

Natura Impact Statement (NIS)
Revised Layout, Howth FHC Harbour Dredging and
Reclamation Project at Howth, Co. Dublin



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1 SUMMARY OF FINDINGS

1.1 NATURA IMPACT STATEMENT

Project Title	Proposed Howth Fishery Harbour Centre Dredging and Reclamation Project, Co. Dublin
Project Proponent	Department of Agriculture, Food and the Marine (DAFM)
Project Location	Howth Harbour, Howth, Co. Dublin
Natura Impact Statement	In cases where an Appropriate Assessment is required a Natura Impact Statement (NIS) is prepared; it includes a report of a scientific examination of evidence and data, carried out by competent persons with the aim of identifying and classifying any implications of a proposal, either individually, or in combination with other plans or projects, on Natura 2000 sites in view of the conservation objectives of the sites
Conclusion	<p>Provided that the design and mitigation measures proposed are implemented in full, it is considered, beyond a reasonable scientific doubt, that no adverse effects will result to the integrity of the sites selected for NIS, in light of the conservation objectives of those sites, namely:</p> <ul style="list-style-type: none"> • Baldoyle Bay SAC (000199) • Rockabill to Dalkey Island SAC (003000) • Lambay Island SAC (000204) • Rogerstown Estuary SPA (004015) • Lambay Island SPA (004069) • Malahide Estuary SPA (004025) • North Bull Island SPA (004006) • Baldoyle Bay SPA (004016) • Ireland's Eye SPA (004117) • South Dublin Bay and River Tolka Estuary SPA (004024)

2 INTRODUCTION

An Appropriate assessment was carried out on the proposed development and included with the planning application to Fingal County Council (F21A/0368) in June 2021. In early 2022 the project underwent a redesign on the reclamation area. The original Natura Impact Statement (NIS) from 2021 was reviewed with regard to the redesign of the reclamation area. This NIS is a revision of the 2021 NIS and is an appropriate assessment of the proposed development based on the revised layout. The project description and revised layout is detailed below in **Section 5**.

Appropriate Assessment is the assessment of the potential impacts on the likely significant effects of the proposed project on the integrity of Natura 2000 sites, either alone or in combination with other plans or projects, with respect to the site's ecological structure and function, and conservation objectives. Additionally, mitigation of these impacts can be considered. A Screening for Appropriate Assessment was completed and determined the need for full Appropriate Assessment (see **Appendix 2**).

The focus of the assessment of this report is to determine whether the proposed dredging, reclamation, coastal protection, landscaping and ancillary works at Howth Fishery Harbour, Co. Dublin will have a significant negative effect on the features of interest of the Natura 2000 site i.e. habitats and species. This assessment identifies the environmental aspects of the project that will interact with the ecological requirements or sensitivities of the habitats and species, and in this case these relate mainly to potential impacts to avian fauna and marine mammals during the construction phase of the project, as well as potential cumulative/in-combination effects throughout the project's construction and operational phases.

The 'test' of the assessment is whether the plan or project will have an adverse effect on the integrity of the Natura 2000 site. Where potentially significant effects are identified, proven mitigation measures will be recommended.

2.1 REQUIREMENT FOR APPROPRIATE ASSESSMENT

Article 6(3) of Directive 92/43/EEC stipulates that certain projects and plans must be subjected to an "appropriate assessment" of their effects on the integrity of Natura 2000 site(s). Article 6(3) provides in full:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the

opinion of the general public.”

The assessment carried out under Article 6(3) must be completed before a decision is made. This means consent can only be given after the competent authority, either the relevant Local Authority or An Bord Pleanála, has determined that the proposal for which consent is sought will not adversely affect the integrity of a Natura 2000 site, in view of the site’s conservation objectives. Case law of the Court of Justice of the European Union has established that the assessment carried out under Article 6(3) cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of a project on a European site¹.

2.2 STAGES OF APPROPRIATE ASSESSMENT

The Appropriate Assessment process is a four-stage process with issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The stages are set out in **Appendix 1**. The screening for Appropriate Assessment, or stage 1, associated with this proposal (See **Appendix 2**) determined that this proposal should proceed as far as Stage 2.

In cases where an Appropriate Assessment is required a Natura Impact Statement shall be prepared which shall include a scientific examination and assessment of evidence and data, carried out by competent persons, that identifies and classifies any implications for Natura 2000 sites in view of the conservation objectives of the site(s) and in light of potential impacts that could ensue from the proposal under consideration. Mitigation measures designed to ameliorate any impacts identified are described in detail in the NIS and these can be considered, subsequently, by the competent authority during the Appropriate Assessment determination.

2.3 PURPOSE OF ASSESSMENT

This Natura Impact Statement (NIS) has been undertaken to determine the potential for adverse effects of a proposal for the proposed dredging, reclamation, coastal protection, landscaping and ancillary works and subsequent operation phase at Howth Fishery Harbour, Co. Dublin, on a number of Natura 2000 sites, identified during the screening for Appropriate Assessment carried out in relation to the proposal considered in this NIS (See **Appendix 2**).

2.4 STATEMENT OF AUTHORITY

This Natura Impact Statement (NIS) has been completed by Ian McDermott (Msc. BSc.), Senior Ecologist, with Malachy Walsh and Partners. Ian has 8 years’ experience in ecological surveys and impact assessment for EIA and AA and has authored and contributed to numerous Natura Impact Statements and Ecological Impact Assessments Reports.

¹ Sweetman v. An Bord Pleanála, Case C-258/11, CJEU judgment 11 April 2013

3 METHODOLOGY

3.1 APPROPRIATE ASSESSMENT GUIDANCE

This Natura Impact Statement has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001) and the European Commission Guidance 'Managing Natura 2000 sites' (EC, 2000) and guidance prepared by the NPWS (DoEHLG, 2009). Further information is available at:

- <http://ec.europa.eu/environment/nature/legislation/habitatsdirective/>
- <http://www.npws.ie/planning/appropriateassessment/>

The aim of the assessment is to provide a sufficient level of information to the competent authority on which to base their appropriate assessment of the plan or project.

3.2 DESK STUDY

In order to complete the Natura Impact Statement certain information on the existing environment is required. A desk study was carried out to collate available information on the subject site's natural environment. This comprised a review of the following publications, data and datasets:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS)
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Irish Whale and Dolphin Group (IWDG)
- Department of Agriculture, Food and the Marine fishery harbour information
- Joint Nature Conservation Council (JNCC)
- NPWS, 2019. The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished Report, NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- Howth Harbour FHC Proposed Dredging and Reclamation Works Terrestrial Habitat, Otter and Bat Survey 2019 (Woodrow, 2020);
- Howth Harbour FHC Proposed Dredging and Reclamation Works Bird Surveys 2019 / 2020 Report (Woodrow, 2020);
- Natura Impact Statement: Proposed Pier Protection Works, East Pier, Howth FHC, Co. Dublin (MWP, 2018)
- Natura Impact Statement: Upgrade of Middle Pier, Howth FHC, Co. Dublin (MWP, 2019)
- Other information sources and reports footnoted in the course of the report

3.3 FIELD SURVEYS

A number of ecological and hydrological surveys were completed as part of the Environmental Impact Assessment Report (EIAR) at the site including:

- Habitat surveys
- Bat surveys
- Mammal surveys
- Intertidal and sub-tidal benthos surveys
- Wintering and breeding bird surveys.

See **Section 5.2.5** below and **Chapter 5** of Volume 2 of the EIAR for further details.

A risk assessment of the proposed works to marine mammals was carried out by the Irish Whale and Dolphin Group (IWDG) based on a review of available literature and data sources. Any other species of interest or ecological information pertinent to the project or this Appropriate Assessment was also recorded.

3.4 MARINE MAMMAL RISK ASSESSMENT (MMRA)

Irish Whale and Dolphin Group Consulting were commissioned by Malachy Walsh and Partners to carry out a Marine Mammal Risk Assessment (MMRA) in relation to the proposed works at Howth Harbour. This risk assessment was based on a review of available literature and data sources, including the IWDG's cetacean sightings database.

Potential impacts identified by the MMRA as being associated with the project comprised noise disturbance, increased water turbidity and physical impact (Berrow *et al.*, 2019). The MMRA determined that significant disturbance of marine mammals is unlikely by virtue of the largely sheltered location of the site, the relatively short duration of the works and the relatively high ambient noise levels, among other factors (Berrow *et al.*, 2019). The risk of injury and/or mortality of marine mammals as a result of vessel movements associated with the works were found to be low.

The MMRA recommended several precautionary mitigation measures in relation to the works and these have been included in the mitigation measures proposed in this document. The MMRA report is included in full in **Appendix 5** of Volume 3 of the EIAR.

4 SCREENING FOR APPROPRIATE ASSESSMENT

As set out in the NPWS guidance, the task of establishing whether a plan or project is likely to have an effect on a Natura 2000 site(s) is based on a preliminary impact assessment using available information and data, including that outlined above, and other available environmental information, supplemented as necessary by local site information and ecological surveys. This is followed by a determination of whether there is a risk that the effects identified could be significant on qualifying species and/or habitats of nearby Natura 2000 sites. The precautionary principle approach is required.

Once the potential impacts that may arise from the proposal are identified the significance of these is assessed through the use of key indicators in the screening process:

- Habitat loss
- Habitat alteration
- Habitat or species fragmentation
- Disturbance and/or displacement of species
- Water quality and resource.

4.1 BRIEF OVERVIEW OF SCREENING FOR APPROPRIATE ASSESSMENT

A screening for Appropriate Assessment was carried out for the proposal. The full screening for Appropriate Assessment report is available in **Appendix 2**. The test for the screening for Appropriate Assessment is to assess, in view of best scientific knowledge, if the proposal, individually or in combination with other plans/projects is likely to have a significant effect on a Natura 2000 site. If there are any significant, potentially significant, or uncertain effects on qualifying habitats and/or species, it will be necessary to proceed to Appropriate Assessment and submit a NIS. Adopting the precautionary principle in identifying potentially affected European sites, all SACs and SPAs within a 15km radius of the proposal site were included. In line with the precautionary principle, during the preparation of this report, Natura 2000 sites that lie outside 15km that may be significantly impacted as a result of the proposed works were also considered. Designated SAC and SPA sites within the zone of potential significant impact influence i.e. within 15km radius, of the proposal site, including their proximity are shown in **Table 1** below.

