGATION MEASURES

2.1 MITIGATION MEASURES ARISING FROM THE EIS

Chapters 5.0 to 13.0 of the EIS assess the likely significant impacts arising from the proposed development. The following table (Table 2.1-1) summarises the potential impacts identified and the mitigation measures required, where necessary.

Table 2.1-1 Summary of Impacts and Mitigation Measures

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
Flora and Fauna (Chapter 5)		
Timing of Dredging Works (page 5-19)	Overarching consideration to minimize the environmental impact on the marine environment notably smolt migration, tern feeding and recovery of benthic ecology.	The dredging works within the River Liffey Channel will be undertaken over a 6 year period during the winter months only (October to March)
Birds		
Black Guillemots (Page 5-18)	Disturbance of bird species which breed in cavities within the existing quays and jetties	In order to avoid disturbance to nesting birds, any existing nest holes in piers to be demolished, will be blocked or otherwise made inaccessible in the month of September (before the birds generally occupy the nest holes), preceding the development works. Prior to this, temporary artificial nest boxes will be provided for the birds in immediately adjacent parts of the port, for the duration of construction works. In addition, concrete nest boxes will be incorporated into the new quays and jetties, at appropriate locations selected at the detailed design stage, to encourage the birds to return to these areas in subsequent breeding seasons.
Brent Geese (Page 5-18)	No adverse impacts on bird species foraging on the spilt agricultural products in Alexandra Basin West as a result of the works being carried out on a phased basis so that shipping will continue to be unloaded here, albeit in different locations.	The work programme will be implemented on a phased basis

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
Marine Mammals		
Harbour porpoise and seals (Page 5-36 & 5-37)	Potential effects of demolition works, piling, dredging and disposal of dredge spoil	The following precautionary measures will be undertaken to minimise the risk of direct injury to marine mammals in the area of operations in line with National Parks & Wildlife Service Guidelines (2013): An adequate number of trained and experienced Marine Mammal Observer (MMO) will be put in place during piling, dredging, dumping, and demolition operations. The MMO(s) will scan the surrounding area to ensure no marine mammals are in a pre-determined exclusion zone in the 30-minute period prior to operations. It is suggested that this exclusion zone is 500m for demolition and dredging activities, and 1,000m for piling activities considering the potential risks outlined. Noise-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. A minimum of four hydrophones (2 SAM and 2 PAM) will be used to assist the detection of marine mammals. Where effective visual monitoring is not possible, the sound-producing activities shall be postponed until effective visual and acoustic monitoring is possible. Visual mitigation for marine mammals (in particular harbour porpoise) will only be effective during daylight hours and if the sea state is 2-3 (Beaufort scale) or less. In the absence of year-round data on marine mammal use within Dublin Bay, there is no justification for limiting works to any particular season. For piling activities, where the output peak sound pressure level (in water) exceeds 170 dB re: 1µPa @ 1m, a ramp-up procedure will be employed following the pre-start monitoring. Underwater acoustic energy output shall commence from a lower energy start-up and thereafter be allowed to gradually build up to the necessary maximum output

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
		over a period of 20-40 minutes. Any approach by marine mammals into the immediate (<50 m) works area will be reported to the National Parks and Wildlife Service. If there is a break in piling, dredging and disposal activity for a period greater than 30 minutes then all pre-activity monitoring measures and ramp-up (where this is possible) will recommence as for start-up. Once normal operations commence (including appropriate ramp-up procedures), there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate, nor if marine mammals occur within a radial distance of the sound source that is 500m for dredging and demolition works, and 1000m for piling activities. The MMO will keep a record of the monitoring using a 'MMO form location and effort (coastal works)' available from the National Parks & Wildlife Service (NPWS) and submit to the NPWS on completion of the works. In order to reliably quantify the zone of responsiveness associated with the proposed programme of piling activities associated with the Alexandra Basin Redevelopment deployment of hydrophones in combination with passive acoustic monitoring will be used. A minimum of four hydrophones (two real time passive acoustic monitoring (PAM) and two static acoustic monitoring (SAM) shall be deployed at the approaches to Dublin Port and to the west of Burford Bank to provide information on the presence of marine mammals.

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
Terrestrial Ecology		
Bats (Page 5-56)	The impact of the works will not result in any loss of typical bat associated habitats such as woodland, fresh water courses and hedgerows. The impact of the proposed works is negligible	The following precautionary measures will be undertaken: Removal of building – Alexandra Quay West - The roof of the building will be removed and left open for 3-4 nights prior to demolition of the building. This will change the internal temperature of the building and encourage residing bats to move off. Relocation of lighthouse - An internal inspection for bats will be undertaken of the lighthouse, prior to movement to a new location, to ensure that there are no bats within. Bats are mobile species and can roost in buildings occasionally. It is important that vigilance for individual bats within the buildings is practiced. These works will be undertaken outside the months of mid-April to mid-September to reduce the likelihood of encountering bats. If a bat is found, the bat will be removed under license by a bat specialist.
Benthic Ecology and Fisheries		
Benthic Habitat & Fisheries (page 5-107 and 5-108)	The proposed development at the Alexandra Basin West will result in a gain of about 3.1ha of new subtidal habitat associated with the reduction in size of the North Wall Quay Extension and the removal of the spoil deposit in the North West corner of the basin. Removal of faunal communities through dredging would be considered locally severe, but minor. Recovery in the area would be expected rapidly (<1 year). The proposed development at Berth 52/53 will result in the loss of about 4.5 ha of subtidal benthic habitat as a result of the infilling of the basin. Although the infilling of	The proposed six year dredging campaign will divide the shipping channel into six separate areas and dredging will be confined to one of the areas each winter period. This is the preferred approach from a benthic and fisheries perspective. A non-dredging window will apply to the inner section of the navigation from below the East Link Toll Bridge as far as the end of the north bank port area at the Alexandra Road Extension. The window will run from March to May unless otherwise advised by Inland Fisheries Ireland in order to protect out-migrating

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
	the basin will result in the permanent removal of this habitat, the impact of this is considered minor due to the nature of the faunal community present in the area. The faunal species removed through dredging are expected to rapidly re-colonise the seabed commencing immediately following cessation of dredging, resulting in a rapid recovery to the pre-dredge community within about 12 months to 2 years. The proposed extension to the existing shipping channel will result in the temporary disturbance to the benthic community covering less than 0.25% of the area of the cSAC. This impact would be considered minor. No reef habitats were identified in or adjacent to the area to be dredged. The proposed capital dredging scheme will therefore have no impact on this qualifying interest of the Rockabill to Dalkey Island candidate Special Area of Conservation. The quality of the feeding in the dredged area for adult and juvenile fish will be significantly reduced following the dredging due to entrainment of surface mobile epifauna by the dredger. Faunal smothering caused by increase sedimentation due to dredging. In general, where the sediment material is the same in nature as the bed material on which it's being deposited, the lower the impact is on the resident benthic fauna. Immediately, post dredging fish and invertebrate predators will move into the dredged areas and scavenge on dead or damaged invertebrates and fish, the area affected providing a temporary local source of food.	smolts. In addition, the inner narrowest portion of the channel upstream and opposite Alexandra Basin West, will not be dredged in October in order to reduce the potential risk to river lamprey migration. These non-dredge windows will be agreed in consultation with IFI. There will be no overflow from the dredger when it is dredging the riverside face and associated berths along the North wall Quay Extension where recent sediment analysis indicated pockets of elevated contaminant levels. This will help to minimise the potential release of contaminants to the water column during dredging. Also, in this area, the dredging will be timed to coincide with tidal movements that will minimise the degree of plume dispersal. It has been shown that the drag-head will tend to entrain more fish and mobile epibenthic crustaceans when it is lifted from the sediment surface while the pumps are still running. This occurs when the dredger comes to the end of a dredged line and turns to dredge back up along an adjacent line. In order to avoid the associated risk of increased entrainment during this turning processes. To remove this risk, the pumps will be switched off while the drag-head is withdrawn from the seabed during the turning process and not engaged again until it is replaced onto the seabed to dredge the next line. To facilitate more rapid recovery of the benthic communities, the depth of the over burden on the faunal communities will be minimised spreading over the whole disposal site as evenly as is practicable per calendar month in a systematic directional sequence to allow the greatest opportunity for deep burrowing invertebrates to move vertically through the newly deposited layers of spoil. No piling will take place along the Liffey channel during the three months of the year when smolts are likely to run in their

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	As soon as the dredging ceases the affected areas will begin the process of re-colonisation. The dredged area will rapidly re-colonise in terms of species number and density over 1-2 seasons, with near full biomass recovery estimated at 2-3 years. In the first season post dredging small, rapidly growing invertebrates often colonise recently dredged areas of fine sediment. These worms form a very important food resource for juvenile flatfish and therefore the expected dip in the quality of food resources for the nursery aspect of the dredged channel may only last for a single season. Taken in the context of Dublin Bay as a whole, the temporary reduction in quality of feeding along the dredged channel will only constitute a minor adverse impact. Piles driven in water give rise to noise levels normally well above ambient levels. In general the effects include: • a range of non-auditory tissue damage up to mortality, • auditory tissue damage, which results in a permanent or temporary reduction in the hearing ability, behavioural affects, e.g. startle or avoidance responses.	highest numbers (i.e. March to May inclusive). This recognises the smaller size of smolts compared to returning adults and lamprey. It also takes account of the fact that smolts have a swim bladder which likely makes them more susceptible than lamprey to pressure trauma due to piling noise. The use of vibratory pile drivers has been shown to be associated with lower peak sound levels and SEL than impact piling and is generally believed to be less likely to cause noise-associated trauma in fish. If vibratory piling can be used on the project, then this will be considered as a methodological mitigation measure, even if piles still require a few strikes with an impact rig to drive them to refusal. The sequencing of piling operations will also be considered in reducing possible piling-related trauma. So, for example, if the large circular piles which potentially generate the greatest levels of noise are spread out in terms of when they are driven, or deliberately driven at a slower rate (i.e. fewer strikes per day) then these time intervals will help any potentially traumatised fish resident in the area to recover and or be exposed to a lower cumulative sound energy level per day.

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Landscape and Visual (Chapter 6)		
Construction Phase	Potential construction stage impacts are as follows:- • Obstruction of views; • Change in landscape character; • Machinery for site preparation/enabling works, dredging and demolition operations; and • Site access and vehicular and plant movements. Potential landscape impacts are slight negative due to the low landscape resource change that will result. No significant visual impacts are predicted during the construction stage.	No mitigation required.
Operational Phase	The predicted significance of landscape impact is slight negative. Landscape related planning designations are assessed there will be no significant impacts. The predicted significance of visual impact for nearby residential properties at will be slight/moderate negative.	No mitigation required.

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Air and Climate (Chapter 7)		
Noise and Vibration		
Construction Phase, Noise (page 7-32 and 7-33)	The assessment of the worst-case predicted construction noise levels (Section 7.13) using the ABC Method (BS5228:2009) and the NRA Guidelines (2004) indicates that worst-case construction noise levels will be within the required threshold limits included in these guidance documents.	British Standard BS5228:2009 – Noise and vibration control on construction and open sites: Part 1 - Noise outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the proposed development. Examples of some of the best practice measures included in BS5228:2009 are

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		listed below: - ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order; - careful selection of quiet plant and machinery to undertake the required work where available; - all major compressors will be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use; - any ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers; - machines in intermittent use will be shut down in the intervening periods between work; - Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, acoustic barriers or enclosures will be utilised around noisy plant and equipment. - Handling of all materials will take place in a manner which minimises noise emissions; - Audible warning systems will be switched to the minimum setting required by the Health & Safety Authority; A complaints procedure will continue to be operated by the Contractor throughout the construction phase and all efforts should be made to address any noise issues at the nearest noise sensitive properties. Where construction activity takes place for the redevelopment in the vicinity of residential properties, the activities will

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		operate between the hours of 08:00 and 18:00 on Monday to Fridays, between 08:00 and 13:00 on Saturdays and there will be no activity on Sundays or Bank Holidays.
Operational Phase, Noise from Night-time Port Activities (page 7-33)	Potential for increased noise impacts from increasing cruise liner activity in the Port due to the redevelopment.	A Noise Management Plan of Port activities will be implemented to ensure that foghorns are only blown when there is a navigational necessity to do so and that noise sources from cruise ships at berth are minimised during the night-time period.
Air Quality and Climate		
Construction Phase, Construction Dust (page 7-58 and 7-59)	No adverse impacts on sensitive receptors in the area around Dublin Port are expected.	A dust minimisation plan will be prepared based upon the industry guidelines in the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities'. This will include measures such as: • Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only; • Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential); • All vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies; • Public roads outside the site, including the Dublin Port Tunnel, shall be regularly inspected for cleanliness, and cleaned as necessary where it is attributable to

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		the site works; • Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind; • Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; • All vehicles which present a risk of spillage of materials, while either delivering or removing materials, will be loaded in such a way as to prevent spillage on to the public road; • The contractor will be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum; and • The construction Contractor will be required to monitor monthly dust deposition levels each month for the duration of construction for comparison with the guideline of 350mg/m²/day (for non-hazardous dusts). This monitoring should be carried out at a minimum of four locations at sensitive receptors around the proposed works. Where dust levels are measured to be above this guideline the mitigation measures in the area must be reviewed as part of the dust minimisation plan.
Construction Phase, Odour (page 7-59 and 7-60)	Negligible impact is predicted from odour generation during the construction phase.	An Odour Management Plan (OMP) to mitigate the potential for odours from dredging operations will be implemented. The OMP will follow the guidance presented in the Environment Agency of England and Wales "Odour Management Guidance" (H4 Guidance, 2011). The odour monitoring and investigation aspects of the OMP will follow the EPA "Odour Impact Assessment Guidance for

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		EPA Licensed Sites” (Guidance Note AG5, 2010).
Construction Phase, Greenhouse Gases (page 7-60 and 7-61)	The total estimated greenhouse gas emissions associated with the proposed construction phase is calculated at 253,863 tonnes of Carbon Dioxide.	An Energy Management System will be implemented for the duration of the works. Materials with a reduced environmental impact will be incorporated into the construction design, where appropriate. Mitigation measures to minimise Carbon Dioxide emissions from transport will include: • Implementation of a Construction Traffic Management Plan • Implementation of an Efficient Material Handling Plan • Restrictions on idling vehicular engines • Regular maintenance of plant and equipment
Material Assets (Chapter 8)		
Transportation		
Construction Phase, Construction Traffic (page 8-39 and 7-60)	The impact of construction traffic was found to have no significant impact upon the surrounding highway network.	Construction Traffic will comply with the Dublin City Council HGV Management Strategy A Construction Traffic Management Plan will be implemented as part of the CEMP
Operational Phase (page 8-43)	The ABR Project will result in the closure of two existing accesses to the port. This will result in a significant reduction in the volume of traffic along the frontage of Dublin Port from East Wall Road to North Wall Quay.	The following two accesses will be closed in the final phase of the construction works • Terminal 3 Access on East Wall Road • Alexandra Road Access on East Wall Road will be closed to all Port related traffic with the exception of users of the DPC Head Offices and by use of coaches travelling between cruise vessels and Dublin City Centre.
Services		
Electricity Supply Network and Infrastructure	ESB / ESB Networks have been consulted on an ongoing basis with respect to the ABR project.	Electricity Supply Board Networks will be contacted when any works are planned in close proximity to any of their assets.

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(page 8-44 and 8-45)	ESB Networks have underground cables along the North Wall Quay Extension and in other parts of Alexandra Basin West. A 220kv cable which crosses the River Liffey will be replaced by ESB. There is a cooling water intake and outfall servicing three power stations, including the Poolbeg Electricity Generating Station. The computational modelling studies have shown that no impact is expected on any cooling water intake and outfall servicing the three power stations.	The Construction Environmental Management Plan (CEMP) will ensure safeguards are put in place to avoid disruption to the power stations. These measures will include: Establishment of monitoring buoys and the setting of water quality trigger levels which can initiate the temporary cessation of elements of the works which may be causing elevated levels of water quality parameters such as turbidity during dredging.
Coastal Processes (Chapter 9)		
Capital Dredging Scheme (page 9-51 to 9-53)	An extensive programme of model simulations, supported by fieldwork and literature review, has been undertaken to evaluate how the proposed ABR Project would impact the coastal processes and the stability of the approach channel as well as to investigate the disposal of dredged spoil at the existing licensed offshore spoil site within Dublin Bay. The results of the model simulations show that: - There will be no significant change to the tidal flow regime of Dublin Bay; - There will be no significant change to the wave climate within Dublin Bay; - There will be no perceptible change in the tidal velocity within the deepened, realigned navigation channel or in its power to cause scouring of the sea bed; - The new navigation channel will require maintenance dredging of a similar magnitude to that	Restricting the navigation channel dredging operations to the winter months (October to March) provides the key mitigation to ensure that the dredging operations will have no significant impact on the qualifying interests of Natura 2000 sites. Additional mitigation measures associated with the proposed dredging works are presented under Chapter 5 Flora and Fauna The comprehensive studies undertaken show that the ABR Project is not expected to have a significant detrimental impact on the coastal processes of Dublin Bay. It can therefore be concluded that the proposed works will have no residual impact.

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	required with the existing channel; • There will be no significant change to the sediment transport regime within Dublin Bay, including the Tolka Estuary; • The proposed offshore disposal site to the west of the Burford Bank is dispersive for the silt fractions within the dredged spoil material. The sand fractions within the dredged spoil will remain on the disposal site under normal tidal conditions. However under storm conditions the sand will gradually be assimilated into the overall sediment regime of Dublin Bay. • The existing disposal site at the Burford Bank is the preferred disposal option as the fine sand material from the navigation channel will not be lost to the overall sediment supply to Dublin Bay; • Model simulations of the dispersion, fate and deposition of sediment plumes arising from the dredging and disposal operations have been used to inform the environmental assessment of the water environment (Chapters 5 and 10). • The dispersion, fate and deposition of sediment plumes arising from the dredging and disposal operations not expected to impact on other users of the waters within the River Liffey channel or Dublin Bay.	
Water (Chapter 10)		
<i>Receiving Water Environment</i>		
Construction phase (page 10-15 and	Mitigation measures are required to safeguard the receiving waters from potential temporary impacts on water quality during the construction phase of the ABR	The following mitigation measures will be implemented to safeguard the receiving waters including:

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10-16)	project.	• Waste Management Plan • Contamination Strategy • Water Quality Management Plan • Establishment of lines of communication, reporting and actions The mitigation measures will include the requirements for best practice and adherence to relevant Irish guidelines, or international guidelines where these are not available: • Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001); • Pollution prevention guidelines in relation to a variety of activities developed by the Environment Agency (EA), the Scottish Environmental Agency (SEPA) and the Northern Ireland Environment Agency (NIEA); • Environment Agency Pollution Prevention Guidelines (PPG6); • Fisheries Guidelines for Local Authority Works. Department of Communications, Marine & Natural Resources, Dublin, (Anonymous, 1998); • Guidelines on protection of fisheries habitats during construction projects (Eastern Regional Fisheries Board, 2006); • International Convention for the Prevention of Pollution From Ships, 1973, as modified by the Protocol of 1978 (MARPOL) for domestic waste discharges to the environment; • International Marine Organisation guidelines; and • Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials. Continual engagement with a range of interested parties/stakeholders including Dublin City Council, EPA, National Parks

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		& Wildlife Service, Inland Fisheries Ireland, Dublin Port tenants and local community groups will be undertaken. A Construction Environmental Monitoring Programme will also be prepared to provide additional safeguards to the receiving environment during the construction phase of the works. The monitoring programme will form part of the specification of the Contract Documents for the construction stage. The design of the Construction Environmental Monitoring Programme will include the following elements related to the receiving waters: • An assessment using 3-D hydrodynamic computational modelling and water quality modelling to design the placement of a number of water quality monitoring buoys and telemetry based warning systems. • The establishment of water quality trigger levels and corresponding actions (including the necessity to temporarily cease construction operations) to safeguard sensitive conservation sites (SPA and SAC) and the operations of other users of the receiving waters (e.g. Power Stations)
Operational phase (page 10-16 and 10-17)	The new port facilities, when complete, will be subject to the Port's existing Environmental Management Plan. Dublin Port is accredited to ISO 14001 to ensure that all employees undertake their work with due consideration for the environment and that guidance is given to tenants to promote the principles of	The new port facilities, when complete, will be subject to the Port's existing Environmental Management Plan. In particularly, the following shall be adhered to with respect to vessels at berth or travelling through Dublin Bay: • No waste will be disposed of at sea; • Ballast water will be treated in accordance with MARPOL standards; • Ballast tanks will be separate from hydrocarbon storage areas and no potentially contaminated streams will be diverted to the ballast tanks;

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	sustainability. Dublin Port has been designated an 'Ecoport' at European level, in relation to its environmental management system. Dublin Port Company also maintains and operates an emergency management plan and has the emergency management structures and arrangements in place which are compatible with the requirements of the 2006 Framework for Major Emergency Management	• De-ballasting will be undertaken offshore in accordance with IMO guidelines; • Hazardous wastes will be stored in sealed, labelled drums in locked chemical cabinets; • Vessels will be equipped with oil-water separation systems in accordance with MARPOL requirements; • Spills on deck will be contained and controlled using absorbing materials; • Vessels without sewage treatment systems will have suitable holding tanks and will bring waste onshore for treatment by licensed contractors; • All chemicals used on-board will be handled in compliance with COSHH instructions on handling hazardous materials; • Chemicals will be stored appropriately in suitably bunded areas and with material safety data sheets; and • All waste discharges will be monitored and recorded as per vessel procedures.
Flood Risk Assessment (FRA)		
	An assessment of the flood risk to the proposed development has determined that the predominant source of flood risk emanates from coastal flooding. The assessment concluded that the proposed port redevelopment complies with the requirements of the Planning System and Flood Risk Management Planning Guidelines (2009). Model simulations have been undertaken to determine any change to the flood risk associated with neighbouring areas of Clontarf,	The level of the quays at Alexandra Basin West and Berth 52/53 have been designed to future proof the port facilities against predicted water level increases as a result of climate change over the next 100 years.

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Flood Risk (page 10-26)	South Quays and North Quays, particularly as a result of the proposed capital dredging scheme. The results of the model simulations have shown that the proposed works are not expected to increase the flood risk to any of these areas. The proposed works will change the site at Alexandra Basin West, from Flood Zone A and B to Flood Zone C (Low Risk). The new level of this area will future proof it for coastal flooding due to predicted climate change.	
Geology and Soils (Chapter 11)		
Construction phase (pages 10-14, 11-11 to 11-16)	The sediments within Alexandra Basin West were found to be unsuitable for disposal at sea.	Contaminated sediments within Alexandra Basin West will not be disposed of at sea. Dredging operations have been designed to minimise the disturbance and escape of material at the seabed and during removal through the water column. A floating pontoon with an excavator mounted clamshell bucket adapted for environmental dredging will be used. A silt curtain will also be placed around the dredger to contain the marine sediments. This method of dredging will serve to minimize the spread of suspended contaminated sediments beyond the dredge foot print. The dredged material recovered from Alexandra Basin West will be transported by barge to a treatment facility adjacent to Berth 52/53. It will be stabilised and modified to improve the engineering properties of the material to allow its re-use as fill material. In order to minimise the stockpiling of dredged material, the rate of dredging will be determined by the rate of treatment of the dredged material Best practice industry techniques will be used to treat the contaminated material yielded from the dredging of Alexandra Basin West. Ex-situ Stabilisation/Solidification (S/S) is

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Construction phase (Cont'd) (pages 11-16, 11-20 to 11-23)		proposed for the treatment of the contaminated material. Ex-situ Stabilisation/Solidification (S/S) is a remediation technology that reduces the mobility of contaminants. Immobilisation is achieved by reaction of contaminants with reagents to promote sorption, precipitation or incorporation into crystal lattices, and/or by physically encapsulating the contaminants. The method produces a high strength monolith-like product that physically reduces the mobility and chemically binds contaminants to the produced matrix. The treated mass can then be recovered/recycled to serve as infill material or for beneficial use. The treatment and recovery of the dredging spoil on site will take place in accordance with the conditions of an Industrial Emissions Licence to be obtained from the EPA. Following treatment the material will be placed in the Berth 52/53 basin and Graving Dock #2 as a recovery activity, replacing the need to use virgin materials that would otherwise be required for the development. A dumping at sea permit will be sought from the EPA. The disposal of dredge spoil at sea will be undertaken in accordance with the conditions of the dumping at sea permit. Sediments immediately adjacent to Alexandra Basin West where low levels of contamination have been found will be disposed of at sea only at slack tide and immediately covered by sand or gravel, if required by the EPA.

Chapter (EIS Page Ref)	Environmental Impact Appraisal	Mitigation Summary
	The sediments within the Navigation Channel were found to be suitable for disposal at sea. There is however an area immediately adjacent to Alexander Basin West where low levels of contamination have been identified. It is proposed to dispose of the dredged at the licensed sea disposal site located to the west of the Burford Bank at the entrance to Dublin Bay, subject to the granting of a Dumping at Sea Permit by the EPA. Mitigation measures are required to safeguard the receiving waters from potential temporary impacts on water quality during the construction phase of the ABR project.	The mitigation measures specified for Chapter 10 (Water) also apply to Chapter 11 (Geology and Soils)
Operational phase	The new port facilities, when complete, will be subject to the Port's existing Environmental Management Plan.	The mitigation measures specified for Chapter 10 (Water) also apply to Chapter 11 (Geology and Soils)

Chapter	Potential Impact	Mitigation
Cultural Heritage (Chapter 12)		
Underwater Archaeology of the navigation channel		
Underwater Archaeology of the navigation channel	Dublin Bay may be regarded as retaining the very high archaeological potential for shipwreck discovery. It may also retain indications of palaeo surfaces and inundated shorelines. A comprehensive marine geophysical survey was undertaken to assess the archaeological risk and to highlight particular areas of archaeological potential in advance of development works, so that the	Archaeological monitoring of all dredging activities conducted within the Approach Channel will be carried out, with the provision to resolve fully any material of archaeological significance observed at that point. An archaeologist experienced in maritime archaeology will be retained for the duration of the relevant works. Archaeological Licences will be required

Chapter	Potential Impact	Mitigation
(pages 12-48 to 12-50)	archaeological risk can be managed. The combination of side-scan sonar, magnetometry and sub-bottom or seismic survey was completed to provide a robust suite of devices to detect anomalies on the seabed and within its sedimentary levels. All anomalies detected by the geophysical surveys were diver truthed under licence from DAHG.	to conduct the on-site archaeological works. These will include detailed method statements which outline the rationale for the works, and the means by which the works will be resolved. The following licence types will be required: Excavation, to cover monitoring and investigations works; Detection, to cover the use of metal-detectors; and Dive Survey, to cover the possibility of having to conduct underwater inspections. Archaeological monitoring will be carried out by suitably qualified and experienced maritime archaeological personnel licensed by the Department of Arts, Heritage and the Gaeltacht. Archaeological monitoring is conducted during all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development. The monitoring will be undertaken in a safe working environment that will facilitate archaeological observation and the retrieval of objects that may be observed and that require consideration during the course of the works. The monitoring will include a finds retrieval strategy that is in compliance with the requirements of the National Museum of Ireland. In the event of archaeologically significant features or material being uncovered during the construction phase, machine work will cease in the immediate area to allow the archaeologist/s to inspect any such material. Once the presence of archaeologically significant material is established, full archaeological recording of such material will be recommended. If it is not possible for the construction works to avoid the material, full excavation will be recommended. The extent and duration of excavation will be a matter for discussion between the client and the licensing authorities. A suitable archaeological team will be on

Chapter	Potential Impact	Mitigation
		standby to deal with any such rescue excavation. This will be complimented in the event of a full excavation. An archaeological dive team will be retained on standby for the duration of any in-water disturbance works on the basis of a twenty-four or forty-eight hour call-out response schedule, to deal with any archaeologically significant/potential material that is identified in the course of the seabed disturbance activities. Facilities will be provided to facilitate the temporary storage of artefacts that may be recorded during the course of the site work. Buoying/fencing of any such areas of discovery will be necessary if discovered and during excavation. Machinery traffic during construction will be restricted to avoid any identified archaeological site/s and their environs. Spoil will not be dumped on any of the selected sites or their environs. It is a condition of archaeological licensing that a detailed project report is lodged with the DAHG within 12 months of completion of site works. The report should be to publication standard and should include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy, along with a discussion and specialist reports. Artefacts recovered during the works need to meet the requirements of the National Museum of Ireland. PLEASE NOTE: the above recommendations are subject to the approval of the National Monuments Section at the Department of Arts, Heritage and the Gaeltacht.

Chapter	Potential Impact	Mitigation
Industrial Archaeological Heritage		
Industrial Archaeological Heritage (pages 12-63 to 12-65)	A conservation strategy has been developed in light of the cultural heritage significance of the North Wall Quay Extension. The conservation strategy includes retaining an exemplar of Bindon Blood Stoney's foundation works for public view as part of the Port's cultural heritage assets. The historic Graving Dock #1 will also be reinstated as part of the ABR Project. .	A heritage architect or Engineer experienced in industrial and maritime architectural heritage will be retained for the duration of the relevant works, to advise specifically in relation to works associated with North Wall Quay Extension and the Graving Docks. The conservation strategy developed for the ABR Project will for Alexandra Basin West be implemented in full.
Human Beings (Chapter 13)		
Construction Phase (page 13-17)	Potential impacts on human beings in relation to construction traffic, noise and dust have been addressed and mitigation measures have been developed in their respective chapters. . An estimated 375 workers will be employed during construction for varying lengths of time on different aspects of the project.	Safe working practices, in accordance with current legislation, will be enforced during the construction period to protect construction workers, port operators and visitors to the construction sites. The construction sites will be suitably fenced and access to the sites shall be limited to authorised personnel. Dublin Port Company will encourage Contractors to utilise local construction workers where it is practical to do so.
Operational Phase	Dublin Port Company employs more than 145 people directly, but a further 4,000 people are employed in what is Ireland's largest industrial estate. The ABR Project will help to secure existing employment at the Dublin Port Estate and provide opportunities for further employment associated with the continued growth in trade. The new berth configuration proposed in Alexandra Basin	No mitigation proposed

Chapter	Potential Impact	Mitigation
	involves the extension of Berth 29 on Alexandra Quay West westwards in front of the entrance to Graving Dock #2. As a result, the port will lose the utility of this graving dock. This will result in the loss of circa 26 jobs.	

2.2 CONDITIONS ON PLANNING AS SPECIFIED BY AN BORD PLEANÁLA

ABP granted Planning Permission for the ABR Project 9 July 2015. The 16 planning conditions set by ABP are detailed in this Section and form an integral part of the CEMP.

Condition 1

- (a) The proposed development shall be carried out and completed in accordance with the plans and particulars lodged with the application as amended by the further plans and particulars received by An Bord Pleanála on the 18th day of August, 2014, the submissions made at the oral hearing, and the further plans and particulars received by An Bord Pleanála on the 2nd day of April, 2015, except as may otherwise be required in order to comply with the following conditions.
- (b) All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement, and associated documentation submitted with the application, the further information responses, and at the oral hearing shall be implemented in full, except as may otherwise be required in order to comply with the following conditions.

Reason: In the interest of clarity and environmental protection.

Condition 2

This permission shall, in accordance with the application, be for a period of ten years from the date of this order.

Reason: In the interest of clarity.

Condition 3

The construction of the proposed development shall be managed in accordance with a Construction Management Plan, which shall be based on the Draft High Level Construction and Environmental Management Plan, shall include specific provisions for the following:

- (a) A Construction Management Strategy for the Dublin Port Tunnel for the duration of the works which shall include details in relation to the timing and routing of construction traffic to and from the construction sites and associated directional signage and shall include details in relation to the proposed closures of existing accesses to/from Dublin Port.
- (b) Proposals for maintaining public roadways free from debris arising from the proposed development.
- (c) Proposals for the staggering of various shift start and finish times to take account of the main ship arrival and departure times.
- (d) A management system for invasive alien species which shall be used for the duration of the proposed works. The plan shall include a comprehensive monitoring schedule to include, inter alia, noise, vibration and dust monitoring with quarterly reporting to the planning authority. A

record of daily checks that the works are being undertaken in accordance with the Construction Management Plan shall also be kept for inspection by the planning authority.

Reason: In the interest of traffic safety, to ensure the continued efficient operation of the port, and to protect the environment and the amenities of the area.

Condition 4

The proposed development shall be operated and managed in accordance with a comprehensive Environmental Management System (EMS), a proposal for which shall be submitted by the developer to, and agreed in writing with, the planning authority prior to commencement of development. The annual audit report for the EMS shall be made publicly available in accordance with the requirements of the planning authority.

Reason: In order to safeguard local amenities and protect the environment.

Condition 5

The developer shall ensure that over-spilling at the surface of the dredger is avoided for all dredging activities within the inner Liffey channel.

Reason: To minimise the levels of suspended sediment in the River Liffey from the dredging operation.

DPC sought clarity from ABP with respect to the interpretation of the areal extent of the inner Liffey channel as specified in Condition 5.

ABP provided their response on 3rd February 2016 as following

"In respect of the inner Liffey what was envisaged by this condition was the entire Liffey channel from the East Link Bridge out to the Bull Walls entrance".

DPC accepts the Board's interpretation of the areal extent of the inner Liffey channel.

Condition 6

- (a) The construction noise levels arising from the proposed development shall not exceed the worst case predicted noise levels presented in Tables 7.1.14-7.1.16 of Volume 1 of the environmental impact statement.
- (b) A programme of construction noise monitoring shall form part of the Construction Management Plan and detailed proposals in this regard shall be submitted to and agreed with the planning authority prior to commencement of development.
- (c) All sound measurements shall be carried out in accordance with ISO Recommendations R 1996, "Assessment of Noise with Respect to Community Response" as amended by ISO

Recommendations R 1996/1, 2 and 3, "Description and Measurement of Environmental Noise" as appropriate.

Reason: In the interest of residential amenity

Condition 7

The developer shall carry out further bat surveys of the structures scheduled for demolition prior to demolition during May to September, in line with best practice, when the bats are active. Detailed measures in relation to the removal of bats shall be submitted to and agreed in writing with the planning authority prior to commencement of development.

Reason: To the interest of wildlife protection.

Condition 8

In relation to marine mammals:

- (a) All of the measures contained in the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters as published by the Department of Arts, Heritage and the Gaeltacht shall be fully implemented including a 1000 metre exclusion zone for piling and a 500 metre exclusion zone for dredging.
- (b) Monitoring shall be carried out through the construction and dredging phases and for a period of two years post completion of all works associated with the proposed development. The monitoring methodology, including proposals to maintain a public record, shall be agreed in writing with the planning authority prior to commencement of development.
- (c) The developer shall make provisions to ensure proposals for an adequate number of suitably qualified marine mammal observers for the duration of piling and dredging in order to ensure satisfactory monitoring.
- (d) The developer shall deploy a minimum of four hydrophones in Dublin Bay to assist in the detection of marine mammals within the 1,000 metre and 500 metre exclusion zones for piling and dredging, which shall be used in combination with all of the measures referred to in (a) and (c) above:
 - (i) A minimum of two real time passive acoustic monitoring system (PAMs) shall be deployed in Dublin Bay at the approaches to Dublin Port to provide information on the presence of marine mammals.
 - (ii) A minimum of two static acoustic monitoring systems (SAMs) shall be deployed at the dump site to the west of the Burford Bank and within Dublin Bay to provide information on the presence of marine mammals.

Reason: In the interest of wildlife protection and to broaden scientific knowledge in relation to ecology in Dublin Bay

Condition 9

The developer shall undertake monthly monitoring of seal haul out sites at the North Bull Island and adjacent areas before, during and after construction for a minimum of two years in line with international best practice. The proposed monitoring methodology, including proposals to maintain a public record, shall be agreed in writing with the planning authority prior to commencement of development. Monitoring for harbour and grey seals shall be further extended to include a survey of Dublin Bay within the zones of influence as defined in the environmental impact statement.

Reason: In the interest of wildlife protection and to broaden scientific knowledge in relation to ecology in Dublin Bay

Condition 10

The developer shall institute a programme to monitor the movement of the River Lamprey in the Liffey Channel in the vicinity of Alexandra Basin West before construction commences and before, during and after the relevant phase of dredging for one full season. The proposed monitoring methodology, including proposals to maintain a public record, shall be agreed in writing with the planning authority prior to commencement of development.