Table 1. Natura 2000 sites within 15km radius of the proposal site

Designated Site	Site Code	Proximity of site to nearest point of designated site
Baldoyle Bay SAC	000199	SAC located immediately adjacent
Howth Head SAC	000202	SAC located approx. 0.3km to south-east
Ireland's Eye SPA	004117	SPA located approx. 0.5km to north-east
Howth Head Coast SPA	004113	SPA located approx. 0.5km to east
Rockabill to Dalkey Island SAC	003000	SAC located approx. 0.5km to east
Ireland's Eye SAC	002193	SAC located approx. 0.8km to north-east
North Dublin Bay SAC	000206	SAC located approx. 1.9km to south-west
North Bull Island SPA	004006	SPA located approx. 1.9km to south-west
Baldoyle Bay SPA	004016	SPA located approx. 2.2km to west
Malahide Estuary SAC	000205	SAC located approx. 5.8km to north-west
Malahide Estuary SPA	004025	SPA located approx. 6.4km to north-west
South Dublin Bay and River Tolka Estuary SPA	004024	SPA located approx. 7.3km to south-west
South Dublin Bay SAC	000210	SAC located approx. 8.3km to south-west
Lambay Island SPA	004069	SPA located approx. 10km to north-east
Lambay Island SAC	000204	SAC located approx. 10.3km to north-east
Rogerstown Estuary SPA	004015	SPA located approx. 10.7km to north-west
Rogerstown Estuary SAC	000208	SAC located approx. 11.3km to north-west
Dalkey Islands SPA	004172	SPA located approx. 12.2km to south

4.2 CONCLUSIONS OF THE SCREENING FOR APPROPRIATE ASSESSMENT

Potential adverse effects on eight of the eighteen Natura 2000 sites which occur within the zone of impact influence have been screened out due to a lack of credible or tangible source-pathway-receptor links between these sites and the proposal site. The comprehensive reasoning for this conclusion is available in the Screening for Appropriate Assessment appended to this report (**Appendix 2**).

The screening assessment concluded that significant habitat loss/alteration e.g. deposition of re-suspended sediments negatively impacting on the mud and sandflat communities within the Baldoyle Bay SAC and disturbance and/or displacement impacts to marine mammals, qualifying interests of Rockabill to Dalkey Island SAC and Lambay Island SAC, and birds species, qualifying interests of the Rogerstown Estuary SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Baldoyle Bay SPA, Ireland's Eye SPA and the South Dublin Bay and River Tolka Estuary SPA, during the construction phase of the proposed development could not be ruled out. Due to the overlap in species between these SPA's, it is difficult to be confident that the birds noted within Howth Harbour correspond to a particular SPA's population and thus each SPA was included in the assessment. Overall, further assessment is required for the following Natura 2000 sites:

- Baldoyle Bay SAC (000199)
- Rockabill to Dalkey Island SAC (003000)
- Lambay Island SAC (000204)
- Rogerstown Estuary SPA (004015)
- Lambay Island SPA (004069)
- Malahide Estuary SPA (004025)
- North Bull Island SPA (004006)
- Baldoyle Bay SPA (004016)
- Ireland's Eye SPA (004117)
- South Dublin Bay and River Tolka Estuary SPA (004024)

Additionally, following identification of on-going activities that could act in-combination with the project, it was concluded that there is potential for significant cumulative effects, or significant cumulative effects could not be ruled out at screening stage.

5 PROJECT BACKGROUND

5.1 BRIEF PROJECT DESCRIPTION

Due in part to build-up of siltation and to increasing vessel sizes, it is necessary to dredge the existing basins & approach channels in Howth Fishery Harbour Centre (FHC) in order to provide safe access, navigation and berthing to the vessels currently using the harbour, and to provide for appropriate maintenance of same into the future through a programme of measurement and maintenance dredging.

It is proposed to dredge circa 240,000m³ of material from the seabed within Howth FHC, treat and beneficially re-use this material to the west of the West pier in order to create an additional circa 4.8Ha of land area. The infill area will initially incorporate a mix of public realm, grassed areas, paths, water access point and hardstanding areas. Subsequently the hardstanding areas may incorporate a mix of fishing and industrial elements and light industrial/ commercial elements. These will ultimately require planning approval separate to the proposed development.

The aim of the overall project is to increase the depth of water in the harbour in order to provide safe access for the largest range of vessel sizes and types on the widest range of tides, within the structural parameters of the existing harbour quay structures; and, where possible to treat and re-use or dispose of dredge material in an environmentally sensitive and cost effective manner.

5.1.1 Purpose of the Project

The purpose of the proposed works is to provide the safe access, navigation and berthing of vessels in Howth Harbour while utilising the treated dredged material to create an additional area of land that will incorporate a mixture of recreational and commercial land uses.

5.1.2 Subject Site Location and Context

Howth Harbour is situated on the north side of Howth Peninsula, to the north of Dublin Bay (**Figure 2**). The harbour itself comprises of three main areas; a trawler basin entered between two bull-noses to the north, swing moorings area to the east and a marked channel to the yacht club marina.

For the purposes of the dredging project the harbour is considered to comprise of five areas:

1. Trawler Basin;
2. Harbour Approach Channel;
3. Mooring area;
4. Marina Approach Channel;
5. Marina Area.

Howth Harbour operates as a Fishery Harbour Centre under the Department of Agriculture, Food and the Marine. The harbour area is enclosed by a West Pier and an East Pier. Within this enclosed area is a

further pier, the Middle Pier, extending northwards from the south side of the harbour, and, a breakwater extending westwards from the East Pier.

The proposed site is situated in proximity to several Special Protection Areas (SPA) and Special Areas of Conservation (SAC), the closest of which are Howth Head SAC, Baldoyle Bay SAC, Ireland's Eye SPA and Howth Head Coast SPA. There is a total of eighteen designated Natura 2000 within 15km of the proposed works.

5.1.3 Revised layout

In early 2022 the project layout got revised from the original layout that was included in the planning application to Fingal County Council (F21A/0368) in 2021. The main changes in the revised layout are shown in the below **Figure 1**. They are a proposed new water channel and bridge between the northern end of the reclamation area and the West Pier.

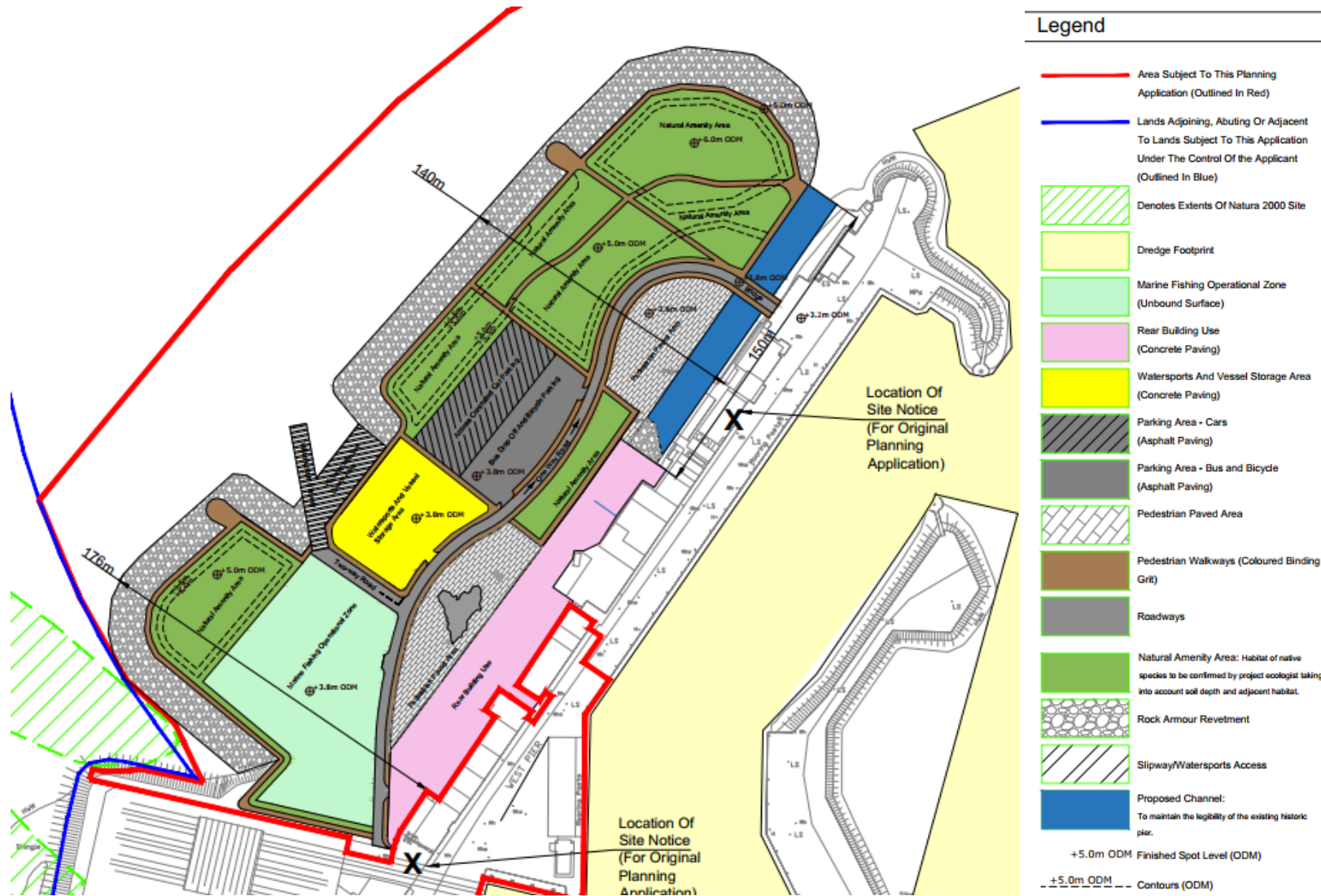


Figure 1. Revised site layout of proposed development (excerpt from planning drawing no. 19934-5002-D-Site Layout Plan).

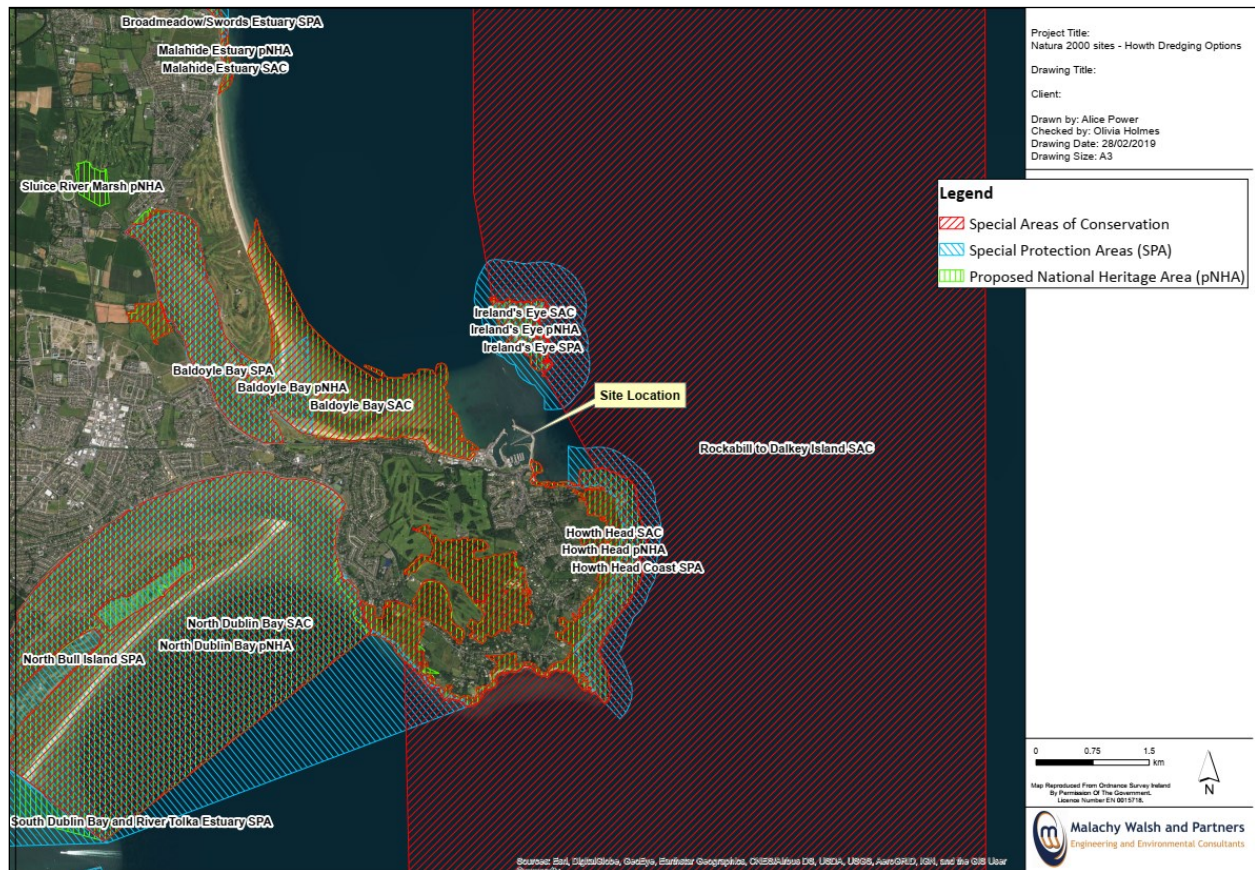


Figure 2 Site location map showing proposed project extent and location

5.1.4 Description of the Site

5.1.4.1 Site Layout

Howth Head is a rocky peninsula situated on the northern side of Dublin Bay and comprises Cambrian rock including sea cliffs of up to 90 metres in height. Ireland's Eye, an uninhabited island, lies approximately 1.0km north of the harbour. To the east of the harbour are Howth Head and the Irish Sea; to the west a large sandy intertidal area towards Baldoyle/Portmarnock. The coastal water quality is classified as 'unpolluted' by the EPA².

Howth Harbour operates as a Fishery Harbour Centre (FHC) under the Department of Agriculture, Food and the Marine. The core fishing fleet is in the order of 65 vessels, and there is significant marine leisure activity including the Howth Yacht Club and the Howth Sailing and Boating Club. There are also a number of restaurants and shops along the West Pier. Fish processing and boat repair works are also

² <http://gis.epa.ie/Envision> [Accessed 11/02/2020]

undertaken on the harbour. Water depth within the harbour varies due to sedimentation and the waters beyond the pier walls are relatively shallow becoming deeper further north of the harbour.

The existing Middle Pier at Howth consists of approximately 180m of quay wall, and an extra 130m of rock armour revetment, serving as a breakwater-type structure within the harbour. The deck widths of the quay wall and revetment areas are approximately 30m and 10m respectively. The total width of the rock armour revetment is approximately 40m at bed level.

The existing East Pier was constructed in the early 19th century. The pier consists of an inner quay wall, an upper and lower promenade and a smooth, shallow, sloped seaward face. The East Pier at Howth FHC is approximately 700m long, with a total area of approximately 30,000m². The structure consists of an inner quay wall, an upper and lower promenade, approximately 6m and 14m wide respectively, and a smooth shallow sloping seawards face. Rock armour protection has been placed to the toe of the seawards face.

The existing West Pier provides approximately 450m of berthing quay wall within the Trawler Basin. Harbour facilities available on the West Pier include a fish auction hall, ice plant, boat lift (Syncrolift) and a repairs shipyard. The west side of the main pier road is primarily used for retail and restaurant trade. In the south western corner of the west pier there are light industrial operations related to the fishing industry. Adjacent to the south western side of the Trawler Basin there is open public parking, green space and the Howth Tourist Information Office.

5.1.4.2 Site History

Howth has been a trading port for many centuries; however, the existing harbour West and East Piers were not constructed until the early 19th century. The West and East Piers are of masonry construction.



Figure 3 Historic 6 Inch Map of Howth Harbour (1837 – 1842)

The current harbour layout was developed in the early 1980s with the construction of the Middle Pier and East Pier breakwater. These works provided segregated areas for fisheries and leisure users i.e. western trawler basin, swing mooring area and marina area. These works were carried out by bunding the harbour mouth and drying out the harbour by pumping water out. Works were carried out in the dry. The proposed dredge levels in this project are the same levels that were previously dredged to in the 1980s.



Figure 4 Construction of the marina area in the 1980s. Dredging was carried out in the dry.

5.1.4.3 *Exiting Harbour Activities*

There are several current operations within the Howth Harbour. These include the following;

- Fisheries - BIM statistics from 2015 (BIM “The Business of Food”, 2015) valued the landings of fish at Howth at €12 million. Howth FHC was joint 6th in terms of fishery landings at Fishery Harbour Centres in 2015. The harbour has 650m of berthing quay face available and an ice plant.
- Shipyard - There is a functioning shipyard, with electric power supply and fresh water, for use to all types of vessels. Engine repairs can be undertaken locally. Electronic and radio repairs are carried out by agents for all gear. The Harbour offers a service to lift and transfer of vessels to the shipyard.
- Commerce - Howth Harbour is active commercially, with a range of retail and leisure outlets, including multiple restaurants. Commerce is concentrated on the West Pier.
- Tourism - Howth is a popular tourist destination with easy access via the DART. Tourists come to Howth to sight see at the harbour, to walk on the piers and hill and also to take boat trips from the harbour. A passenger ferry pontoon is located on the West Pier.
- RNLI - The RNLI operate an inshore lifeboat from a station situated within the Marina Area, just west of the Yacht Club Marina.

- Leisure - Howth Yacht Club marina is a private member sailing club with a 250-berth marina. There are also swing moorings available within the harbour for leisure users.

5.1.5 Field Surveys

A number of ecological and hydrological surveys were completed as part of the Environmental Impact Assessment Report (EIAR). The following sections summarise the methodologies employed and the results for the same.

5.1.5.1 Existing Hydraulic Regime

A Hydrological and Sediment Regime assessment was carried out (**Appendix 4** of the EIAR) as part of the EIAR. A survey of the tidal currents was carried out as part of this assessment. Tidal currents on the latter quarter of the ebb and for most of the flood sweep around Howth Head and move north-west past the mouth of the harbour. On the latter quarter of the flood and most of the ebb the currents sweep back from the north and west and out into the Irish Sea east of Howth Head. The currents fill and empty Baldoyle Estuary to the west. The average current within the harbour is much slower than outside the harbour.

5.1.5.2 Intertidal & Sub-tidal Benthos Survey

Aquatic Services Unit (ASU) undertook a survey of the intertidal and sub-tidal benthos in the area. A total of 19 sub-tidal stations (see **Figure 5**) were sampled for benthic faunal analysis, granulometric analysis and organic carbon analysis. Samples were taken exclusively where there was sufficient penetration of the Van-Veen grab. Granulometric analysis was carried out on oven dried sediment samples from each station using the protocols described by Holme & McIntyre (1984). Further analysis of the sediment data was undertaken using the Gradistat package (Blott & Pye, 2001). See **Appendix 6** of Volume 3 of the EIAR for full report details.

On returning to the laboratory all faunal samples were sieved on a 1.0mm mesh sieve, preserved in buffered formalin and subsequently sorted by eye. All fauna was identified to the lowest taxonomic level possible using standard keys to north-west European fauna.

A number of biotic indices were calculated from the species / abundance matrix from the grab samples. These indices included Simpson's Dominance Index (where values range from low dominance [0] to high dominance [1]), Shannon-Wiener Diversity Index (Values ranging from low diversity [0] to high diversity [4]) and Pielou's Evenness Index (values ranging from low i.e. dominated by a few species [0] to high evenness i.e. a more even spread of species [1]).

Additionally, a walk-over survey of intertidal habitats and associated biological communities was undertaken along the northern side of the Howth West Pier during low spring tide on June 7th 2019.

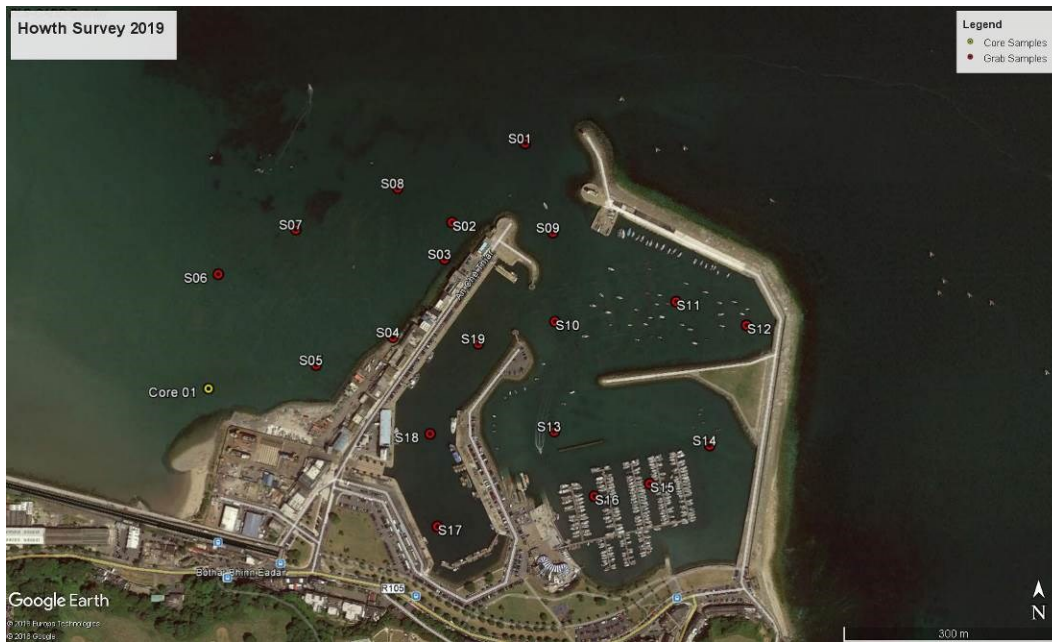


Figure 5 Map showing positions of sampling stations in connection with the sub-tidal faunal sampling.



Figure 6 Study area showing survey sections from Intertidal hard benthos survey.

In total 55 taxa were encountered in the soft sediment samples. A full list of the species and their densities are shown in **Appendix 6** of Volume 3 of the EIAR. Derived indices for each station are presented in **Table 2** below.

Stations S01 and S02 contained the highest number of taxa per site compared to all other sites, with numbers of 23 and 17 respectively (**Table 2**). Three stations had only 2 taxa (Stations S16, S17 & S18). All sites located outside of the Howth Harbour basin had more diversity compared to all sites within the basin, with the exception of S09, which is located at the Harbour entrance.