Reason: In the interest of wildlife protection and to broaden scientific knowledge in relation to ecology in the River Liffey.

Condition 11

The developer shall institute a programme to monitor the movement of winter wetland birds in the adjacent European Sites at the South Dublin Bay and the South Dublin Bay and River Tolka Estuary Special Protection Area. This monitoring programme shall continue throughout the construction phase and for a period of two years after the completion of such works, with monthly surveys from October to March. The results of this monitoring programme shall be submitted to the planning authority at 12-monthly intervals to maintain a public record.

Reason: In the interest of wildlife protection and to broaden scientific knowledge in relation to ecology.

Condition 12

The developer shall institute a programme to monitor the movement of Black Guillemots, Common Tern and Arctic Tern in Dublin Port. This monitoring programme shall continue throughout the construction phase and for a period of two years after the completion of such works. The results of this monitoring programme shall be submitted to the planning authority at 12-monthly intervals to maintain a public record.

Reason: In the interest of wildlife protection and to broaden scientific knowledge in relation to ecology.

Condition 13

The historic blocks recovered from demolition works at North Wall Quay Extension shall be stored in safe and secure location within Dublin Port. Any future use of these blocks shall be agreed in writing with the planning authority prior to reuse.

Reason:

To ensure the management of industrial and engineering heritage within Dublin Port, and in the interest of the propose planning and sustainable development of the area.

Condition 14

The developer shall facilitate the preservation, recording and protection of archaeological materials or features that may exist within the site. The area requiring testing is outlined in the environmental impact statement. In this regards, the developer shall –

- (a) Notify the planning authority in writing at least four weeks prior to the commencement of any site operations, including hydrological and geotechnical investigations relating to the proposed development.
- (b) Employ a suitably-qualified archaeologist who shall monitor all site investigations and other excavation works.
- (c) Provide arrangements, acceptable to the planning authority, for the recording and for the removal of any archaeological material which the planning authority considers appropriate to remove.

In default of agreement on any of these requirements, the matter shall be referred to An Bord Pleanála for determination.

Reason: In order to conserve the underwater archaeological heritage of the site and to secure the preservation and protection of any remains that may exist within the site.

Condition 15

The developer shall submit a detailed landscaping plan to the planning authority for written agreement prior to commencement of development.

Reason: In the interest of visual amenity and biodiversity.

Condition 16

The applicant shall implement the community gain proposal set out in the Planning Report (page 36) and the associated Appendix 7 “Community Gain Proposal” prepared by MacCabe Durney Barnes,

including the financial commitments set out therein, which are considered a community gain in accordance with Section 37(G)(7)(d) of the Planning and Development Act 2000, as amended. In default of agreement on any of these commitments, the matter shall be referred to An Bord Pleanála for determination.

Reason: In the interest of the proper planning and sustainable development of the area and the protection of wildlife.

Mitigation measures imposed by ABP take precedent over mitigation measures within the EIS, where there is potential conflict.

2.3 CONDITIONS ON FORSHORE AS SPECIFIED BY DECLG

ABR Foreshore Licence – Licence Conditions

Specific Licence Conditions (relates to Foreshore in State ownership – dredging)

(the summary below is for guidance only, full details are given in the Foreshore Licence)

1. The Licensee shall use that part of the Foreshore the subject matter of this lease for the purposes as outlined in the application and for no other purposes whatsoever
2. The Licensee shall notify the Department of the Environment, Community and Local Government at least 14 days in advance of the commencement of the works on the foreshore.
3. During the course of the works the Lessee shall ensure that:
 - (a) all necessary precautions are put in place to protect the public in accordance with relevant Health and Safety Legislation;
 - (b) existing public access arrangements to the general foreshore area are not impeded by any plant or materials used in connection with the works, where relevant this access should be made safe and guaranteed by the provision of appropriate signage/notices/barriers etc. to the satisfaction of the Department of Environment, Community and Local Government;
 - (c) procedures are adopted to ensure that the works are not injurious to fishing, navigation, adjacent lands or the public interest.

4. The capital dredge works shall have a maximum navigation channel dredge depth of - 10.0mCD.
5. The Licensee shall ensure that all mitigation measures set out of the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted with the application are implemented in full.
6. Prior to the commencement of any works on the foreshore a Construction Environmental Management Plan (CEMP), shall be drawn up by the lessee for the approval of the Minister (subject to such modifications, if any, as he may deem appropriate).

The CEMP shall provide detailed construction methodology and shall further consider all potential and predicted impacts and how they shall be managed, the mitigation and control measures and how they shall be implemented as well as monitoring proposed.

The CEMP shall as a minimum, include:

- Waste Management Plan;
 - Pollution Prevention Procedures;
 - Environmental Emergency Procedures and Contingency Plans;
 - Procedures for the control and minimisation of surface water discharge and suspended solids movement onto the foreshore.
7. Prior to the commencement of dredging operations on the Foreshore within the navigation channel the Licensee shall hold a valid Dumping at Sea Permit from the EPA.
 8. The Licensee shall ensure that all imported rock armour material is free of any contamination and invasive alien species and is sourced from authorised/licensed quarry operators.
 9. Prior to the commencement of the works the Licensee shall furnish the names/registered number of all vessels involved in the operation to the Marine Survey Office in Dublin to ensure compliance with respect to Irish Load line and other relevant vessel certification and the Lessee shall ensure that all vessels/floating plant shall have appropriate certification from the Marine Survey Office.
 10. The Licensee shall arrange for the publication of a local marine notice. This local marine notice should give a general description of operations and approximate dates of commencement and completion. An advertisement in a locally read newspaper shall suffice. Additionally the Licensee shall arrange for a Port Marine Notice to be issued by the Dublin Port Harbour Master.

11. The Licensee shall submit annually, for the duration of the works, a report to DECLG providing brief details of the piling method used, details of the location and dates on which activity took place and the duration of activity on each date. This information shall be included in the DECLG's "Noise Register" as required under the Marine Strategy Framework Directive.

Specific Lease Conditions (relates to Foreshore in State ownership – piling)

(the summary below is for guidance only, full details are given in the Foreshore Lease)

1. The Lessee shall use that part of the Foreshore the subject matter of this licence for the purposes as outlined in the application and for no other purposes whatsoever
2. The Lessee shall notify the Department of the Environment, Community and Local Government at least 14 days in advance of the commencement of the works on the foreshore.
3. During the course of the works the Licensee shall ensure that:
 - (a) all necessary precautions are put in place to protect the public in accordance with relevant Health and Safety Legislation;
 - (b) existing public access arrangements to the general foreshore area are not impeded by any plant or materials used in connection with the works, where relevant this access should be made safe and guaranteed by the provision of appropriate signage/notices/barriers etc. to the satisfaction of the Department of Environment, Community and Local Government;
 - (c) procedures are adopted to ensure that the works are not injurious to fishing, navigation, adjacent lands or the public interest.
4. The capital dredge works shall have a maximum navigation channel dredge depth of -10.0m CD.
5. The Lessee shall ensure that all mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted with the application are implemented in full.

6. Prior to the commencement of any works on the foreshore a Construction Environmental Management Plan (CEMP), shall be drawn up by the Licensee for the approval of the Minister (subject to such modifications, if any, as he may deem appropriate).

The CEMP shall provide detailed construction methodology and shall further consider all potential and predicted impacts and how they shall be managed, the mitigation and control measures and how they shall be implemented as well as monitoring proposed.

The CEMP shall as a minimum, include:

- Waste Management Plan;
 - Pollution Prevention Procedures;
 - Environmental Emergency Procedures and Contingency Plans;
 - Procedures for the control and minimisation of surface water discharge and suspended solids movement onto the foreshore.
7. Prior to the commencement of the works the Lessee shall furnish the names/registered number of all vessels involved in the operation to the Marine Survey Office in Dublin to ensure compliance with respect to Irish Load line and other relevant vessel certification and the Licensee shall ensure that all vessels/floating plant shall have appropriate certification from the Marine Survey Office.
 8. The Lessee shall arrange for the publication of a local marine notice. This local marine notice should give a general description of operations and approximate dates of commencement and completion. An advertisement in a locally read newspaper shall suffice. Additionally the Licensee shall arrange for a Port Marine Notice to be issued by the Dublin Port Harbour Master.
 9. The Lessee shall submit annually, for the duration of the works, a report to DECLG providing brief details of the piling method used, details of the location and dates on which activity took place and the duration of activity on each date. This information shall be included in the DECLG's "Noise Register" as required under the Marine Strategy Framework Directive.

Specific Ministerial Consent Conditions (relates to Foreshore in DPC ownership)

(the summary below is for guidance only, full details are given in the Foreshore Ministerial Consent)

1. The Consent shall remain in force from the date of acceptance by Dublin Port Company except as may be hereinafter provided.
2. The Consent Holder shall use that part of the Foreshore the subject matter of this licence for the purposes as outlined in the application and for no other purposes whatsoever

3. The works shall be carried out within the area delineated in red on the Foreshore Section 10 Consent Map Drawing Number IBM569-FS-0026.
4. The Consent Holder shall notify the Department of the Environment, Community and Local Government at least 14 days in advance of the commencement of the works on the foreshore.
5. The Consent Holder shall ensure that works are completed in accordance with the drawings and documents submitted in support of the application
6. During the course of the works the Consent Holder shall ensure that:
 - (a) all necessary precautions are put in place to protect the public in accordance with relevant Health and Safety Legislation;
 - (b) existing public access arrangements to the general foreshore area are not impeded by any plant or materials used in connection with the works, where relevant this access should be made safe and guaranteed by the provision of appropriate signage/notices/barriers etc. to the satisfaction of the Department of Environment, Community and Local Government;
 - (c) procedures are adopted to ensure that the works are not injurious to fishing, navigation, adjacent lands or the public interest.
7. Prior to the commencement of dredging work within Alexandra Basin West and the placement of treated sediments works within Berths 52/53 on the foreshore the Consent Holder shall hold a valid Industrial Emissions Licence from the Environmental Protection Agency
8. The Consent Holder shall ensure that all mitigation measures set out of the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted with the application are implemented in full.
9. Prior to the commencement of any works on the foreshore a Construction Environmental Management Plan (CEMP), shall be drawn up by the Consent Holder for the approval of the Minister (subject to such modifications, if any, as he may deem appropriate).

The CEMP shall provide detailed construction methodology and shall further consider all potential and predicted impacts and how they shall be managed, the mitigation and control measures and how they shall be implemented as well as monitoring proposed.

The CEMP shall as a minimum, include:

 - Waste Management Plan;

- Pollution Prevention Procedures;
- Environmental Emergency Procedures and Contingency Plans;
- Procedures for the control and minimisation of surface water discharge and suspended solids movement onto the foreshore.

10. Prior to the commencement of the works the Consent Holder shall furnish the names/registered number of all vessels involved in the operation to the Marine Survey Office in Dublin to ensure compliance with respect to Irish Load line and other relevant vessel certification and the Licensee shall ensure that all vessels/floating plant shall have appropriate certification from the Marine Survey Office.

11. The Consent Holder shall arrange for the publication of a local marine notice. This local marine notice should give a general description of operations and approximate dates of commencement and completion. An advertisement in a locally read newspaper shall suffice. Additionally the Consent Holder shall arrange for a Port Marine Notice to be issued by the Dublin Port Harbour Master.

12. The Consent Holder shall submit annually, for the duration of the works, a report to DECLG providing brief details of the piling method used, details of the location and dates on which activity took place and the duration of activity on each date. This information shall be included in the DECLG's "Noise Register" as required under the Marine Strategy Framework Directive.

Dublin Port Company commitments with respect to the ABR Foreshore Licence/ Lease/ Ministerial Consent

Piling Activities

- For all piling activities a ramp-up procedure will be employed following the pre-start monitoring, where the output peak sound pressure level (in water) exceeds 170 dB re: 1µPa @ 1m. Underwater acoustic energy output shall commence from a lower energy start-up and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes;
- No piling will take place on the river side of the River Liffey Channel between March and May to avoid the peak movement of migratory smolts. Note, this does not apply to piling within Alexandra Basin West since no significant noise propagates into the River Liffey Channel;
- The piling programme will ensure that no piling will take place on the river side of North Wall Quay/southern end of Ocean Pier and the Marina Wall at the same time in order to avoid a potential noise barrier across the River Liffey;
- The piling programme will ensure that only one large piling rig required for the piling of the large diameter circular piles will take place on the river side of North Wall Quay/southern end

of Ocean Pier and the Marina Wall at any one time. Note, this is not necessary for the piling of sheet piles.

- Similarly, the piling programme will ensure that only one large piling rig required for the piling of the large diameter circular piles will take place on the river side of Terminal 5 (Berths 52/53) at any one time. Note, this is not necessary for the piling of sheet piles.
- A programme of underwater noise measurements will be undertaken to ensure the zones of impact predicted by modelling with respect to fisheries are representative of the actual piling activities. If it proves necessary, piling cushions will be introduced to the piling operations.

Water Quality Monitoring

- A monitoring point within the Tolka Estuary will be established during dredging activities in the navigation channel between Berths 52/53 and the entrance to the Bull Walls in order to safeguard the interests of the winter swimmers.

ABR Marine Site Investigation Foreshore Licence (granted 18th March 2016)

(For information only – the site work associated with the ABR Marine Site Investigation was completed in November 2016. Laboratory analysis is expected to be completed in February 2017))

Specific Conditions which applied to the ABR Marine Site Investigation are outlined below:

The Licensee shall throughout the Term:

1. Use that part of the Foreshore the subject matter of this licence for the purposes as outlined in the application and for no other purposes whatsoever.
2. Notify the Department of the Environment, Community and Local Government at least 14 days in advance of the commencement of the works on the Foreshore.
3. Arrange the publication of a Marine Notice, issued by the Irish Maritime Administration, giving a general description of operations and approximate dates of commencement and completion. An advertisement in a locally read newspaper shall suffice. Additionally the Licensee shall arrange for a Port Marine Notice to be issued by the Dublin Port Harbour Master.
4. Ensure all vessels/floating plant shall have appropriate certification from the Marine Survey Office.
5. During the course of the survey operations the Licensee shall ensure that,
 - (a) All necessary precautions are put in place to protect the public in accordance with the relevant Health and Safety Legislation;

- (b) Existing public access arrangements to the general Foreshore area are not impeded by any vessels, plant or materials used in connection with any site investigations/surveys;
 - (c) Procedures are adopted to ensure that the survey operations are not injurious to fishing, navigation, adjacent lands or the public interest.
- 6. Ensure full compliance with the requirements set out in the NPWS “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” (January 2014). In respect of all noise producing activities on the Foreshore.
- 7. Ensure no refuelling of equipment, machinery or plant shall take place on the foreshore during the course of the works.
- 8. Ensure all waste arising from the drilling of the boreholes shall be removed from the site and disposed of onshore at a licensed waste facility.
- 9. Ensure that on completion of survey operations that all equipment and materials are removed and the Foreshore is reinstated to its original condition, to the satisfaction of the Licensor.
- 10. Ensure that within 2 months of completion of all the boreholes drilling activity the Licensee shall submit a report to the Licensor providing brief details of the method used, details of the dates on which activity took place and the duration of activity on each date. This information shall be included in the Licensor’s “Noise Register” as required under the Marine Strategy Framework Directive.

2.4 CONDITIONS ON DUMPING AT SEA AS SPECIFIED BY THE EPA

Specific Licence Conditions

(the summary below is for guidance only, full details are given in the Dumping at Sea Permit)

- Condition 1.2/1.3 Material to be only loaded from part of sea specified as Loading Area B
- Condition 1.4 All material to be dumped at the licensed offshore Dump Site
- Condition 2.1 Minimise litter, man-made debris and odour
- Condition 2.2 Minimise noise so not to cause a nuisance
- Condition 2.3/2.4 Ensure that a nominated, suitably qualified person is present at all times during operations
- Condition 2.5 Notify the EPA at least 2 weeks in advance of commencement of loading and dumping operations

- Condition 2.6 Issue a copy of the Dumping at Sea permit to all personnel whose duties relate to any condition of the permit
- Condition 2.7 Initiate an investigation and corrective action in the event of non-conformity with the Dumping at Sea Permit
- Condition 2.8 Maintain a public awareness and communication programme to ensure members of public can obtain information
- Condition 3.1 Loading and dumping must be completed by 31st March 2021
- Condition 3.2 Loading and dumping activities may only be carried out between 1st October and 31st March
- Condition 3.3 Loading shall be carried out by a backhoe dredger or trailing suction hopper dredger
- Condition 3.4 No over-spilling from the vessel shall be permitted while the loading activity is being carried on in the inner Liffey channel (west of Bull Walls entrance)
- Condition 3.5 Permit holder shall take reasonable measures during loading to limit release of suspended solids into water column
- Condition 3.6 Dumping shall be carried out through vessel hull
- Condition 3.7 No material shall be dumped at sea which has been categorised as unsuitable for disposal
- Condition 3.8 Liaise with Harbour Master prior to the commencement of loading and dumping activities
- Condition 3.9 Mitigation measures set out in the Natura Impact Statement shall be implemented
- Condition 3.10 Information relating to the activity shall be recorded each trip (see items (i) to (viii) in condition 3.10)
- Condition 3.11 MSO to be consulted prior to commencement to ensure all vessels meet their requirements
- Condition 3.12 Authorised officers shall be permitted to board vessel
- Condition 4.1 Carry out all monitoring in line with Schedule C of permit
- Condition 4.2 Ensure all sampling and analysis are carried out by an appropriate Standard Method
- Condition 4.3 Submission of relevant ambient monitoring results from external bodies to the Agency, according to schedule B
- Condition 4.4 Frequency, scope etc of sampling and monitoring may be amended with agreement of Agency following evaluation of test results
- Condition 4.5 Full time monitoring of Marine Mammals within 500m of loading and dumping operations. No dumping permitted if marine mammal is detected within 50m distance from dredger
- Condition 4.6 Pre and Post bathymetry surveys required

- Condition 4.7 Chemical and granulometric analysis of sediments required
- Condition 4.8 Archaeological plan to be agreed with DAHRRGA in advance of works. Full time monitoring by marine archaeologists required
- Condition 4.9 Water quality monitoring required
- Condition 4.10 Hydrographic monitoring at the dumpsite required
- Condition 4.11 Sediment plume monitoring required. Plan required 3 months prior to commencement of works
- Condition 5.1 In event of an incident, follow protocol outlined in (i) to (vi) of condition 5.1
- Condition 5.2 Produce a report on investigation into the agency within one month of incident occurring.
- Condition 5.3 A documented Accident Prevention Procedure to be in place prior to commencement
- Condition 5.4 A documented Emergency response procedure to be in place prior to commencement
- Condition 6.1 Notify Agency (or other relevant authority in accordance with conditions 6.2, 6.3, 6.4) as soon as practicable after the occurrence of an incident
- Condition 6.5 Record all complaints related to loading and dumping and the responses given to these
- Condition 6.6 Maintain full documentation record on site for the inspection of the EPA
- Condition 6.7 Submit electronically an AER by the 31st March each year covering the previous calendar year
- Condition 6.8 Keep an open record of the material being dumped on each trip
- Condition 6.9 All reports to be certified by a suitably qualified individual
- Condition 6.10 Notify the Agency in writing when loading and dumping is completed
- Schedule A Maximum quantity per calendar month is 292,000 (tonnes, wet weight)
- Schedule A Maximum quantity per winter season is 1,752,000 (tonnes, wet weight)

2.5 CONDITIONS ON INDUSTRIAL EMISSIONS AS SPECIFIED BY THE EPA

Specific Licence Conditions

(the summary below is for guidance only, full details are given in the Industrial Emissions Licence)

The CEMP shall provide detailed construction methodology and shall further consider all potential and predicted impacts and how they shall be managed, the mitigation and control measures and how they shall be implemented as well as monitoring proposed.

Installation Management

The licensee shall employ a suitably qualified and experienced installation manager who shall be designated as the person in charge. The installation manager or a nominated, suitably qualified and experienced deputy shall be present on the installation at all times during its operation or as otherwise required by the Agency.

Environmental Management System (EMS)

The licensee shall establish, maintain and implement an Environmental Management System (EMS), which shall incorporate energy efficiency management, within six months of the date of grant of this licence. The EMS shall be reviewed by senior management for suitability, adequacy and effectiveness and updated on an annual basis.

Installation of Notice Board

The licensee shall, within one month of the date of grant of this licence, provide an Installation Notice Board on each of two areas of the installation so that it is legible to persons outside the main entrance to the installation. The minimum dimensions of the board shall be 1200 mm by 750 mm. The notice board shall be maintained thereafter.

Fire-water Retention

The licensee shall carry out a risk assessment to determine if the activity should have a fire-water retention facility. The licensee shall submit the assessment and a report to the Agency on the findings and recommendations of the assessment within six months of the date of grant of this licence.

Wind Sock

The licensee shall, prior to commencement of waste activities, install and maintain in a prominent location on the site a wind sock, or other wind direction indicator, which shall be visible from the public roadway outside the site.

Specified Engineering Works

The licensee shall submit proposals for all Specified Engineering Works, as defined in Schedule D: Specified Engineering Works of this licence, to the Agency for its agreement at least two months in advance of the intended date of commencement of any such works. No such works shall be carried out without the prior agreement of the Agency.

Installation Security

The licensee shall install a CCTV system which monitors the waste storage areas on a 24-hour basis. The CCTV system shall be operated at all times and copies of recordings kept on site and made available to the Agency on request.

Weighing of waste and Wheel Cleaners

The licensee shall ensure that the weight of all waste treated and used as fill at the installation is calculated or measured and recorded.

The licensee shall provide and maintain wheel cleaners or wheel cleaning equipment at the installation.

Waste handling, ventilation and processing plant

Items of plant deemed critical to the efficient and adequate processing of waste at the installation (including inter alia waste-loading vehicles) shall be provided on the following basis:

- (i) 100% duty capacity;
- (ii) 20% standby capacity available on a routine basis; and
- (iii) Provision of contingency arrangements and/or backup and spares in the case of breakdown of critical equipment.

Prior to commencement of waste activities, the licensee shall maintain an inventory detailing the duty and standby capacity in tonnes per day of all waste handling equipment to be used at the installation. These capacities shall be based on the licensed waste intake, as per Schedule A: Limitations of this licence.

Emissions

The exceedance of Environmental Quality Standards in marine water at monitoring points SW1, SW2 and SW3 shall be treated as an incident.

Control and Monitoring

The fill areas at Graving Dock No. 2 and Berth 52/53 shall, upon completion, be capped and sealed to prevent the infiltration of rainwater.

Process Effluent

The acute toxicity of the undiluted final effluent to at least four aquatic species from different trophic levels shall be determined by standardised and internationally accepted procedures and carried out by a competent laboratory. The name of the laboratory and the scope of testing to be undertaken shall be submitted, in writing, to the Agency, prior to commencement of waste activities. Once the testing laboratory and the scope of testing have been agreed by the Agency, the Agency shall decide when this testing is to be carried out and copies of the complete reports shall be submitted by the licensee to the Agency within six weeks of completion of the testing.

The licensee shall, prior to commencement of the activity, establish suitable trigger levels for pH, TOC and suspended solids in storm water discharges, such that storm waters exceeding these levels will be diverted for retention and suitable disposal. The licensee shall have regard to the Environmental Protection Agency "Guidance on the setting of trigger values for storm water discharges to off-site surface waters at EPA IPPC and Waste licensed facilities" when establishing the suitable trigger levels.

Noise

A suitably qualified Marine Mammal Observer shall be engaged to carry out monitoring during relevant noise-producing activities.

Materials Handling

Where leachate from treated waste exceeds the limit values specified in Schedule B.6 Leachate Limits in three consecutive samples, the treated waste shall be deemed unsuitable for fill and shall be excavated for re-treatment or removed off site for appropriate disposal.

Waste Acceptance Criteria for Treatment and Infill

No waste shall be accepted at the installation other than sediment which has been dredged from the Alexandra Basin.

Waste Storage Plan

The licensee shall, prior to commencement of waste activities, establish, maintain and implement a Waste Storage Plan for all waste stored and held at the installation.

Accident Prevention and Emergency Response

The licensee shall, in advance of the commencement of the activity, ensure that a documented Accident Prevention Procedure is in place that addresses the hazards on-site, particularly in relation to the prevention of accidents with a possible impact on the environment. This procedure shall be reviewed annually and updated as necessary.

The licensee shall, in advance of the commencement of the activity, ensure that a documented Emergency Response Procedure is in place that addresses any emergency situation which may originate on-site. This procedure shall include provision for minimising the effects of any emergency on the environment. This procedure shall be reviewed annually and updated as necessary. The licensee shall, prior to commencement of waste activities, establish, maintain and implement a Waste Storage Plan for all waste stored and held at the installation.

Closure, Restoration and Aftercare Management Plan (CRAMP)

The licensee shall maintain a fully detailed and costed plan for the closure, restoration and aftercare management of the site or part thereof. The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER.

The licensee shall have regard to the Environmental Protection Agency's Guidance on Assessing and Costing Environmental Liabilities (2014) and, as appropriate, Guidance on Financial Provision for Environmental Liabilities (2015) and the baseline report, when implementing Conditions 10.2.1 and 10.2.2.

Control and Monitoring

Monitoring of Emissions to Water - Schedule C.2.2 requires continuous and daily monitoring of emission from water treatment works.

Marine Water Monitoring in the Liffey Estuary - Schedule C.2.3 requires continuous and daily monitoring within the Estuary. Daily includes metals PAHs, PCBS and Petroleum hydrocarbons in SW1, SW2 and SW3.

Monitoring of Storm Water Emission - Schedule C.2.4 requires weekly monitoring metals PAHs, PCBS and Petroleum hydrocarbons in storm waters

Waste Monitoring - Schedule C of the Proposed Determination proposes samples to be taken every 1,000 m3 of dredged material tested and leachate samples will be tested at 1, 2, 4 and 9 days.

3 SUMMARY OF MITIGATION MEASURES

3.1 ROLES AND RESPONSIBILITIES

DPC intends to appoint a Contractor(s) to undertake each phase of the works. The Contract between DPC and the Contractor will allocate responsibility for compliance with the terms of the CEMP during the construction phase of the Project.

The first phase of the works (construction of Cross Berth Quay) commenced in November 2016. The conditions of planning were discharged by the Planning Authority, Dublin City Council, prior to the commencement of the works.

DPC has established a liaison group which includes representatives of DPC, the Contractor, Dublin City Council and DECLG Foreshore Unit. An invitation to attend has also been sent to the EPA. The group meets at least quarterly with an agenda and minutes taken of the meetings.

DPC has appointed a suitably qualified person to the role of Environmental Facility Manager (Environmental Clerk of Works) to monitor the construction works. The Environmental Facility Manager provides monthly reports to the members of the liaison group. The Environmental Facility Manager works closely with the Contractors site supervisors to monitor activities and ensure that all relevant environmental legislation is complied with and that the requirements of the CEMP are implemented. The Environmental Facility Manager has the authority to review method statements, oversee works and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary. The Environmental Facility Manager is supported on site by a full time Assistant Environmental Facility Manager and full time Marine Ecologist/MMO.

3.2 HOURS OF WORKING

Where construction activity takes place for the redevelopment in the vicinity of residential properties, the activities operate between the hours of 08:00 and 18:00 on Monday to Fridays, between 08:00 and 13:00 on Saturdays and there is no activity on Sundays or Bank Holidays in accordance with the requirements of the EIS and other consents.

Where additional or alternative working hours are required, these will be agreed in advance with Dublin City Council and the EPA.

3.3 ENVIRONMENTAL MANAGEMENT SYSTEM DESCRIPTION

3.3.1 Background

In order to safeguard local amenities and protect the environment ABP Condition 4 states that:

'The proposed development shall be operated and managed in accordance with a comprehensive Environmental Management System (EMS), a proposal for which shall be submitted by the developer to, and agreed in writing with, the planning authority prior to commencement of development. The annual audit report for the EMS shall be made publicly available in accordance with the requirements of the planning authority'.

This section sets out the systems in place to ensure compliance with Condition 4.

The principal activities of DPC are to facilitate the safe, efficient flow of goods and passengers through the port. The company provides the infrastructure, facilities, services and hard standing areas to meet with the needs of their customers and to allow the transfer of goods and passengers between sea and land. DPC has continued to grow over recent years and services include pilotage, a towing service catering for large ocean going vessels. Eight private companies are licensed by DPC to provide stevedoring services at the port.

In the region of 100 tenants hold facilities at Dublin Port. Sectors represented in the port include, haulage and shipping services, engineering, the food industry, fuel storage, bulk loading and unloading services for a number of products including animal feed, grain, mining products, peat and vehicle distribution, waste management and the construction industry.

DPC aims to continue to progress and increase the development of the port facilities and services in order to fulfil the needs of their tenants and customers and in a way that is sensitive to the local environment. The ABR Project is part of that process.

3.3.2 Existing EMS Certification

Dublin Port Company (DPC) has a comprehensive Environmental Management System (EMS) in place which is certified to international standard ISO 14001. A copy of the current certification is provided in Figure 3.3-I. An EMS Manager oversees the implementation of the system.

The EMS is comprised of the following elements:

- DPC Environmental Policy: a statement of intent to improve and sustain environmental performance Figure 3.3-2. ;
- Planning: identification of legal requirements, objectives and targets and establishment of management programme;

- Implementation and operation: training of appropriate personnel, record keeping and establishment of emergency planning;
- Checking and Corrective action: auditing EMS, implementing corrective actions;
- Management review: assessment of EMS (i.e. objectives and targets) relevant to operations and defined policy.

At the Environmental Management Review in December 2015 the EMS scope was reviewed, and it was confirmed that the ABR project is within the existing scope. The Certification body have also confirmed this.

In addition, DPC is a member of the Ecoports network and is a certified user of the 'Ports Environmental Review System' (PERS) since 2008. This certification is reviewed every 2 years, with the most recent successful re-certification in March 2016.



Figure 3.3-1. Dublin Port Company Current ISO 14001 Certification



ENVIRONMENTAL POLICY

The principal activities of Dublin Port Company (DPC) are to facilitate the efficient flow of goods and passengers through the port. The company provides the infrastructure, facilities, services and handling areas to meet with the needs of their customers and to allow the transfer of goods and passengers between sea and land.

"It is our policy to manage our obligations to the environment in a responsible manner and to take a sustainable approach to developing the port's business"

As part of this policy we aim to:

1. Comply with all relevant environmental legislation and Best Environmental Management Practices in line with the membership of the ISO14001 and PERS Certification.
2. Having regard to DPC's commitment to the concept of Corporate, Social Responsibility, work shall continue in developing and building partnerships with Dublin City Council, Regulator's, Non Governmental Organisations and local resident groups.
3. Promote best practise on environmental issues in the planning, design and implementation of projects in consultation with our tenants, customers and wider stakeholders.
4. DPC recognises the sensitivity of its location in close proximity to designated conservation sites and the corresponding significant aspects and impacts of Port operations. DPC will ensure a continued positive focus on nature conservation.
5. Follow best environmental practice in regard to our own activities ensuring that pollution prevention is a major consideration in all operational activities.
5. Having regard to protecting DPC's assets, work shall continue with both DPC staff and Port tenants in improving management of the potential environmental consequences of Port activities.
7. Seek to minimise significant environmental impacts of our activities especially in the areas of waste generation, pollution control and energy usage through the progressive development of environmental management procedures as determined by our business needs.
8. Establishing objectives and measurable targets against which improvements in environmental performance will be monitored.
9. Raise staff awareness of the environmental issues and the environmental effects of DPC's activities through communication and training.
10. Review annually our environmental policy and consider the need for any amendments in the light of changing circumstances.
11. Make the environmental policy statement available to our stakeholders and the public and consult with local communities on relevant matters.
12. Build on the environmental standards we have achieved through a process of continuous improvement in environmental performance.
13. Publish an annual Sustainability Report.
14. Ensure the availability of necessary resources to implement this policy.

Signature: _____

Date: _____

21/6/2017

Revision 10

Figure 3.3-2. Dublin Port Company Environmental Policy

3.3.3 EMS Purpose

The ISO 14001 internationally certified Environmental Management System operated by DPC provides a comprehensive framework within which DPC carries out its operations and activities to the highest environmental standards and in a sustainable manner. It is a systematic framework to manage the immediate and long term environmental impacts of DPC's products, services and processes. Its ongoing implementation ensures that DPC's environmental footprint is minimised, the risk of pollution incidents is diminished, and ensures compliance with relevant environmental legislation.

DPC's Environmental Management Manual (EMM) describes in detail how the EMS identifies and manages significant environmental issues associated with DPC's activities, including the ABR Project, and consequently how it applies environmental awareness and responsible decision making in all its procedures. The EMM and associated documented procedures are intended to facilitate effective and efficient management of the environmental aspects and any potential impacts of the Dublin Port operations. DPC is committed to implementing this EMS in relation to all its activities so as to prevent any significant adverse environmental effects.

3.3.4 Environmental Facility Manager

DPC have appointed an Environmental Facility Manager (Environmental Clerk of Works) to monitor and to assess the environmental implications of all construction works associated with the ABR Project. The Environmental Facility Manager will work closely with the Contractors' site supervisors to monitor activities and ensure that all relevant environmental legislation and EMS protocols are complied with, and that the requirements of the CEMP are implemented. The Environmental Facility Manager will review method statements, oversee works and instruct action, as appropriate, and has the authority to require the temporary cessation of works, where necessary.

3.3.5 ABR-EMS Implementation

The EMS Manager provided ABR – DPC ENV Management System induction to the Environmental Facility Manager on 12th April 2016. Relevant documentation was provided including:

- EMS Manual MAN-DPC-ENV-001
- Environmental Aspects Register AR-DPC-ENV-001
- Internal EMS Audits SOP-DPC-ENV-004
- PC Legal Index/Register REF-DPC-ENV-001
- Initial Environmental Assessment SOP-DPC ENV-003
- Monitoring & Measurement of Environmental Aspects SOP-DPC-ENV-006

- Environmental Aspects Monitoring Log REF-DPC-ENV-012
- Emergency Management Plan REF: MAN-DPC-OPS-002 DPC
- Preparation, Revision & Control of SOPs SOP-DPC-QUAL-001
- Document Control System SOP-DPC-ENV-015
- Roles and Responsibilities REF-DPC-ENV-010
- Corrective Actions/ Preventive Actions SOP-DPC-ENV-008
- Internal Communication SOP-DPC-ENV-007
- External Communication SOP-DPC-ENV-011

Relevant documents have been reviewed by the Environment Facility Manager in the context of the ABR Project. This review identified further new environmental considerations to be considered arising from the ABR. It identified additional aspects and controls for inclusion in the Environmental Aspects register, and revised the environmental audit checklist to ensure comprehensive coverage of ABR issues. The environmental legal register has been reviewed and additional legislative instruments germane to the ABR project identified.

As part of the ongoing implementation of the EMS in relation to the ABR Project, the Environmental Facility Manager participated in the Capital Projects Internal Audit of the 8th June 2016, and will continue to fully implement the EMS and engage in all EMS procedures and protocols as required.

3.3.6 EMS Scope

The EMM sets out the scope of the EMS and specifically includes management, maintenance and development of port infrastructure: including roads, ramps, drainage system, selected utilities under the roads alignment (mains water supply), buildings, piles, hydrographical surveys and dredging.

Key relevant provisions of the existing DPC ISO 14001 Environmental Management System include:

- the requirement for all contractors to be assessed/audited at procurement stage and throughout the project in accordance with SOP-DPC-ENV-018 Environmental Performance in Procurement;
- awareness raising in ABR-specific environmental issues to be provided to contractors during the project;
- ongoing auditing and monitoring as programmed in the EMS and CEMP;
- identification and documentation of environmental non-conformances and corrective actions/preventative actions using the EMS QPulse document control system;
- data storage and reporting as required by the EMS and CEMP.

3.3.7 EMS Implementation and Operation

The EMS is managed by the EHS Specialist and relevant management personnel. The EMM sets out the overall structure for implementation and defines the roles and responsibilities of personnel in relation to the EMS.

The ABR Project is supported by its own dedicated Environmental Management Team. The key roles are set out in Figure 3.3-2. Additional expertise will be available as required when phased project elements come on-stream over the lifetime of the project.