The bivalve mollusc *Abra alba* is the most common taxa within the survey area, being present at 13 sites with 384 individuals identified (See **Appendix 6** of Volume 3 of the EIAR). Other common taxa present across the survey area include the polychaete worms *Nephtys hombergii* (70 individuals across 12 sites), *Lanice conchilega* (51 individuals across 8 sites), *Owenia borealis* (36 individuals across 9 sites), the gastropod mollusc *Peringia ulvae* (269 individuals across 6 sites) and the bivalve molluscs *Fabulina fabula* (80 individuals across 8 sites) and *Corbula gibba* (13 individuals across 7 sites).

Table 2 Derived indices calculated for all stations in the survey area.

	Number of Species (S)	Number of Individuals (N)	Shannon-Wiener Diversity (H')	Pielou's Evenness (E)	Simpson's Dominance (D)
S01	23	380	1.38	0.439	0.483
S02	17	52	2.41	0.852	0.12
S03	13	54	1.83	0.712	0.256
S04	9	29	2.05	0.933	0.141
S05	9	19	1.88	0.857	0.197
S06	8	25	1.8	0.864	0.206
S07	9	47	1.37	0.622	0.41
S08	12	57	1.79	0.721	0.288
S09	11	35	2.05	0.855	0.167
S10	7	17	1.71	0.877	0.211
S11	7	169	0.926	0.476	0.533
S12	7	57	1.48	0.761	0.288
S13	5	53	1.17	0.73	0.36
S14	5	127	0.384	0.239	0.838
S15	4	7	1.28	0.921	0.306
S16	3	7	0.796	0.725	0.551
S17	2	2	0.693	1	0.5
S18	2	5	0.673	0.971	0.52
S19	2	5	0.5	0.722	0.68

Core 1	11	28	2.04	0.851	0.173
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The littoral shore within Howth Harbour has been classified as Infralittoral Fine Mud (SS.SMu.IFiMu) habitat which is a common habitat in harbours in Ireland and the UK (Connor *et al.*, 2004). Outside the Harbour, fauna typical of fine sands and muddy sands were recorded which reflect the nature of the sediment identified. This littoral habitat has been classified as Infralittoral muddy sand (SS.SSa.IMuSa) habitat (Connor *et al.*, 2004).

Results from the particle size analysis (Granulometry) indicated the presence of two distinct sediment types in the area based on location in relation to the Howth Harbour Basin. Samples collected from within the Harbour basin consist of fine muds and sandy muds, while samples collected from outside the harbour basin consist of fine sands and muddy sands.

The report concluded that *'all species and habitats identified in the survey area are common in Irish coastal waters. In soft sediment areas within the basin, dominated by fine muds, abundances and diversities are low. Samples taken from within the areas to be dredged are similar to those taken as dredge site controls. Areas located outside the basin consist of sands and muddy sands, with no differences in habitat noted between the proposed disposal areas and the disposal control areas. Diversity is higher in samples collected outside the Howth basin'* (ASU, 2019).

5.1.5.3 Habitat Survey

A total of sixteen habitats were identified during an initial phase 1 habitat survey of Howth Harbour and surrounding coastal landscape, see **Figure 7** below for locations. The habitats recorded are as follows;

- Buildings and artificial surfaces BL3
- Sea walls, piers and jetties CC1
- Shingle and Gravel Banks CB1
- Embryonic Dune CD1
- Marram Dune CD2
- Fixed Dune CD3
- Dune Scrub and Woodland CD4
- Amenity Grassland (Improved) GA2
- Ornamental/non-native shrub WS3
- Treelines WL2
- Scattered Trees and Parkland WD5
- Scrub WS1
- Scrub WS1 on Coastal Cliff CS1

Refer to **Appendix 12** of the EIAR '*Howth Harbour FHC Proposed Dredging and Reclamation Works; Terrestrial Habitat, Otter and Bat Survey 2019*' for further detail.

Of the habitats recorded five corresponded to or have links to Annex I Habitats of the EU Habitats Directive, three of which occur adjacent to the western pier (Woodrow, 2020). See **Table 3** below. It is noted none of these habitats occur within the proposed development site.

Table 3. Habitats recorded during the site survey which correspond to or have links to the Annex I habitats of the EU Habitats Directive

Fossitt Habitat Classification	Annex I Habitat	Correspond to/Links to		Qualifying Habitat of Natura 2000 site
Shingle and Gravel Banks CB1	Annual Vegetation of Drift Lines (1210)	Correspond to		Located within the Baldoyle Bay SAC. However, not listed as a qualifying habitat.
Embryonic Dune CD1	Embryonic Shifting Dunes (2110)	Correspond to – western end of Claremont Beach	Links to – eastern end of Claremont Beach, south of proposed reclamation area.	Located within the Baldoyle Bay SAC. However, not listed as a qualifying habitat.
Marram Dune CD2	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes") (2120)	Correspond to		Located within the Baldoyle Bay SAC. However, not listed as a qualifying habitat.
Fixed Dune CD3	Fixed Coastal Dunes with Herbaceous Vegetation ("Grey Dunes") (2130)	Correspond to		Located within the Baldoyle Bay SAC. However, not listed as a qualifying habitat.
Sand Shores LS2	Mudflats and sandflats not covered by seawater at low tide (1140)	Correspond to		Sections of this habitat occur within the Baldoyle Bay SAC and are shown as the Annex 1 habitat 1140 within the conservation objective series document (NPWS 2012c)



Figure 7 Habitat Map (Woodrow, 2020)

5.1.5.4 Breeding Bird Survey

A total of three species were confirmed as breeding within Howth Harbour i.e. Black Guillemot (3 to 4 pairs within the harbour walls and 1 to 2 pairs in buildings facing onto the proposed reclamation area), pied wagtail (1 pair holding a territory at the mouth of the harbour) and rock pipit (1 pair holding a territory along the eastern seawall, adjacent to the Moorings).

Numerous seabird species were recorded breeding in the environs of Howth Harbour, namely Fulmar, Cormorant, Shag, Gannet, Herring Gull, Lesser Black-backed Gull, Great black-backed Gull, Kittiwake, Common Guillemot, Razorbill and Puffin. These species were largely confined to both Ireland's Eye (SPA) and Howth Head Cliffs. Refer to **Appendix 7 'Howth Harbour FHC Proposed Dredging and Reclamation Works; Bird Surveys 2019 / 2020 Report'** for further detail.

Of these species Cormorant, Herring Gull, Guillemot, Razorbill and Kittiwake are listed as species of conservation interest (SCI) for the Ireland's Eye SPA. Kittiwake is the only qualifying species for Howth Head Coast SPA.

5.1.5.5 Wintering Bird Survey – High tide / Low tide bird usage.

The site was split into four survey sections which covered both Howth Harbour and the surrounding environment (see **Figure 8** below). Numerous species were recorded foraging and roosting within Howth Harbour and / or in proximity to the harbour and proposed reclamation area during high and low tide cycles, these are shown in **Table 4 & 5** below. Refer to **Appendix 7 'Howth Harbour FHC Proposed Dredging and Reclamation Works; Bird Surveys 2019 / 2020 Report'** for further detail.

During high tide several high tide roosts were noted. Ringed plover was only recorded during the high tide period and this was related to birds utilising the outer walls of the harbour as high tide roost locations. One of the roosts was located on the eastern seawall and is therefore removed from proposed works. The other roost location is on the western seawall near the mouth of the harbour and at the northern tip of the proposed spoil reclamation area. This roost site was noted to contain nationally important numbers of Ringed Plover. See **Section 7.4.2 Figure 26** for roost locations. It appears that this roost location is inter-changeable with the roost on the East Pier; however, based on occupancy levels the location on the West Pier appears to be a favoured option.

A mixed flock high tide roost at the south-western tip of the proposed spoil reclamation area is noted as a roost location in the supported information for the Baldoyle Bay SPA and was categorised as a roost supporting between 50 to 99 birds (NPWS, 2012). Counts conducted by Woodrow over 2019-20 confirmed the occupation of this roost at high tide and found that the roost was less fixed in terms of location and birds sometimes gathered further south or actually spread more in the reclamation area. A wider range of species utilised this roost than the one further north, although attendance was by relatively small numbers and included (max. counts reported) a number of species listed as qualifying interests of nearby SPA's: Brent geese (10 birds - foraging), , Oystercatcher (22 birds), Turnstone (33 birds), Curlew (1 bird), , Herring gull (72 birds) and Black-headed gull (10 birds). In addition, the assemblage of species at the roost was highly variable across all the counts.

There were several small Redshank and Turnstone roosts in Section 1 & 2, including southwest and northern tip of the proposed spoil reclamation area, the inner harbour wall between the Marina and the approach channel and the mid-harbour wall.

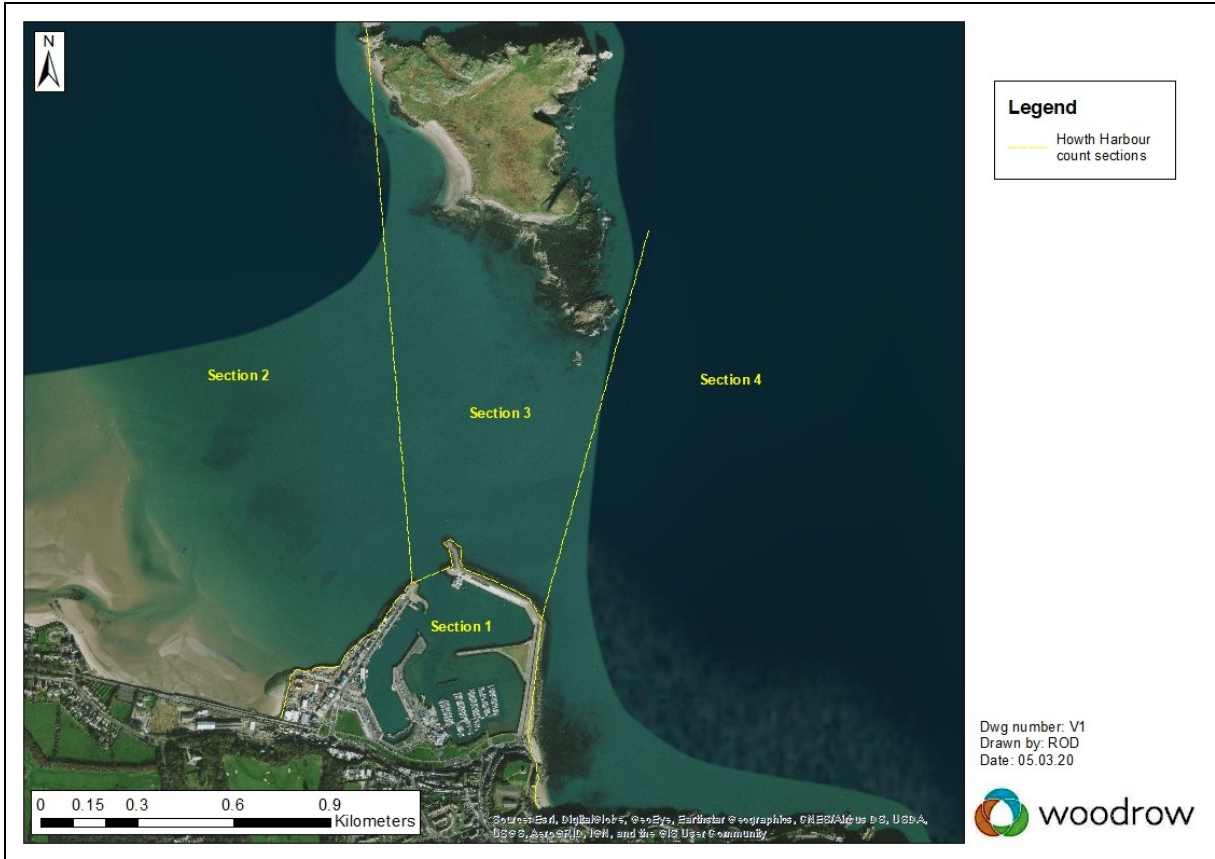


Figure 8 Howth Harbour bird usage mapping count sections

Table 4 Winter bird usage - species list, max count per section, average number of birds counted per section: LOW TIDE