The Environmental Facility Manager is the designated point of contact with the EMS Management Team. An Environmental Compliance Process Flow Diagram has been prepared by DPC's Programme Management Office for the ABR project and is presented in Figure 3.3-3. It outlines the stages in the process of environmental planning, assessment and reporting for ABR construction activities.

The process begins at the procurement tendering stage, and covers the process of environmental management plan development and approval, the audit and inspection schedule roles, and reporting mechanisms. All Contractors are made aware of DPC's environmental policy, the EMS and DPC environmental point of contacts. This information is made available within tender documentation as per SOP-DPC-ENV-018 – Environmental Performance in Procurement. The Environmental Facility Manager will provide reports to the competent authorities, and to identified stakeholders at the agreed frequency.

The EHS Specialist will conduct an internal environmental audit of the ABR project every six months. Additional audits of ABR construction activities will be completed by the Environmental Facility Manager every three months initially. However, if a large number of non-conformances are identified, this frequency will be increased in consultation with the EHS Specialist.

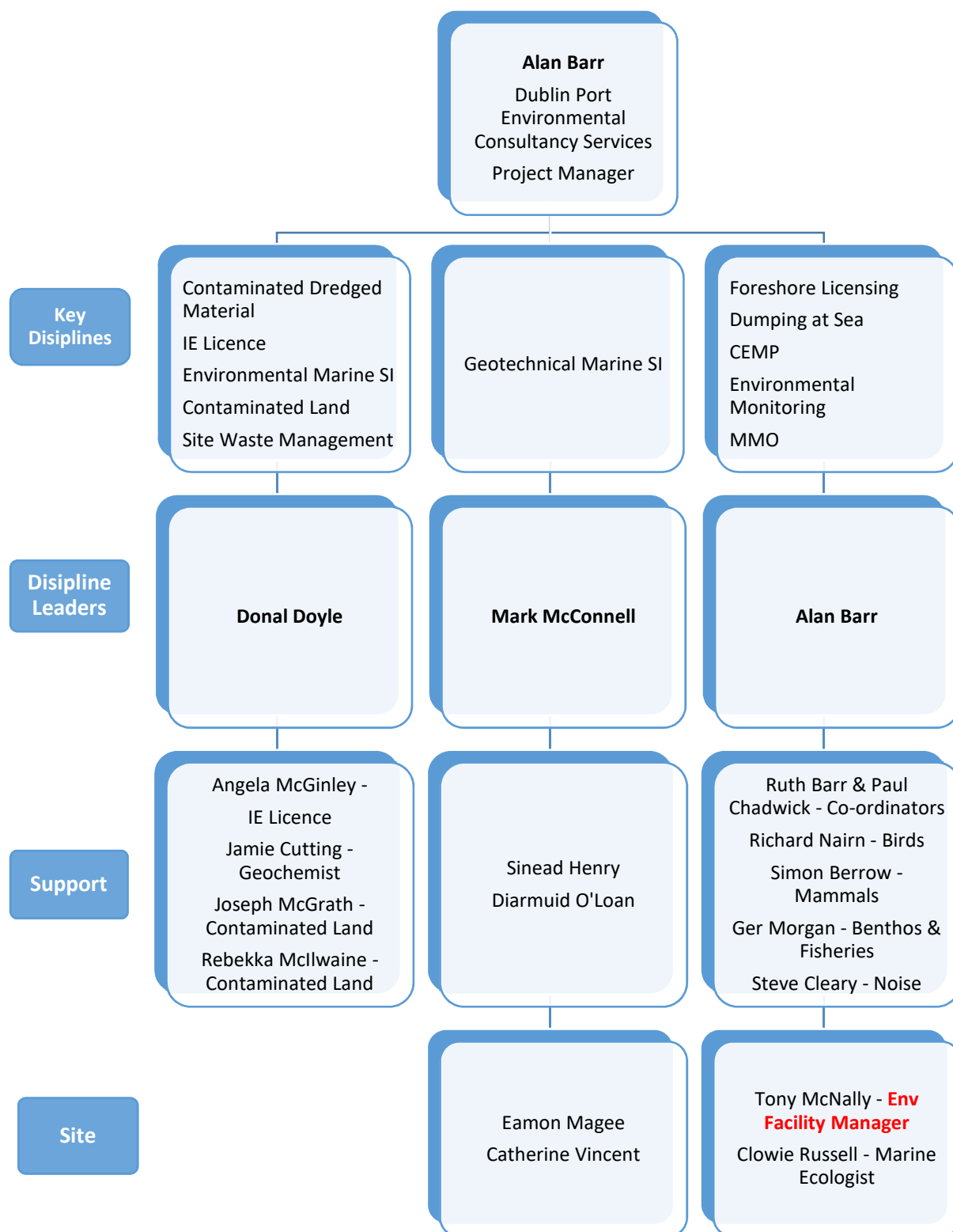


Figure 3.3-2. ABR Environmental Management Team key roles.

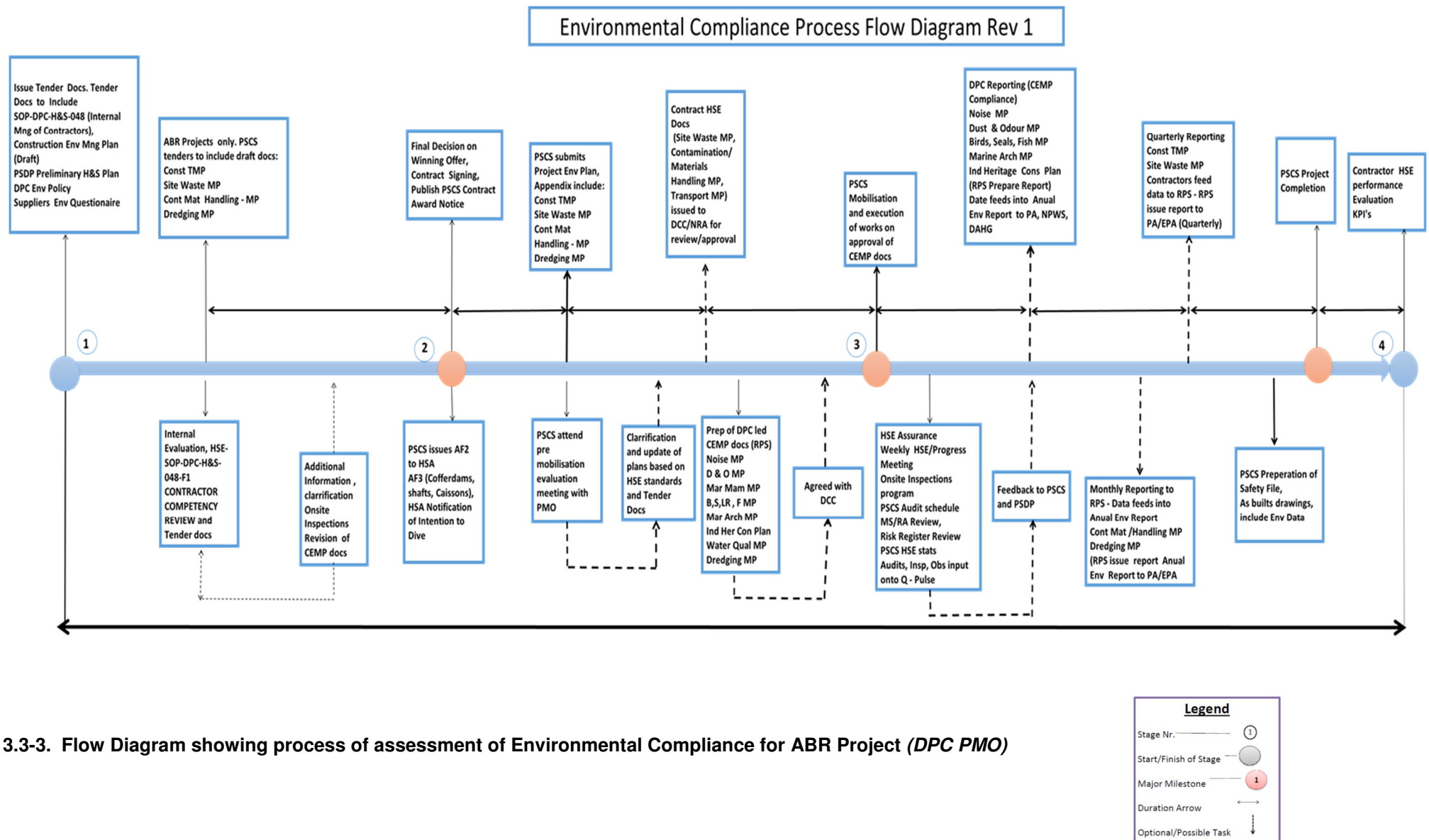


Figure 3.3-3. Flow Diagram showing process of assessment of Environmental Compliance for ABR Project (DPC PMO)

3.3.8 EMS Documentation

EMS specific documentation is maintained by the EMS Manager. This documentation is subject to periodical review and amendments to reflect new operations or activities carried out by DPC, changes in legal requirements and development of the system. Such a review process was undertaken at the beginning of the ABR project and will be ongoing throughout the life of the project.

The preparation, revision and control of documents related to the EMS is outlined in SOP-DPC-ENV-015. DPC use a document control system called Q- Pulse and an associated procedure SOP- DPC-ENV-009 combined with hard copy control to meet the ISO standard requirements for document control.

A list of documentation comprising the DPC EMS is provided in Table 3.3-1. It is a key requirement of the Dublin Port Master Plan 2012 -2040 that all future DPC activities (including the ABR Project) are undertaken in accordance with the requirements of the company's accredited EMS as set out in the documents in Table 3.3-1.

3.3.9 EDEN

DPC are registered on Environmental Data Exchange Network (EDEN) portal. All correspondence and reporting in relation to the requirements of the IE Licence will be made to the EPA via the EDEN System. DPC are aware that all information submitted via the Eden system can be viewed by members of the public on request at any EPA office. Some information such as environmental reporting is made available on EPA licensing web page. The EPA will be informed if any information submitted is deemed to be confidential.

TABLE 3.3-1. Documents comprising the DPC EMS System.

AR-DPC-ENV-001	DPC Aspects Register
MAN-DPC-ENV-001	DPC Environmental Management System Manual
OBJ-DPC-ENV-001	DPC Objectives and Targets
REF-DPC-ENV-001	DPC Legal Index
REF-DPC-ENV-002	DPC Environmental Policy
REF-DPC-ENV-004	DPC Environmental Management Review
REF-DPC-ENV-008	Distribution List for Environmental Policy
REF-DPC-ENV-010	Environmental Roles and Responsibilities
REF-DPC-ENV-011	EMS Documentation Map
REF-DPC-ENV-012	Environmental Aspects Monitoring Log
REF-DPC-ENV-014	DPC Environmental Awareness Training
SOP-DPC-ENV-001	Environmental Inspection Procedure
SOP-DPC-ENV-002	Identify and Update Environmental Legal Index
SOP-DPC-ENV-003	Initial Environmental Assessment
SOP-DPC-ENV-004	Internal EMS Audits
SOP-DPC-ENV-005	Environmental Awareness and Training Procedure
SOP-DPC-ENV-006	Monitoring & Measurement of Environmental Aspects
SOP-DPC-ENV-007	Internal Communication
SOP-DPC-ENV-008	Corrective Actions/ Preventive Actions
SOP-DPC-ENV-009	Q Pulse Document Control System
SOP-DPC-ENV-010	Control of Records
SOP-DPC-ENV-011	External Communication
SOP-DPC-ENV-013	Control of Measuring and Monitoring Devices
SOP-DPC-ENV-014	Marine Oil Spill Response
SOP-DPC-ENV-014-A1	Pollution Equipment Table
SOP-DPC-ENV-014-A2	Location of Pollution response equipment
SOP-DPC-ENV-015	Doc Control
SOP-DPC-ENV-016	Environmental Management Review
SOP-DPC-ENV-017	Setting, Communicating & Monitoring DPC Obj & Tar
SOP-DPC-ENV-018	Environmental Performance in Procurement
SOP-DPC-ENV-018-A1	Standard EMS Requirements in tendering for DPC
SOP-DPC-ENV-019	Audit of Compliance
SOP-DPC-ENV-020	Environmental Site Audits
SOP-DPC-ENV-021	Environmental Clause for Dublin Port Tenants lease and agreement
SOP-DPC-ENV-022	Galley Waste Management
SOP-DPC-ENV-030	Waste Handling Procedures, LEAD ACID BATTERIES
SOP-DPC-ENV-031	Waste Handling Procedures, CARDBOARD
SOP-DPC-ENV-034	Waste Handling Procedures: Drain Cleaning Waste
SOP-DPC-ENV-035	Waste Handling Procedures: Fluorescent Light Bulbs

3.4 APPROACH TO COMMUNITY ENGAGEMENT

This section sets out Dublin Port Company's (DPC) approach to community engagement with respect to the ABR Project.

3.4.1 Spatial extent with respect to potential noise

Noise modelling was undertaken to identify properties which have the potential to hear the construction works associated with the ABR Project.

The results of this study are summarized in Figure 3.4-1 which shows the properties within a 50 dB noise contour envelope which may arise from time to time from construction activities within the ABR Project site.

The properties lie within the following four communities:

- Ringsend
- Pierce Street
- Sherriff Street
- East Wall

There are existing arrangements in place to engage with these four communities which will be used for the duration of the ABR Project.

3.4.2 Existing Arrangements to Engage with Neighbouring Communities

A Community Liaison Committee (CLC) has been engaging with the neighbouring communities since 1997, operating under the umbrella of the Dublin Docklands Development Authority (DDDA). The CLC is currently chaired by Charlie Murphy, DPC. Minutes of CLC meetings are taken by officials of Dublin City Council. The CLC provides an opportunity to inform the neighbouring communities of the ABR Project, to communicate work programmes and to engage with community representatives to resolve any potential concerns or issues arising.

A separate River Users Group is also in place to co-ordinate activities and to resolve any potential issues arising between DPC and other users of the River Liffey, comprising rowing clubs, Poolbeg marina and fishermen.

Both of the above forums are well established, are working to the satisfaction of the local communities and provide strong lines of communication between DPC and the four neighbouring communities to the ABR Project.

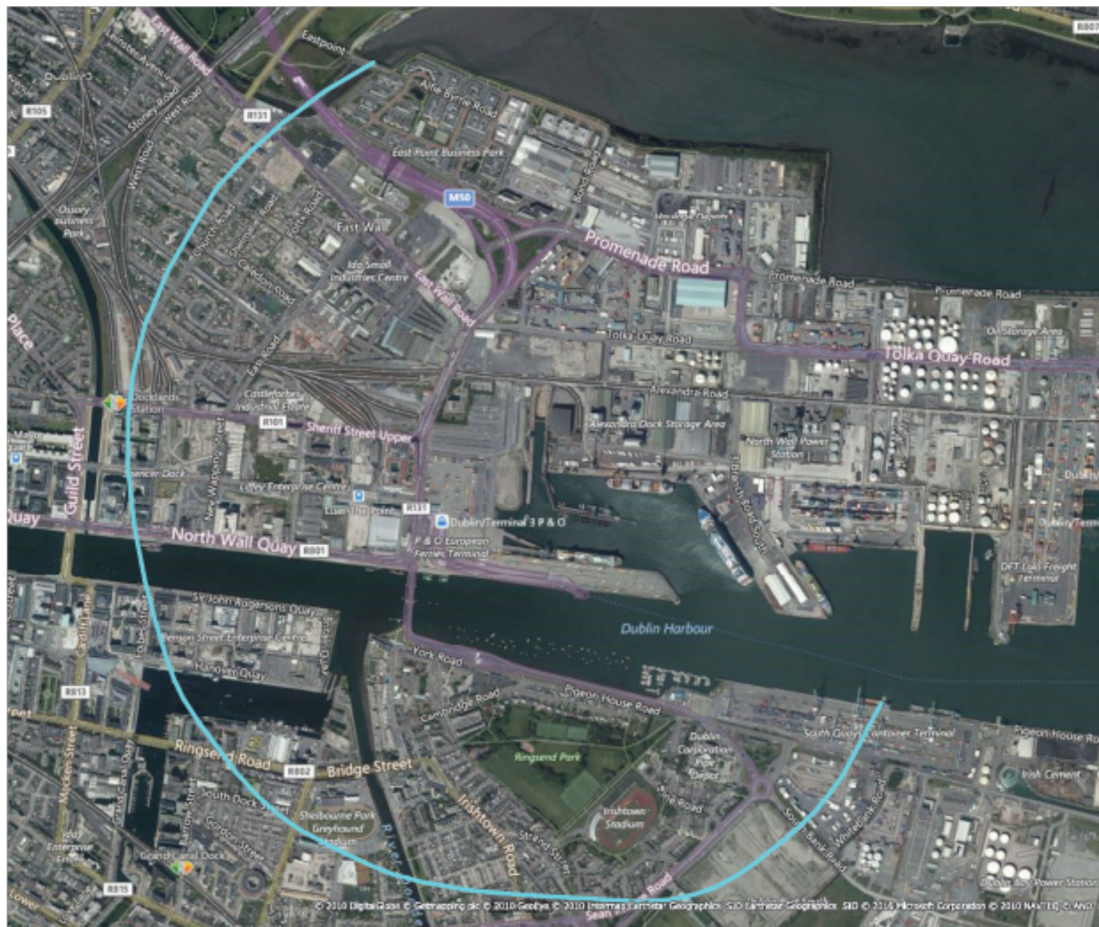


Figure 3.4-1. Properties with potential to hear construction noise lie within the 50dB contour line shown in blue.

3.4.3 Future Arrangements to Engage with Neighbouring Communities

In response to the formation of the North & South Lotts and Poolbeg Strategic Development Zones (SDZs), a Dublin Docklands Oversight & Consultative Forum is currently being established and expressions of interest are being sought from organisations to participate on the Forum within the following categories

- Organisations engaged in the promotion or carrying out of community development and/or engaged in the promotion of the social, economic or general interest of communities in the Dublin Docklands Area;
- Organisations representative of persons engaged in the promotion or carrying out of economic activity (including employment) in the Dublin Docklands Area; and
- Organisations representative of persons involved in the promotion or carrying out of educational activities in the Dublin Docklands Area.

This Forum will have two representatives from DPC. It is likely that a sub-committee will be formed to continue the work of the existing CLC.

3.4.4 ABR Project Liaison Group

DPC has established a liaison group comprising the following representatives

- DPC;
- Dublin City Council;
- Foreshore Unit, DECLG;
- Main Contractor;
- Environmental Facility Manager; and
- Health & Safety Manager.

The objective of the liaison group is to provide a forum to discuss the progress of the construction works, programme and any issues arising.

The group meets quarterly with an agenda and minutes taken of the meetings.

Port users will be kept informed of the outcome of the meetings through established lines of communication within the Port.

3.4.5 ABR Project Website

The existing ABR Project Website will be used to keep local communities informed of construction progress and programme, highlighting the extent of the works scheduled over a three month rolling period.

3.5 ENVIRONMENTAL MANAGEMENT PLANS

A suite of Construction Phase Management Plans will be prepared in association with the preferred Contractor(s). These Management Plans will be agreed with DPC and the relevant competent authorities in advance of the final Contract being signed. Regular audits of the CEMP will be undertaken during the construction phase of the works by the Environmental Facility Manager.

Table 3.5-1 illustrates which of the Management Plans will be Contractor led or DPC led using independent consultants. Table 3.5-3 provides a summary of all Management Plans at the end of section 3.5.

For Contractor led elements, the CEMP provides the mitigation measures to which the Contractor must adhere to. The Contractor shall be responsible for developing the Plan to suit his plant and working methodology.

For DPC led elements using independent consultants, the CEMP provides the Contractor with an awareness of the independent monitoring programmes which will be undertaken and the constraints/mitigation measures to which the Contractor shall work to.

Table 3.5-1 Elements of the CEMP

Section Reference	Element of CEMP	Contractor Led	DPC Led
	Establish a Liaison Group		x
	Appoint Environmental Facility Manager		x
	Establish Public Website		x
	Analyse environmental data / prepare Annual Environmental Reports		x
3.5.1	Construction Traffic Management Plan	x	
3.5.2	Invasive Alien Species Management Plan		x
3.5.3	Site Waste Management Plan	x	
3.5.4	Noise Management Plan		x
3.5.5	Dust and Odour Management Plan		x
3.5.6	Contamination / Materials Handling Management Plan	x	
3.5.7	Marine Mammals Management Plan		x
3.5.8	Birds, Seals, Lamprey, Bats, Benthos & Fisheries Management Plan		x
3.5.9	Marine Archaeology Management Plan		x
3.5.10	Industrial Heritage Conservation Plan		x
3.5.11	Water Quality Management Plan		x
3.5.12	Dredging Management Plan	x	
3.6	IE Licence CEMP requirements	x	

3.5.1 Construction Traffic Management Plan

The Construction Traffic Management Plan shall include, but not be limited to, the following elements:

- Details to demonstrate compliance with the Dublin City Council's HGV Management Strategy;
- Provisions for routing, wheel washing and covering of loads using the Dublin Port Tunnel;
- Provisions for appropriate parking facilities for site operatives and visitors within the site and to ensure all parking areas are clearly signed and monitored;
- Provision of a Construction Management Strategy for the Dublin Port Tunnel for the duration of the works which shall include details in relation to the timing and routing of construction traffic to and from the construction sites and associated directional signage and shall include details in relation to the proposed closures of existing accesses to/from Dublin Port;
- Proposals for maintaining public roadways free from debris arising from the proposed development;
- Proposals for the staggering of various shift start and finish times to take account of the main ship arrival and departure times; and
- Proposals for a management system for invasive alien species which shall be used for the duration of the proposed works in order to prevent the spread of alien species to or from Dublin Port Estate, both by road and by sea.

The Construction Traffic Management Plan shall recognise DPC's commitment to encourage transportation of materials by sea where this is both economically viable and more environmentally sustainable than transport by land.

DPC will provide details of proposals and phasing to close the Terminal 3 Access on East Wall Road and Alexandra Road Access on East Wall Road (to all port related traffic with the exception of users of the DPC Head Offices and use by coaches travelling between cruise vessels and Dublin City Centre) during the final phase of the construction period. Once the construction stages are complete the site access closures will result in a significant reduction in the volume of traffic along the frontage of Dublin Port from East Wall Road to North Wall Quay.

The CEMP will be augmented by operational Construction Traffic Management Plans when contractors are appointed, and liaison with Dublin City Council will take place with regard to approval of the revised plan.

An operational Cross Berth Quay: Construction Traffic Management Plan has been prepared for the initial commencement phase of ABR and submitted to Dublin City Council on 10th August 2016.

3.5.2 Invasive Alien Species Management Plan

3.5.2.1 Introduction

ABP Planning condition 3 (d) requires that the ABR CEMP shall make provisions for 'A management system for invasive alien species which shall be used for the duration of the proposed works'. Additional conditions have been made by DECLG through the consent process for the Foreshore Licence/Lease/Ministerial Consent. These include a stipulation that 'all imported rock armour material is free of any contamination and invasive alien species and is sourced from authorised/licensed quarry operators'. This section addresses the requirements of the conditions above and supports the Construction Traffic Management Plan outlined above.

Dublin Port Company is very aware of the fundamental importance of biodiversity in maintaining robust and sustainable ecosystems. In recent years the widespread occurrence and continual dispersal of invasive alien species poses a growing threat to native flora and fauna and the ecosystems that support them. Species of concern are listed in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (Non-native species subject to restrictions under *Regulations 49 and 50*) which prohibits their introduction and dispersal.

The importance of the threat posed by invasive alien species (IAS) is reflected in a suite of international, European and national policy and legislation. These include:-

- Convention on Biological Diversity
- EU Biodiversity Strategy to 2020
- Regulation of the European Parliament and of the Council on the prevention and management of the introduction and spread of invasive alien species
- Actions for Biodiversity 2011-2016, Ireland's 2nd National Biodiversity Plan
- European Communities (Birds and Natural Habitats) Regulations 2011

The current estimate of the economic cost of invasive species to the Republic of Ireland is approximately €203,000,000. IAS can negatively impact on native species, can transform habitats and threaten whole ecosystems causing serious problems to the environment and the economy. They can be extremely difficult and costly to control and eradicate. In some instances the latter may be impossible and adverse effects are irreversible. Early detection of IAS and preventing new introductions are effective management strategies.

Negative impacts of IAS on biodiversity can occur through a range of mechanisms such as competition, herbivory, predation, alteration of habitats and food webs, introduction of parasites and pathogens and through the dilution of native gene pools. On the island of Ireland the most prominent negative impact appears to be direct competition with native biota, whilst alteration to habitats and the influence of parasites and pathogens are also important. A range of specific habitat types, and a variety of native species are currently under threat, including freshwater rivers and lakes; coastal floodplains, saltmarsh and sand dunes; tidal mudflats and sandflats.

The total number of alien animal and plant species on the island of Ireland has been estimated at over 1,200. Not all of these are 'invasive' or have an impact i.e. given to vigorous dispersal and displacement of natives. A group of 163 of the worst IAS threatening biodiversity in Europe has been compiled and the island of Ireland has over 40 of this group.

Key Irish legislation with provision for control of invasive species is the Wildlife Acts and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011), both of which prohibit the spreading of invasive species. Specifically, regulation 49 of the Birds and Habitats Regulations provides for a prohibition on the introduction and dispersal of certain listed species. The species of concern are listed in the Third Schedule to these Regulations which is reproduced in Appendix 2 for convenience. Not all species listed are relevant to Dublin Port and the ABR project.

The schedule also refers to vector materials that may occasion the dispersal of IAS. For the ABR Project particular relevance is attached to 'soil or spoil taken from places infested with Japanese knotweed (*Fallopia japonica*), giant knotweed (*Fallopia sachalinensis*) or their hybrid Bohemian knotweed (*Fallopia xbohemica*)'.

3.5.2.2 IAS Management in Dublin Port

This management strategy is informed by best practice guidance, advice on mitigation methods, and aids to identification provided in a range of sources including:

- National Roads Authority (2010). *Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads Revision 1, December 2010*
- Invasive Species Ireland Project (2009). *Field Guide to Invasive Species in Ireland. 2nd Edition.*
- Invasive Species Ireland website: <http://invasivespeciesireland.com>
- GB Non-Native Species Secretariat website: www.nonnativespecies.org

3.5.2.3 Initial IAS Assessment

The implementation of biosecurity measures in relation to IAS must be based on a risk based approach. To inform this approach the Environmental Facilities Manager will undertake an initial IAS assessment to include:-

- an appraisal of the key IAS that are most likely to pose a threat based on
 - habitat availability at the construction site
 - known occurrence of IAS in the likely region of influence
 - available pathways for dispersal to and within the construction site
 - extent of risk presented by an individual IAS (considering potential economic, operational, and environmental impacts, and presence of resident vulnerable or threatened native species)
- a visual survey of the construction site for the presence IAS
- mapping and photographic record of any IAS detected
- compilation of visual identification aids for shortlisted key IAS

Biosecurity measures are a series of precautionary steps designed to reduce the risk of dispersal / introduction of IAS. The management approach taken will prioritise prevention of IAS introduction to, or dispersal from Dublin Port. Mitigation measures will be implemented if required to contain, eradicate or control as appropriate any IAS found to be present in the areas of project operations.

3.5.2.4 Prevention

Prevention measures will range from raising awareness of IAS and the potential for their dispersal, to ensuring best practice in relation to the movement of materials into, within or out of the operations area. Measures to be implemented by the Contractor are to include:

- Ensuring that rock armour, gravels, sand or soils to be imported to the site are sourced from authorised/licensed quarry operators
- Specifying that such material should be free of invasive plant species and their propagules
- Implementing a waste management plan for the proper storage and controlled movement of waste materials
- Implementing a materials handling plan for the proper storage and controlled movement materials
- Implementing a construction traffic management plan for control of vehicle and plant access and movements, including wheel wash and plant inspection at site entrance
- Ensuring that all vehicles and construction plant arriving on site are reasonably clean and free of significant deposits of mud and plant debris (particularly tyres, wheel arches, excavator buckets and tracks) that might be a vector for spread of IAS
- Cordoning off any IAS locations on site identified and mapped in the initial IAS assessment
- Washing down machinery that has operated in IAS infested areas in designated locations before moving within the site or leaving the site

- Inclusion of IAS awareness in toolbox talks using visual aids to identification for the most likely species to be encountered prepared by the initial IAS assessment
- Notification of any suspected new occurrences of IAS to the Environmental Facilities Manager

3.5.2.5 Containment / Treatment

If any IAS is identified on the construction site, the management plan will aim to contain its spread in the first instance and subsequently eradicate it if possible from the site. This will include implementation of the following measures:

- Cordoning off any invasive species infestations to limit movement of people / machinery in infested area and relevant buffer zones
- Confirmation of the identification of the species concerned, and collation of relevant information
- Selection of the most appropriate best practice methods for control / treatment
- Prioritisation of treatment areas
- Undertaking physical or chemical control measures as appropriate in line with best practice guidance and in compliance with health and safety requirements
- Ensuring control measures are undertaken by suitably qualified personnel
- Handling and disposal of treated material appropriately to prevent further spread.

The Environmental Facilities Manager will be responsible for ensuring that appropriate mitigation is in place as part of the Construction Environmental Management Plan during the implementation of the ABR Project.

3.5.3 Site Waste Management Plan

Contractors working on site during the works will be responsible for the collection, control and disposal of all wastes generated by the works. An indication of the types of waste likely to be generated by the works and the most appropriate method of disposal are presented in the table below (EIS, Table 4.5).

Typical Wastes Generated by the Construction Works and recommended disposal / treatment options

Activity	Waste Generated	Disposal/Treatment Recommendations
Demolition Waste	Construction materials, concrete, steel, clay pipes	Collected onsite for disposal by licensed waste contractor.
General Construction Waste	Waste oils	Collected by waste recycling contractor.
	Other waste	Collected in skips for disposal by licensed waste contractor.
General Office/Messing	Paper, packaging, canteen etc.	Collected in covered skips/large bins for disposal by a licensed waste contractor.
Temporary Site Toilets	Sewage	Emptied under contract for disposal at an appropriate facility.

The Contractor shall develop a detailed Site Waste management Plan which will specify the following:

- type and quantity of wastes likely to be generated;
- locations where wastes will be stored on site;
- measures which will be taken to prevent their loss or migration to the receiving environment;
- details of how the wastes will be disposed including details of their final destination; and
- protocols for maintaining adequate records.

There are clear synergies between the Site Waste Management Plans and the Contamination and Materials Handling Plans in relation to the interaction of waste categorisation of waste streams and subsequent material handling of this waste. The review of the waste plans will be carried out in

conjunction with the review of the contamination/materials plan to ensure these plans are synchronised and the various interactions are noted.

As a minimum, the waste plans prepared will be required to specify the following details for the review process:

- The type and quantity of all waste streams likely to be generated during the works covered by the plan including the EWC codes and designation of potentially hazardous streams;
- Any locations where wastes will be temporarily stored on site and the infrastructure proposed to accommodate this storage;
- Any measures which will be taken by the Contractor (both routine and emergency) to prevent spills, incidents or discharges of waste material to the environment;
- The details of how the wastes will be disposed including details of the transport of waste (including waste collection permits of all hauliers) and the final destination for disposal recovery (it include waste permits/licenses and TFS details if relevant);
- The protocols for maintaining adequate records including roles and responsibilities in the contractor's team and document control measures.

3.5.4 Noise Management Plan

The Contractor shall comply with the mitigation measures prescribed below.

- (a) The construction noise and vibration levels arising from the proposed development shall not exceed Noise and Vibration Threshold Limits in NRA Guidelines (2004) and BS5229:2009 and the noise levels presented in Tables 7.1.14-7.1.16 of Volume 1 of the environmental impact statement (reproduced below).
- (b) The following mitigation measures, presented in the EIS (Chapter 7), shall be adhered to, in compliance with British Standard BS5228:2009 – Noise and vibration control on construction and open sites: Part 1 – Noise.
 - Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order;
 - Careful selection of quiet plant and machinery to undertake the required work where available;
 - All major compressors will be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use;
 - Any ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
 - Machines in intermittent use will be shut down in the intervening periods between work;
 - Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, acoustic barriers or enclosures will be utilised around noisy plant and equipment.
 - Handling of all materials will take place in a manner which minimises noise emissions;
 - Audible warning systems will be switched to the minimum setting required by the Health & Safety Authority.

A complaints procedure shall be operated by DPC throughout the construction phase and the Contractor will be instructed to make all efforts to address any noise issues at the nearest noise sensitive properties.

Table 7.1.14 Worst-Case Predicted Construction Noise Levels at Nearest Noise Sensitive Properties from Construction Phase (Scenario 1)

Property Reference	Nearest Property (See Figure 7.1.1)	Predicted Worst-Case Construction Noise [Including Dredging] (dBA)
1	51 York Road	54.8 [65.9]
2	1 Alex Quay	55.1 [65.6]
3	1 Pigeon House Road	51.2 [58.4]
4	30 Pigeon House Road	51.2 [69.2]
5	46 Pigeon House Road	55.4 [59.5]
6	62 Pigeon House Road	54.8 [58.7]
7	71 Pigeon House Road	52.2 [57.4]
8	80 Pigeon House Road	51.9 [57.0]
9	The O ₂	58.2 [60.2]
10	Point Hotel	60.8 [61.0]
11	210 Clontarf Road	44.3 [44.6]
12	22 Vernon Court	44.3 [44.6]
13	221 Clontarf Road	44.0 [44.3]

Table 7.1.15 Worst-Case Predicted Construction Noise Levels at Nearest Noise Sensitive Properties from Construction Phase (Scenario 2)

Property Reference	Nearest Property (See Figure 7.1.1)	Predicted Worst-Case Construction Noise [Including Dredging] (dBA)
1	51 York Road	59.5 [67.1]
2	1 Alex Quay	59.5 [66.8]
3	1 Pigeon House Road	55.4 [60.2]
4	30 Pigeon House Road	57.1 [68.0]
5	46 Pigeon House Road	63.5 [64.5]
6	62 Pigeon House Road	57.5 [60.2]
7	71 Pigeon House Road	55.9 [58.5]
8	80 Pigeon House Road	54.7 [57.8]
9	The O ₂	68.3 [68.5]
10	Gibson Hotel	66.3 [66.4]
11	210 Clontarf Road	42.4 [42.8]
12	22 Vernon Court	42.4 [42.8]
13	221 Clontarf Road	42.4 [42.8]

Table 7.1.16 Comparison of Worst-Case Predicted Construction Noise Levels with Noise Threshold Limits in NRA Guidelines (2004) and BS5229:2009

Property Ref	Nearest Property (See Figure 7.1.1)	Predicted Worst-Case Construction Noise* (dBA)		Noise Threshold Limit (LAeq) (dBA)	
		Scenario 1	Scenario 2	NRA Guidelines	BS5228:2009 ABC Method
1	51 York Road	65.9	67.1	70	70
2	1 Alex Quay	65.6	66.8	70	70
3	1 Pigeon House Road	58.4	60.2	70	70
4	30 Pigeon House Road	69.2	68.0	70	70
5	46 Pigeon House Road	59.5	64.5	70	70
6	62 Pigeon House Road	58.7	60.2	70	70
7	71 Pigeon House Road	57.4	58.5	70	65
8	80 Pigeon House Road	57.0	57.8	70	65
9	The O ₂	60.2	68.5	70	70
10	Gibson Hotel	61.0	66.4	70	70
11	210 Clontarf Road	44.6	42.8	70	70
12	22 Vernon Court	44.6	42.8	70	70
13	221 Clontarf Road	44.3	42.8	70	70

Noise Monitoring Programme

Noise surveys will be conducted in accordance with *BS7445: Description and Measurement of Environmental Noise*. All measurements will be made using Type 1 precision digital sound levels meters and associated hardware. The following parameters will be recorded as a minimum: L_{Aeq}, L_{Amax}, L_{Amin}, L_{A10} & L_{A90}

All data will be collected and analysed on a weekly basis and the analysed data will be fed back to DPC and the Contractors on a weekly basis with a view to reviewing the compliance of construction phase activities in the context of planning approval Condition 6 and the thresholds/requirements included in this CEMP. This will also include any liaison requirement with Dublin City Council in this regard.