Low tide		Max no of birds present				Mean			
Species code	Species name	Section 1	Section 2	Section 3	Section 4	Section 1	Section 2	Section 3	Section 4
BA	Bar-tailed Godwit		1				0.1		
BH	Black-headed Gull	7	23		2	2.3	7.4		0.3
CA	Cormorant	5	5	17	14	1.7	0.8	3.1	3.0
CA/SA	Cormorant/Shag			7				1.1	
CM	Common Gull	1	3			0.1	0.3		
CU	Curlew		26				4.8		
ET	Little Egret	1				0.1			
GB	Great Black-backed Gull	26	62	52	19	8.3	22.0	25.8	3.4
GG	Great Crested Grebe	1	2			0.1	0.4		
GU/RA	Guillemot/Razorbill			250				20.8	
GU	Common Guillemot			1	12			0.1	1.1
GX	Northern Gannet			260				55.4	
H	Grey Heron	16	3	1	2	4.6	0.8	0.5	0.3
HG	Herring Gull	175	456	456	89	92.5	176.6	226.2	39.8
KI	Black-legged Kittiwake				90				11.8
MA	Mallard	2				0.3			
MS	Mute Swan	5		5		0.4		0.4	
OC	Oystercatcher	1	18	9	5	0.3	10.3	1.3	2.7
PB	Brent Goose	34	18	52		10.0	1.8	6.1	
PS	Purple Sandpiper			4	6			1.0	0.5
RA	Razorbill			15	51			1.3	4.3
RH	Red-throated Diver		2		1		0.2		0.1
RK	Redshank	14	3	3	5	5.0	0.6	0.3	1.0
RM	Red-breasted Merganser		2				0.2		
SA	Shag	2	4	13	10	0.9	0.8	4.2	3.5
SU	Shelduck			13				2.4	
TT	Turnstone	2		9	4	1.1		1.8	0.8
TY	Black Guillemot	1				0.1			

Table 5 Winter bird usage - species list, max count per section, average number of birds counted per section: HIGH TIDE

High tide		Max no of birds present				Mean			
Species code	Species name	Section 1	Section 2	Section 3	Section 4	Section 1	Section 2	Section 3	Section 4
BH	Black-headed Gull	14	13		42	2.0	3.7		6.3
CA	Cormorant	5	2	63	6	1.2	0.3	9.7	1.3
CA/SA	Cormorant/Shag		8	43	12		0.7	12.1	1.9
CM	Common Gull		2	1			0.1	0.1	
CU	Curlew		1				0.1		
DN	Dunlin	2	2	12		0.1	0.1	1.8	
GB	Great Black-backed Gull	45	6	73	13	22.7	2.3	22.1	1.9
GG	Great Crested Grebe		4				0.6		
GK	Greenshank		1				0.3		
GU/RA	Guillemot/Razorbill			200	16			200	
GU	Common Guillemot	4	1	38	25	0.4	0.1	2.9	2.0
GX	Gannet			230	11			44.4	0.9
H	Grey Heron	14	5	1		4.8	0.4	0.1	
HG	Herring Gull	245	87	415	109	151.9	20.98	94.6	26.9
KI	Black-legged Kittiwake				36				2.6
LG	Little Grebe	5				0.9			
MA	Mallard	2				0.1			
ND	Great Northern Diver		1	1			0.1	0.1	
OC	Oystercatcher	13	23	39	1	1.5	7.0	4.6	0.1
PB	Brent Goose	51	10	66		6.6	2.2	14.3	
PE	Peregrine Falcon			1				0.1	
PS	Purple Sandpiper**		1	11**	9		0.1	2.0	0.4
RA	Razorbill	1		41	4	0.2		2.9	0.4
RH	Red-throated Diver	2	4	1		0.2	0.4	0.1	
RK	Redshank	30			3	9.4			0.4
RM	Red-breasted Merganser		8				0.6		
RP	Ringed Plover*	11	157*	115		0.8	47.4	21.7	
SA	Shag	2	3	6	3	0.1	0.4	0.9	0.9
SS	Sanderling		1				0.1		
SU	Shelduck			14				2.4	
TT	Turnstone	63	33	7	3	13.0	4.6	1.3	0.2
TY	Black Guillemot	5		4		1.2		0.3	

*Note: ringed plover roost is at the boundary between section 1 and 2, hence counted the same birds in each section. The roost in section 3 is different from the section 1/2 roost, however was thought to support the same birds. **Nationally important numbers for this species is 120.**

**Note: Nationally important numbers for this species is 20.

5.1.6 Characteristics of the Project

The purpose of this section is to provide an appropriate level of detail on the proposed development to present a basis for the assessment of potentially significant effects in view of the conservation objectives of the surrounding Natura 2000 within the zone of influence.

5.1.6.1 *Timing and Duration of Construction*

The project is aiming to start in the Summer of 2022. The works programme is estimated to be 24 months from commencement on Site.

Dredging and treating activities will be carried out as follows;

- Monday-Friday: 07:00 – 21:00
- Saturday: 07:00 – 17:00
- Sunday : No work

All other activities such as construction of the embankment, rock revetment, landscaping, drainage etc will be undertaken as follows;

- Monday-Friday: 07:00 – 19:00
- Saturday: 07:00 – 17:00
- Sunday: No work

Table 6 The proposed Programme of Works is likely to be as follows, but in accordance with any required mitigation

Year	1												2											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Stage1 - Perimeter Embankment	█	█	█	█	█	█	█	█	█															
Stage2 - Dredging of Howth Harbour				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█			
Stage3 - Reclamation of land up to ground level				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█			
Stage4 - Finishings																				█	█	█	█	█

5.1.6.2 Construction Elements

The proposed works can be divided into 4 stages as follows:

- Element 1: Construction of a perimeter embankment and rock armour revetment to the seawards edge of the reclaimed land area;
- Element 2: Dredging of Howth Harbour;
- Element 3: Reclamation of land up to ground level; Element 3 will include the works around the redesign that will include a new water channel which has been included to maintain the legibility of the existing historic pier and to provide increased opportunities for creating active building uses overlooking the reclamation area. A new bridge crossing is also proposed.
- Element 4: Finishing's

Works will commence with Element 1. There will be an overlap between Elements 1 and Elements 2 and 3. This will be possible due to potential phasing of the perimeter into discrete cells. Elements 2 and 3 will be carried out in parallel. There will later be an overlap between Elements 2 and 3 and Element 4 where the formation level of the reclamation area has been reached.

Element 1: Construction of the perimeter embankment and rock armour revetment to reclaimed land area.

Works to the perimeter embankment will begin at the intersection locations of the perimeter embankment with the existing West Pier. Works can begin from either or both ends or at intermediate points. It is envisaged that the embankment core material will be brought to site by road. Works will commence either with the placement of larger diameter rocks into the underlying silt material beneath the footprint of the embankment or the dredging of the thin layer of soft silty material from under the foundation of the embankment. The larger stones will settle into the softer material and provide a foundation on which to build the embankment. An alternative would be to remove the thin layer of softer material using a dredger and to construct the embankment on the underlying firm material.

Providing a foundation of larger stones within the matrix of the existing silt layer would use a long reach excavator to place the stone either from land or from a floating pontoon barge. It is likely that the construction of the embankment will commence from the landwards end(s). Once a foundation is provided for a short length the bulk of the material will likely be placed by trucks tipping their load onto the foundation and building the embankment to a level above high tide.

Material will be placed on top of the existing West Pier revetment and there will be no removal or demolition required to the existing west pier.

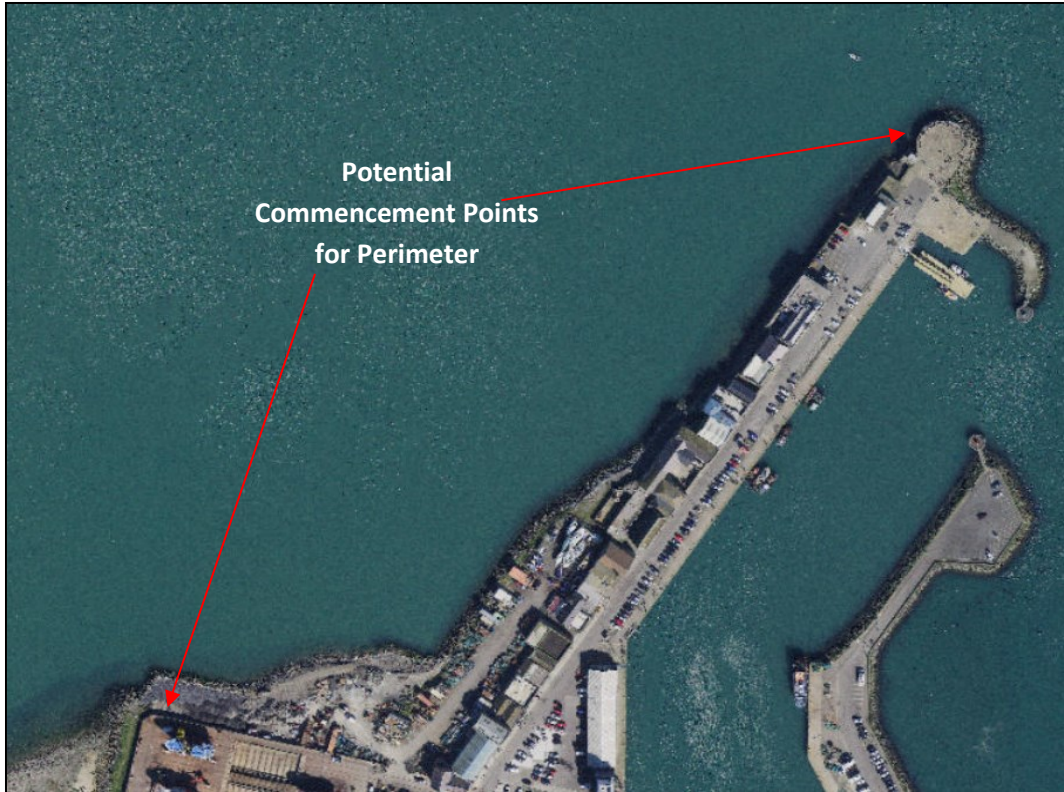


Figure 9 Serial photograph showing commencement/finishing points for the perimeter embankment.