Any noise nuisance issues associated with the construction phase activities will be immediately assessed and analysed in relation to the recorded noise levels and all correspondence with DPC, the Contractor, Dublin City Council and the residents will be conducted with the appropriate level of

urgency. This will include the appropriate liaison with DPC and the Contractor to control activities to ensure that the construction phase activities are in line with the Condition 6 and the CEMP.

Input into the Annual Environmental Report

Summary data and graphical outputs for each year of the construction phase will be fed into the DPC Annual Environmental Report for Dublin Port activities. This will be completed for each year in which construction phase activities will be taking place at the port. The data will be prepared in an analytical output that will aim to provide a concise representation of the construction phase noise levels from the port and will aim to avoid presentation of lengthy datasets.

Equipment

In a meeting with Dublin City Council on 19th April 2016, it was agreed that there would be two permanent noise meters set up for the entire duration of the construction phase. These noise meters will be located at the marina adjacent to Pigeon House Road and at a location to the western boundary of Dublin Port lands. The noise meters will include a full outdoor weather proof kit and will be located so as to be secure from interference from members of the public but still appropriately located as to be representative of the nearest noise sensitive receptors to the port.

The noise meters used will conform to the description of a Type 1 precision digital sound level meters as described in the relevant noise guidance documentation. All equipment will be calibrated at regular intervals.

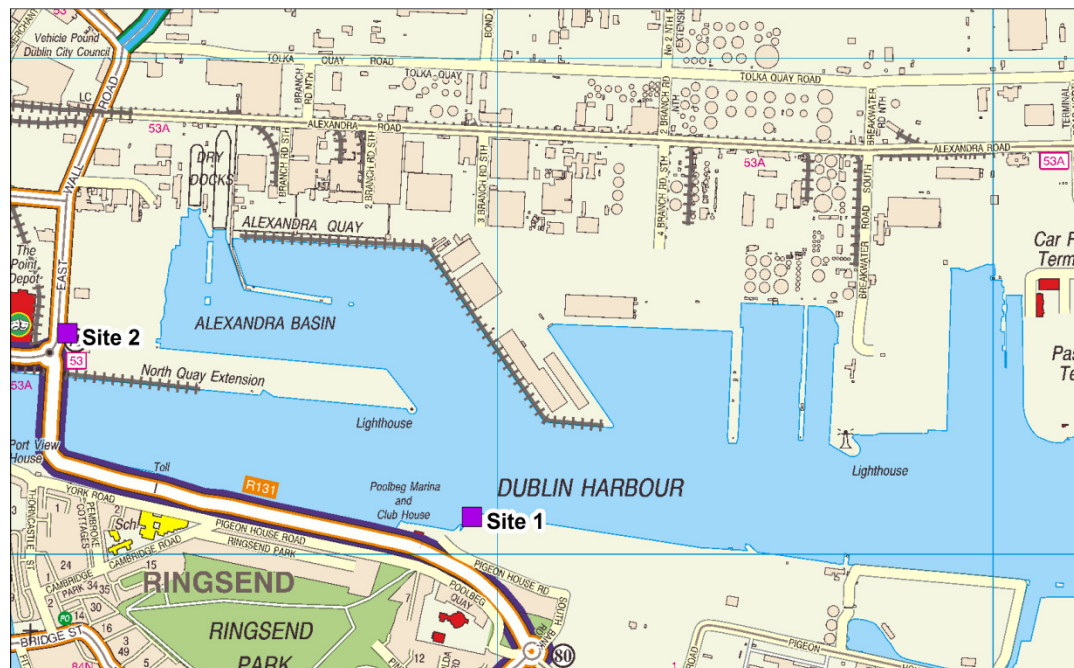


Figure 3.5.4-1 Continuous Noise Monitoring Locations

Neighbour Notification

In a meeting with Dublin City Council on 19th April 2016, it was agreed that Dublin Port would engage in a neighbour notification exercise prior to the commencement of the construction phase. The extent of residents to be notified of construction activities will be determined by a noise modelling exercise which will determine what residents are likely to hear the construction phase activities.

3.5.4.1 IE Licence Noise Monitoring

Noise monitoring will be undertaken at 5 locations (N1-N6) as required by Condition 6.16 and Schedule C.5 of the IE licence P1022-02. Monitoring will be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'

3.5.5 Dust & Odour Management Plan

The Contractor shall comply with the mitigation measures prescribed below (Please refer to Section 3.6.1 for site specific Dust and Odour Management Plan for Phase 1 of the work as per IE Licence)

Dust Minimisation Plan

The dust minimisation plan is based upon the industry guidelines in the Building Research Establishment document entitled '*Control of Dust from Construction and Demolition Activities*' (2003).

In order to ensure that any dust nuisance is minimised, a series of mitigation measures are prescribed below:

- The moisture content of the dredged material in the waste treatment area will be maintained at levels to prevent the generation of dust from this operation.
- Site traffic will be restricted to 20km/hr to minimise dust re-suspension.
- Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only.
- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential).
- All vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes should be self-contained systems that do not require discharge of the wastewater to water bodies.
- Public roads outside the site, including the Dublin Port Tunnel, shall be regularly inspected for cleanliness, and cleaned as necessary where it is attributable to the site works.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind.
- All material handling will be carried out to minimise drop heights from plant to plant or from plant to stockpile.
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.
- All vehicles which present a risk of spillage of materials, while either delivering or removing materials, will be loaded in such a way as to prevent spillage on to the public road.
- The contractor will be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

The level of mitigation (water misting, use of bowsers, etc.) will be dictated by the results of the monitoring strategy and the levels of rainfall experienced in a given period. This will prevent the excessive use of water for dust suppression on site when not required to minimise secondary drainage impacts.

As part of a broader audit of the works under the CEMP, the application of the above measures will be assessed and recorded. Where required, corrective actions will be identified and presented to the Contractor to fully implement the above measures to minimise dust.

Independent Consultants will monitor dust deposition levels each month for the duration of construction. Baseline monitoring in advance of any works will also be carried out for a minimum of three months to determine background levels from other sources (e.g. road transport).

The monitoring procedure employed will be the German Standard Method VDI 2119 (*Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument (Standard Method) German Institute*). The dust deposition rate will be measured by positioning a series of Bergerhoff Dust Deposit Gauges at strategic locations at key receptor points which will be tested on a monthly basis. The selection of sampling point locations will be completed after consideration of the requirements of VDI 2119 with respect to the location of the samplers relative to buildings and other obstructions, height above ground and sample collection and analysis procedures. The locations will be proposed to Dublin City Council for approval and will be based on the potential risk to sensitive receptors in the area.

The results of the monitoring will be compared against the guideline of 350mg/m²/day. This is the standard German TA Luft guideline which is widely applied in Ireland to determine dust nuisance.

This guideline will be used as a trigger to determine dust nuisance. Where any monthly dust level exceeds the trigger value the Environmental Facility Manager will carry out an investigation to determine the potential cause. Recent operations within the site, possible external sources and met data will be identified to determine the cause of any exceedance. Where the works are identified as the source the contractor will be obliged to increase mitigation, modify the proposed works or provide alternative means of dust minimisation measures. All exceedances of the trigger value and subsequent investigations will be recorded and available for review by Dublin City Council.

Odour Management Plan

This Odour Management Plan (OMP) has been prepared in accordance with the following guidance documents:

- Odour Management Plans for Waste Handling Facilities (Environment Agency, 2011)
- *Odour Management Guidance*" (Environment Agency, 2011).
- *Odour Impact Assessment Guidance for EPA Licensed Sites*" (EPA Guidance Note AG5, 2010).

The OMP has been designed to:-

- Employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- Prevent unacceptable odour pollution at all times; and

- Reduce the risk of odour releasing incidents or accidents by anticipating them and planning accordingly.

Odour Risk

The risk of odour from the proposed work has been assessed based on the standard source-pathway-receptor model. Each area is outlined in the following section to provide an assessment of overall risk.

Source

The potential sources of odour during the constructions works relate to the dredging operation where decayed organic material has the potential to release sulphurous compounds (such as hydrogen sulphide) or where solvent contamination is uncovered.

Hydrogen sulphide (H_2S) is partially water soluble so some H_2S released during dredging will dissolve in the water to form sulphuric acid at trace concentrations which will rapidly dilute and disperse in the water column. Previous dredging operations in the same area and at similar depths have released no hydrogen sulphide to the atmosphere.

Very low levels of organic solvents are recorded in the material to be dredged in the basin and channel equating to less than 0.02% of the total material. Any solvent vapour released during dredging will be low volume and will quickly condense into the liquid phase and either dissolve in the water (such as water soluble solvents such as alcohols) or form a residue on the water surface where not water soluble (such as aromatics).

Pathway

In the event that any odours become airborne the odours will dilute and disperse in the air. The direction of dispersion and extent of dilution is largely dictated by the wind speed and direction. Higher winds will lead to greater dilution than lower winds and calm days (such as temperature inversion) will restrict dilution/dispersion and increase odour risk. Wind direction in the Dublin area is predominately westerly-south westerly (circa 60% of the year) which will direct odours away from residential areas to the south. Northerly and north easterly winds in the direction of the residential areas to the south are very infrequent (circa 10%) as are calms (2.2% of the time).

Receptor

The nearest sensitive residential receptors to the proposed dredging operation are the residential dwellings on York Road, Pigeon House Road, Ringsend Park and Pembroke Cottages approximately 100 metres to the south of the dredging area. Further north there are a number of residential areas along Clontarf Road which lie over 1.5km to the north of the proposed dredging operations.

The nearest commercial receptors to the proposed development include the various operations along Alexandra Road to the north and east of the site. In addition the O2 Theatre and the Gibson Hotel are

the closest operations to the west of the site. To the south of the site there are a number of office developments on York Road and Thorncastle Road.

Ecological receptors can be affected by deposition of air pollutants such as nitrogen oxides and sulphur dioxide. The nearest sensitive ecological sites to the proposed development are the Grand Canal pNHA (Site Code 2104), the Royal Canal pNHA (Site Code 2103) and South Dublin Bay and River Tolka Estuary SPA (Site Code 4024). Ecological receptors would be less sensitive to odours than human receptors.

Monitoring and Audit

This plan includes for the periodic odour audit of the facility by a suitably qualified expert to identify all sources on site together with nature and scale of the odour release and associated construction details. This will be to both validate the sources listed above coupled with the identification of any new sources. The periodic odour monitoring and investigation aspects of the OMP will follow the procedures presented in the EPA “*Odour Impact Assessment Guidance for EPA Licensed Sites*” (Guidance Note AG5, 2010). The number and frequency of audits will be dictated by the frequency of complaints (if any) coupled with any direction provided by Dublin City Council and/or EPA.

The results of the monitoring events and audits will be communicated to the construction manager to advise of any changes to the working practices or abatement measures to mitigate odour risk.

Complaint Investigation

As part of the plan, DPC will put in place a dedicated recording system to allow for the management of odour complaints. One of the most important factors associated with odour complaint recording includes the use of an easily contactable phone number for complainants to discuss their complaints. A free phone number is preferable. During normal working hours, an experienced person who is familiar with the processes should answer the phone. Only during out of hours should an answer phone be used. The answer phone should clearly state the information required of the complainant. The complainant should always be contacted back if a message is recorded. The relevant information to be recorded includes:

- Date and time of complaint
- Name of complainant
- Location of complainant
- Duration of odour
- Where and when odour was detected
- How strong the odour was/is (Intensity on a scale of 0 to 5 where 0 is not perceptible, 1 is very weak, 2 is weak, 3 is distinct, 4 is strong and 5 is very strong)?

- What did the odour smell like - A number of random descriptors should be proposed by the facility representative or offered by the resident (saying that the odour smells bad is not sufficient).
- Details of the responses made to the complainant.
- Details of the existing met conditions, in particular wind speed. Up to date met data is available on: <http://www.met.ie/latest/reports.asp>

Where possible the location of the complainant should be visited immediately to verify the nature of the odour. Where the source is confirmed to relate to the works, the construction manager should be contacted immediately to cease or modify the operation causing the odour until suitable mitigation measures are devised.

3.5.6 Contamination / Materials Handling Plan

Alexandra Basin West

Contaminated sediments within Alexandra Basin West shall not be disposed of at sea. The treatment and recovery of the dredging spoil on site shall take place in accordance with the conditions of an Industrial Emissions Licence. Following treatment the material will be placed in the Berth 52/53 basin and Graving Dock #2 as a recovery activity, replacing the need to use virgin materials that would otherwise be required for the development.

Please refer to Section 3.6.10 for site specific Contamination and Material Management Plan for Phase 1 of the work as per IE Licence)

Sediment Treatment Control and Monitoring Programme

The treatment and recovery of the dredging spoil on site shall take place in accordance with the conditions of an Industrial Emissions Licence obtained from the EPA. The monitoring programme for the treatment and recovery of the dredging spoil on site is provided in Table 3.5-2 below.

Table 3.5-2 Monitoring Programme

Requirements	Monitoring Locations	Parameters
Schedule C: Control & Monitoring C.2.2. Monitoring of Emissions to Water	WW1(Phase 1, Phase 2, Phase 3) Berth 52/53 WW2 Graving Doc No 2	Flow temperature pH TOC DO Suspended solids, Total Dissolved Solids Ammonia (as N) Total Phosphorus (as P), Heavy Metals, TBT, Phenols, PAH, PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C.2.3. Marine Water Monitoring in the Liffey Estuary	SW1 to SW3	Suspended solids, Turbidity Temperature, Heavy Metals, TBT, PAH, PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C2.4 Monitoring of Storm Water Emissions	SWO1 Graving Doc No 2 SWO2 Berth 52/53	Temperature pH Suspended solids, Heavy Metals, TBT, Phenols, PAH, PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C.4 Waste Monitoring	In any case every 1,000 m ³ . Leachate samples will be tested at 1, 2, 4 and 9 days.	Nickel TBT
Schedule C: Control & Monitoring C.5 Noise	N1,N2,N4,N5, and N6	

Requirements	Monitoring Locations	Parameters
Monitoring		
Schedule C: Control & Monitoring C.6 Dust Deposition	DS1 to DS4	Bergerhoff Method
Schedule C: Control & Monitoring C.7 Groundwater Monitoring	GW1, GW2, GW4, GW5, GW6, GW7, GW8, GW10, GW12	pH COD Nitrate, Total Ammonia, Total Nitrogen, Conductivity , Chloride, Fluoride, Relevant Hazardous Substances, Heavy Metals, TBT, PAH, PCB, Petroleum hydrocarbons

Results will be assessed against emission limits/trigger levels set out in Schedule B Emission limits of an Industrial Emissions Licence.

Navigation Channel

The disposal of dredge spoil at sea shall be undertaken in accordance with the conditions of the Dumping at Sea Permit and Foreshore Licence.

The contractor shall ensure that over-spilling at the surface of the dredger is avoided for all dredging activities within the inner Liffey channel.

Further detail is provided in Section 3.5.12 - Dredging Management Plan.

3.5.7 Marine Mammals Management Plan

3.5.7.1 Introduction

The ABR Project will involve major works for a period up to 6 years including pile driving, dredging and dumping. As part of the planning consent a Marine Mammal Mitigation Plan was conditional to minimise any potential impacts especially on seals and harbour porpoise in the Dublin Bay and adjacent areas. This document provides details on the implementation of this mitigation plan.

3.5.7.2 Legal Framework

Marine mammals are protected by national and international legislation to which the Republic of Ireland is a signatory. The main national legislation that attempts to afford protection to marine mammals in Irish waters is the Wildlife Act (1976) and amendment (2000), which prohibits wilful interference to wild mammals and disturbance of resting and breeding sites.

All cetacean (whales, dolphins and porpoises) species occurring in European waters are entitled to strict protection under the EC Habitats Directive (92/43/EEC). The current transposition of this legislation in Ireland is the EC 'Birds and Natural Habitats' Regulations (2011). All cetaceans are included in Annex IV of this Directive as species '*in need of strict protection*'. Additionally the harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) are designated Annex II species ('*those animals of community interest, whose conservation requires the designation of special areas of conservation*'). Ireland's two pinniped (seals) species, the harbour or common seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*), are also designated Annex II species under the EC Habitats Directive.

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

In light of the legislation and conservation status of marine mammals, careful assessment and consideration must be given prior to and during all anthropogenic activity with potential for effects on these species and their habitat.

3.5.7.3 Dublin Bay

Dublin Bay and environs has a wealth of marine mammals including seals, harbour porpoise, dolphins and whales recorded in its waters. Its international importance is recognised through the designation of a number of Special Areas of Conservation (SAC).

Seals

Lambay Island in north Co. Dublin is designated as an SAC (site code 000204) for grey and harbour or common seals, as it is an important pupping site for both species. Lambay Island is the closest recorded haul-out site for harbour seals in Dublin Bay where approximately 30 harbour seals were observed during a national census in 2003 (Cronin *et al.* 2004) and 2012 (Duck & Morris, 2013). In 2005, grey seal breeding sites were identified at Lambay Island, Irelands Eye, Dalkey Island and St. Patricks Island during a national census of the grey seal population (Ó Cadhla *et al.* 2007). Pup counts were small at these sites (less than 3) apart from Lambay Island where 49 pups were counted. Further surveys conducted in 2009 recorded 77 pups on Lambay Island and Ireland's Eye (Ó Cadhla *et al.* 2013).

Although not protected a number of important seal haul out sites are known, including Bull Island. Up to 20-30 individual seals, mainly grey seals, are regularly recorded off the north-eastern tip and there have been reports of pups present. Seals are also regularly recorded hauled out on Dalkey Island where a group of 36 grey seals were counted during the 2007 census and 26 grey seals on Rockabill Island.

Cetaceans

Rockabill to Dalkey Island SAC (site code 003000) was designated in 2012 for the protection of the harbour porpoise (as well as reef habitat). The proposed capital dredging scheme extends into the new Rockabill to Dalkey SAC. The licensed offshore disposal site for dredge spoil, located to the west of the Burford Bank, also lies within the SAC.

In 2008 density estimates of harbour porpoise surveys in North County Dublin from Howth to Rockabill were 2.03 porpoises per km² which gave an abundance estimate of 211 ± 47 , however in Dublin Bay there was a notable decrease of 1.19 porpoises per km² in Dublin Bay with an abundance of 138 ± 33 (Berrow *et al.* 2008). The average of the overall density estimates in 2008 for the two sites equates to 1.61 which is quite similar to the 1.44 porpoises per km² from the harbour porpoise SAC survey in 2013. In the north Irish Sea, to the east and north of Rockabill to Dalkey Island SAC, results from a wider-scale line-transect survey found a density estimate of 1.59 porpoises per km² (Berrow *et al.* 2011) which is also comparable to that derived from surveys in 2013. The most recent abundance estimate for harbour porpoise in the Rockabill to Dalkey Island SAC is 391 ± 25 from the harbour porpoise SAC survey (Berrow and O' Brien 2013).

Surveys of cetaceans in the waters outside of Dublin Bay, in the Irish Sea, indicated that harbour porpoise were by far the most abundant species in the area with relative abundance of harbour porpoise estimated at 0.55 porpoise per km² (Berrow *et al.* 2011). Sighting rates of harbour porpoise, and thus local densities, were notably higher adjacent to Rockabill and Lambay Islands. This was consistent with Berrow *et al.*, (2008) who recorded high densities during smaller scale harbour porpoise surveys in the same area. Acoustic data confirms this species is present at the site in all seasons, while important cohorts within the harbour porpoise community such as adults, juveniles and newborn calves have also been recorded within the site, including during the calving/breeding season.

Dublin Bay is frequently used by bottlenose dolphins that may remain in the area for a few days. However, these dolphins which are part of the inshore population which is highly mobile and the same individuals have been recorded off the south west, west and northwest coast and in Northern Ireland (O'Brien *et al.* 2009). Recently a small group of three individuals were present in Killiney Bay between 2010 and 2012 and two of them have been recorded off west Kerry since they left Dublin Bay. In the summer minke whales are regularly recorded, to the north off Lambay Island and there are recent records of single humpback whales off Howth Head and Lambay Island.

3.5.7.4 Potential Impacts

There are a number of potential impacts on marine mammals associated with the redevelopment of Alexandra Basin but acoustic impacts from a variety of activities associated with the ABR are the main areas of concern. These include from piling, dredging and dumping. Extended exposure to high levels of continuous noise and/or impulsive sounds with high rise times can lead to injuries of the hearing structures in cetaceans and pinnipeds resulting in permanent or temporary hearing loss and other injuries (Richardson *et al.* 1995). The ABR Project includes work in two main areas of the Port, as well as dredging works within the navigation channel as shown in Figure 3.5-1.

Piling

Pile driving associated with the proposed development is considered to pose a potentially negative impact on marine mammals because it can produce a high source level and broad bandwidth pulse, which is biased towards the lower frequencies. Sound produced during pile-driving propagates through the air into water, through the water column and, to a lesser degree, through the sediment and from there back into the water column (Thompson *et al.* 2006). Sound pressure levels in impact pile-driving are dependent on the length and the diameter of the pile and the impact energy (Nedwell *et al.* 2003) as well as the seabed conditions or substrate hardness. The response thresholds of cetaceans are usually the lowest for pulsed sounds and pile driving is one of the loudest sources of this type of noise (Richardson & Wursig, 1996). Phocid seals (which includes the grey and harbour seals) are more sensitive than small odontocetes (toothed whales including the harbour porpoise) to noise of low frequency and are therefore potentially more susceptible to disturbance from low frequency anthropogenic noise (Thompson *et al.* 1998). Consequently, both harbour seal and grey seal will be susceptible to disturbance from underwater anthropogenic noise from works associated with piling.

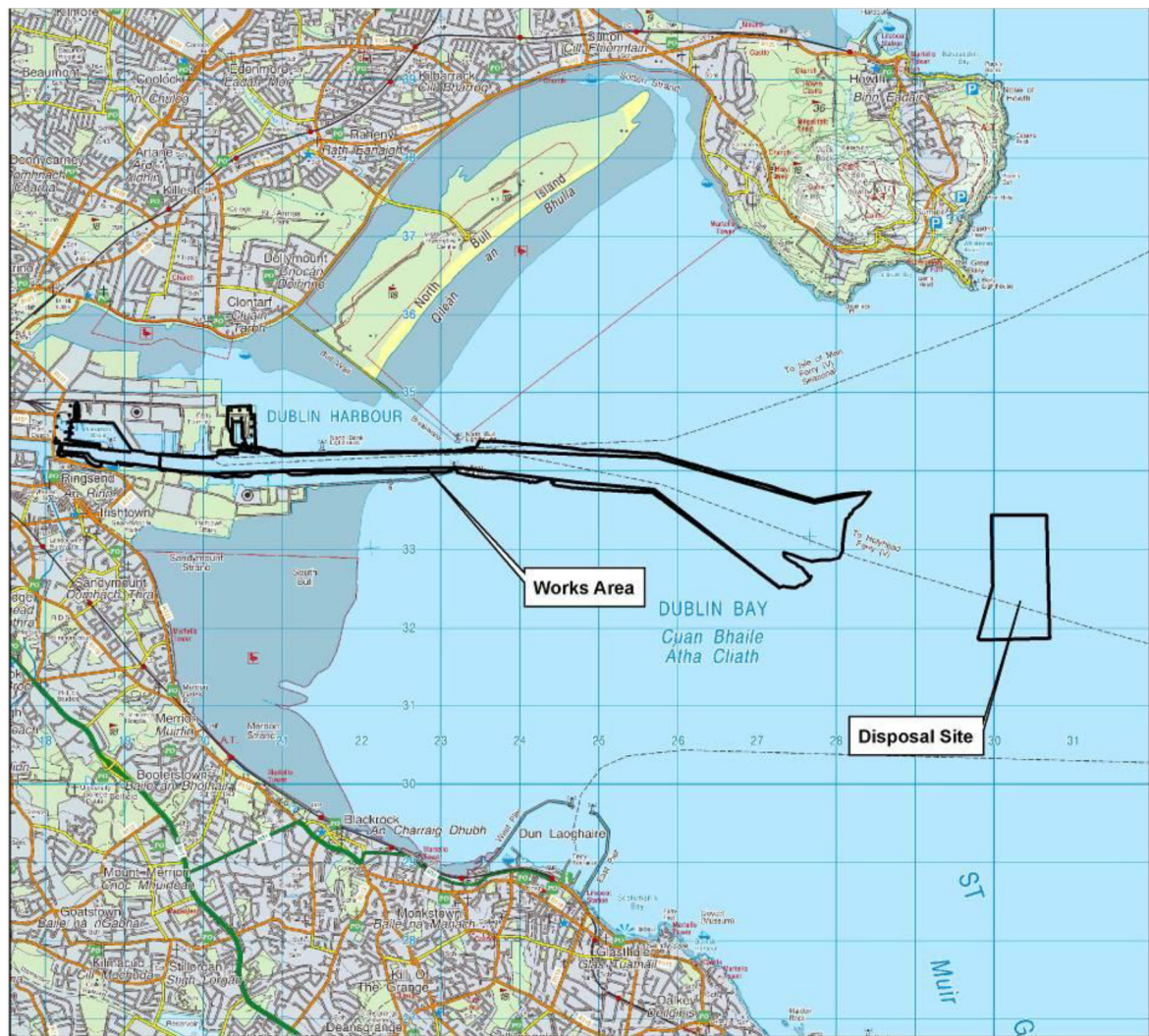


Figure 3.5-1 Overview of the proposed works areas within the Alexandra Basin and Navigation Channel and Disposal Site (RPS 2014)

Recent piling projects which impact on marine mammals involve offshore wind-farm construction. Russell *et al.* (2016) results showed that there was a significant displacement of seals during periods when pile-driving took place, up to 25km from the centre of the wind-farm at the Wash in south-east England. The distance that significant displacement extended to, appears similar to that recorded previously for harbour porpoise in response to pile driving (Tougaard *et al.* 2009). However, offshore windfarms are typically installed on 4 to 6m diameter piles in relatively deep water which are much larger piles than those specified for the ABR project.

In order to inform management and risk assessments, RPS carried out a series of ambient noise measurements along a transect to model sound propagation (McKeown 2014). The model was based on H-section piles with a cross sectional area of 333cm². However, the ABR has a requirement for 1.6m diameter piles with a cross sectional area approximately twice the H-section piles. The pile driving energy required for the larger cross-sectional area will result in an increased acoustic output. Therefore

the estimated noise levels have been increased by 6 dB to provide worst case noise levels. These measurements suggested a SEL of 214 db re 1 $\mu\text{Pa}^2\text{s}$ within 70m of piling. However, the trials determined the attenuation of sound pressure from piling at the proposed construction site and showed rapid attenuation within 500m of the sound source due to the topography, seabed substrate and the shallow water. Sound pressure was undetectable above ambient noise at 3,570m from the sound source. Although these trials carried out during piling on smaller diameter piling activity than proposed for the ABR project, this suggests that piling will not cause temporary threshold shift (TTS) in marine mammals within 500m of the site (McKeown 2014). Noise measurements were taken in the Liffey and port area during test piling at Cross Berth Quay in Alexandra Basin West in May 2016 to test this model. We are still awaiting results of this test and the MMMP will be updated if necessary if there are any implications arising from this study.

Dredging and Dumping

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

Noise associated with dredging is predominantly of low frequency, below 1 kHz; estimated source sound pressure levels range between 168dB and 186dB re 1 μPa at 1m. In most cases the noise is continuous in nature. Potentially this will affect low frequency cetaceans such as minke whales to a greater extent than mid or high frequency cetaceans. The harbour porpoise is a potential exception, as it has a relatively high sensitivity across most frequencies. There is also a potential issue with seals as both harbour and grey seals have relatively good underwater hearing at frequencies below 1kHz (Thomsen *et al.* 2009). It is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Todd *et al.* 2014).

In the ABR project the sediment comprises mainly soft sediment of fine sand and silt which creates less noise when dredged compared to gravel. From the modelling carried out by McKeown (2014), underwater noise levels from the dredging activity will be significantly lower than those arising during piling. The underwater noise transmission loss is significant due to the shallow water and the sediment/sand based seabed at Dublin Port.

Diederichs *et al.* (2010) using passive acoustic monitoring techniques, showed harbour porpoises in the North Sea, off the Island of Sylt in Germany, temporarily avoided an area where sand extraction took place with a Trailing Suction Hopper Dredger (TSHD). The authors found that when the dredging vessel

was closer than 600m to the monitoring location, it took three times longer before a porpoise was detected compared with times without sand extraction.

There are limited studies on the effects of dredging sound on pinnipeds. In Broadhaven Bay, Co Mayo, results found that grey seals are more sensitive to high construction-related vessel traffic. However the reflection of noise from rocky shores surrounding the bay may have led to increased effects of vessel noise for species with higher hearing sensitivity at low frequencies (Anderwald *et al.* 2013). Similarly, Hawaiian monk seals showed no adverse reactions to bucket dredgers around Tern Island, Hawaii (Gilmartin, 2003). However, all of these studies only considered dredging and not the dumping of dredged material.

Thus dredging seems to have less effect on marine mammals than moving sound sources although avoidance behaviour of baleen whales exposed to high levels of activity have been documented. Reactions, when measured have only occurred when received sound levels are well above ambient levels (Richardson *et al.* 1995). Adverse impacts from dredging can be limited by ensuring mitigation measures are carried out. However when discussing impacts context is important, as marine mammals may remain near active dredgers and tolerate disturbance if it is a prime foraging location. In this case, reactions may not be obvious to observers, but the absence of a measurable response does not mean longer-term impacts are absent (Todd *et al.* 2014).

Despite these references to the potential effects of dredging on marine mammals the international research contains little consideration of the impact of the actual dumping of dredge material as opposed to removal of material from the site to be dredged. This is either an oversight, or more likely reflects the extremely low impact of the dumping of dredged material on marine mammals, compared to the effects of dredging, which are considered low down the spectrum of impacts of coastal activities on marine mammals. OSPAR (2008) suggested that the dumping of dredge materials is largely irrelevant with respect to environmental impact and the issue is confined to disturbance due to underwater noise emission during the dumping process and during the transport (ship noise).

Previous studies on sound production by TSHDs in silt/mud substrates have found that maximum source levels from different activities associated with TSHD dredging (including the dredging process, transit to dump site, placement, pumping and rainbowing) were very similar with dredging itself not producing louder sounds than those produced by the dredger during transit (De Jong *et al.* 2010). Therefore marine mammals occurring at the site over the durations of the works will be exposed to sound equivalent to an additional ship in the area. Given that the dump site is adjacent to one of the busiest shipping lanes in coastal Irish waters (Beck *et al.* 2013), marine mammals frequenting the site will be well accustomed to shipping noise.

Dublin Bay generally (within which the dumping site occurs) is likely to be a foraging area for harbour porpoise throughout the year and perhaps other species seasonally. Harbour porpoise in Dublin Bay

are part of a larger widely dispersed population in the Irish Sea. Common and grey seals are known to occasionally occur in small numbers in Dublin Bay and may forage on Burford Bank. However harbour porpoises are highly mobile and have been shown to travel up to 23km per day in the North Sea (Sveegaard *et al.* 2011). Bottlenose dolphins recorded in Dublin Bay are also highly mobile (O'Brien *et al.* 2009) and thus any local impacts if they occur should be considered in the overall range of the species.

3.5.7.5 Mitigation Measures

The Contractor shall comply with the mitigation measures prescribed below.

Marine Mammal Observation Plan

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

- A trained and experienced Marine Mammal Observer (MMO) will be put in place during piling, dredging, and dumping operations. The MMO will scan the surrounding area to ensure no marine mammals are in a pre-determined exclusion zone in the 30-minute period prior to operations. The NPWS exclusion zone is 500m for dredging and 1000m for piling activities considering the potential risks outlined in the EIS.

(A submission based on the modelling exercise carried out as part of the ABR EIS suggested a mitigation zone of 250m for dredging and dumping and 500m for piling. This proposal was supported by the NPWS but was not revised in the ABR license conditions).

- Noise-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring is not possible, the sound-producing activities shall be postponed until effective visual monitoring is possible. Visual scanning for marine mammals (in particular harbour porpoise) will only be effective during daylight hours and if the sea state is 2-3 (Beaufort scale) or less. In the absence of year round data on marine mammal presence within Dublin Bay, there is no justification for limiting works to any particular season.
- For piling activities, where the output peak sound pressure level (in water) exceeds 170 dB re: 1µPa @ 1m, a ramp-up procedure will be employed following the pre-start monitoring. Underwater acoustic energy output shall commence from a lower energy start-up and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes. The peak SPL for the ABR project is predicted at 190 dB re: 1µPa @ 1m (McKeown 2014).

- If there is a break in piling / dredging activity for a period greater than 30 minutes then all pre-activity monitoring measures and ramp-up (where this is possible) will recommence as for start-up.
- Once normal operations commence (including appropriate ramp-up procedures), there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate, nor if marine mammals occur within a radial distance of the sound source that is 500m for dredging and demolition works, and 1000m for piling activities.
- Any approach by marine mammals into the immediate (<50m) works area will be reported to the National Parks and Wildlife Service.

The MMO will keep a record of the monitoring using a 'MMO form location and effort (coastal works)' available from the National Parks and Wildlife Service (NPWS) and submit to the NPWS on completion of the works.

In order to reliably quantify the zone of responsiveness associated with the proposed programme of piling activities associated with the Alexandra Basin Redevelopment, planning consent required that the following methods be used:

- Modelling of sound propagation calibrated using field measurements
 - Underwater noise arising from dredging, dumping and piling activities will be measured to test model assumptions
- Deployment of hydrophones in combination with passive acoustic monitoring (PAM)
 - To verify that anthropogenic noise levels arising from the ABR project remain within acceptable limits in ecologically sensitive areas
 - To provide information on the presence of marine mammals during periods when visual mitigation is constrained

We propose to use both methods to assess sound propagation at the development site. The modelling of sound propagation will identify distances at which impacts are most likely to cause disturbance, while hydrophones and PAM will determine if animals are in the vicinity.

In line with best international practice a combination of visual and acoustic mitigation techniques will be used to ensure there are no significant impacts on all Annex II species, including harbour porpoise, grey seal and harbour seal. Two acoustic techniques will be used; Static Acoustic Monitoring (SAM) through the deployment of CPODs, and Passive Acoustic Monitoring (PAM) through the deployment of a real-time PAM system. For long term SAM monitoring, sites will be established and maintained throughout the project and for two years post-construction. A PAM system will be installed at the approaches to Dublin Port to provide information on the presence of marine mammals during periods when visual mitigation is constrained. These techniques are to complement and not replace visual techniques.

Passive Acoustic Monitoring (PAM)

The PAM system will be provided by JASCO Applied Sciences which is a world leader in the science of underwater noise and its effects on marine life. JASCO's innovative technologies provide real-time transmission and analysis of underwater sound. We are also looking at partnering with Techworks in Dun Laoghaire to provide the buoys and moorings as they have considerable experience working in the challenging environment of Dublin Bay. Detection of marine mammal calls in real-time during operations can provide information on the presence of marine mammals and assess the impacts of activities. Continuous recording of the soundscape at the site can verify that anthropogenic noise levels remain within acceptable limits in ecologically sensitive areas.

The PAM system will be installed throughout the capital dredging period at the approaches to Dublin Port and adjacent to selected sites targeted during each dredging campaign, to provide information on the presence of marine mammals during those periods. PAM will record a broad band spectrum from 1 to 250 kHz to provide data on vessel noise, noise generated from marine activities and the ability to detect and log the presence of vocalising mammals. The detection range of the system is around 250 – 800m for harbour porpoises and other odontocetes (bottlenose dolphins) and will also detect mid and low frequency seal and minke whale vocalisations. It is proposed to detect and process acoustic detections onboard the PAM buoy and only send acoustic detections via wifi link to a receiving station at the site office in Dublin Port while storing the whole sound recording as a .wav file on the buoy. These files can be downloaded periodically to have the full sound spectrum throughout the entire campaign for analysis. Analysis could include not only presence and behaviour of marine mammals but an analysis of vessel traffic, ambient noise and effects of variables such as wind, rain and tide.

PAM will be used to ensure compliance with EU legal obligations (Habitats Directive and Marine Strategy Framework Directive (MSFD)) that any disturbance will not lead to any significant impacts on marine mammals in the long term. This method will allow for the assessment of disturbance as well the effectiveness of mitigation measures.