The core of the bund will be constructed of imported granular stone fill (such as TII Class 6A or similar). “Class 6A” or similar stone fill is a well graded granular material. It is specifically graded such that it can be placed below water without the requirement to compact, i.e. it is self-compacting. The material is natural gravel, crushed gravel or crushed rock. The core stone fill will initially be placed in layers with a long reach excavator bucket until it is safe to track the excavator and delivery trucks at low tides. Once a section of embankment is built to a level above high tide, the embankment can be advanced by tipping truck loads at the seawards end of the embankment. A long reach excavator will also be in attendance to place the larger foundation stone if necessary and to grade the slopes of the embankment to the required slope for rock armour or geotextile.



Figure 10 Shows typical operations for construction and embankment from land out into water.

The revetment geotextile filter layer will be placed on the outer face of the profiled embankment. Geotextiles are permeable sheet materials. It is placed on the finer embankment material beneath the armourstone to prevent escape of the finer particles while allowing the free passage of water. The geotextile provides a stable and consistent bedding layer for armourstone and saves the need to import further additional layers of armourstone resulting in cost and material savings. The geotextiles used will be of the non-woven needle punched type. They are stable and durable materials with high strength under tension and against punching from rock placement.

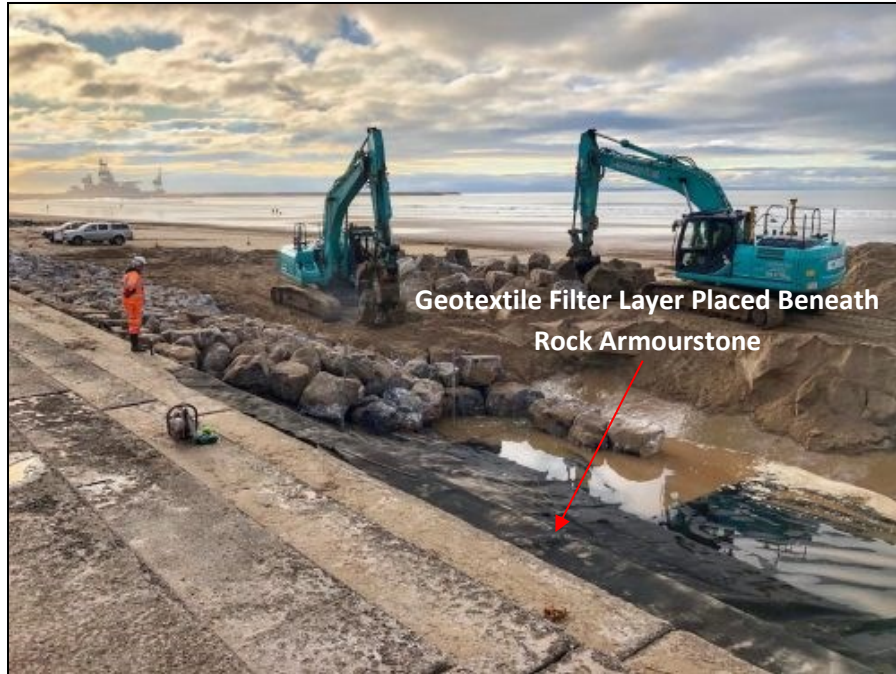


Figure 11 shows a typical arrangement of laying geotextile as a filter layer beneath the main rock armourstone in a coastal revetment.

The revetment under layer rocks (smaller in size compared to the outer primary layer of rock) will be placed with a long reach excavator to provide a well graded and interlocked slope to receive the larger primary layer rocks. Primary and under layer rock armour is placed first below water level to provide a stable toe to build the armour layers up the slope. Dump trucks will deliver core and large stone material to the excavator at the end of the embankment/causeway and armour along the length of the causeway. This process will continue out along the line of the perimeter until a closed perimeter is constructed. It is likely that there will be temporary cross bunds constructed to allow the phased infill of the full area.



Figure 12 Example breakwater showing rock armour revetment and crest wall. Similar in construction to the proposed perimeter embankment.

At the crest of the revetment a reinforced concrete crest wall will be constructed. This wall acts as both part of the revetment structure to reduce wave overtopping into the reclaimed area behind, and also as a barrier for pedestrians from accessing the rock revetment.

When the external face of the embankment is completed to a certain level (above high tide) the internal face will be lined with an impermeable clay liner to act as a barrier to movement of water and contaminants in and out of the reclaimed land. Geosynthetic Clay Liners (GCLs) are reinforced composites which combine two durable geotextile outer layers with a uniform core of natural bentonite clay to form a hydraulic barrier. A stone fill layer will be placed on top of the GSL to keep it in fixed in place during the in-filling process. The GSL will be constructed down to the underlying clay layer approximately 1-2m below the existing bed level within the reclaimed land area in order to prevent the flow of water under the embankment structure.



Figure 13 Showing a typical clay liner installation process.

When completed, the sealed embankment will retain a volume of water behind it. This water will be removed prior to infilling. A non-return outfall will have been constructed into the embankment with its inlet at Mean Low Water Spring. Constructing the inlet at this level will drain the enclosed area down to Mean Low Water Spring. Sealing the embankment at this low level would enclose 25,000m³ of water. The enclosed seawater will be pumped from behind the embankment out into the open water at a rate of between 200 and 600 l/s, requiring 2 -3 days to empty down to bed level. When the bulk of the remaining water is removed the infilling works element can commence.

It is likely that instead of completing the full embankment perimeter prior to infilling, the infill will be undertaken in discrete cells, for example one third or one quarter of the proposed reclamation area being bunded off and infilled at a time. This would allow the quicker draw down of water levels in bunded area for each section. These volumes would be easier to manage and infilling of the discrete cells would reach above MHWS at a quicker rate than if the full. In this way uncertainties with regard to sealing of the base of the perimeter and storms overtopping the perimeter would be much more manageable.

Element 2: Dredging of Howth Harbour.

The dredging works will be undertaken using a long reach excavator or grab operating from a floating pontoon barge or an equivalent configuration.

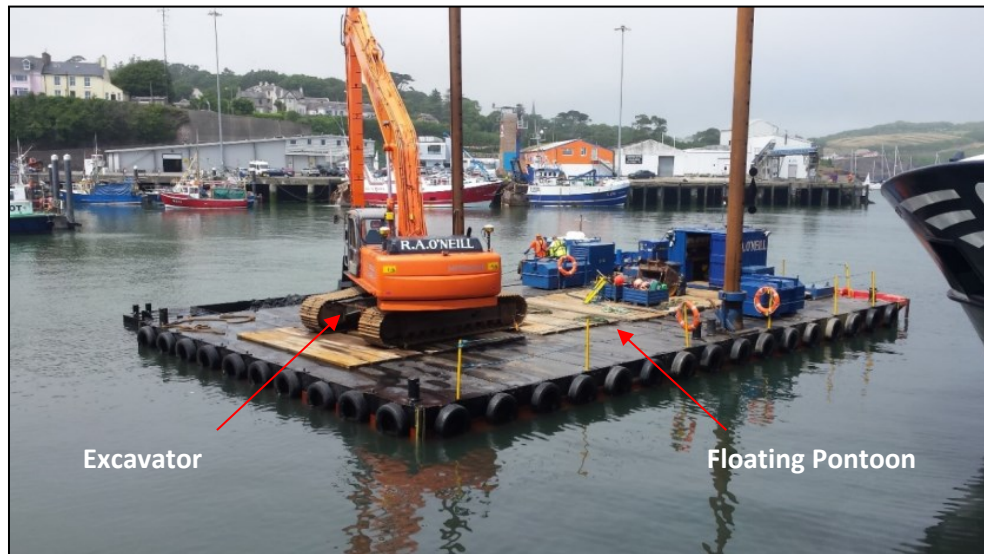


Figure 14 Example dredging operations using a floating barge and long reach excavator.

All excavators carrying out the dredging works will be fitted with environmental dredging buckets in order to contain finer materials and therefore minimise the loss of dredge spoil into the harbour during dredging.



Figure 15 Example of an environmental bucket showing a lid that can be closed to seal contents during lifting.

In addition, silt curtains can, if necessary, be established around the dredging operations in order to further minimise the loss of dredge spoil from the site.



Figure 16 Example silt curtain arrangement surrounding dredging activities.

Monitoring of water quality (i.e. suspended sediments and turbidity) will be carried out on the outside of the dredge site at selected locations. Limits will be set prior to the works commencing. Contingency plans will be in place for when the limits are exceeded by dredging activities. These will include ceasing works until the source is identified and adjustment of methodology until levels can be reduced below the limit levels.

Approximately, 10% of the dredge material will be bedrock. It will be necessary to break this rock prior to excavation. Breaking will be carried out by a long reach excavator using a rock breaker attachment such as a Sandvik G130. The broken rock will then be excavated from the bed by the long reach excavator with a bucket attachment.

The following table is a breakdown of the estimated dredge volumes and durations by area and material type:

Location	Design dredge Depth mODM	Overburden Volume m ³	Weeks Dredging No.	Rock Volume m ³	Weeks Dredging No.	Total Volume m ³	Weeks Dredging No.
Trawler Basin	-6.5	31230	10	3268	1	34499	11
Harbour Approach Channel	-6.5	39734	11	2222	1	41956	12
Marina Approach Channel	-5.5	19426	7	3188	1	22614	8
Moorings	-5.5	74142	21	1734	1	75876	22
Marina	-5.5	47096	13	17959	10	65055	23
Totals	-	211,629	63	28,371	14	240,000	77

Dredge spoil will be transferred into floating dump barges from the floating pontoon/ dredger. Once loaded, the barges will be towed to an unloading quay side point within the harbour. The unloading point will be located adjacent to the stabilisation and solidification treatment facility, at the middle pier compound. The locations of dredging, quantities, times etc will be recorded.

Bathymetric surveys will be used to ensure the correct dredge depths are achieved and to identify high-spots for further dredging.