On the start-up of the dredging campaign, visual monitoring in suitable conditions (sea state is Beaufort 2-3 or less and during daylight hours), will be used to ensure there are no marine mammals within 500m during a 30 minute period which will allow the dredger to commence. Once dredging has started noise will be continuous throughout the dredge and dump cycle as the transition time from the dredge site to the dump site will be <20min. Continuous vessel noise rather than the noise associated with the activity will be the main impact on marine mammals. If there is a break in dredging for a period greater than 30 minutes then all pre-activity monitoring measures will recommence as for the start-up procedure, including 30 minute pre-commencement visual monitoring to ensure no marine mammals are within the exclusion zone.

Technical back up to maintain the system and support data analysis will be provided by JASCO Applied Sciences, Techworks and IWDG, but the ABR project's full-time marine mammal ecologist will be responsible for the day to day running of the systems and interpretation of the data.

The PAM data will be used to:

1. Assist the Marine Mammal Ecologist in implementing mitigation measures
2. Assess use of the site by marine mammals over time
3. Quantify Sound Exposure Levels (SEL) from dredging and piling
4. Provide information on source levels from operations

Deployment of PAM is linked to the capital dredging programme and entails of the proposed system deployment will be agreed with the Planning Authority and incorporated in the CEMP Marine Mammal Management Plan in advance of commencement of the dredging campaign. A short term PAM deployment is planned for 2016 to record the soundscape including ambient noise levels, detection rates and vessel noise to assist in determining battery use and data acquisition rates.

Static Acoustic Monitoring (SAM)

In order to validate the long term effectiveness of mitigation measures for harbour porpoises a static acoustic monitoring programme (SAM) will be established using C-PODS. The C-POD is a fully automated, static, passive acoustic monitoring system which can detect porpoises, dolphins and other toothed whales by recognising the trains of echolocation clicks these species make in order to detect their prey, orientate themselves and interact with one another. These units are designed and manufactured by Chelonia Ltd and they are the only commercially available instruments, accompanied by click train recognition software which produces fully automated, accurate data on the behaviour and identification of cetacean species (see www.chelonia.co.uk).

Once deployed at sea, C-PODs operate in a passive mode and are constantly listening for tonal clicks within a frequency range of 20kHz to 160kHz. When a tonal click is detected, the C-POD records the time of occurrence, centre frequency, intensity, duration, bandwidth and frequency of the click. Internally, the C-POD is equipped with a Secure Digital (SD) flash card, and all data are stored on this card. Dedicated software, CPOD.exe, provided by the manufacturer, is used to process the data from the SD card when connected to a PC via a card reader. This allows for the extraction of data files under pre-determined parameters as set by the user. Additionally, the C-POD also records temperature over its deployment duration. It must be noted that the C-POD does not record actual sound files, only information about the tonal clicks it detects.

Static acoustic monitoring is independent of weather conditions once deployed and thus ensures high quality data is collected but only at a small spatial scale, typically around 800m radius for dolphins and

250m for porpoise (O'Brien *et al.* 2013). They can be deployed on a mooring for 4-6 months before recovery and downloading of data. Data will be recovered and analysed three times a year. This data will be analysed as detection positive minutes (DPM) to generate an acoustic index of activity. This technique provides large datasets to enable changes in activity to be identified at high resolutions.

O'Brien *et al.* (2013) recommended a minimum of four units should be deployed in small inshore study areas to ensure that statistically robust data can be collected. The number of C-PODs required should reflect the parameters to be tested (e.g. fine scale diel or larger scales such as seasonal trends). Using an even number design for replication purposes can allow for parameters such as inshore and offshore trends to be explored in larger areas. The more units that can be deployed in an area, the more an informed evaluation of a site and successful monitoring indices will be generated.

A total of ten units have been purchased to enable individual units to be swapped on the moorings and downloaded and maintained ashore between deployments. In line with best practice, a field calibration trial was carried out in the Shannon Estuary during one month from May to June 2016 in order to test the use of the C-PODs for diel/tidal traffic, and to assess any differences in sensitivity. Field calibrations are necessary when introducing new units to an existing study, and calibrations should be carried out at the beginning and end of project.

Four SAM stations will be monitored, including one to the north and one to the south of the dump site on the Burford Bank, and two within Dublin Bay. These stations will be monitored pre-construction, during construction and for a minimum of two years post-construction. This monitoring will determine whether displacement of harbour porpoises has occurred and whether activity returns to pre-construction levels when construction is completed. This monitoring will provide information to determine if the requirements of the Habitats Directive have been met i.e. temporary disturbance from preferred habitats and inform future similar developments. This is in line with best international practice. C-PODs will be recovered every four months and analysed for Detection Positive Minutes (DPMs) providing high quality data on seasonal, diel and tidal occurrence. Data will be compared across sites, before during and after construction following the BACI type design similar to Carstensen *et al.* (2006). This will provide opportunities for adaptive project management through regular feedback to environmental managers and contractors.

Seal Survey

Monthly monitoring of seal haul out sites at the North Bull Island will be carried out before, during and after construction for a minimum of two years in line with international best practice (Figure 3. 5-2). The haul out site at Bull Island will be surveyed two hours either side of low water from the same vantage points following the recommended technique by London *et al.* (2012). These same vantage points were used during the EIA. Known and suspected haul out sites will be surveyed during low water to record species, maturity stage (relative size), behaviour and vigilance.

Photo-identification (Photo-ID) is a technique used to identify and track individuals of a population over time (Figure 3. 5-3). Grey seals have a unique fur pattern on their neck that stays with them throughout their life. Photo-ID will help provide population estimation, site fidelity and movements between Bull Island and Dublin Port. Long term monitoring will provide new insights into the status and distributions of the seals on Bull Island.



Figure 3. 5-2 Location of vantage point on the NE side of Bull island as well as the different areas used over the course of the tidal cycle.



Figure 3. 5-3 Examples of different neck patterns of individuals on Bull Island

In addition to these formal monthly surveys, counts of seals at their haul out site will be carried out regularly as time allows. In addition, if any new haul out sites are discovered or reported, regular counts will be carried out to explore the numbers and use of these sites.

A survey to identify new, previously unsurveyed seal haul out sites in the Dublin coastal region will be carried out during the ABR project in consultation with NPWS. This will be organised to coincide with NPWS funded national seal surveys to maximise the value to the data. Aerial surveys for breeding harbour seals are carried out in June and July, and for grey seals in October.

There are no known haul sites for seals in the immediate proximity of the proposed works but a small group of resident harbour and grey seals haul out on the North Bull Island around 6km to the northeast, on Lambay Island 15km to the north and Dalkey Island 12km to the south. These sites are considered far enough away from the construction activity to have no negative effect, especially as sensitivity of seals to disturbance is less when hauled out.

The waters surrounding haul out sites are a critical habitat for feeding and/or for navigation to more offshore foraging areas. Seals often haul out on man-made structures and tolerate considerable human

activity, which may lead to chronic exposure to man-made noise. In areas with repeated exposure, mammals may become habituated with a decline in avoidance responses and thus become less sensitive to noise and disturbance (Richardson *et al.* 1995). Besides the local seals from the Howth peninsula, it is likely that Bull Island is also visited by seals from nearby Skerries, Lambay Island, Ireland's Eye, Dalkey islands and possibly further afield. The ABR project poses little risk of impact or disturbance to these animals, and is unlikely to cause detectable impacts on seals at the population level.

3.5.7.6 Marine Mammal Stakeholder Engagement

Stakeholder engagement is a key element of this mitigation plan.

The project's Marine Mammal Ecologist (MME) will establish and cultivate relationships with identified stakeholders, building on existing networks through IWDG involvement, DCC and neighbouring Local Authority Environmental and Heritage Officers, and DPC community engagement programmes. The MME will provide information on project implementation and results of marine mammal monitoring programmes, and also act as a contact for stakeholders with relevant information or concerns.

The MME will be proactive and visit key stakeholders including the Irish Seal Sanctuary, North Bull Seal Study Group, UNESCO Biosphere Steering Committee and local resident groups (e.g. Save Dublin Bay) and maintain regular contact. Presentations on marine mammals in Dublin Bay will be delivered early on in the project to increase awareness of the importance of Dublin Bay for marine mammals.

A page on the ABR website (www.dublinportabr.ie) dedicated to marine mammals will be created and maintained to provide information on the delivery of the mitigation plan. It is hoped that the live stream from the PAM can be accessed through the webpage, and a facility for the public to report sightings of marine mammals will be created.

3.5.7.7 Reporting

Comprehensive reporting will be on an annual basis with each annual report prepared after the winter dredging campaign to be submitted at the end of May. Short reports on specific aspects will be prepared for circulation as required, and to inform the implementation programme as necessary.

3.5.7.8 References

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3.5.8 Birds, Lamprey, Bats, Benthos & Fisheries Management Plan

3.5.8.1 Birds

DPC will instigate a programme to monitor the movement of Black Guillemots, Common Tern and Arctic Tern in Dublin Port. This monitoring programme shall continue throughout the construction phase and for a period of two years after the completion of such works. The results of this monitoring programme shall be submitted to the planning authority at 12-monthly intervals to maintain a public record.

DPC will also undertake a programme to monitor winter wetland birds in the adjacent European Sites at the South Dublin Bay and the South Dublin Bay and River Tolka Estuary Special Protection Area. This monitoring programme shall continue throughout the construction phase and for a period of two years after the completion of such works, with monthly surveys from October to March. The results of this monitoring programme shall be submitted to the planning authority at 12-monthly intervals to maintain a public record.

Black Guillemot Monitoring Programme

Location: Black Guillemots are seabirds that nest in crevices within the quays and other structures of Dublin Port between Poolbeg and Butt Bridge on the River Liffey.

Methods: The population of Black Guillemots nesting within Dublin Port will be monitored on an annual basis. This will be carried out following the methods of Mitchell *et al.* (2004)¹. Two surveyors will carry out the census between 26th March and 15th May and between 05:00 and 09:00 (BST), in winds no stronger than Beaufort force 4 and in calm sea conditions. The census will be conducted from a boat by two surveyors who will visit and survey all quaysides within the port on two separate dates in this period. The count unit will be the number of adult Black Guillemots visible on land or on the sea within 300m of the shore. Any Apparently Occupied Sites (AOS) will be mapped and Black Guillemots associated with such sites will be recorded separately. The nestboxes erected for Black Guillemots at the Oil Jetty will be checked for occupancy.

Common Tern and Arctic Tern Monitoring Programme

Location: Common Terns and Arctic Terns are seabirds that nest on permanent structures and floating pontoons within Dublin Port.

¹ Mitchell, P.I., Newton, S.F., Ratcliffe, N. and Dunn, T.E. 2004. *Seabird Populations of Britain and Ireland*. Poyser. London.

Methods: The population of Common Terns and Arctic Terns nesting within Dublin Port will be monitored on an annual basis. The monitoring will be limited to a census of Apparently Occupied Nests (AON) on each of these structures following the methods of Mitchell *et al.* (2004). Two surveyors will carry out walked transects through each subsite of the colony recording the number of egg clutches of each species present (one clutch of eggs is treated as one Apparently Occupied Nest). Access to each of the subsites will be by boat.

Where access to a subsite is restricted for safety or other reasons, an estimate will be made of number of terns in the air over the colony during flushing (flush count). The number of birds counted by this method is divided by 1.5 in order to convert it to AONs. The survey will be timed to coincide with the peak of incubation activity when the maximum number of nests and incubating adults are present for AON counts and when adult attendance for flush counts is most stable. The survey will be carried out by two surveyors on two separate dates in the period 10th June to 15th July, in moderate weather and sea conditions. Surveys will not be undertaken during rainfall to avoid the chilling of eggs.

Winter Wetland Bird Monitoring Programme

Location: The area to be monitored is the South Dublin Bay and River Tolka Estuary SPA. This includes all intertidal areas between Dun Laoghaire West Pier and the Bull Wall. (Note: North Bull Island SPA is excluded from the area to be monitored by the An Bord Pleanála planning conditions for this development (Planning Consent no: 29N.PA0034)).

Methods: A series of six low tide surveys will be carried out at approximately monthly intervals between 1st October and 31st March each year. Survey dates will be selected when low tide occurs in daylight and in good weather conditions. Surveys will be carried out within two hours either side of low tide to ensure that all birds foraging in the census area are present in the intertidal area. The surveys will be undertaken by a team of five experienced observers using binoculars and telescopes with each observer positioned in a suitable vantage point on shore. In each case, bird flocks (giving species codes and estimated numbers present) will be mapped on large scale drawings for later analysis.

Reporting

An annual report on the results of the Bird Monitoring Programme will be prepared and submitted to the Planning Authority not later than 31st July each year. This will cover the results of the monitoring programme for the previous year (i.e. from April to March).

Black Guillemot Nest Sites

The only likely negative impact on birds, of the proposed ABR Project, is the loss during the construction period of nest sites for a number of pairs of Black Guillemots. These are small seabirds that nest in cavities in a variety of coastal locations. Dublin Port has been fully surveyed in both of the

last two breeding seasons and the total size of the Black Guillemot colony here was estimated at 82 (2013) and 62 birds (2014). This included a maximum of 8 nesting pairs in the Alexandra Basin (West) and 2 pairs in the area of Berths 52/53. The nest sites are mainly in the older quay walls, that tend to have more suitable cavities and drainage pipes, or beneath jetties and other open structures.

Black Guillemots are relatively common and widespread around the coasts of Ireland. Natural nest sites are generally in crevices at the base of rocky cliffs but they also commonly nest in harbour walls and even in artificial nest boxes (Mitchell et al. 2004). The birds, their nests and eggs are protected under the Wildlife Acts 1976 to 2000. They are not listed as Special Conservation Interests for any of the Special Protection Areas in the Dublin area.

Likely impacts

The older quay walls in the Alexandra Basin will be replaced as part of the redevelopment project. This will involve the loss, during construction, of approximately 10 nest sites within cavities in these walls in the combined areas of Alexandra Basin (West) and Berths 52/53. Mitigation measures will be introduced to provide alternative nest sites in neighbouring areas of the port, in advance of the redevelopment.

Mitigation measures

Black Guillemots generally come ashore and occupy the nest holes in October, some five months prior to egg-laying (Greenwood 1987, 1991). Young birds have generally left the nests by late August (Ferguson-Lees et al. 2011). In order to avoid disturbance to nesting birds, any existing nest holes in piers or structures to be demolished, will be blocked or otherwise made inaccessible in the month of September preceding the development works.

Prior to this, at least 10 artificial nest boxes will be erected in nearby areas of the not currently proposed for redevelopment. In addition, 10 concrete nest boxes will be incorporated into the new quays and jetties, at appropriate locations selected at the detailed design stage, to encourage the birds to return to these areas in subsequent breeding seasons.

Artificial nest boxes in similar types of harbour structures have been successfully used by Black Guillemots for nesting in Bangor Marina in Northern Ireland over the period 1985 to 2013, allowing the population at this site to increase from 7 to 38 pairs (Greenwood 2014).

3.5.8.2 Lamprey

DPC will undertake a programme to monitor the movement of the River Lamprey in the Liffey Channel in the vicinity of Alexandra Basin West before construction commences and before, during and after the relevant phase of dredging for one full season. The proposed monitoring methodology, including proposals to maintain a public record, shall be agreed with Dublin City Council prior to commencement of development.

Methodology

Based on previous survey data collected by Inland Fisheries Ireland (IFI) in the Lower River Liffey and having discussed the modalities of sampling with IFI, the following approach to sampling for lamprey is proposed.

Sampling will take place over 3-4 days in each of 3 months namely October, December and February. The nets will be fished overnight covering at least 12 hours from 17:00 to 10:00. Sampling will take place during the dark phase of the moon in each case, which is the time when research indicates that river lamprey are most likely to migrate upstream.

We propose to use 6 anchored fyke nets, a string of 3 on opposite banks, each with its entrance and leader facing downstream. The nets will be secured from a boat and installed in positions which would be difficult to approach from the bank where possible in order to reduce the risk of vandalism or gear theft. The exact configuration of the nets will be decided in the field and be decided based on a range of determining factors including net security, water levels, accessibility etc.

Sampling Locations

Two possible sampling locations are suggested only one of which will be sampled at any one time. These are just upstream of the weir at Island Bridge (Figure 3.5-4) or just upstream of the more upstream bridge at Heuston Station (Figure 3.5-5). This latter is at the head of the tidal part of the Liffey, but still tidal, it will only be fished if the Island Bridge location proves problematic for any reason.

Proposed monthly sampling programme for October, December and February

Day 1 – prep and install nets

Day 2 – raise and check nets, clean and re-set – adjust positions if necessary

Day 3 – raise and check nets, clean and re-set – adjust positions if necessary

Day 4 - raise and check nets, clean and remove the nets.

It is proposed that in the first month (i.e. October) that 3 net lifts (i.e. a 4-day programme) would be undertaken, but on the two subsequent samplings (December and February) just 2 night's fishing i.e. a 3-day programme in each case.

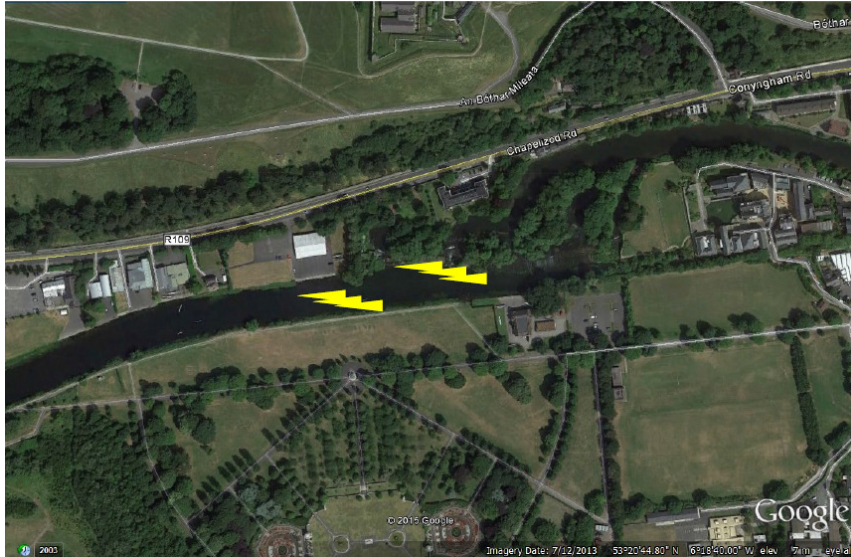


Figure 3.5-4 Proposed fyke net sampling locations immediately upstream of Islandbridge Weir.

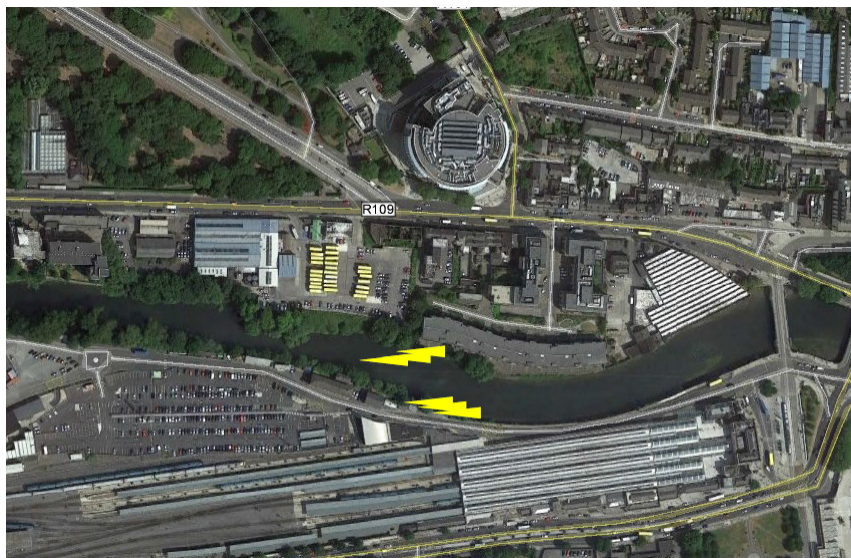


Figure 3.5-5 Alternative proposed fyke net sampling locations by Heuston Railway Station

3.5.8.3 Bats

Bats are mobile species and can roost in buildings occasionally. It is important that vigilance for individual bats within the buildings is practiced. These works will be undertaken outside the months of mid-April to mid-September to reduce the likelihood of encountering bats. If a bat is found, the bat will be removed under license by a bat specialist.

Methodology

The following methodology will be followed to comply with the requirements for bats as set out in the planning conditions and draft CEMP.

- DPC will survey the building to be demolished on Alexandra Quay West and the lighthouse to be relocated between May and September 2016;
- This survey will determine if special measures are required in relation to bats;
- If special measures are required, a method statement will be drafted to accompany a wildlife derogation licence application to NPWS;
- This method statement will also be submitted to the planning authority for approval;
- This method statement will contain the provisions of EIS Section 5.3.4, p5/56 which includes the text below.

EIS Section 5.3.4, p5/56 states the following:

“Removal of building – Alexandra Quay West

- *The roof of the building will be removed and left open for 3-4 nights prior to demolition of the building. This will change the internal temperature of the building and encourage residing bats to move off.*

Relocation of lighthouse

- *An internal inspection for bats will be undertaken of the lighthouse, prior to movement to a new location, to ensure that there are no bats within.*

Bats are mobile species and can roost in buildings occasionally. It is important that vigilance for individual bats within the buildings is practiced. These works will be undertaken outside the months of mid-April to mid-September to reduce the likelihood of encountering bats. If a bat is found, the bat will be removed under license by a bat specialist.”

DPC shall ensure that the demolition programme provides for –

- Demolition of the building on Alexandra Quay West and relocation of the lighthouse to occur between October and March inclusive following a bat survey in the summer preceding that window;
- The required lead in time of roof removal prior to demolishing the building on Alexandra Quay West; and the required lead in time of internal inspection prior to relocation of the lighthouse.

3.5.8.4 Benthos and Fisheries

The proposed six year dredging campaign will divide the shipping channel into six separate areas and dredging will be confined to one of the areas each winter period. This is the preferred approach from a benthic and fisheries perspective.

A non-dredging window will apply to the inner section of the navigation channel from below the East Link Toll Bridge as far as the end of the north bank port area at the Alexandra Road Extension. The window will run from March to May in order to protect out-migrating smolts.

There will be no overflow from the dredger when it is dredging the riverside face and associated berths along the North wall Quay Extension where recent sediment analysis indicated pockets of elevated contaminant levels. This will help to minimise the potential release of contaminants to the water column during dredging.

It has been shown that the drag-head will tend to entrain more fish and mobile epibenthic crustaceans when it is lifted from the sediment surface while the pumps are still running. This occurs when the dredger comes to the end of a dredged line and turns to dredge back up along an adjacent line. To remove this risk, the pumps will be switched off while the drag-head is withdrawn from the seabed during the turning process and not engaged again until it is replaced onto the seabed to dredge the next line.

To facilitate more rapid recovery of the benthic communities, the depth of the over burden on the faunal communities will be minimised spreading over the whole disposal site as evenly as is practicable per calendar month in a systematic directional sequence to allow the greatest opportunity for deep burrowing invertebrates to move vertically through the newly deposited layers of spoil.

No piling will take place along the Liffey channel during the three months of the year when smolts are likely to run in their highest numbers (i.e. March to May inclusive). This recognises the smaller size of smolts compared to returning adults and lamprey. It also takes account of the fact that smolts have a swim bladder which likely makes them more susceptible than lamprey to pressure trauma due to piling noise.

The sequencing of piling operations will also be considered in reducing possible piling-related trauma.

Benthic Surveys

Benthic Grab & Video Survey

It is proposed to collect up to 30 drop down video samples at locations within and around the dumpsite. Information gathered from this survey will be used to select infaunal sediment stations, and will be used to provide a snapshot of the seabed prior to sediment disposal at the dumpsite, as well as monitor recovery at the site following disposal. An outline on potential sampling locations is presented in Figure 3.5-6. These are subject to change following the video survey. However, it should be noted that the number of samples will remain consistent.

In addition, it is proposed to collect subtidal infaunal sediment samples at 12 locations, 4 within the dumpsite and 8 located outside the dumpsite.

Dispersion models for the dredge spoil disposal indicate the impact will remain localised within the footprint of the disposal area, with minor impacts expected further afield, primarily along a north-south axis. This is shown in the EIS, Figure 9.51 of Chapter 9, indicating the transport of sand material from the spoil site at the end of a 10 day south easterly storm event. As such, the sampling locations located outside of the disposal area will be less than 1km away from the edge of the disposal area. It is proposed to collect three replicate samples at 6 locations and six additional single stations, resulting in a total of 24 faunal samples.

This will allow for a detailed assessment to be made on the communities present in the area (replicates showing large degree of variability are often indicators of stress) whilst maximising the spatial spread in areas of potential impact to the north and south of the disposal area. Each biological grab sample will be taken in the same location as a video drop sample. This will allow for a more detailed assessment to be made on potential impacts from the dredge spoil disposal activities. In addition, blotted wet weight biomass will be measured at each site for each of the major phyla identified.

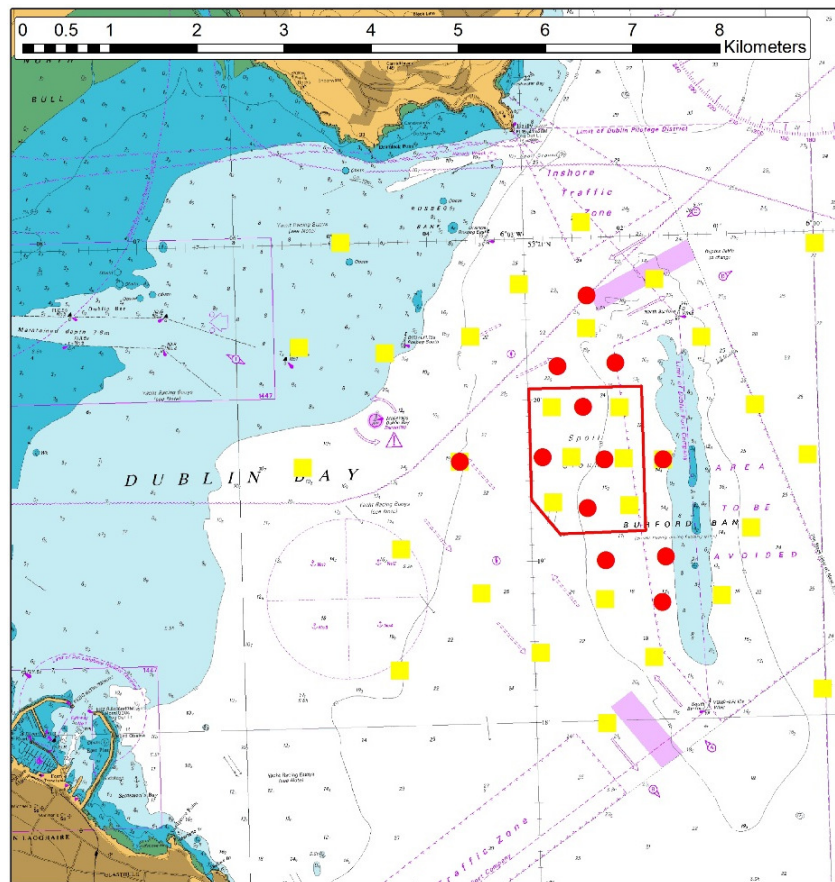


Figure 3.5-6 Proposed sampling locations (Biological infaunal samples – Red; Video drops – Yellow). These sites are indicative and subject to change following the video survey.

Environmental data for granulometry and organic matter (Loss on Ignition) will also be measured at each site.

Results from these surveys will then be used to assess the community structure in the area using a combination of univariate indices (such as evenness and diversity indices) and multivariate analysis.

It is proposed to repeat this survey on completion of the dredge disposal activities. Comparisons will be made between the pre- and post-disposal results, and assessments made on community level impacts at the sites, and the spatial distribution of impacts.

Fisheries Management - Beam Trawl Survey

The beam trawl surveys are designed to confirm that the fish community in these areas from year to year would remain largely the same, i.e. dominated by the same range of species, across the same general size ranges and broadly the same rank i.e. relative frequency of occurrence.

Replicate 2m beam trawls would be taken roughly in the middle of Dublin Bay one north and one south of the shipping channel with one taken within the channel. In addition one replicate trawl would be taken

within the dumpsite and one immediately to the west of the dumpsite. See Figure 3.5-7 for the approximate locations of the proposed beam trawls.



Figure 3.5-7 Approximate location of replicate beam trawl survey tracks

3.5.9 Marine Archaeology Management Plan

The Contractor shall comply with the mitigation measures prescribed below.

DPC will arrange for archaeological monitoring of all dredging activities conducted within the Approach Channel, with the provision to resolve fully any material of archaeological significance observed at that point.

DPC will appoint an archaeologist experienced in maritime archaeology for the duration of the relevant works.

Archaeological Licences will be required to conduct the on-site archaeological works. These will include detailed method statements which outline the rationale for the works, and the means by which the works will be resolved. The following licence types will be required: Excavation, to cover monitoring and investigations works; Detection, to cover the use of metal-detectors; and Dive Survey, to cover the possibility of having to conduct underwater inspections.

Archaeological monitoring will be carried out by suitably qualified and experienced maritime archaeological personnel licensed by the Department of Arts, Heritage and the Gaeltacht. Archaeological monitoring is conducted during all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development.

The monitoring will be undertaken in a safe working environment that will facilitate archaeological observation and the retrieval of objects that may be observed and that require consideration during the course of the works.

The monitoring will include a finds retrieval strategy that is in compliance with the requirements of the National Museum of Ireland.

In the event of archaeologically significant features or material being uncovered during the construction phase, machine work will cease in the immediate area to allow the archaeologist/s to inspect any such material.

Once the presence of archaeologically significant material is established, full archaeological recording of such material will be recommended. If it is not possible for the construction works to avoid the material, full excavation will be recommended. The extent and duration of excavation will be a matter for discussion between the client and the licensing authorities.

A suitable archaeological team will be on standby to deal with any such rescue excavation. This will be complimented in the event of a full excavation.

An archaeological dive team will be retained on standby for the duration of any in-water disturbance works on the basis of a twenty-four or forty-eight hour call-out response schedule, to deal with any archaeologically significant/potential material that is identified in the course of the seabed disturbance activities.

Facilities will be provided to facilitate the temporary storage of artefacts that may be recorded during the course of the site work.

Demarcation of any such areas of discovery will be necessary if discovered and during excavation.

Machinery traffic during construction will be restricted to avoid any identified archaeological site/s and their environs.

Spoil will not be dumped on any of the selected sites or their environs.

It is a condition of archaeological licensing that a detailed project report is lodged with the DAHG within 12 months of completion of site works. The report should be to publication standard and should include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy, along with a discussion and specialist reports. Artefacts recovered during the works need to meet the requirements of the National Museum of Ireland.

3.5.10 Industrial Heritage Conservation Plan

The Contractor shall comply with the mitigation measures prescribed below.

In keeping with DPC's concept of the sustainable development of the deep water facility at Alexandra Basin, DPC also requires a Best Practice approach to conservation on the site in order to preserve the cultural significance of Dublin Port as a Deep Water Port.

A detailed conservation strategy has been developed in light of the cultural heritage significance of the North Wall Quay Extension and forms an integral part of the works.

The conservation strategy comprises the following main elements:

Conservation Zones on North Wall Quay Extension

The alterations to North Wall Quay Extension include the construction of a quay wall outside the existing wall on the Liffey frontage, the shortening of the overall length and a reconfiguration to provide accommodation for larger ships on the Alexandra Basin side by narrowing the quay. The new quay wall will be penetrated by six conservation zones which not only relieve the horizontal proportioning of the new quay but also show the existing quay wall features – mooring rings, steps etc thereby allowing the original wall to be legible. This policy of legibility is continued across the finishes of the quay.

Best Practice recording using 3D laser technology of the existing North Wall Quay Extension will be undertaken in advance of any construction / demolition works.

Interpretative Zones at each end of the North Wall Quay Extension

Interpretative Zone 1 - this is a public interpretation area to view an exemplar of Bindon Blood Stoney's foundation works. It involves lifting a 350 tonne block onto the western end of the quay augmented by a contemporary design by MOLA architects.

Interpretative Zone 2 – this is an area around the repositioned lighthouse at the eastern end of the new quay with controlled access since it passes through the operational area. It involves the development of high quality reconstruction of the quay end to include a 1902 lighthouse on original granite plinth with a new curved granite wall producing above the fenders on the eastern quay end.

Re-opening of Graving Dock #1 and closure of Graving Dock #2

Graving Dock #1 – this historic graving dock will be reinstated as part of the ABR Project.

Graving Dock #2 – the scheme includes for the retention and conservation of structures of regional significance including three cranes and capstans.

Salvage Policy

The large blocks of Dalkey granite making up the facing of the North Wall Quay Extension shall be recovered from the demolition works and shall be stored in a safe and secure location within Dublin Port. Any future use of these blocks shall be agreed in writing with the planning authority prior to reuse. A heritage architect or Engineer experienced in industrial and maritime architectural heritage will be retained for the duration of the relevant works, to advise specifically in relation to works associated with North Wall Quay Extension and the Graving Docks.

DPC will appoint an archaeologist experienced in industrial and maritime heritage for the duration to the relevant works, to advise and resolve matters specifically in relation to works associated with North Quay Extension and the Graving Docks.

The conservation strategy developed for the ABR Project for Alexandra Basin West will be implemented in full.

3.5.11 Water Quality Management Plan

The Contractor shall comply with the mitigation measures prescribed below (Please refer to Section 3.6.7 for site specific Water Quality Management Plan for Phase 1 of the work as per IE Licence).

The objective of the Water Quality Management Plan is to ensure that the mitigation measures specified in Chapter 10 of Volume 1 of the EIS are adhered to and that a monitoring regime is put in place to confirm the efficacy of the mitigation measures implemented so as to further safeguard the receiving water environment.

Temporary impacts on water quality have the potential to occur during the construction phase of the works. Pollution from mobilised suspended sediment is the prime concern.

- Increased suspended sediment levels due to dredging and deposition of dredge spoil;
- Sedimentation due to settling of suspended silt;
- The dispersal and fate of contaminated sediments; and
- Water quality impacts associated with works machinery, infrastructure and on-land operations (for example leakages /spillages of fuels, oils, other chemicals and waste water, controlled discharges under licence).

Any of these activities have the potential to impact on water quality (and associated species and habitats) and therefore the activities associated with the construction phase of the development require mitigation.

Mitigation Measures

A suite of measures has been designed and proposed by DPC in order to mitigate the potential impacts of the proposed development on water quality, and shall be implemented by the contractor in order to comply with the requirements for best practice and adherence to relevant Irish guidelines, or international guidelines where these are not available:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
- Pollution prevention guidelines in relation to a variety of activities developed by the Environment Agency (EA), the Scottish Environmental Agency (SEPA) and the Northern Ireland Environment Agency (NIEA);

- Environment Agency Pollution Prevention Guidelines (PPG6);
- Fisheries Guidelines for Local Authority Works. Department of Communications, Marine & Natural Resources, Dublin, (Anonymous, 1998);
- Guidelines on protection of fisheries habitats during construction projects (Eastern Regional Fisheries Board, 2006);
- International Convention for the Prevention of Pollution From Ships, 1973, as modified by the Protocol of 1978 (MARPOL) for domestic waste discharges to the environment;
- International Marine Organisation guidelines; and
- Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials.

Water Quality Monitoring Programme

This Water Quality Monitoring Programme has been prepared to provide additional safeguards in respect of the receiving water environment during the construction phase of the works.

The implementation of a monitoring regime will facilitate the policing of contractor's activity on site with respect to environmental practices. A combination of water quality monitoring and regular environmental audits will provide an indication of which, if any, practices require modification and to provide early warning of any unforeseen incidents.

The management of the environmental monitoring programme will fall under the remit of the Environmental Facility Manager who is independent of the Contractor. The Environmental Facility Manager will provide reports to the relevant authorities as required and will also submit copies of those reports to the liaison group.

The management of the environmental monitoring programme for the IE Licence requirement will fall under the remit of the Installation Manager in accordance with Condition 2.1 of the Licence.

Monitoring Programme Design

The monitoring system has been designed to ensure robust protection is afforded to the assets of the users of the River Liffey Channel, notably the intakes of power stations, as well as Natura 2000 sites, notably the South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) (Site Code 004024).

It is proposed to use three monitoring stations at locations indicated in Figure 3.5-8.



Figure 3.5-8 Location of Monitoring Stations

Monitoring Station 1

This monitoring station will be sited in the River Liffey Channel upstream of the works.

Monitoring Station 2

This monitoring station will be sited along the southern edge of the River Liffey Channel in close proximity to a power station intake.

Monitoring Station 3

This monitoring station will be sited along the northern edge of the River Liffey Channel, outside but within close proximity to, the South Dublin Bay and River Tolka SPA.

The location of the monitoring stations will be moved during the construction phase of the works, with the agreement of Dublin City Council, depending on the construction activities taking place at the time.

Monitoring System Specification

The specification is based on state of the art 24/7 real time monitoring. Water quality monitoring sensors, giving high resolution data with respect to the following parameters will be used at each of the three monitoring locations

- Turbidity
- Dissolved Oxygen
- Temperature

- Salinity

Turbidity is measured as a surrogate for suspended solids. Site specific tests will be undertaken to define the relationship between Turbidity and suspended solids.

Suitable housing and moorings will be used, designed for the marine conditions at the monitoring locations.

A data acquisition and transfer system will be used to enable the transmission of high resolution data at 10-15 minute intervals.

A calibration and maintenance programme will be put in place comprising:

- Regular calibration of sensors
- Regular maintenance of sensors (including cleaning)
- Maintain Data Quality Control
- Provision of replacements if required

A data storage, interrogation and advanced warning system will be put in place comprising

- Provision of Data Server
- Web site for access to data
- Suitable Software to interrogate data
- Automatic warning system (e.g. message to mobile phone)

Duration of Monitoring Programme

The monitoring programme will be established at least one month prior to commencement of the works associated with the Alexandra Basin Redevelopment and continue for the duration of the construction works.

Automatic Warning System

The system will be designed to automatically send text messages to the mobile phones of the ENCoW, Contractor and the Resident Engineer to alert them that a pre-determined trigger level has been breached. This early warning system will enable the responsible parties to quickly determine the cause of the breach and to take appropriate action, including the temporary cessation of the works where appropriate.

The following trigger levels are proposed:

- Dissolved Oxygen level falling below 6 mg/l

- Peak Suspended Solids level rising above 100mg/l above background

The Dissolved Oxygen trigger level has been selected to safeguard fish-life.

The Suspended Solids trigger level has been selected based on the results of the computational modelling work presented in Chapter 9 of Volume 1 of the EIS. The monitoring stations will be relocated when the dredging works are being undertaken within 150m of the dredger.

The trigger levels can be varied, with the agreement of Dublin City Council, depending on the nature of the construction works at the time.

Additional Requirements of the Dumping at Sea Permit

Inner Liffey Channel

A fourth monitoring buoy will be installed within the inner Liffey Channel to safeguard the winter swimming group. The location of the buoy will be agreed with the EPA.

Dublin Bay

An extensive programme of monitoring associated with the loading and dumping of dredge spoil will be undertaken in accordance with the requirements of the Dumping at Sea Permit.

Four offshore monitoring buoys will be deployed in Dublin Bay to record the environmental impact of each winter capital dredging season (October – March). Each Buoy will have three turbidity sensors at three depths deployed from the centre of the buoy hull which will be anchored on a two point mooring system. A real-time data cable will be used to collect data from the turbidity sensors. At each service visit (circa every 6 weeks) a water sample will be taken at all three depths for all four buoy locations for suspended solid laboratory analysis.

The Turbidity data will be managed and visualised the real-time data through the CoastEye data portal. CoastEye is the base station web platform which enables 2-way communication with each deployed data logger and associated turbidity sensor at each deployment site.

An ADCP sensor measuring tidal current velocities, direction and water depth will be deployed on the monitoring buoy located within the licensed dump site located to the west of the Burford Bank.

A wave sensor will also be housed in the same buoy. The wave sensor is specially adapted for data buoy platforms. The 9 Degrees of Freedom sensor compensates for 3-D motion, rotation and compass heading in all dimensions to cover the 9 degrees of freedom. The on-board electronics are able to provide near real-time wave statistics.

Groundwater and Surface Water Sampling associated with the Contaminated Materials Handling Plan (CMHP)

The following plans have been completed by the appointed contractor for Phase 1 of the works;

- 648_IED_Environmental Management Plan Rev 01
- 648_IED_Water Quality Management Plan Rev 01

Please refer to Section 3.6.

Reporting

The management of the environmental monitoring programme for the IE Licence requirement will fall under the remit of the Installation Manager in accordance with Condition 2.1 of the Licence. The Installation Manager will interpret the laboratory analysis and will transfer these into a standard report format. Any emission/trigger level or compliance value which does not comply with the requirements of the IE licence will be treated as an incident in accordance with Condition 9.3 of the Licence and notified to DPC who will then notify the Agency and other relevant authorities.

The IE licence sets out reporting frequencies for the submission of monitoring data and reporting to the EPA. The report will include the results for the monitoring and will identify any areas groundwater / surface water quality standards or emission limits are exceeded

In addition an Annual Environmental Report (AER) will be required.

All documentation will be produced in accordance with our Quality Standards set out in our Integrated Management System, and in particular in accordance with the requirements of ISO9001 certification.

Notification

The Installation Manager will monitor activities and ensure that all relevant environmental legislation is complied with and that the requirements of the CEMP and conditions of the IE Licence are implemented.

The Installation Manager will notify the DPC immediately the occurrence of any item as listed in Condition 11.3 of the IE licence;

- (i) an incident or accident that significantly affects the environment;
- (ii) any release of environmental significance to atmosphere from any potential emissions point including bypasses;
- (iii) any breach of one or more of the conditions attached to this licence; emissions point including bypasses;
- (iv) any malfunction or breakdown of key control equipment or monitoring equipment set out in Schedule C: Control and Monitoring, of this licence which is likely to lead to loss of control of the abatement system; and

(v) any incident with the potential for environmental contamination of surface water or groundwater, or posing an environment threat to air or land, or requiring an emergency response by the Local Authority.

This shall include date and time of the incident, summary details of the occurrence, and where available, the steps taken to minimise any emissions, measures taken to restore compliance where breach of a licence condition has occurred.

The EPA and other Agencies as listed in Condition 11.4 of IE will be notified. The EPA will be informed by DPC by telephone and incident notification web form in EDEN completed and logged by DPC/RPS in addition to DPC EMS procedures.

3.5.12 Dredging Management Plan

Revision F of the CEMP comprises an updated Dredging Management Plan.

The objectives of the updated Dredging Management Plan are twofold:

1. To confirm that the first winter season capital dredging campaign (October 2017 – March 2018) was fully compliant with the requirements of the Dumping at Sea, Foreshore and Planning Consents. The assessment takes account of the environmental monitoring results reported in the Annual Environmental Report submitted to the Office of Environmental Enforcement (OEE) in March 2018.
2. To set out a loading and dumping methodology for winter dredging seasons 2, 3 and 4 based on the results of the environmental monitoring programme to ensure continued compliance with the conditions of the consents.

BACKGROUND

Planning Consent

The Capital Dredging Scheme is an integral part of the ABR Project and was therefore included in the planning application to An Bord Pleanála (ABP) on 6th March 2014 supported by the following documents:

- Planning Report which presented the case for the project as being in the interests of the proper planning and sustainable development of the area;
- Planning Drawings;
- Project level Environmental Impact Statement (EIS) and Natura Impact Statement (NIS); and
- Built Heritage Conservation Strategy.

The EIS and NIS included an assessment of the loading and dumping activities required for the Capital Dredging Scheme to ensure that a holistic approach was taken to the assessment of potential environment effects.

ABP granted permission for the ABR Project on 8th July 2015.

Foreshore Consent

Dublin Port Company (DPC) submitted a Foreshore Application for the ABR Project to the Department of Environment, Community and Local Government (DECLG) on 1st July 2015 in order to obtain permissions for undertaking works on the Foreshore (below the mean High Water Mark) including the

construction of new quays and jetties and undertaking capital dredging operations. This application was supported by the same ABR Project EIS and NIS as the planning application to ABP.

The Minister for DECLG granted a Lease/Licence/Consent under Sections 2(1), 3(1) and 10(1) of the Foreshore Act, 1933 to DPC on 12th May 2016.

Dumping at Sea Consent

DPC submitted a Dumping at Sea Permit application for the ABR Project to the EPA on 13th July 2015. This application was supported by the same ABR Project EIS and NIS which included detailed environmental appraisals of the proposed capital dredging scheme which is an integral part of the overall Project.

The EPA granted a Dumping at Sea Permit to DPC on 13th September 2016 (Dumping at Sea Permit No S0024-01).

The Dumping at Sea Permit granted was restricted to the loading and dumping at sea of dredged material from Loading Area B (navigation channel between the western oil jetty and the -10.0m CD contour in Dublin Bay). Chemical analysis has shown that the sediments from this section of the navigation channel are suitable for conventional dumping at sea.

Under this permit the loading and dumping activities are confined to the winter months (1st October to 31st March). The permit is valid for four winter dredging seasons, ending 31st March 2021.

The permit restricts the maximum quantity of dredged material per calendar month to 292,000 tonnes, wet weight. The total quantity per winter dredging season is therefore 1,752,000 tonnes which equates to 1,061,818 cubic metres using a conversion factor of 1.65 which has been agreed with the EPA. The permit therefore allows the loading and dumping of 4,247,272 cubic metres over the four winter seasons.

Key Mitigation Measures

The following key mitigation measures apply to each winter season's capital dredging campaign:

- No over-spilling at the surface of the dredger for all dredging activities within the inner Liffey Channel is permitted.
- The dredger will work on one half of the channel at a time within the inner Liffey channel to prevent the formation of a silt curtain across the River Liffey.

- The dredging of sediments within the navigation channel will be carried out during the winter months (October – March) to negate any potential impact on salmonid migration (particularly smolts) and summer bird feeding, notably terns, in the vicinity of the dredging operations.
- A trailer suction head dredger (TSHD) or Back-hoe dredger will be used for the capital dredging works. When operating in the River Liffey Channel, the TSHD pumps will be switched off when the drag head is being lifted and returned from the bottom as the dredger turns between successive lines of dredging to minimise the risk of fish entrainment.

WINTER SEASON 1 (October 2017 – March 2018)

Dredging and Loading Activity

The first winter season capital dredging campaign undertaken as part of the ABR Project commenced on 22nd October 2017 by dredging company NewWaves Solutions, a subsidiary of the International Dredging Company DEME using a Trailer Suction Hopper Dredger.

NewWaves Solutions used a Trailer Suction Hopper Dredger (TSHD) called *Minerva* for the October 2017 dredging campaign which has a hopper capacity of 3,500 cubic metres. The *Minerva* was replaced by the *Reynaert*, a larger Trailer Suction Hopper Dredger which has a hopper capacity of 5,580 cubic metres, for the November 2017 to March 2018 dredging campaigns.

NewWaves Solution's Trailer Suction Hopper Dredgers' are equipped with a trailing suction head. When the ship reaches the location requiring dredging, it reduces speed and lowers the suction head to the seabed. The trailing suction head moves slowly over the bed, collecting the sediments in a similar way to a giant vacuum Hoover. The water and material mix is then pumped up the arm of the suction head to the ship's hull (hopper). Once full, the dredger retracts its suction head and begins to sail slowly to the dump site.

When in position over the dump site, the ship slowly sails in the desired direction as doors in the underside of the vessel open and the sediment is released from the hopper. This allows the operators to control accurately where the sediment is deposited.

The first winter season capital dredging campaign was confined to dredging within Dublin Bay which is dominated by fine sands.

Monthly dredging campaigns took place over the following days

22 – 31 October 2017

23 – 30 November 2017

01 – 09 December 2017
 06 – 17 January 2018
 15 – 23 February 2018
 04 -14 March 2018

The dredging effort is summarised by the following statistics:

Amount dumped per calendar month.....circa 292,000 wet tonnes
 Average number of dumps per day12
 Maximum number of continuous days dredging.....17 (Nov-Dec 2017).

Environmental Monitoring Programme

The following environmental monitoring was carried out during the first winter dredging season to assess the impact of the dredging activities at the licenced dump site located at the approaches to Dublin Bay to the west of the Burford Bank.

Water Quality Monitoring

Continuous monitoring of turbidity was undertaken at four specified locations within Dublin Bay. A programme of water quality sampling and analysis was also undertaken to determine the relationship between turbidity measurements and suspended solids.

Hydrographic Monitoring

Continuous monitoring of tidal current velocity, direction and water depth was undertaken at the central monitoring station within the dumping site using a Nortek Acoustic Doppler Current Profiler (ADCP). Monitoring commenced over one month prior to the commencement of the first dumping campaign.

Continuous monitoring of wave climate was also undertaken at the central monitoring station within the dumping site. Wave climate was monitored continuously using a Seaview Wave Sensor.

Sediment Plume Monitoring

Sediment plume monitoring was undertaken in the vicinity of the dumping activity. The monitoring programme was designed to enable the horizontal and vertical extent of the sediment plume generated by the permitted dumping activity at different stages of the tide to be measured. High resolution real time data provided as part of Water Quality Monitoring and Hydrographic Monitoring above was augmented by boat surveys during dumping operations to measure sediment plume extent and movement.

Marine Mammal Monitoring

Independent Marine Mammal Observers (MMOs) from the Irish Whale and Dolphin Group (IWDG) monitored a 500m zone around loading and dumping activities for the presence of marine mammals in

accordance with the requirements of the National Parks and Wildlife Service. MMOs operate continuously on board the dredging vessel during the campaign.

Environmental Monitoring Results

The environmental monitoring results are reported in the Annual Environmental Report submitted to the Office of Environmental Enforcement (OEE) in March 2018.

Summary of Assessment of Environmental Monitoring Results

The measured turbidity results demonstrate that the first winter season capital dredging season did not cause any discernible increase in turbidity above recorded background levels.

The results show the spring – neap – spring tidal cycles and wave action during storm events are the dominant causes of the natural variations in turbidity which exist in Dublin Bay. Further evidence is provided by satellite imagery (ESA Sentinel 2 & 3) for Dublin Bay.

The results of the hydrographic monitoring (waves and tidal currents) are consistent with the predicted results of computer models and validate the hydrodynamic and wave climate model presented in Appendix C: Coastal Processes Modelling to the NIS and Chapter 9 of the EIS.

The sediment plume tracking results show that turbidity levels at 1m below the surface did not differ within the dumping area and in adjacent areas outside the dumping site or at a control site. The results therefore show that the release of dredge spoil did not create a significant dredge plume within the surface waters. This suggests that the dredged material fell rapidly towards the seabed.

Model Validation

The results of the sediment plume monitoring were used to validate the sediment plume dispersal model presented in Appendix C: Coastal Processes Modelling to the NIS and Chapter 9 of the EIS.

The Plume Dispersal Modelling used in the NIS comprised a Mike 21 sediment transport model which was coupled with the Mike 21 hydrodynamic module. A series of computational model simulations were then undertaken to assess the dispersion and fate of the dredged material to be dumped at the licensed offshore dump site to the west of the Burford Bank.

The particle size distribution analysis of the sediment samples detailed in the NIS shows that there are essentially two different types of material that make up the sea bed of the navigation channel. The material in the sea bed of the navigation channel, seaward of the Bull Walls, is generally composed of

fine sand whilst the material in the sea bed, landward of the Bull Walls, is generally composed of a fine silty material with a small proportion of coarser silt.

The sediment dredged from the loading area during the first winter season's dredging campaign (single block within Dublin Bay) was predominately fine sand. This consists of three discrete fractions, with mean grain diameters of 0.2mm (20%), 0.1mm (60%) and 0.06mm (20%).

The model simulations presented in the NIS showed that the sediment was predicted to settle rapidly and proximally to the release point within the dumping site and therefore independent of the rate of release of the dredged material from the dredger during dumping activities (spill rate).

The model results are therefore fully consistent with the measured results of the environmental monitoring programme.

Compliance with Consents – First winter dredging campaign

The first winter dredging campaign was fully compliant with the conditions imposed by the Dumping at Sea, Foreshore and Planning Consents. Notably, the maximum tonnage per calendar month set by Dumping at Sea Permit S0024-01 was met throughout the dredging campaign. Inspections undertaken by the Office of Environmental Enforcement (OEE) during the dredging operations also confirmed full compliance with the Dumping at Sea Permit.

The dredging activity was restricted to Dublin Bay which is dominated by fine sands. The results of both the environmental monitoring programme and modelling results presented in the EIS and NIS show that the dredged material released at the dump site fell rapidly to the seabed and did not create a significant dredge plume within the surface waters. Furthermore the measured turbidity results demonstrate that the first winter season capital dredging season did not cause any discernible increase in turbidity above recorded background levels.

WINTER SEASON 2 (October 2018 – March 2019)

Dredging and Loading Activity

The second winter season dredging campaign will also take place within Dublin Bay which is dominated by fine sands. No changes to the loading and dumping activities /methodology is therefore required,

There is however a relatively small quantity of material to be removed from the inner Liffey channel of between 16,000 - 18,000 cubic metres. This entails dredging to create a berthing pocket to facilitate ABR Project construction works comprising the infilling of Berth 52/53.

The sediments within the inner Liffey channel are dominated by silts and their behaviour during loading and dumping activities differs significantly from that of fine sands as presented in Appendix C: Coastal Processes Modelling to the NIS and Chapter 9 of the EIS.

The model simulations of silts loaded and dumped from the inner Liffey channel, as presented in the EIS and NIS, were based on over-spill being allowed from the dredger during loading operations. However, a condition of the planning permission granted for the ABR Project was that there shall be no over-spill from the dredger when dredging material within the inner Liffey channel. Revised computational model simulations are therefore required for the dispersal of dredged silts at the dump site because there will be less control over the rate of release given the significantly higher water to sediment ratio of the dredged spoil.

The following input was used in the model simulations, representative of the likely dredging activity to take place within the inner Liffey channel during the second winter dredging season.

Typical Capacity of Trailer Suction Hopper Dredger	4,500m ³ hopper capacity
Ratio of sediment/entrained water during loading	0.3
Number of trips to dredge 40,000 m ³	30
Method of disposal	bottom doors
Time to release load	90 seconds
Programme	October 2018

Model simulations have been run to examine a suitable dumping regime that would comply with the requirements of the suspended sediment concentrations presented within the EIS and NIS which supported the consenting process.

The disposal simulation have been run using tidal data from the period 23 October to 2 November with the discharge occurring every 3 hours from 24 October 12:00 hrs to 28 October 03:00 hrs inclusive. Figure 3.5.12.1 shows the tidal curve for the period of the simulation with the dumping times shown by red circles on the diagram.

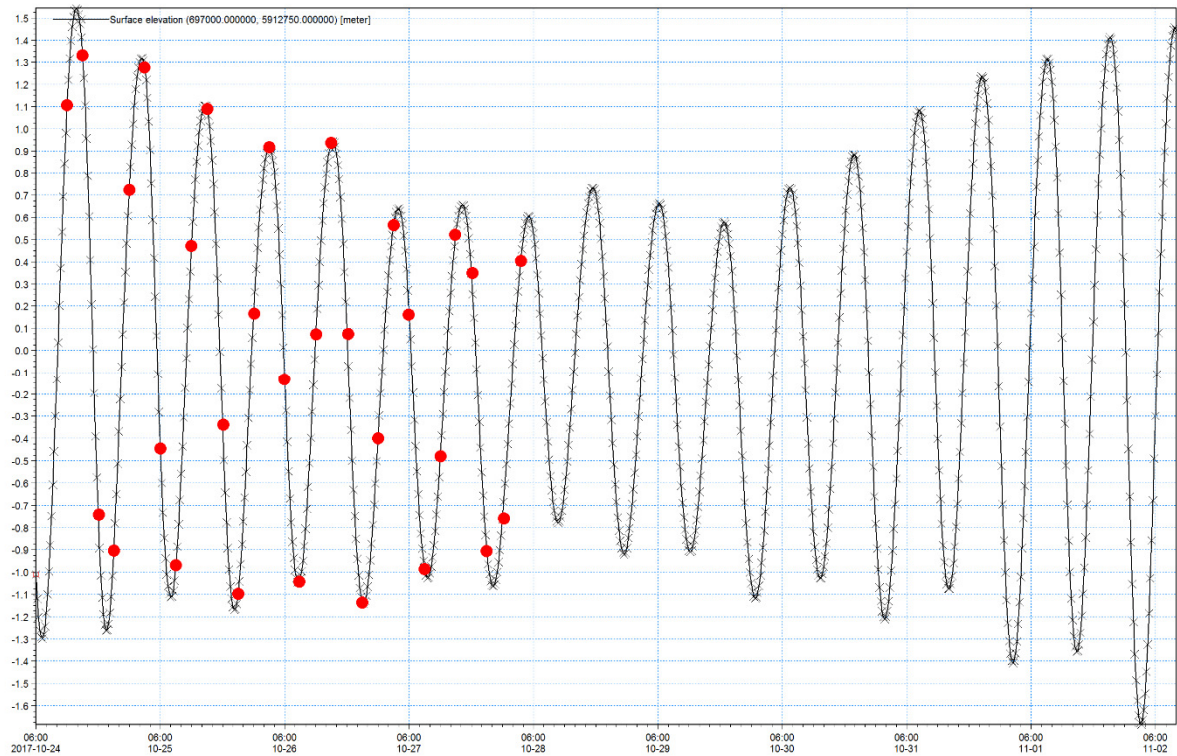


Figure 3.5.12.1 Tidal curve during simulation with times of dumps shown by red circles.

The material to be dumped has the same consistency as the silt dumps used in the simulations presented in the EIS and NIS, that is, 33% fine sand 33% medium silt and 34% very fine silt/clay.

The results of the simulations are presented in Figure 3.5.12.2 and Figure 3.5.12.3 as a maximum total suspended sediment concentrations envelope. The envelope shows the maximum concentration of suspended sediment in each cell at any time during the simulation and covers all the sediment plume excursions. It will be seen from the plume diagrams that the total suspended sediment concentrations arising from dumping are below 20 mg/l (0.02 kg/m³) outside the area of the dump site.

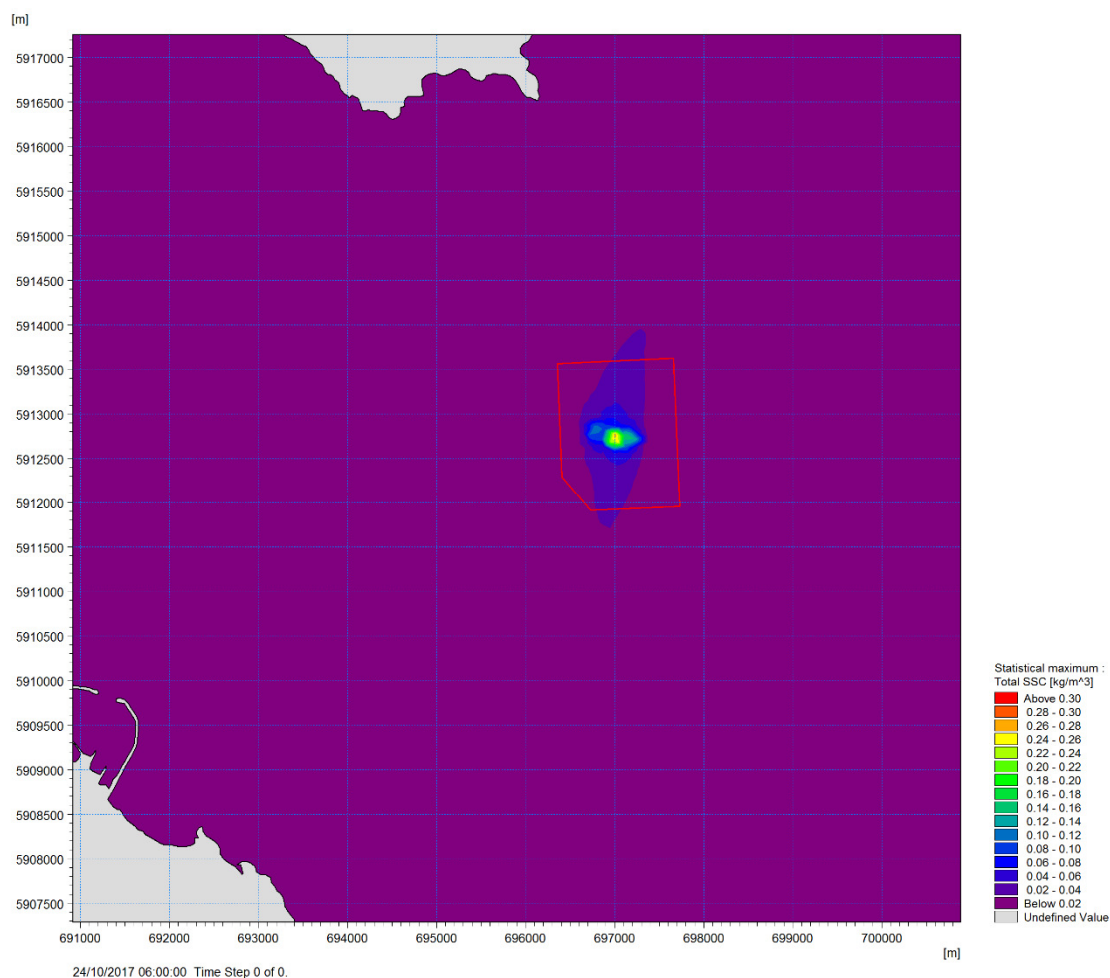


Figure 3.5.12.2 Maximum Total Suspended Solids concentration envelope during simulation of 30 number silt dumps at 3 hourly intervals at centre of dump site.

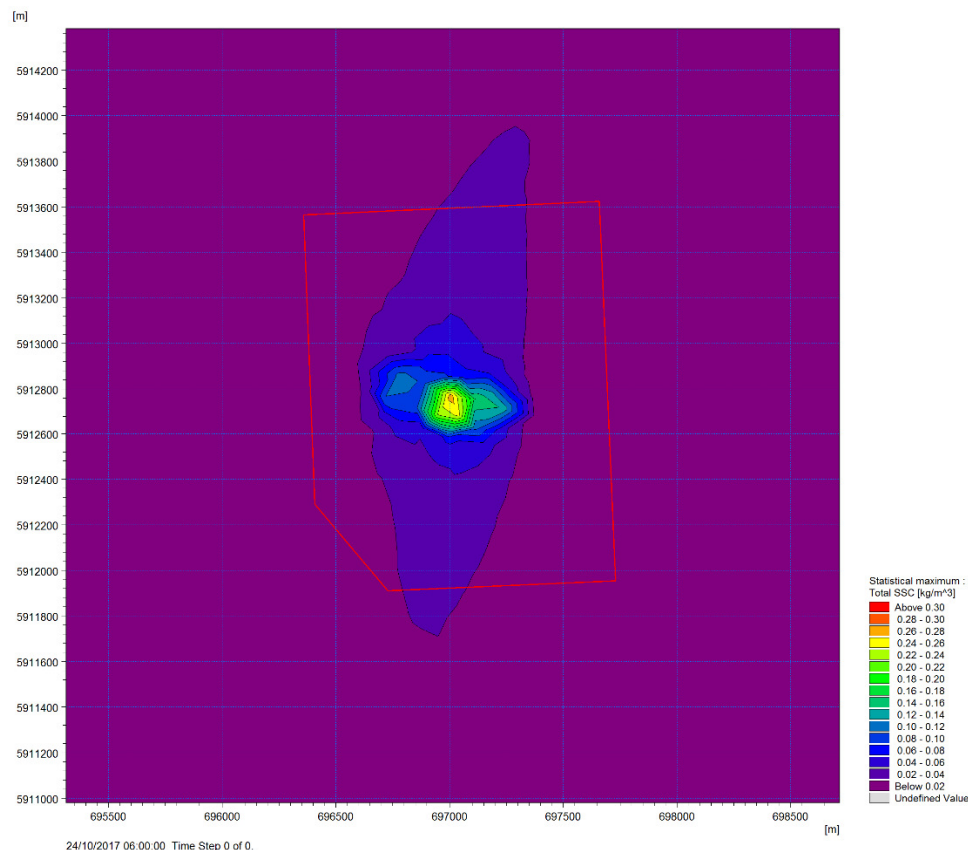


Figure 3.5.12.3 Close up at dump site of the maximum Total Suspended Solids concentration envelope shown in Figure 3.5.12.2

Conclusion

The computational modelling undertaken to simulate the dispersal of silt material from within the inner Liffey Channel required during the second winter dredging campaign has shown that it will be possible to dump the silt material, which has been dredged with no over-spill, in a series of high discharge rates and comply with the suspended solids concentrations presented within the EIS and NIS which supported the consenting process.

WINTER SEASON 3 (October 2019 – March 2020)

Dredging and Loading Activity

The third winter season dredging campaign will also take place within Dublin Bay which is dominated by fine sands. No changes to the loading and dumping activities /methodology is therefore required,

WINTER SEASON 4 (October 2020 – March 2021)

Dredging and Loading Activity

The fourth winter season dredging campaign will take place within the inner Liffey channel which is dominated by silts.

Model simulations presented below show that a significant change to the loading and dumping activities /methodology is required compared to Seasons 1 to 3 given the large quantity of silt to be removed.

The original simulations presented within the EIS and NIS were based on the assumption that dredging would be undertaken continuously over the six month winter season and this was represented by a continuous dumping release rate of 108 kg/s which assumed that over-spill would be permitted (Figure 3.5.12.4 and 3.5.12.5 for reference).

A Model simulation of a similar loading and dumping regime to that undertaken in Season 1 (dredging restricted to circa 10 days per calendar month) is presented in Figure 3.5.12.6. The figure shows that excessive Total Suspended Solids concentrations would be expected outside the confines of the dump site at much higher levels than reported within the EIS and NIS. In conclusion, the loading and dumping activities /methodology successfully used to dredge fine sands in Dublin Bay is not appropriate for the dredging of silts within the inner Liffey channel for the quantity of material to be dredged.

Model simulations of a loading and dumping regime using a smaller Trailer Suction Dredger, akin to current maintenance dredging practices, are presented in Figures 3.5.12.7 and 3.5.12.8.

The following input was used in the model simulations:

Typical Capacity of Trailer Suction Hopper Dredger	4,100m ³ hopper capacity
Ratio of sediment/entrained water during loading	0.3
Average Trip Frequency	3-4 hours
Time to release load	90 seconds

A comparison between the results for this dredging scenario and that presented within the EIS and NIS show a similar distribution and concentration of Total Suspended Solids within the receiving waters, outside the footprint of the dump site. It is therefore proposed to adopt this dredging methodology during the fourth winter season to ensure no significant environmental impact from the loading and dumping activity. The methodology will result in an increase in the total number of days on which dredging occurs to about 18 - 24 days per calendar month and ensure that there is no increase in turbidity above recorded background levels, outside the confines of the dump site.

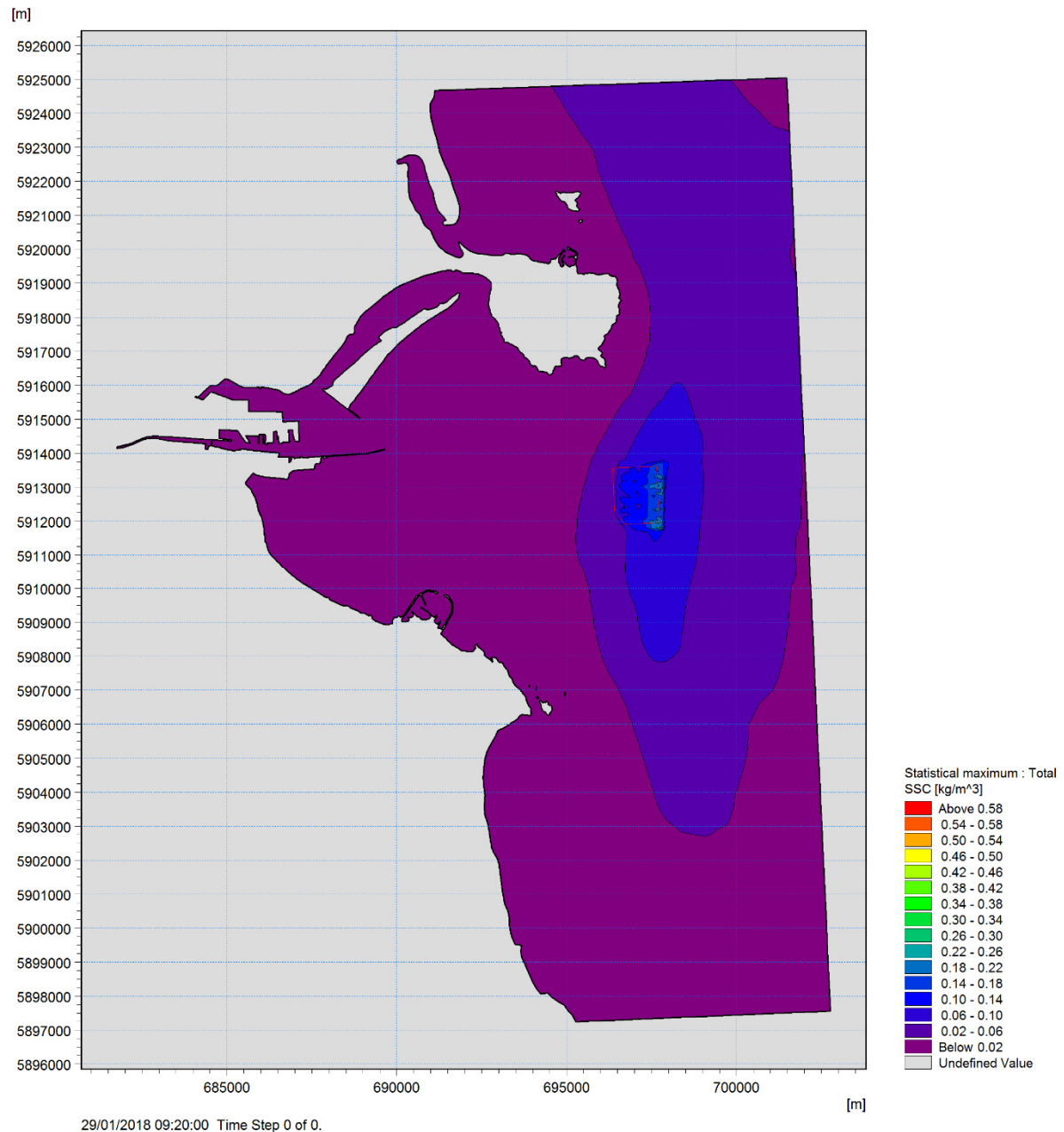


Figure 3.5.12.4 – Maximum Total Suspended Solids Concentration envelope based on a continuous dump rate of 108 kg/s as per EIS and NIS