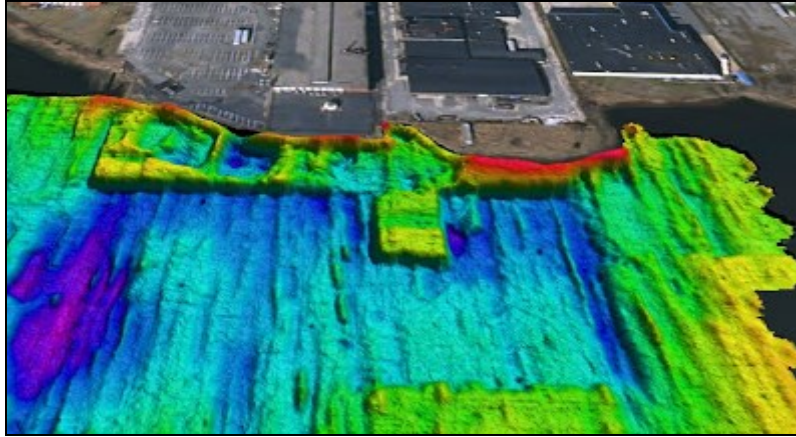


Figure 17 Example multi-beam bathymetric survey colour coded results

Waste debris collected during dredging works will be segregated and removed offsite by a licensed haulier to a licensed facility.



Figure 18 Example waste segregation arrangement

Dredging work can be undertaken in parallel with the perimeter construction if the perimeter construction is undertaken in a phased manner using temporary cross bunds.

Element 3: Reclamation of land up to ground level.

Dredge material will be brought to an unloading point on the quays within the western trawler basin of the harbour.

Dredge spoil will be comprised predominantly of silt, with some sand, gravel and rock. It is estimated up to 10% of the overall dredge volume could consist of rock.

Rock spoil and coarser (>20mm) material will be screened out from the dredge spoil and temporarily stockpiled. This material will then be transferred to the reclamation area by truck where it will be

directly placed in layers and compacted into the infill area or used in temporary bunds or in the perimeter embankment.

Based on sediment sampling and testing results, the dredge material has been found to contain both Class 2 and Class 3 contamination levels. Contaminant levels are such that the vast majority of the material cannot be disposed of at sea directly.

Sandy and silty material will undergo engineering stabilisation and solidification prior to placement into the reclaimed infill area. Such finer material will be pumped into a treatment plant. Coarser materials (greater than say 20mm) will be filtered from the pumped material and transferred separately. A binder will be added to this dredge spoil within the treatment plant until a homogenous mix is attained. The binder will consist of a combination of Portland Cement and Ground Granulated Blast Furnace Slag (GGBS) or equivalent. The treated dredge material will then be pumped as a wet mix from the treatment plant to the banded reclaimed land area where it will be deposited as backfill. Excess supernatant water will collect on the surface of the stabilised mass. This water will be contained within the impermeable perimeter of the reclaimed land area and prevented from loss into open water. This water will be re-circulated by pump back into the treatment plant for further use in mixing the dredge material and binder.

The below photograph is an example treatment layout. The dredge spoil is brought to the quayside in a barge. Within the barge the material is agitated and fluidised in order to allow it to be pumped into the treatment plant. Material could similarly be transferred to bunds on land where the material can be agitated and fluidised and screened for larger sized particles. Silos containing cement/GGBS/ Binder are based within the facility. These components are conveyed to the treatment mixing plant in liquid form. Mixing is undertaken in an enclosed container. Dust emissions can be controlled within an enclosed plant operation. A controlled and consistent end-product can be produced with predictable engineering characteristics.

The facility consisting of the mixing plant, binder silos, storage areas and pumps will be banded. Any loss of dredge material within the banded area will be collected and fed through the treatment facility again for disposal within the reclaimed area. A waste licence/IEL will be obtained for the treatment process.

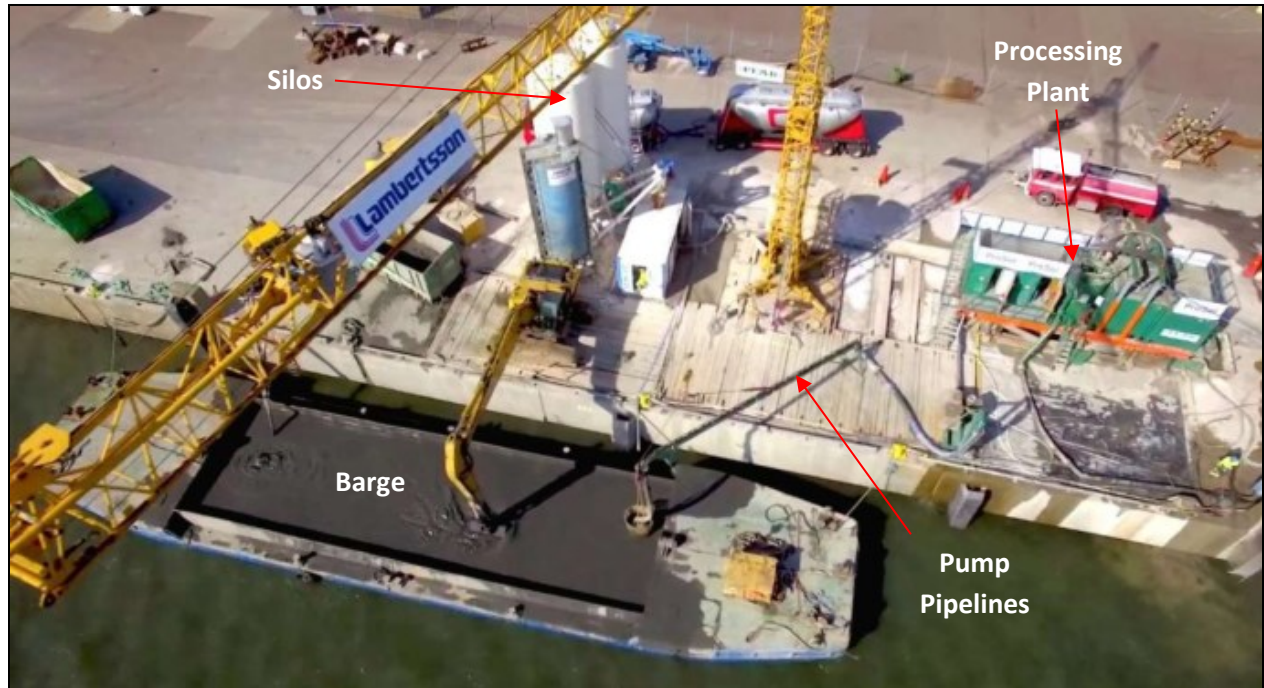


Figure 19 Example dredge spoil treatment facility

The quantities of dredge spoil, binders, treated material, when processed and where deposited will be recorded.

Stabilisation, solidification and placement within the reclamation area will be undertaken in parallel.

Material will be placed on top of the existing West Pier revetment and there will be no removal or demolition required to the existing West Pier.

Stockpiles of imported topsoil will have the depth and storage time kept to a minimum in order to reduce degradation. Any of the soils being imported into the site will be checked to be invasive species free. The stockpile of imported soil that is being moved will be checked over to ensure there are no invasive species growing on it. The at-risk plant species are as follows:

- Japanese knotweed
- Giant Hogweed
- Himalayan Balsam

Stockpiles of other imported stone fill be graded to minimise run-off and kept a minimum of 10m away from any water source.

Element 4: Finishing's.

When the reclaimed area is filled to the required formation level works can commence on the surface finishing's. These works will include landscaping, pathways, roadways, parking, surface water drainage, mains water supply, electricity supply, storage areas, viewing areas and water access points.

Landscaping works will involve importing and depositing topsoil with grass seeding.

Pedestrian pathways will be constructed on a base of stone fill and paved with a bituminous flexible pavement. The pathways will be suitably edged with precast concrete edgings. The pavement will be suitably lined and sign posted as per national guidelines. As discussed previously, there will be a low (1.1m) reinforced concrete revetment crest wall along the seawards edge of the path adjacent to the top of the revetment.

Surface water drainage will be constructed to collect and drain away surface water from areas with impermeable surfaces. Trenches will be excavated, drains will be placed on a stone bedding material and backfilled with stone fill. Surface water will be collected via gullies. Surface water will be discharged to the sea via a hydrocarbon interceptor/silt trap. Surface water from wave overtopping will be collected in French drains constructed along the landward edge of the proposed crest wall pathway. Wave overtopped water will be outfallen via a series of weep holes in the crest wall. Land drains will be used to drain surface water from landscaped areas.

Mains water will be supplied to the water access area. Watermains will be constructed in trenches in accordance with Irish Water specifications.

Viewing areas will be constructed onto two roundheads at the entrance to the sheltered water sports access and storage area.

A slipway will be constructed at the water sports access area. The slipway will be constructed in concrete. It will be constructed into the rock revetment.

Hardstanding areas will be surfaced with tar and chip for future parking, roadways and areas for potential harbour operations.

Further finishing's will include fencing.

5.1.6.3 Dredging and Water Quality

During the dredging of the harbour some 240,000m³ of material will be dredged and re-used for the reclamation of land to the west of the West Pier. The majority of this material is fine material to which contaminants attach. An assessment of the average concentrations of contaminants are given in the table below together with the Marine Institute limit for contaminant levels of materials suitable for dumping at sea.

During the dredging of the harbour some 240,000m³ of material will be dredged and re-used for the reclamation of land to the west of the west pier. The majority of this material is fine material to which contaminants attach. An assessment of the average concentrations of contaminants are given in the table below together with the Marine Institute limit for contaminant levels of materials suitable for dumping at sea.

A site investigation was carried out in December 2019, where a total of 23 sediment samples (SP1 - SP23) were taken. The samples were analysed to enable a comparison of the sediment contaminant concentrations against the Marine Institute (MI) sediment quality Upper and Lower Levels for disposal at sea (Marine Institute, 2006). The Marine Institute guidelines are designed to assess the suitability of disposing of dredged material at sea: they identify a Lower Level (1) and Upper Level (2) of contamination and characterise the marine sediments into three classes of potential contamination.

1. Class 1: Where contamination concentrations are less than Level 1 the sediment is considered to be uncontaminated - with no biological effects likely.
2. Class 2: Where contamination concentrations are between Level 1 and Level 2 the sediment is considered to be marginally contaminated; further sampling and analysis should be considered to delineate problem areas, if possible.
3. Class 3: Where contamination concentrations are above Level 2 the sediment is considered to be heavily contaminated and very likely to cause biological effects/toxicity to marine organisms. The MI guidelines recommend that alternative management options are considered for this level.

Table 7 Analysis results compared to MI lower and upper levels.