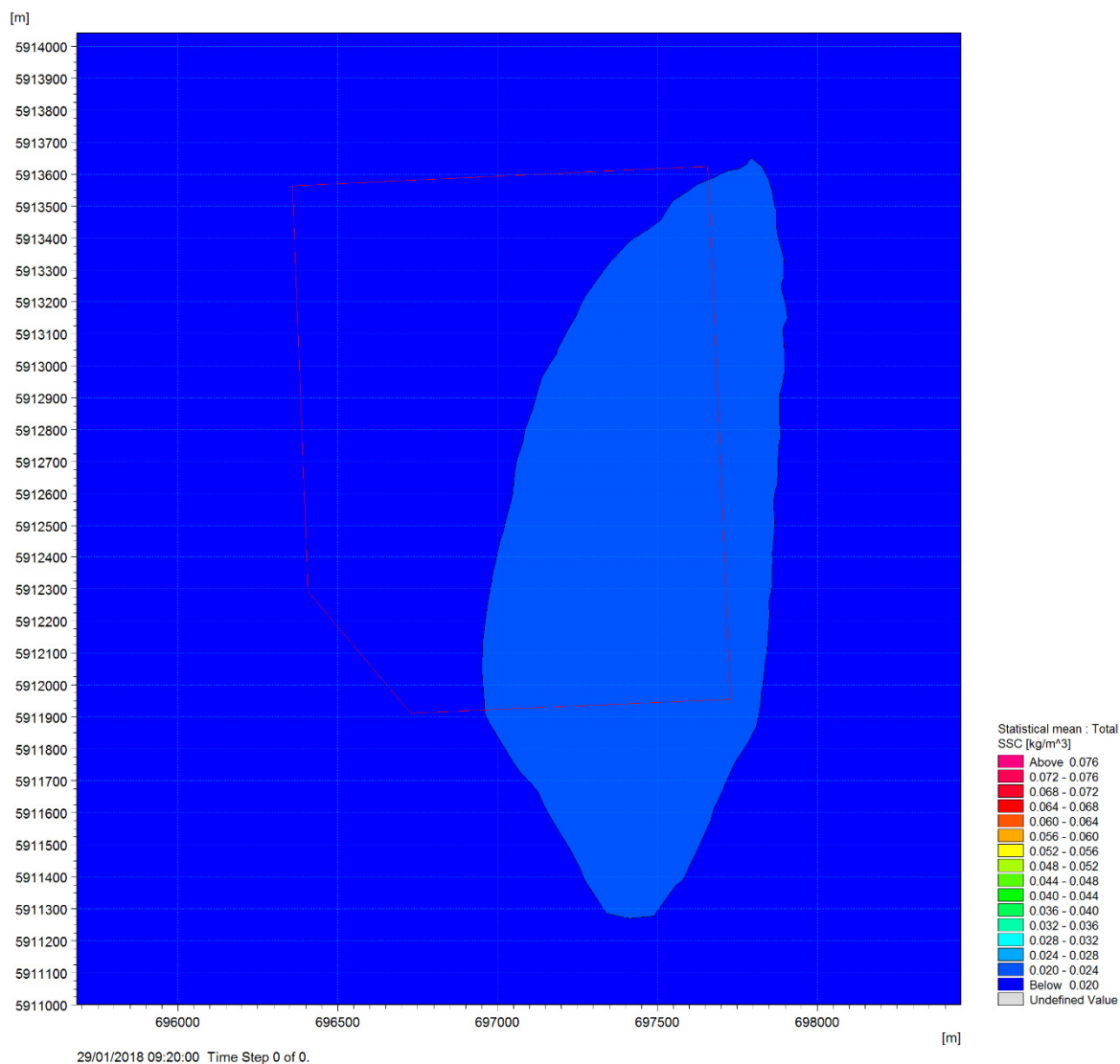


Figure 3.5.12.5 – Mean Total Suspended Solids Concentration envelope based on a continuous dump rate of 108 kg/s as per EIS and NIS

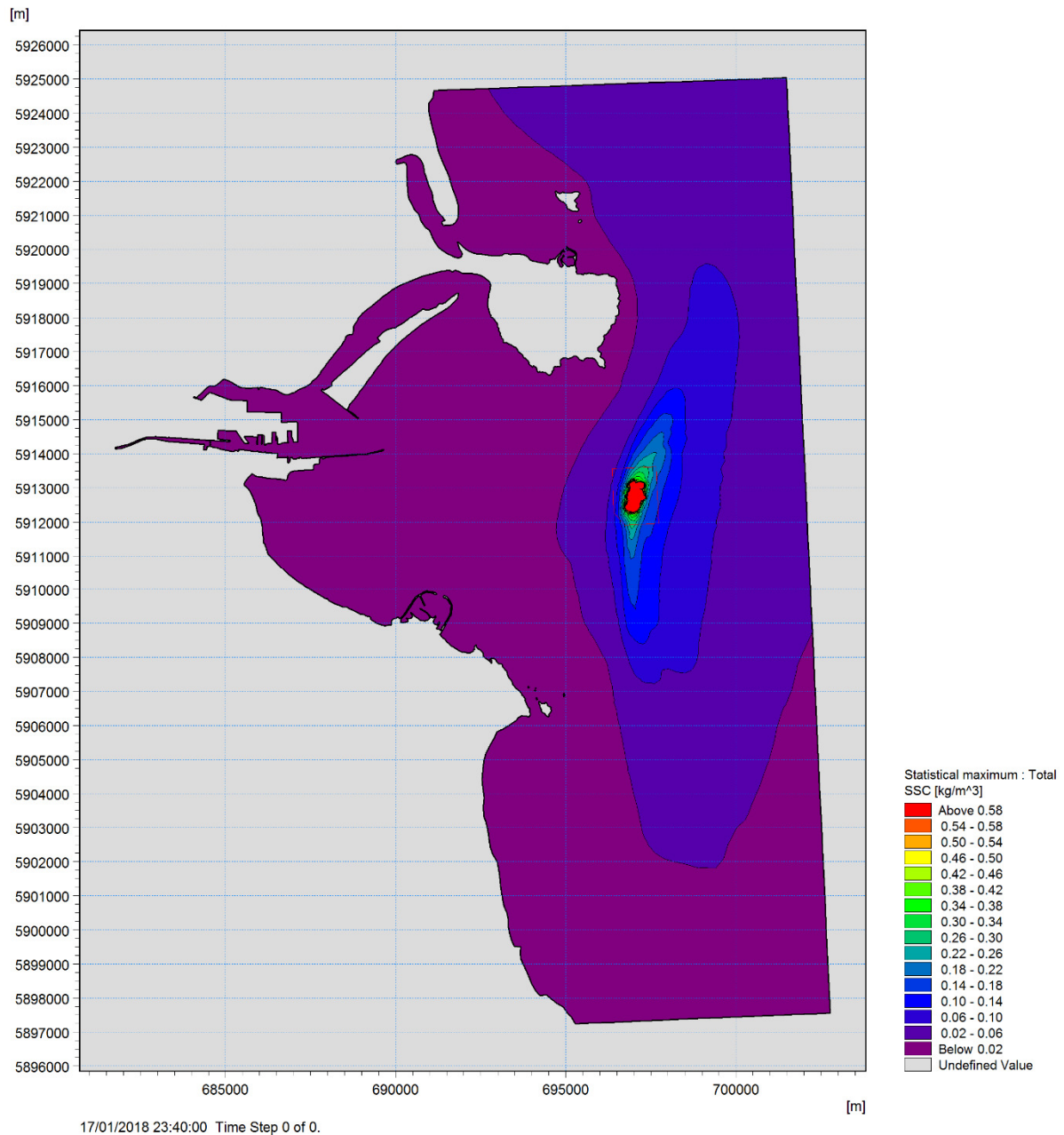


Figure 3.5.12.6 – Maximum Total Suspended Solids Concentration envelope with dumping regime as per first winter dredging campaign (Excessive concentrations are predicted outside dump site)

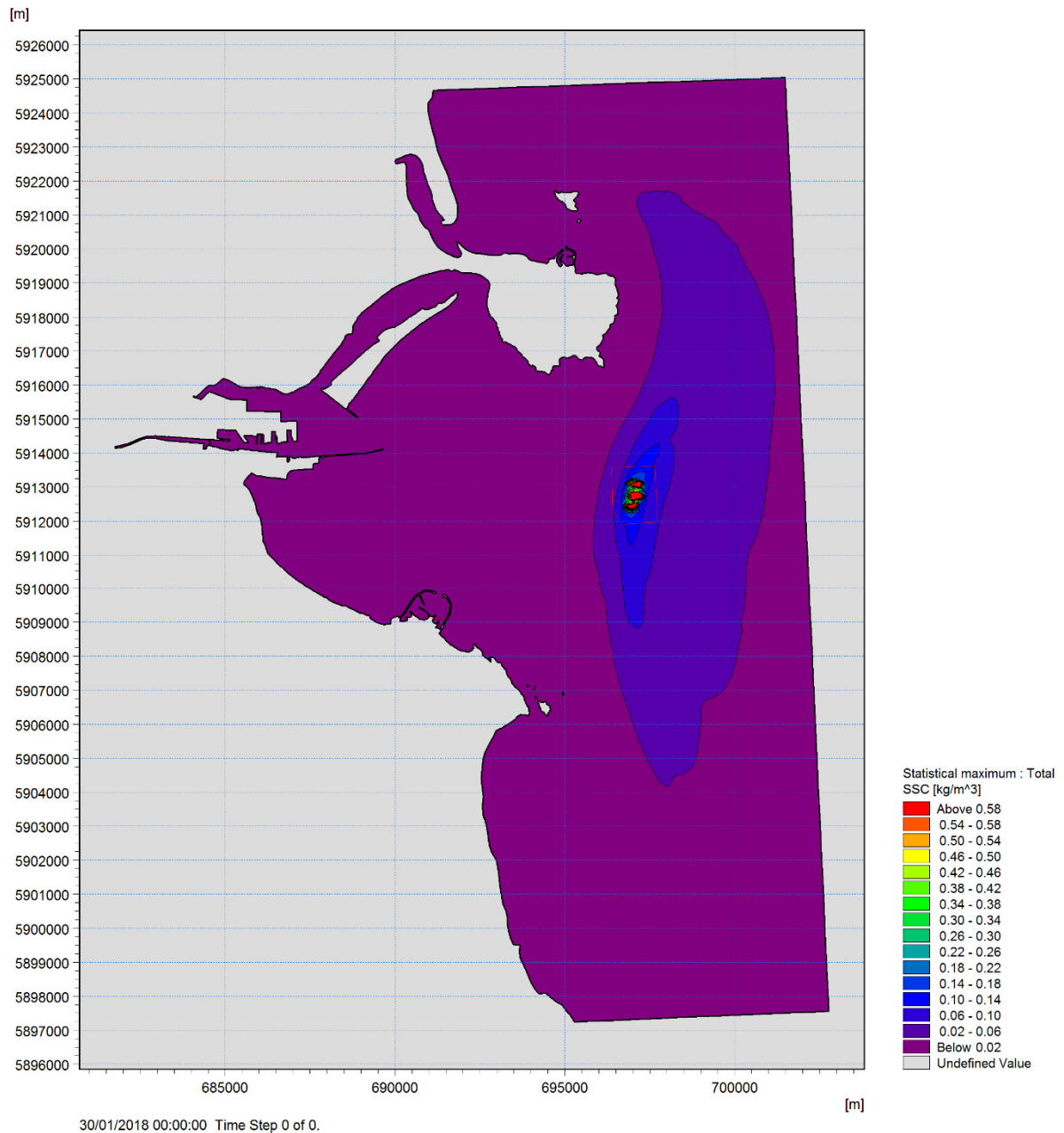


Figure 3.5.12.7 – Maximum Total Suspended Solids Concentration envelope using a smaller Trailer Suction Dredger dumping circa 1,220 tonnes at 3 hourly intervals on average over the 6 month winter season

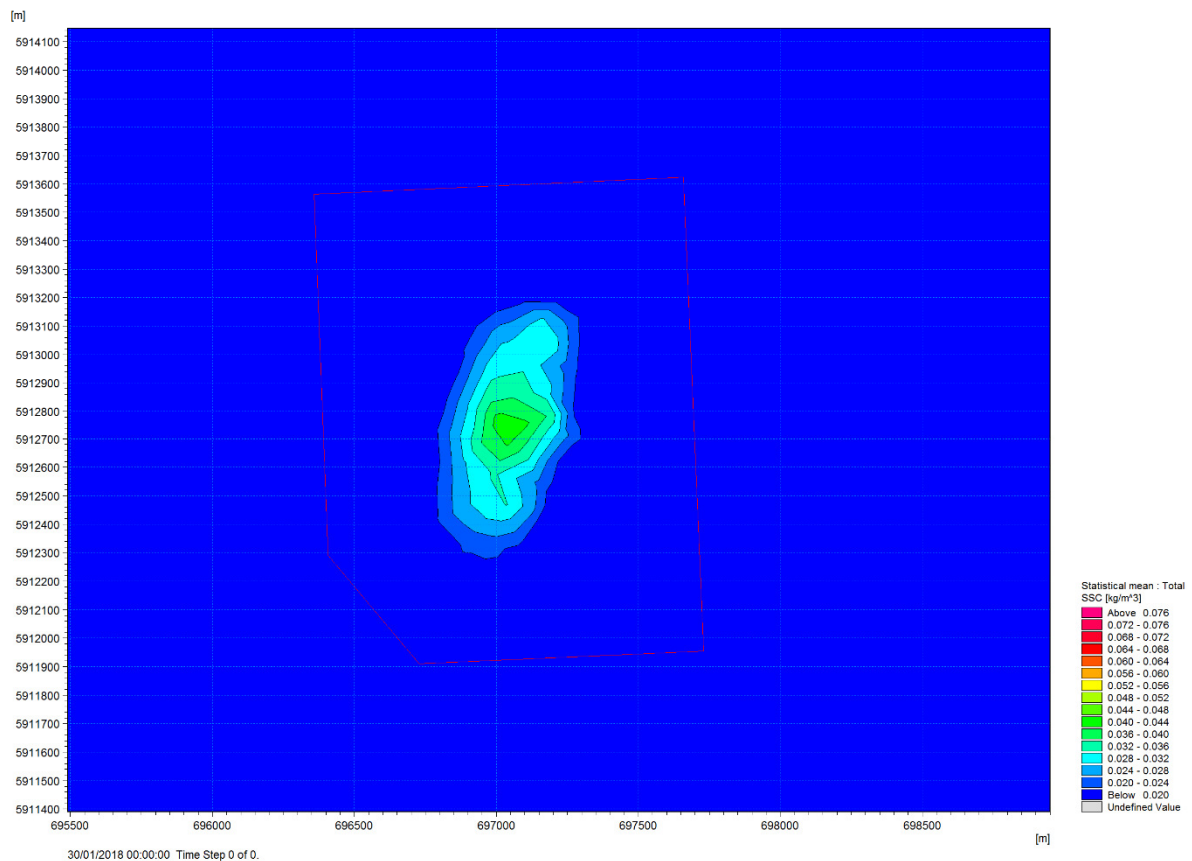


Figure 3.5.12.8 – Mean Total Suspended Solids Concentration envelope using a smaller Trailer Suction Dredger dumping circa 1,220 tonnes at 3 hourly intervals on average over the 6 month winter season

CONTRACT MANAGEMENT

The capital dredging works are being carried out by suitably qualified and experienced dredging contractors, following competitive tender. The contractors are provided with a copy of the CEMP at tendering stage and are required to comply with all relevant mitigation and environmental protection measures therein.

Each winter dredging season, the successful dredging contractor sets up a base office within the Dublin Port Estate. Daily meetings take place among the dredging contractor, DPC, Harbour Master and the environmental facilities manager. These meetings review the capital dredging works undertaken the previous day and agree the current day's work programme, taking into consideration navigational requirements including scheduled vessel movements and environmental constraints including feedback from Marine Archaeologists and Marine Mammal Observers (MMOs) undertaking monitoring duties on board the dredger.

Inspections by the Office of Environmental Enforcement (OEE) and the Foreshore Unit, DECLG are facilitated at short notice.

Dredging Risk Assessment

A Dredging Risk Assessment has been completed of the proposed dredging works that will occur in the Alexandra Basin West and the Navigation Channel (see Appendix 3).

The risk assessment considers the risk of incidents occurring that could result in liabilities materialising e.g. the event of an accident, spillage or containment breach. The risk assessment has been prepared following the Environmental Liability Risk Assessment (ELRA) methodology outlined in EPA document 'Guidance on assessing and costing environmental liabilities' (EPA, 2014). The ELRA procedure is based on the standard risk assessment principles presented in Irish Standards I.S. ISO 31000:2009 Risk Management – Principles and Guidelines; and IS. EN 31010:2010 Risk Management – Risk Assessment Techniques.

Risk identification was undertaken following a review of the information provided in the EIS. The risk identification process involved the identification of plausible incidents from dredging & disposal operations only that pose a potential hazard to the environment. Following this risk identification, a risk analysis was carried out which involved determining the likelihood and consequences for identified risk event. A risk evaluation was then carried out, which involved developing a risk matrix to allow risks to be easily displayed and risk treatment which includes mitigation measures to control and reduce the risks.

The risk assessment was carried out pre-mitigation and with-mitigation to display the reduction in risk with the proposed mitigation measures/control measures in place as outlined in the EIS. Where mitigation measures/control measures have been proposed, a set of revised risk scores have been applied.

The risk assessment has demonstrated that the proposed mitigation measures/control measures proposed will be effective in reducing the likelihood and consequence of the risk occurring.

3.6 IE LICENCE CEMP REQUIREMENTS

Condition 2.2.2.8 of the IE licence requires CEMP plan for the project. RBLMK have been commissioned by Dublin Port to undertake Phase 1 dredging and treatment of contaminated sediments within the Alexandra Basin of Dublin Port. In accordance with the licensed activities at the site the following works are proposed for the first phase of the treatment of contaminated sediments from Alexandra Basin.

- Construction of treatment facility at Berth 27
- Installation of waste water treatment plant
- Lining of Graving Dock 2
- Operation of the Treatment Facility
- Filling of Graving Dock and capping layer at Berth 53
- Environmental Monitoring
- Construction of temporary storage bund at Berth 52/53 (will be dealt with in a later submission)
- Transport of dredged material to Berth 52/53

Section 3.6 of this CEMP contains information specific to IE licence requirements.

3.6.1 Odour Management Plan

A dust and odour management plan (Ref 648_ied_dust and odour management plan) has been completed by the appointed contractor for Phase 1 of the works. This was submitted to the EPA and was approved (Licensee Return LR041122) subject to the review and implementation of the recommendations of the odour assessment report, which is to be submitted to the Agency for approval. The approved dust and odour management plan is included Appendix 4.

3.6.2 Monitoring and auditing programme (for construction works and post construction).

The monitoring programme for the treatment and recovery of the dredging spoil on site is provided in Table 3.6-1 below and frequency as detailed in Appendix 1.

Table 3.6-1 Monitoring Programme

IE Licence Requirement		
Requirements	Monitoring Locations	Parameters
Schedule C: Control & Monitoring C.2.2. Monitoring of Emissions to Water	WW1(Phase 1, Phase 2, Phase 3) Berth 52/53 WW2 Graving Doc No 2	Flow temperature pH TOC DO Suspended solids, Total Dissolved Solids Ammonia (as N) Total Phosphorus (as P), Heavy Metals, TBT, Phenols, PAH, PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C.2.3. Marine	SW1 to SW3	Suspended solids, Turbidity Temperature, Heavy Metals, TBT, PAH,

Water Monitoring in the Liffey Estuary		PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C2.4 Monitoring of Storm Water Emissions	SWO1 Graving Doc No 2 SWO2 Berth 52/53	Temperature pH Suspended solids, Heavy Metals, TBT, Phenols, PAH, PCB, Petroleum hydrocarbons Organic Compounds
Schedule C: Control & Monitoring C.4 Waste Monitoring	In any case every 1,000 m ³ . Leachate samples will be tested at 1, 2, 4 and 9 days.	Nickel TBT
Schedule C: Control & Monitoring C.5 Noise Monitoring	N1,N2,N4,N5, and N6	
Schedule C: Control & Monitoring C.6 Dust Deposition	DS1 to DS4	Bergerhoff Method
Schedule C: Control & Monitoring C.7 Groundwater Monitoring	GW1, GW2, GW4, GW5, GW6, GW7, GW8, GW10, GW12	pH COD Nitrate, Total Ammonia, Total Nitrogen, Conductivity , Chloride, Fluoride, Relevant Hazardous Substances, Heavy Metals, TBT, PAH, PCB, Petroleum hydrocarbons

Results where applicable will be assessed against emission limits/trigger levels set out in Schedule B Emission limits of an Industrial Emissions Licence.

The following plans have been completed by the appointed contractor for Phase 1 of the works;

- 648_IED_Environmental Management Plan Rev 01
- 648_IED_Water Quality Management Plan Rev 01

All monitoring listed in Table 3.6-1 except for noise and dust will be undertaken by the appointed contractor. The above mentioned Plans are included in Appendix 5 and 6.

3.6.3 Waste Management Plan

A waste management plan (648_IED_Waste Management Plan Rev 02) has been completed by the appointed contractor for Phase 1 of the works. This was submitted to the EPA. The waste management plan is included Appendix 7.

3.6.4 Waste Treatment Procedures

A Contamination and Material Management Plan (648_IED_Contamination and Material Management Plan Rev 02). This was submitted to the EPA. The Contamination and Material Management Plan is included Appendix 8.

Waste Treatment Procedures are also included in Appendix 8.

3.6.5 Waste Deposition/Fill Procedures

A Contamination and Material Management Plan (648_IED_Contamination and Material Management Plan Rev 02). This was submitted to the EPA. The Contamination and Material Management Plan is included Appendix 8.

3.6.6 Waste Monitoring Procedures

The following plans have been completed by the appointed contractor for Phase 1 of the works

- 648_IED_Environmental Management Plan Rev 01)
- 648_IED_Water Quality Management Plan Rev 01

All monitoring listed in Table 3.6-1 except for noise and dust will be undertaken by the appointed contractor. The above mentioned Plans are included in Appendix 5 and 6.

3.6.7 Water Quality Management Plan

A water quality management plan (648_IED_Water Quality Management Plan Rev 01) has been completed by the appointed contractor for Phase 1 of the works. The Water Quality Management Plan is included Appendix 6.

3.6.8 Noise and Vibration Management Plan

The Contractor shall comply with the mitigation measures as per the Noise Management Plan specified in Section 3.5.4. Monitoring of 5 locations as required by Condition 6.16 and Schedule C.5 of the IE licence will be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'

Noise-producing activities shall only take place during daylight hours where visibility provides for effective monitoring.

The Contractor shall comply with the noise emission levels as per Schedule B.4 of IE Licence. Noise from the IE installation shall not give rise to sound pressure levels LA^{eq}_{T} measured at the noise sensitive locations which exceed the limit value(s)

Noise data applicable to the IE licence will be reported to the EPA for the locations and frequency required by the IE licence conditions.

3.6.9 Dust Management Plan

A dust and odour management plan (Ref 648_ied_dust and odour management plan) has been completed by the appointed contractor for Phase 1 of the works. This was submitted to the EPA and was approved subject to the review and implementation of the recommendations of the odour assessment report, which is to be submitted to the Agency for approval. The approved dust and odour management plan is included Appendix 4.

3.6.10 Contamination Strategy

The contaminated dredge will be stabilised within the bunded area and then loaded into dump trucks for placing as fill. Best practice industry techniques will be used to treat the contaminated material yielded from the dredging of Alexandra Basin West. Ex-situ Stabilisation/Solidification (S/S) is proposed for the treatment of the contaminated material.

A Contamination and Material Management Plan (648_IED_Contamination and Material Management Plan Rev 02) has been completed by the appointed contractor for Phase 1 of the works. This was submitted to the EPA and was approved. The Contamination and Material Management Plan is included Appendix 8.

3.6.11 Traffic Management Plan

A traffic management plan (648_IED_Traffic Management Plan Rev 01) has been completed by the appointed contractor for Phase 1 of the works. The traffic management plan is included Appendix 9.

3.6.12 Marine Mammal Observation Plan

As per Section 3.5.1

3.6.13 Marine Archaeology Management Plan

As per Section 3.5.1

3.6.14 Industrial Heritage Conservation Plan

As per Section 3.5.1

3.6.15 Line of Communication, Reporting, Actions

An Environmental Management Plan (Environmental Management Plan Rev 01) has been completed by the appointed contractor for Phase 1 of the works.

The Contractor shall comply with the requirement of DPC EMS which includes procedures for internal and external communication. DPC are registered on the EDEN portal.

The preparation, revision and control of documents related to the EMS are outlined in SOP-DPC-ENV-015. DPC use a document control system called Q- Pulse and an associated procedure SOP- DPC-ENV-009 combined with hard copy control to meet the ISO standard requirements for document control.

All correspondence and reporting in relation to the requirements of the IE Licence will be made to the EPA via the EDEN System.

The IE licence sets out reporting frequencies for the submission of monitoring data and reporting to the EPA. In addition an Annual Environmental Report (AER) will be required. Reporting and notification will be undertaken as per Section 3.6.7 above.

4 SITE SAFETY

Safety will be of prime importance during the construction works. The works will be subject to the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations, 2013 (EIS, Chapter 4). All aspects of design construction will be reviewed with regard to health and safety and a risk assessment will be carried out.

A project supervisor (design phase) will be appointed to produce a pre-tender Health and Safety Plan for the project. The principal contractor will be responsible for the control and co-ordination of health and safety during the works and will be appointed as the project supervisor (construction stage).

All individuals working on the Project will be required to undertake induction procedures. Such will be designed to make individuals aware of all the issues associated with the Project and will include, but not be limited to;

- The terms of the CEMP;
- Working Hours;
- Access arrangements;
- Health, Safety and environmental policy and procedures;
- Code of Conduct within the site and surrounding environs;
- Statutory obligations of individuals on site;
- Traffic Management;
- Site parking;
- Public Access;
- Lighting requirements;
- Complaints and disciplinary procedures;
- Protection of the water environment;
- Protection of wildlife and habitats;
- Dust and air quality;
- Noise and vibration; and
- Emergency procedures.

Visitors will not be allowed onto the site unless they have received formal induction or are accompanied by an authorised person who has completed the induction. All visitors will be required to sign a visitor's book.

TABLE 3.5-3. SUMMARY OF ENVIRONMENTAL MANAGEMENT PLANS

Type of Environmental Management Plan	Compliance with Planning Condition Number	Compliance with IE Licence Condition Number	Lead Organisation	Ongoing Mitigation Required	Ongoing Mitigation Specific Requirements	Ongoing Monitoring/ Auditing Required	Timing of Ongoing Monitoring	Reporting Requirements	Reporting Procedures	Ongoing Liaison Required	Other Specific Requirements
Construction Traffic Management Plan	Condition 1, 3, 4	Condition 2.2.2.8	Contractor	Yes	Compliance with DCC's HGV Management Strategy	Yes	During Construction	Quarterly Reports	Report submitted to Planning Authority	Yes	Complaints Procedure
Site Waste Management Plan	Condition 1, 4	Condition 2.2.2.8	Contractor	Yes	Collection, control and disposal of all wastes to be recorded	Yes	During Construction	Quarterly Reports	Report submitted to Planning Authority and EPA	Yes	Complaints Procedure
Noise Management Plan	Condition 1, 4, 6	Condition 2.2.2.8	DPC	Yes	Compliance with NRA Guidelines and BS5229:2009	Yes	Preconstruction and during construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and EPA	Yes	Specific noise limits to be met at nearest noise sensitive receptors, Complaints Procedure
Dust and Odour Management Plan	Condition 1, 4	Condition 2.2.2.8	DPC Contractor	Yes	Compliance with EPA and BRE Guidelines	Yes	Preconstruction and during construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and EPA	Yes	Complaints Procedure
Contamination / Materials Handling Management Plan	Condition 1, 4, 5	Condition 2.2.2.8	Contractor	Yes	Compliance with IED Licence Conditions	Yes	Preconstruction, during construction and for 2 years after works completion	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and EPA	Yes	Complaints Procedure
Marine Mammals Management Plan	Condition 1, 4, 8	Condition 2.2.2.8	DPC	Yes	Compliance with NPWS Guidelines	Use of MMOs, installation of real-time PAM system, installation of SAM system	Preconstruction, during construction and for 2 years after works completion	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and NPWS	Yes	Close liaison required with NPWS

Type of Environmental Management Plan	Compliance with Planning Condition Number	Compliance with IE Licence Condition Number	Lead Organisation	Ongoing Mitigation Required	Ongoing Mitigation Specific Requirements	Ongoing Monitoring/ Auditing Required	Timing of Ongoing Monitoring	Reporting Requirements	Reporting Procedures	Ongoing Liaison Required	Other Specific Requirements
Birds, Seals, Lamprey, Bats, Benthos & Fisheries Management Plan	Condition 1, 4, 7, 9, 10, 11, 12		DPC	Yes	Adherence to piling and dredging mitigation measures	Specialist surveys required	Preconstruction, during construction and for 2 years after works completion	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and NPWS	Yes	Existing Black Guillemot nest boxes to be removed and replaced at specific time of year.
Marine Archaeology Management Plan	Condition 1, 4, 14	Condition 2.2.2.8	DPC	Yes	Compliance with DAHG Guidelines	Monitoring to be undertaken by marine archaeologist	During Construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and DAHG	Yes	Appropriate Licences required from DAHG
Industrial Heritage Conservation Plan	Condition 1, 4, 13	Condition 2.2.2.8	DPC	Yes	Compliance with conservation strategy developed for the ABR Project	Monitoring to be undertaken by heritage engineer or architect and marine archaeologist	Preconstruction and during construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and DAHG	Yes	Appropriate Licences required from DAHG
Water Quality Management Plan	Condition 1, 4	Condition 2.2.2.8	DPC Contractor	Yes	Compliance with EPA Guidelines etc	Installation of real-time water quality monitoring system	Preconstruction and during construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and EPA	Yes	Complaints Procedure
Dredging Management Plan	Condition, 1, 4, 5		Contractor	Yes	Compliance with Dumping at Sea Permit and Foreshore Licence	Yes	During Construction	Monthly Reports, input to Annual Environmental Report	Report submitted to Planning Authority and EPA	Yes	Complaints Procedure

APPENDIX 1 - MONITORING PROGRAMME SUMMARY

Monitoring Programme	Monitoring Element	Frequency of Monitoring	Location	Site Code	Coordinates	Parameters Measured	Surveyors / Support	Sampling Constraints	Action Threshold	Monitoring and Reporting	Report / Frequency
BIRD MONITORING	Census of Black Guillemot Population nesting in Dublin Port	Annually in period 26 March to 15 May. Two surveys to be carried out on two separate dates.	Quaysides within Dublin Port			- Number Black Guillemots on land or sea within 300m of the shore - Number of occupied nest sites and associated adults - Number of nest boxes at Oil Jetty occupied	2 / Boat Support	0500 - 0900 BST. Beaufort 4 or less. Calm Sea Conditions		RPS Bird Specialist	Annually (year ending March) by 31st July each year.
	Census of Common and Arctic Terns nesting in Dublin Port	Annually in period 10 June to 15 July	Permanent Structures and Pontoons in Dublin Port			Number of apparently occupied nests (egg clutches or flush count).	2 / Boat Support	Safety Issues. Moderate weather and sea conditions.		RPS Bird Specialist	Annually (year ending March) by 31st July each year.
	Winter Wetland Birds	6 surveys, monthly from October 1 to March 31	Intertidal areas between Dún Laoghaire West Pier and Bull Wall.			Bird Flocks - species and approx. numbers.	5	Low tide $\pm$ 2 hours. Daylight. Good weather conditions.		RPS Bird Specialist	Annually (year ending March) by 31st July each year.
MARINE MAMMALS	Marine Mammal Observation in exclusion zones	For piling, dredging, dumping and demolition operations	- Within 500m of dredging/dumping operations. - Within 1,000m of piling operations.			Presence of marine mammals	1 to 3 as required	Suitable vantage point. Accommodation on dredging vessels.	Presence of marine mammal in exclusion zone.	Marine Mammal Observer	NPWS MMO Location and Effort Forms
	Real time Passive Acoustic Monitoring	Real time at two stations	Approaches to Dublin Port	PAM1 PAM2		Dolphin, porpoise and seal vocalisations				Marine Mammal Ecologist	

	Continuous Static Acoustic Monitoring	Ongoing data logging at four stations	North of Fairway South of Fairway NW of Burford SW of Burford	SAM1 SAM2 SAM3 SAM4	N53.34861 W6.11319 N53.31889 W6.08284 N53.35213 W6.04000 N53.28610 W6.03616	Echolocation clicks of dolphins and porpoises				Marine Mammal Ecologist	
	Seal Haul Out Sites Dublin Bay	Monthly	North Bull Island and adjacent areas. Dublin Bay within zones of influence. Vantage points as defined in EIA			Species. Maturity Stage. Behaviour.	Coordinate with NPWS surveys	Low water $\pm$ 2 hours.		Marine Mammal Ecologist	
	Sea Lamprey	October, December and February	Liffey at Island Bridge OR Heuston Station		53.34621,- 6.31606 53.3 4693,-6.29571			17.00 to 10.00 h. Dark Phase of Moon.		RPS Fisheries Specialist	
	Bat Monitoring prior to building demolition/disturbance	May to September as required	Alexandra Quay West North Wall Extension			Presence of bats		NPWS - Wildlife Derogation Licence	Presence	RPS Bat Specialist	
MARINE BENTHOS	Benthic Grab and Video Surveys	Before and after capital dredging programme	Outer Dublin Bay			Benthic Communities Biomass of major Phyla Granulometry Organic Matter Content	Boat Support	Good weather, sea and visibility conditions		RPS Fisheries Specialist	
	Beam Trawl Surveys	Before and after capital dredging programme	Outer Dublin Bay			Fish Communities - Species rank / size ranges					
WATER QUALITY	Water quality in lower Liffey in Dublin Port	High frequency (15min) real time at three stations	Dolphin d/s East Link Eastern end Sludge Jetty North Bank		53.34567,-6.22637 53.34209,-6.19304 53.34539,-6.16885	Dissolved Oxygen Turbidity Temperature Salinity				RPS Environmental Facilities Manager	

			#Light								
	Water quality in Dublin Bay	High frequency (15min) real time at three stations	Dublin Bay Buoy Northwest of Dump Site Southwest of Dump Site		53.33187,-6.07743	Dissolved Oxygen Turbidity Temperature Salinity				RPS Environmental Facilities Manager	
	Wastewater and treated contaminated material as per IED licence conditions	As per licence conditions – see table 2	Graving Doc 2 and Berth 52 & 53			As per licence conditions			As per licence conditions	See Table 2	
ATMOSPHERIC NOISE AND DUST	Dust Deposition	Continuous over project duration	Poolbeg Marina DPC near Port Centre	ND1 ND2	53.34367,- 6.21483 53.34937,-6.22646	Dust deposition using Bergerhoff Dust Deposition Gauges				RPS Environmental Facilities Manager	
		IE Licence		DS1 DS2 DS3 DS4		Dust deposition using Bergerhoff Dust Deposition Gauges			As per licence conditions	RPS Environmental Facilities Manager	
	Noise Levels	Continuous for duration of Project	Poolbeg Marina DPC near Port Centre	ND1 ND2	53.34367,- 6.21483 53.34937,-6.22646	L _{Aeq}				RPS Environmental Facilities Manager	Weekly to Contractor/ DPC Annual AER
		IE Licence		N1 N2 N4 N5 N6		L _{Aeq} L _{Ar,T}			As per licence conditions	RPS Environmental Facilities Manager	To Contractor/ DPC/EPA Annual AER

APPENDIX 1 TABLE 2

APPENDIX 2 - INVASIVE ALIEN SPECIES

S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.

THIRD SCHEDULE

Non-native species subject to restrictions under Regulations 49 and 50

Part 1: PLANTS

Common name	Scientific name	Geographical application
American skunk-cabbage	<i>Lysichiton americanus</i>	Throughout the State
A red alga	<i>Grateloupia doryphora</i>	Throughout the State
Brazilian giant-rhubarb	<i>Gunnera manicata</i>	Throughout the State
Broad-leaved rush	<i>Juncus planifolius</i>	Throughout the State
Cape pondweed	<i>Aponogeton distachyos</i>	Throughout the State
Cord-grasses	<i>Spartina</i> (all species and hybrids)	Throughout the State
Curly waterweed	<i>Lagarosiphon major</i>	Throughout the State
Dwarf eel-grass	<i>Zostera japonica</i>	Throughout the State
Fanwort	<i>Cabomba caroliniana</i>	Throughout the State
Floating pennywort	<i>Hydrocotyle ranunculoides</i>	Throughout the State
Fringed water-lily	<i>Nymphoides peltata</i>	Throughout the State
Giant hogweed	<i>Heracleum mantegazzianum</i>	Throughout the State
Giant knotweed	<i>Fallopia sachalinensis</i>	Throughout the State
Giant-rhubarb	<i>Gunnera tinctoria</i>	Throughout the State
Giant salvinia	<i>Salvinia molesta</i>	Throughout the State
Himalayan balsam	<i>Impatiens glandulifera</i>	Throughout the State
Himalayan knotweed	<i>Persicaria wallichii</i>	Throughout the State
Hottentot-fig	<i>Carpobrotus edulis</i>	Throughout the State
Japanese knotweed	<i>Fallopia japonica</i>	Throughout the State
Large-flowered waterweed	<i>Egeria densa</i>	Throughout the State
Mile-a-minute weed	<i>Persicaria perfoliata</i>	Throughout the State
New Zealand pigmyweed	<i>Crassula helmsii</i>	Throughout the State
Parrots feather	<i>Myriophyllum aquaticum</i>	Throughout the State
Rhododendron	<i>Rhododendron ponticum</i>	Throughout the State
Salmonberry	<i>Rubus spectabilis</i>	Throughout the State
Sea-buckthorn	<i>Hippophae rhamnoides</i>	Throughout the State
Spanish bluebell	<i>Hyacinthoides hispanica</i>	Throughout the State
Three-cornered leek	<i>Allium triquetrum</i>	Throughout the State

Wakame	<i>Undaria pinnatifida</i>	Throughout the State
Water chestnut	<i>Trapa natans</i>	Throughout the State
Water fern	<i>Azolla filiculoides</i>	Throughout the State
Water lettuce	<i>Pistia stratiotes</i>	Throughout the State
Water-primrose	<i>Ludwigia</i> (all species)	Throughout the State
Waterweeds	<i>Elodea</i> (all species)	Throughout the State
Wireweed	<i>Sargassum muticum</i>	Throughout the State

Part 2: ANIMALS

A: animals to which Regulations 49 and 50 apply throughout the State or in particular places or categories of places.

Common name	Scientific name	Geographical application
A colonial sea squirt	<i>Didemnum spp.</i>	Throughout the State
A colonial sea squirt	<i>Perophora japonica</i>	Throughout the State
All freshwater crayfish species except the white-clawed crayfish	<i>All freshwater crayfish species except Austropotamobius pallipes</i>	Throughout the State
American bullfrog	<i>Rana catesbeiana</i>	Throughout the State
American mink	<i>Neovison vison</i>	Throughout the State
American oyster drill	<i>Urosalpinx cinerea</i>	Throughout the State
Asian oyster drill	<i>Ceratostoma inornatum</i>	Throughout the State
Asian rapa whelk	<i>Rapana venosa</i>	Throughout the State
Asian river clam	<i>Corbicula fluminea</i>	Throughout the State
Bay barnacle	<i>Balanus improvisus</i>	Throughout the State
Black rat	<i>Rattus rattus</i>	Offshore islands only
Brown hare	<i>Lepus europaeus</i>	Throughout the State
Brown rat	<i>Rattus norvegicus</i>	Offshore islands only
Canada goose	<i>Branta canadensis</i>	Throughout the State
Carp	<i>Cyprinus carpio</i>	Throughout the State
Chinese mitten crab	<i>Eriocheir sinensis</i>	Throughout the State
Chinese water deer	<i>Hydropotes inermis</i>	Throughout the State
Chub	<i>Leuciscus cephalus</i>	Throughout the State
Common toad	<i>Bufo bufo</i>	Throughout the State
Coypu	<i>Myocastor coypus</i>	Throughout the State
Dace	<i>Leuciscus leuciscus</i>	Throughout the State
Freshwater shrimp	<i>Dikerogammarus villosus</i>	Throughout the State
Fox	<i>Vulpes vulpes</i>	Offshore islands only
Grey squirrel	<i>Sciurus carolinensis</i>	Throughout the State
Greylag goose	<i>Anser anser</i>	Throughout the State

Harlequin Ladybird	<i>Harmonia axyridis</i>	Throughout the State
Hedgehog	<i>Erinaceus europaeus</i>	Offshore islands only
Irish stoat	<i>Mustela erminea hibernicus</i>	Offshore islands only
Japanese skeleton shrimp	<i>Caprella mutica</i>	Throughout the State
Muntjac deer	<i>Muntiacus reevesi</i>	Throughout the State
Muskrat	<i>Ondatra zibethicus</i>	Throughout the State
Quagga Mussel	<i>Dreissena rostriformis</i>	Throughout the State
Roach	<i>Rutilus rutilus</i>	Throughout the State
Roe deer	<i>Capreolus capreolus</i>	Throughout the State
Ruddy duck	<i>Oxyura jamaicensis</i>	Throughout the State
Siberian chipmunk	<i>Tamias sibiricus</i>	Throughout the State
Slipper limpet	<i>Crepidula fornicata</i>	Throughout the State
Stalked sea squirt	<i>Styela clava</i>	Throughout the State
Tawny owl	<i>Strix aluco</i>	Throughout the State
Wild boar	<i>Sus scrofa</i>	Throughout the State
Zebra mussel	<i>Dreissena polymorpha</i>	Throughout the State

B: animals to which specified provisions of Regulations 49 and 50 apply.

Common name	Scientific name	Geographical application
Fallow deer	<i>Dama dama</i>	Throughout the State
Sika deer	<i>Cervus nippon</i>	Throughout the State

Part 3: VECTOR MATERIALS

Vector material	Species referred to	Geographical application
Blue mussel (<i>Mytilus edulis</i>) seed for aquaculture taken from places (including places outside the State) where there are established populations of the slipper limpet (<i>Crepidula fornicata</i>) or from places within 50 km. of such places	Mussel (<i>Mytilus edulis</i>) Slipper limpet (<i>Crepidula fornicata</i>)	Throughout the State
Soil or spoil taken from places infested with Japanese knotweed (<i>Fallopia japonica</i>), giant knotweed (<i>Fallopia sachalinensis</i>) or their hybrid Bohemian knotweed (<i>Fallopia xbohemica</i>)	Japanese knotweed (<i>Fallopia japonica</i>) Giant knotweed (<i>Fallopia sachalinensis</i>) Bohemian knotweed (<i>Fallopia x bohemica</i>)	Throughout the State

APPENDIX 3 – DREDGING RISK ASSESSMENT

1.0 SCOPE OF RISK ASSESSMENT

The scope of the Risk Assessment is limited to the proposed dredging works that will occur in the Alexandra Basin West and the Navigation Channel.

Dublin Port Company (DPC) has an existing Emergency Management Plan (EMP) in place. The EMP is designed to provide guidelines to the DPC for responding to an emergency within their area of jurisdiction. As such the EMP is designed to cater for both marine and land based emergencies and the plan outlines the DPC structures and arrangements for responding to emergencies that may occur within Dublin port. As the structures and arrangements are well defined, this EMP will be adhered to during the construction phase of the Alexandra Basin Redevelopment and as such it will cover the dredging works in the event of an accident, spillage or containment.

2.0 PROPOSED DREDGING & DISPOSAL OF DREDGE MATERIAL

Activities involved

The following capital dredging activities will take place

- (a) Dredging of Alexandra Basin West to -10.0m CD
- (b) Dredging of the Liffey Channel to -10.0m CD, from the East Link Bridge to the Dublin Bay Buoy over a 6 year period.

This equates to approximately 6,370,000m³ of dredging.

Alexandra Basin West is contaminated particularly with heavy metals as a result of past cargo handling and ship repair activities.

As outlined in Chapter 4 of Volume 1 of the EIS, a suite of sampling and environmental testing has been undertaken to quantify and identify the nature of the contamination within the bed materials of Alexandra Basin West and the Liffey Channel. The results shows that the bed materials within the Alexandra Basin West are contaminated with heavy metals such as Arsenic, Copper, Chromium, Cadmium, Nickel, Lead, Mercury and Zinc at depths exceeding 2m. Lower levels of contamination (Class 2) were recorded in the channel sediments adjacent to the basin. The volume of material to be dredged is outlined in Table 2.1 below.

Table 2.1 – Dredge Volumes

Source Location	Material Status	Approx. Volume (m ³)
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Source Location	Material Status	Approx. Volume (m ³)
Alexandra Basin West	Heavily Contaminated	470,000
Navigation Channel	Slight/Moderately Contaminated	500,000
Navigation Channel	Uncontaminated	5,400,000
Total Volume	-	6,370,000

As such, there are 3 distinct dredging and disposal operations that will be carried out as part of the proposed development, and each are discussed in more detail below.

- Dredging & Disposal of Uncontaminated material from the Navigation channel (between the West Oil Jetty and the Dublin Bay Buoy);
- Dredging & Disposal of Slight/Moderately contaminated material from the Liffey Channel (upstream reach from East Link Bridge to the West Oil Jetty);
- Dredging of Heavily contaminated material from Alexandra Basin West and treatment of material at facility at Berth 52/53.

Dredging & Disposal of uncontaminated material

The marine sediments from the outer channel, comprising mainly silts, sands and gravel, between the the West Oil Jetty and the Dublin Bay Buoy will be dredged using a Trailer Suction Hopper Dredger, or equivalent. The dredged material will be loaded into the hull of the dredger, or barges, and transported directly to the licensed sea disposal site, Burford Bank in outer Dublin Bay. This disposal option is preferred because it keeps the dredge material within the natural Dublin Bay sediment cell.

It is envisaged that the dredging of uncontaminated material will be carried out during winter months only, within a 6 month period (October to March) to negate any potential impact on salmonid migration and summer bird feeding, notably terns, in the vicinity of the dredging operations.

A Dumping at Sea Permit was granted by the EPA, which enables DPC to carry out the disposal of dredged material at the licensed disposal site, Burford Bank.

Dredging & Disposal of slight/moderately contaminated material

The EPA excluded from the Dumping at Sea Permit, the loading and dumping of Class 2 sediments present in the upper reach of the navigation channel (between East Link Bridge and the West Oil Jetty). DPC are currently evaluating engineering options for the safe disposal of this material.

Dredging of Heavily contaminated material

As part of this scheme, Alexandra Basin West will be dredged to -10.0m CD. In order to achieve this, approximately 470,000m³ of material must be removed from the basin. Dredging of contaminated material within Alexandra Basin West will be undertaken to the design dredge level for the scheme.

The dredging will be undertaken using a floating pontoon with an excavator mounted clamshell bucket adapted for environmental dredging. This will minimise the disturbance and escape of material at the seabed and during removal through the water column. In addition, a silt curtain will be utilised around the dredger whilst the dredging of contaminated material is ongoing.

It is envisaged that the dredging of the contaminated sediments will not be seasonally dependent, as the silt curtain will serve to prevent the spread of suspended contaminated sediments beyond the dredge foot print.

A programme of sediment quality sampling and analysis has shown that the sediments within Alexandra Basin West are contaminated and not suitable for disposal at sea. As such, the dredged material recovered from the Alexandra Basin West will be loaded onto barges to be transported to a treatment facility adjacent to Berth 52/53. No overtopping of barges will be permitted and spill plates will be utilised to prevent spillage during offloading operations.

In order to minimise the stockpiling of dredged material, the rate of dredging will be determined by the rate of treatment of the dredged material. The treatment and recovery of the dredging spoil on site will take place in accordance with the conditions of an Industrial Emissions Licence which has been granted by the EPA.

3.0 RISK ASSESSMENT

The risk assessment considers the risk of incidents occurring that could result in liabilities materialising e.g. the event of an accident, spillage or containment breach. The risk assessment was prepared following the Environmental Liability Risk Assessment (ELRA) methodology outlined in EPA document 'Guidance on assessing and costing environmental liabilities' (EPA, 2014).

The ELRA approach is a standard risk assessment that involves the assessment of the likelihood of occurrence of an event in combination with the consequences of that event. The ELRA procedure is based on the standard risk assessment principles presented in the following Irish Standards;

- I.S. ISO 31000:2009 Risk Management – Principles and Guidelines; and
- IS. EN 31010:2010 Risk Management – Risk Assessment Techniques.

Following the EPA Guidance, the procedure is as follows:

- risk identification, i.e. the systematic identification of plausible risks, the sensitivity of the receiving environment (receptor) and the potential pathway for the activity to impact on the environment.

- risk analysis consists of determining the likelihood and consequences for identified risk events.
- risk evaluation is the ranking and presentation of risks to allow for prioritisation of the risk treatment programme.
- risk treatment is a process to mitigate risks, e.g. by removing the risk or minimising the likelihood or consequences

Risk Identification

Risk identification was undertaken following a review of the information provided in the EIS. The risk identification process involved:

- The identification of plausible incidents from dredging & disposal operations only that pose a potential hazard to the environment.

Based on a review of the dredging and disposal operations, the risks presented in Table 3.1 have been identified. The list includes all plausible risks that are considered possible to be associated with the dredging and disposal activities.

Table 3.1 Risk Register

Id	Process	Plausible Risk Identified	Environmental Effect
1	Dredging	Ship Collision with the dredge vessel within the navigation channel	Release of diesel fuel resulting in marine pollution
2		Collision of dredge vessel with fixed object within the navigation channel	Release of diesel fuel resulting in marine pollution
3		Major spill from the dredge vessel during dredging activities	Release of diesel fuel, hydraulic fluid etc. resulting in marine pollution
4		Breach in containment of the silt curtain around the dredger in Alexandra Basin West during dredging of heavily contaminated material	Spread of suspended contaminated sediment beyond the dredge foot print resulting in marine pollution
5	Loading	Overtopping of barge with recovered heavily contaminated dredged material from Alexandra Basin West	Release of recovered heavily contaminated dredged material resulting in marine pollution
6		Rupture or failure of the barge with recovered heavily contaminated dredged material from Alexandra Basin West	Barge failure with the release of sediment plume resulting in marine pollution
7		Uncontrolled or poorly controlled release of heavily contaminated dredged material during loading operations	Release of sediment plume resulting in marine pollution

8	Transport	Breach in containment of the spill plates around the barge transporting heavily contaminated dredged material to Berth 52/53	Spillage of sediment into the water column resulting in marine pollution
9		Rupture or failure of the barge while transporting heavily contaminated dredged material to Berth 52/53	Barge failure with the release of sediment plume resulting in marine pollution
10		Ship collision with the barge within the Liffey Channel	Release of diesel fuel resulting in marine pollution
11		Collision of the barge with fixed object within the Liffey Channel	Release of diesel fuel resulting in marine pollution
12	Unloading	Breach in containment of the spill plates around the barges	Spillage of sediment into the water column resulting in marine pollution
13	Dumping	Dumping Dredged spoil from the Navigation Channel at the incorrect location	Potential for impact on marine flora and fauna of a higher ecological value than the approved dump site location

Risk Analysis

The risks identified in Table 3.1 were assessed against the Risk Classification Tables (RCT) in Tables 3.2 and 3.3. The risk classification tables were designed to reflect the levels of risk appropriate to the dredging activities.

Ratings, taken from the risk classification table, were applied to the consequence and likelihood of occurrence of each hazard. A risk score was calculated for each risk using the ratings.

Table 3.2 Risk Classification Table (Likelihood)

	Likelihood	
Rating	Category	Description
1	Very Low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High Chance of hazard occurring
5	Very High	Greater than chance of hazard occurring

Table 3.3 Risk Classification Table (Consequence)

	Consequence
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Rating	Category	Description
1	Trivial	No damage or negligible change to the environment
2	Minor	Minor impact/localised or nuisance
3	Moderate	Moderate damage to environment
4	Major	Severe damage to local environment
5	Massive	Massive damage to a large area, irreversible in medium term

Risk Register

The hazards identified associated with the dumping and dredging activities are outlined in Table 3.4. A description of each heading in the table is outlined below:

- Risk ID – Provides a unique identifier for each hazard.
- Process – Notes the activity to which the hazard relates.
- Potential Risk – Identifies the potential failure mode, which could result in the hazard occurring.
- Environmental Effect – The effect on the potential hazard on the environment, in this case Marine Flora & Fauna including migratory birds, benthic communities etc.
- Consequence Rating – Rates the environmental impact due to the hazard event occurring given the current controls. The consequence rating is ranked against the Risk Classification Table (RCT) as provided in Table 3.3.
- Basis of Consequence – Identifies the basis for the selected consequence rating.
- Likelihood Rating – Rates the likelihood of the potential hazard occurring given the current controls. The occurrence rating is ranked against the Risk Classification Table (RCT) as provided in Table 3.2.
- Basis of Likelihood – Identifies the basis for the selected occurrence rating and notes the current controls in place for the hazard.
- Risk Score – Provides a risk score to allow the ranking of each hazard. The risk score is based on the product of the severity rating and the occurrence rating for the hazard.

Table 3.4 – Risk Analysis for Dredging Operations (pre-mitigation)

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
1	Dredging	Ship Collision with the dredge vessel within the navigation channel	Release of diesel fuel from one or both vessels resulting in marine pollution	4	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. The volumes involved may warrant the activation of Tier 3 response under the DPC Emergency Management Plan.	2	Low chance of collision occurring, however operations occurring in busy port	8
2		Collision of dredge vessel with fixed object within the navigation channel	Release of diesel fuel resulting in marine pollution	3	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.	2	Low chance of occurrence with sufficient force for loss of vessel or inventory.	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					The volumes involved may warrant the activation of a Tier 3 response under the DPC Emergency Management Plan.			
3		Major spill from the dredge vessel during dredging activities	Release of diesel fuel, hydraulic fluid etc resulting in marine pollution as a result of mechanical failure or refuelling	4	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. The volumes involved may warrant the activation of a Tier 3 response under the DPC EMP	2	Low level releases are possible during operations due to mechanical failure or refuelling spillage. High levels of loss or inventory loss are unlikely.	8
4		Breach in containment of the silt curtain around the dredger in Alexandra Basin West	Spread of suspended contaminated sediment beyond the dredge foot print resulting	3	Suspended sediment loss containing heavy metals could have an impact on the marine environment, as the sediment plume may disperse over a large	2	Low chance of occurrence, the choice of silt curtain will be determined by the site specific environmental conditions e.g. nature or material to be dredged,	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
		during dredging of heavily contaminated material	in marine pollution		area. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. <u>Birds</u> Wintering Brent Geese, while they swim on the surface of the water, do not feed while on the water and will not be exposed to contaminated sediments during dredging. Turbidity in the water of the Dublin Port shipping channel has the potential to increase. Fish-eating birds, such as Black Guillemots, or Cormorants or terns, can be sensitive to increasing turbidity as they use their eyes to chase and capture their prey under water. Black		type of dredger, etc.	

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					Guillemots are rarely seen foraging in the water areas of the Basin as it is unlikely that their preferred fish prey occurs here in sufficient density. As such unlikely to be affected. The breeding tern colonies will not be affected as they are located some 2km away.			
5	Loading	Overtopping of barge with recovered heavily contaminated dredged material from Alexandra Basin West	Release of recovered heavily contaminated dredged material resulting in marine pollution	3	Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. In the EIS, the spill rate from the barges was taken to be 108kg ms⁻¹, this equates to the disposal of circa 0.177million m³ per month Model simulations in the EIS (Chapter 9)	2	Low chance of occurrence as there will be restriction on the maximum load of dredged material that can be carried on the barge. No over-spill will be allowed on the barges.	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					evaluated that there will be no significant impacts affecting the intertidal habitats (wetlands) which support the wintering waders and water birds for which this site is designated.			
6		Rupture or failure of the barge with recovered heavily contaminated dredged material from Alexandra Basin West	Barge failure with the release of sediment plume resulting in marine pollution	3	The dredged material recovered from the Alexandra Basin West will be loaded onto barges to be transported to a treatment facility adjacent to Berth 52/53. The failure or rupture of the barge will result in a sediment plume, but this will be contained within the Alexandra Basin West. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.	2	Low chance of occurrence of the total loss of recovered dredged material from the barge	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
7		Uncontrolled or poorly controlled release of heavily contaminated dredged material during loading operations	Release of sediment plume resulting in marine pollution	3	The dredging will be undertaken using a floating pontoon with an excavator mounted clamshell bucket adapted for environmental dredging. This will minimise the disturbance and escape of material at the seabed and during removal through the water column. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.	2	Medium chance of occurrence, however the use of mounted clamshell bucket will minimise the release of recovered heavily contaminated dredged material. The grab size of the clamshell bucket will be between 0.75 -3 m³. Any uncontrolled release will result in localised sediment plume.	6
8	Transport	Breach in containment of the spill plates around the barge transporting heavily contaminated dredged material to Berth 52/53	Spillage of sediment into the water column resulting in marine pollution	3	The breach in containment of the spill plates around the barge may result in a spillage of sediment into the water column. Six Natura 2000 sites and two Ramsar sites lie within 5km of the	2	Low chance of occurrence as the silt curtains will be maintained. The times in which the curtains are temporarily opened will be minimised to control the containment of	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					development.		suspended solids.	
9		Rupture or failure of the barge while transporting heavily contaminated dredged material to Berth 52/53	Barge failure with the release of sediment plume resulting in marine pollution	3	The dredged material recovered from the Alexandra Basin West will be loaded onto barges to be transported to a treatment facility adjacent to Berth 52/53. The failure or rupture of the barge will result in a sediment plume, but this will be contained within the Alexandra Basin West. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.	2	Low chance of occurrence of the total loss of recovered dredged material from the barge	6
10		Ship collision with the barge within the Liffey Channel	Release of diesel fuel resulting in marine pollution	4	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality. The volumes involved may warrant the activation of a Tier 1 to Tier 3 response under	2	Low chance of collision occurring, however operations occurring in busy port	8

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					the DPC Emergency Management Plan. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.			
11		Collision of the barge with fixed object within the Liffey Channel	Release of diesel fuel resulting in marine pollution	3	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. The volumes involved may warrant the activation of a Tier 3 response under the DPC Emergency Management Plan.	2	Low chance of occurrence with sufficient force for loss of vessel or inventory.	6
12	Unloading	Breach in containment of the spill plates around the	Spillage of sediment into the water column	3	Spillage could cause fish kill, impact to birds and other marine life, impact on water quality	2	Low chance of occurrence of the breach in containment and	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
		barges	resulting in marine pollution		within the Alexandra Basin and impact on wider area. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development.		rupture of barge	
13	Dumping	Dumping Dredged spoil from the Navigation Channel at the incorrect location	Potential for impact on marine flora and fauna of a higher ecological value than the approved dump site location	3	The main impact associated with dredge spoil disposal is smothering of the benthos following deposition of large volumes of inert sediment on the seabed. The sandy sediments to be collected from the outer areas of Dublin Bay are similar in nature to the sediments identified in large parts of the dump site, as such the recovery of benthic communities present at the site will proceed more rapidly than if there were large	2	The proposed dump site (subject to DaS permit from the EPA) has been mapped and documented for many years. The disposal site has been used for dredge spoil disposal for several decades, with the benthos and demersal fish species subject to periodic smothering, and the dump site is not a known hotspot" for harbour porpoise foraging. The impacts associated with the deposition of 5.9 million m³ of mixed sediment over a 6 year period will be temporary	6

Risk Id	Process	Potential Risk	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
					differences in composition between the spoil and the sediment already at the site. Dublin Port Company will provide all dredging companies with detailed drawings, grid co-ordinates and admiralty charts indicating the exact location of the dump site. Six Natura 2000 sites and two Ramsar sites lie within 5km of the development. A deposition rate of approximately 177,000m³ of sediment (from the main shipping channel) per calendar month at the disposal site will be disposed.		negative in nature, principally affecting the direct footprint of the disposal site, and that substantial recovery can be expected to occur within 12 months of the cessation of disposal. The disposal of dredged material in the approved disposal site will take place entirely in the winter months (Oct - March), over a period 6 years.	

Risk Evaluation

Based on the risk analysis carried out in Table 3.4, the risks were prioritised to identify the risks with the highest profile and allow for prioritisation of risk treatment. The prioritised risks are presented in Table 3.5.

The prioritisation in Table 3.5 indicates that all risks with a consequence rating of 4 relate to a ship collision with the dredger or barge vessel resulting in a release of diesel fuel. The likelihood of such events occurring is however considered “low”. The risks with a consequence rating of 3 relate mainly to dispersal of silt plume or oil as a result of an incident. The likelihood of such events occurring however is considered “low” or “Moderate”.

Table 3.5 – Risk Evaluation Table (by Rank) pre-mitigation

Id	Process	Plausible Risk Identified	Consequence Rating	Likelihood Rating	Risk Score
1	Dredging	Ship Collision with the dredge vessel within the navigation channel	4	2	8
3	Dredging	Major spill from the dredge vessel during dredging activities	4	2	8
10	Transport	Ship collision with the barge within the Liffey Channel	4	2	8
2	Dredging	Collision of dredge vessel with fixed object within the navigation channel	3	2	6
4	Dredging	Breach in containment of the silt curtain around the dredger in Alexandra Basin West during dredging of heavily contaminated material	3	2	6
5	Loading	Overtopping of barge with recovered heavily contaminated dredged material from Alexandra Basin West	3	2	6
6	Loading	Rupture or failure of the barge with recovered heavily contaminated dredged material from Alexandra Basin West	3	2	6
7	Loading	Uncontrolled or poorly controlled release of heavily contaminated dredged material during loading operations	3	2	6
8	Transport	Breach in containment of the spill plates around the barge transporting heavily	3	2	6

		contaminated dredged material to Berth 52/53			
9	Transport	Rupture of failure of the barge while transporting heavily contaminated dredged material to Berth 52/53	3	2	6
11	Transport	Collision of the barge with fixed object within the Liffey Channel	3	2	6
12	Unloading	Breach in containment of the spill plates around the barges	3	2	6
13	Dumping	Dumping Dredged spoil from the Navigation Channel at the incorrect location	3	2	6

In addition to the risk evaluation table in Table 3.5, a risk matrix was developed to allow the risks to be easily displayed. The consequence and likelihood ratings are used in the matrix with the level of consequence forming the x-axis and the likelihood forming the y-axis. This matrix provides a visual tool for regular risk reviews since the success of mitigation can be easily identified. The risk matrix is displayed in Table 3.6.

The risks have been colour coded in the matrix to provide a broad indication of the critical nature of each risk. The colour code is as follows:

- Red- There are hazards with high-level of risks and requiring priority attention. These hazards have the potential to be catastrophic and should be addressed as a priority.
- Amber – There are hazards with medium to high-level of risk requiring action, but are not as critical as a red coloured risk.
- Green – These are the lowest-level risks and indicate a need for continuing awareness and monitoring on a regular basis. Whilst they are currently low or minor risks, some have the potential to increase to medium or even high-level risks and must therefore be regularly monitored and if cost effective mitigation can be carried out to reduce the risk even further this should be pursued.

The Risk Matrix indicates that there are no risks in the red zone requiring priority treatment.

There are 3 risks in the amber zone requiring treatment through mitigation or management action. These risks are associated with a ship collision with the dredge vessel within the navigation channel during dredging activities, major spill from the dredge vessel during dredging activities or ship collision with the barge within the Liffey Channel during transportation of dredged material which has the potential to result in marine pollution.

The majority of identified risks are located in the green zone indicating the need for continuing awareness and monitoring on a regular basis. However, assessment of the green zone risks has indicated that a number of these risks can be reduced through the implementation of mitigation measures. These risk treatment measures should be adopted where considered cost-effective to further reduce the risks.

Table 3.6 – Risk Matrix (Pre-Mitigation)

Likelihood	V. High	5					
	High	4					
	Medium	3					
	Low	2			2, 4, 5, 6, 7, 8, 9, 11, 12, 13	1, 3, 10	
	V. Low	1					
			Trivial	Minor	Moderate	Major	Massive
			1	2	3	4	5
			Consequence				

Risk Treatment

During the Risk Assessment, each risk identified has been examined in relation to the mitigation measures which have been recommended and proposed in the EIS. As such an updated Risk Analysis was carried out on the Risk Register, which has taken into account the mitigation measures/control measures that will be in place and as such an updated risk score is presented in Table 3.7.

Following the completion of the Risk Analysis (with-mitigation), a risk matrix was developed. This risk matrix was developed to allow the with-mitigation risks to be easily displayed. The consequence and likelihood ratings are used in the matrix with the level of consequence forming the x-axis and the likelihood forming the y-axis. The risk matrix is displayed in Table 3.8.

Table 3.7 – Risk Analysis for Dredging Operations (With-mitigation)

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
1	Dredging	Ship Collision with the dredge vessel within the navigation channel	Release of diesel fuel resulting in marine pollution	8	Marine notices, Radio Navigation warnings, monitoring and control of operations by the Dublin Port Harbour Master. Emergency response plans (SOPEP, DPC Emergency Plan, Dublin Bay OSCP) Onsite oil spill containment and response unit in the port.	4	1	4
2		Collision of dredge vessel with fixed object within the navigation channel	Release of diesel fuel resulting in marine pollution	8	Marine notices, Radio Navigation warnings, monitoring and control of operations by the Dublin Port Harbour Master.	3	1	3
3		Major fuel spill from the dredge vessel during dredging activities	Release of diesel fuel resulting in marine pollution	9	Emergency response plans (SOPEP, DPC Emergency Plan, Dublin Bay OSCP) Onsite oil spill containment and response unit in the port.	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
4		Breach in containment of the silt curtain around the dredger in Alexandra Basin West during dredging of heavily contaminated material	Spread of suspended contaminated sediment beyond the dredge foot print resulting in marine pollution	6	The silt curtains will be maintained. The times during which the curtains are temporarily opened will be minimised to control the containment of suspended solids. A contingency bubble curtain will be installed across the entrance to the Alexandra Basin West. This bubble curtain will be utilised in the event of a silt curtain around the dredger. If a failure or breach occurs, dredging activities will immediately cease, and the silt curtain will be repaired/replaced prior to restarting dredging. When required, the bubble curtain will be activated by switching on a compressor, which will force compressed air through a submerged perforated hose allowing a series of "bubble plumes". The rising bubbles cause a vertical current of air and water flowing towards the surface, generating an air curtain. This bubble curtain will prevent the spread of contaminated sediment entering the outer Navigation channel, whilst maintaining vessel access to and from the Basin. Silt curtains will be monitored as part of the site management. A furling system will allow	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
					for ease of installation and removal, allowing the silt curtains to be easily removed. The effectiveness of the silt curtains will be monitored by field turbidity measurements within and outside the curtain area. In addition, the curtain screen and anchoring will be inspected through a diver survey. The frequency of inspection will be dependent on the environment. Calmer environments can have inspections every several weeks. In the chance of extreme weather, the dredging will cease and the curtains will be removed in advance to avoid risk of damage.			
5	Loading	Overtopping of barge with recovered heavily contaminated dredged material from Alexandra Basin West	Release of recovered heavily contaminated dredged material resulting in marine pollution	6	Barge load limits will be adhered to and the appropriate level will be clearly marked on the materials barge hull.	3	1	3
6		Rupture or failure of the barge with recovered heavily	Barge failure with the release of sediment plume resulting in marine	6	Dublin Port Company are provided with certification of inspection and sea worthiness for all vessels. All vessels are subject to Irish Load Line certification and	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
		contaminated dredged material from Alexandra Basin West	pollution		MSO inspection as appropriate.			
7		Uncontrolled or poorly controlled release of heavily contaminated dredged material during loading operations	Release of sediment plume resulting in marine pollution	9	A silt curtain will be utilised around the dredger whilst the dredging of contaminated material is on-going. Loading operations will be monitored by Site manager.	3	1	3
8	Transport	Breach in containment of the spill plates around the barge transporting heavily contaminated dredged material to Berth 52/53	Spillage of sediment into the water column resulting in marine pollution	6	Spill plates will be designed to prevent any "drippings" from falling between the material barge and dock where the unloading equipment is stationed. All equipment will be inspected prior to commencement of activity.	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
9		Rupture of failure of the barge while transporting heavily contaminated dredged material to Berth 52/53	Barge failure with the release of sediment plume resulting in marine pollution	6	All equipment will be inspected prior to commencement of activity. Activity to be monitored by site management.	3	1	3
10		Ship collision with the barge within the Liffey Channel	Release of diesel fuel resulting in marine pollution	8	Marine notices, Radio Navigation warnings, monitoring and control of operations by the Dublin Port Harbour Master. Emergency response plans (SOPEP, DPC Emergency Plan, Dublin Bay OSCP) Onsite oil spill containment and response unit in the port.	4	1	4
11		Collision of the barge with fixed object within the Liffey Channel	Release of diesel fuel resulting in marine pollution	8	Marine notices, Radio Navigation warnings, monitoring and control of operations by the Dublin Port Harbour Master.	3	1	3
12	Unloading	Breach in containment	Spillage of sediment into	6	Spill plates surrounding the barges will be	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
		of the spill plates around the barges	the water column resulting in marine pollution		checked and maintained. If breach in containment is noted in the spill plates, the unloading will cease and the spill plates will be repaired/replaced prior to restarting the unloading from the barges. All equipment will be inspected prior to commencement of activity.			
13	Dumping	Dumping Dredged spoil from the Navigation Channel at the incorrect location	Potential for impact on marine flora and fauna of a higher ecological value than the approved dump site location	6	The fine sediment elements of the dredged material are predicted to disperse in a plume on each tide. Turbidity at the approved disposal site will be elevated as dumping at this location is ongoing; however, suspended solids levels will return to background levels within a period of days, following the completion of dumping in March each year. Each vessel will be fitted with a tracking device which will record the vessels position and time to ensure the dredged spoil is dumped at the correct licensed location. Restricting the navigation channel dredging operations to the winter months (October to March) provides suitable mitigation to	3	1	3

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
					ensure that the dredging operations will have no significant impact on the qualifying interests of Natura 2000 sites. To minimise the risk of direct injury to marine mammals in the areas of operation, the following will be put in place: A trained & experienced Marine Mammal Observer (MMO) will be put in place during dredging & dumping activities. The MMO will scan the surrounding area to ensure no marine mammals are in a pre-determined exclusion zone (500m for dredging activities) in the 30-minute period prior to operations. Operations will be conducted in accordance with NPWS (2014) Guidance² and will include seals. Once operations have begun operations, operations should cease temporarily if a cetacean or seal is observed swimming in the immediate (<50m) area of dredging and work can be resumed once the animal(s) have moved			

²(NPWS, 2014) "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" Department of Arts, Heritage and the Gaeltacht, Ely Place Dublin.

Risk Id	Process	Potential Risk	Environmental Effect	Risk Score (with-mitigation)	Mitigation and controls	Consequence	Likelihood	Residual Risk Score
					away. Dumping of material at sea should not take place if a cetacean or seal is within 50m of the vessel. Any approach by marine mammals into the immediate (<50 m) works area will be reported to the NPWS.			

The Risk Matrix indicates that there are no risks in the red zone.

Pre-mitigation there were 3 risks identified in the amber zone. These risks are associated with a ship collision with the dredge vessel within the navigation channel during dredging activities, major spill from the dredge vessel during dredging activities or ship collision with the barge within the Liffey Channel during transportation of dredged material which has the potential to result in marine pollution. Through the implementation of the mitigation measures/control measures that were specified in the EIS, it is evident that the likelihood of these risks can be reduced. As such, following the implementation of the proposed mitigation measures/control measures outlined in the EIS, there will no risks in the amber zone.

Pre-mitigation the remaining risks identified were in the green zone, however the likelihood of occurrence was Low. With-mitigation, the likelihood of these risks occurring has reduced and the risk of occurrence is very low.

With-mitigation, all risks will be located in the green zone, indicating the need for continuing awareness and monitoring on a regular basis.

Table 3.8 – Risk Matrix (With-Mitigation)

Likelihood	V. High	5					
	High	4					
	Medium	3					
	Low	2					
	V. Low	1			2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13	1, 10	
			Trivial	Minor	Moderate	Major	Massive
			1	2	3	4	5
			Consequence				

4.0 CONCLUSION

The scope of the Risk Assessment report is limited to the proposed dredging works that will occur in the Alexandra Basin West and the Navigation Channel.

The risk assessment considers the risk of incidents occurring that could result in liabilities materialising e.g. the event of an accident, spillage or containment breach. The risk assessment has been prepared following the Environmental Liability Risk Assessment (ELRA) methodology outlined in EPA document 'Guidance on assessing and costing environmental liabilities' (EPA, 2014).

The risk assessment included the identification of risks, risk analysis which involved determining the likelihood and consequences for identified risk events, risk evaluation which involved developing a risk matrix to allow risks to be easily displayed and risk treatment which includes mitigation measures to control and reduce the risks.

The risk assessment was carried out pre-mitigation and with-mitigation to display the reduction in risk with the proposed mitigation measures/control measures in place as outlined in the EIS. Where mitigation measures/control measures have been proposed, a set of revised risk scores have been applied. The risk assessment has demonstrated that the proposed mitigation measures/control measures proposed will be effective in reducing the likelihood and consequence of the risk occurring.

APPENDIX 4 DUST AND ODOUR MANAGEMENT PLAN

APPENDIX 5 ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX 6 – WATER QUALITY MANAGEMENT PLAN

APPENDIX 7 – WASTE MANAGEMENT PLAN

APPENDIX 8 – CONTAMINATION AND MATERIAL MANAGEMENT PLAN WASTE TREATMENT PROCEDURES

APPENDIX 9 – TRAFFIC MANAGEMENT PLAN