Determinand	Units	MI Lower Level	MI Upper Level	Total Samples	Limit of detection	Count of samples exceeding MI		Soil concentrations (units/kg dry weight)	
						Lower level	Upper level	Ave	Max
Aluminium	mg/kg	n/a	n/a	23	10	n/a	n/a	27626.09	56000
Arsenic	mg/kg	20	70	23	1	21	0	34.62	51.8
Cadmium	mg/kg	0.7	4.2	23	0.1	17	0	0.87	1.3
Chromium	mg/kg	120	370	23	0.5	0	0	72.04	118
Copper	mg/kg	40	110	23	2	10	1	55.23	320
Lead	mg/kg	60	218	23	2	3	1	60.83	392
Lindane (GHCH)	µg/Kg	0.3	1	23	0.1	1	0	0.13	0.41
Mercury	mg/kg	0.2	0.7	23	0.01	1	0	0.08	0.34
Nickel	mg/kg	40	60	23	0.5	2	0	32.81	45.5
Zinc	mg/kg	160	410	23	3	11	0	177.35	377
Dibutyl Tin	mg/kg	n/a	n/a	23	0.001	n/a	n/a	0.07	0.636
Tributyl Tin	mg/kg	n/a	n/a	23	0.001	n/a	n/a	0.45	6.48
Dibutyl Tin & Tributyl Tin	mg/kg	0.1	0.5	23	0.001	7	3	0.53	7.116
HCB	µg/Kg	0.3	1	23	0.1	1	0	0.16	0.86
TEH (as THC)	g/kg	1	n/a	23	0.0001	8	0	0.86	2.94
Total Of 16 PAH's	mg/kg	4	n/a	23	0.001	2	0	2.46	12.6163
PCB (individual congeners)									
PCB28	µg/Kg	1	180	23	0.08	2	0	0.56	1.43
PCB52	µg/Kg	1	180	23	0.08	2	0	0.79	5.2
PCB101	µg/Kg	1	180	23	0.08	2	0	0.64	6.3
PCB118	µg/Kg	1	180	23	0.08	3	0	0.75	6.67
PCB138	µg/Kg	1	180	23	0.08	6	0	1.05	9.27
PCB153	µg/Kg	1	180	23	0.08	6	0	0.92	7.94
PCB180	µg/Kg	1	180	23	0.08	1	0	0.47	4.42
Total PCBs (7 Congeners)	µg/Kg	7	1260	23	0.56	4	0	5.17	41.23

The data indicates that all of the sediment samples are above the MI Lower level in one or more parameters. Three of the samples (SP8, SP12 and SP23) are above the MI Upper level. Due to the elevated levels of Copper, Lead and Tributyl Tin in three areas it is considered that this material is not suitable for dumping at sea.

5.1.6.4 Summary of Project Characteristics

The proposed development involves the following main elements:

- Dredging the harbour;
- Reclaiming land on the west side of the west pier using dredge material;
- Coastal protection works to the perimeter of the reclaimed area;
- Landscaping on the reclaimed area;
- Pavements e.g. footways, roadways and parking areas;
- Slipway for access to the water;
- Storage areas for harbour activities;
- Provision of services.

The following table 8 provides a summary of the characteristics of the project. The proposal has been confirmed with the project engineer.

Table 8 Project Summary

<p><i>Size, scale, area, land-take</i></p>	<p>The proposed works will take place at Howth Fishery Harbour Centre (FHC). The proposed development will involve dredging circa 240,000m³ within the confines of the harbour and treating and re-using the dredged material for land reclamation along the western side of the western pier. This will additional circa 48,000 square metres of land area.</p> <p>The total area of works is 18.8Ha. This includes a dredge area of 14Ha and land reclamation area of 4.8Ha.</p> <p>There is no spatial overlap with any Natura 2000 site; therefore, there will be no land-take within any Natura 2000 site.</p>
<p><i>Details of physical changes that will take place during the various stages of implementing the proposal</i></p>	<p>The proposed works can be divided into 4 stages as follows:</p> <ul style="list-style-type: none"> • Element 1: Construction of a perimeter embankment and rock armour revetment to reclaimed land area • Element 2: Dredging of circa 240,000m³ of sediment within 14Ha of land within Howth Harbour • Element 3: Reclamation of circa 48,000 square metres of land up to ground level to the west of the western pier. A new water channel and bridge. • Element 4: Finishing's which will include landscaping, pathways, roadways, parking, surface water drainage, mains water supply, electricity supply, storage areas, viewing areas and water access points.
<p><i>Description of resource requirements for the construction and operation of the proposal (water resources, construction material, human presence etc)</i></p>	<p>The equipment and resources required for the works will include:</p> <ul style="list-style-type: none"> • Long reach excavators for the dredging of the harbour, construction of the perimeter embankment and lifting requirements on the quayside. • 20 T excavator for lighter excavating and lifting requirements e.g. laying clay liner, geotextile, shutters reinforcement etc. • Floating pontoon barge to be used in tandem with the long reach excavators for the dredging of the harbour and construction of the perimeter embankment. • Two floating dump barges for the transport of dredge spoil to the quayside unloading point. • Dump trucks for the transport of rock and gravel material on site and transport of material from land to the long reach excavators on the embankment. • Delivery trucks for the delivery of materials, plant etc. to site. • A work boat for the movement of unpowered floating plant. • A safety boat for health and safety requirements. • Landing craft (e.g. RIB) for the movement of people between land and floating plant. • A soil treatment plant for the processing of dredge spoil into suitable engineered fill. • Two binder storage silos for storing portland cement and GGBS required in the treatment of the dredge spoil. • Pumps and piping for the movement of unprocessed from the unprocessed storage area, through the treatment plant and delivery of processed material to the reclaimed land area.

	<ul style="list-style-type: none"> • A compactor for the compacting of imported stone fill for placement under pavements. • A paver and roller for the laying and rolling of bituminous pavements. • 53,000m³ of 6A Stone Fill (embankment core). This translates into approximately 5,300 trucks. • 10,000m² of Geotextile filter layer on seaward side. This translates into approximately 20 trucks. • 25,000m³ of Rock armourstone. This translates into approximately 2,500 trucks. • 10,000m² of Impermeable clay liner. This translates into approximately 20 trucks. • 1,800m³ of Reinforced Concrete Crest Wall. This translates into approximately 300 trucks. • 36,000m³ of Cement/GGBS Binder. This translates into approximately 1,800 trucks. • 300m³ of Masonry Facing Crest Wall. This translates into approximately 30 trucks. • 8,700m of Surface water drains. This translates into approximately 22 trucks. • 12,000m³ of Stone fill (surface water drains). This translates into approximately 1,200 trucks. • 8,100m³ of Topsoil (landscaping). This translates into approximately 810 trucks. • 3,500m³ of Stone fill (pavements). This translates into approximately 350 trucks. • 1,500m² of Pedestrian Paving. This translates into approximately 30 trucks. • 7,200m² of Tar and Chip Paving. This translates into approximately 145 trucks.
<p><i>Description of timescale for the various activities that will take place as a result of implementation (including likely start and finish date)</i></p>	<p>Each stage of the proposed development should take approximately;</p> <ul style="list-style-type: none"> • Element 1: 9 months for the construction of a perimeter bund and rock armour revetment to reclaimed land area; • Element 2: 18 months for the dredging of Howth Harbour; • Element 3: 18 months for the reclamation of land up to ground level (occurs in parallel with Element 2 dredging); • Element 4: 6 months for finishing works.
<p><i>Description of wastes arising and other residues (including quantities) and their disposal</i></p>	<ul style="list-style-type: none"> • All waste will be removed off site and disposed of appropriately. • The basin necessitates the dredging of approximately 240,000m³ of material ranging from silt, sands, gravel and rock. Analysis of the sediment sampling undertaken for this project classifies the bed material as Class 2 and Class 3 contamination levels. Contaminant levels are such that the vast majority of the material cannot be disposed of at sea directly. It is intended the dredge spoil will be reused as engineering fill behind the land reclamation area. The reclamation would be protected by a rock armour revetment underlain with a geo-textile. The area behind the revetment will be filled with both dredge material and imported clean material. The reclaimed area will be surfaced with a bituminous flexible pavement. • All other construction waste will be removed off site and disposed of appropriately.

<p><i>Identification of wastes arising and other residues (including quantities) that may be of particular concern in the context of the Natura 2000 network</i></p>	<ul style="list-style-type: none"> • There will be 240,000m³ of dredge spoil to be excavated from the harbour bed. This material will be stabilised and re-used in the structure. • Fuels and oils will be present on-site which pose a risk to Natura 2000 sites were a fuel spill or oil leak to occur. A fuel management and spill contingency plan will be in place.
<p><i>Description of any additional services required to implement the project or plan, their location and means of construction</i></p>	<ul style="list-style-type: none"> • There will be a services requirement relating to the supply of water and electricity to the reclamation area. • A temporary site compound will be located on the Western Pier along with a pump compound. A dredge spoil treatment compound will be located on the Middle Pier.

5.2 IDENTIFICATION OF OTHER PROJECTS OR PLANS OR ACTIVITIES

There are a number of current grants of permission for remediation and extension works in the greater area. Planning permission (F19A/0296) has been granted by Fingal County Council for development works to the Middle Pier. The Middle pier development includes dredging, land reclamation and a new 134m length of quayside. These works are proposed to allow the FHC to comply with future requirements with regards to fish discards and allow the greater separation of amenity, leisure and commercial fishing and fishing related activities. The middle pier will provide a new area for berthage, taking craft away from their present position on the West Pier with the aim of improving amenity value of the West Pier. It will also provide a new hard standing working area for repairing netting. The middle Pier construction works started in late 2020.

Planning permission F15A/0362 granted for 178 residential units and 2,756sq m of commercial space at Project Pier located approximately 190m south west of the reclamation area immediately west of the Dart Station. This location has a current application in process with An Bord Planala (ref SHD/009/19) for 512 residential units (including parking for 439 cars). There is no date for construction works to start at this site. If construction works do start, they will include a traffic plan to keep the R105 clear of construction traffic. Once built the land reclamation area will have a positive effect in cumulation with the residential area as an amenity area and potential area for employment as businesses are built in the future.

Extension of duration of permission, planning reference F10A/0353/E1. Howth Yacht Club for the extension to the existing marina facilities for the provision of 158 additional berths. It is understood that this permission lapsed in September 2020. There will not be any overlap of construction works.

Other future proposed development plans for the harbour include:

- Reinstatement of the existing boat shed to match the previous building complete with domed roof, on the northern end of the East Pier of Howth Fishery Harbour Centre.

There is potential for some future proposed works to overlap with the timing of the proposal considered in this assessment. Therefore, there is potential for cumulative impacts. Other activities considered to have potential to result in in-combination impacts are municipal, recreational, and commercial fishing activities which currently take place within the vicinity of the harbour. See **Section 7.5** below for a list of further planning applications permitted, or in progress within the vicinity of Howth Harbour.

6 SCOPE OF ASSESSMENT

When assessing impact, qualifying features are only considered relevant where a credible or tangible source-pathway-receptor link exists between the proposed development and a protected habitat or species type. In order for an impact to occur there must be a risk initiated by having a 'source' (e.g. construction noise), a 'receptor' (e.g. a protected marine mammal) and an impact pathway between the source and the receptor (e.g. a water body which connects the source and the receptor). Identifying a risk that could, in theory, cause an impact does not automatically mean that the risk event will occur, or that it will cause or create an adverse impact. Identification of the risk does mean that there is a latent possibility of ecological or environmental damage occurring. The level and significance of the impact will depend upon the nature of the risk, the extent of the exposure to the risk and the characteristics of the receptor. Therefore, bearing in mind the scope, scale, nature and size of the project, its location relative to the distribution of the species and habitats listed, and the degree of connectedness that exists between the project and the potential receptors, it is considered that not all receptors are within the zone of potential impact of the proposal. An evaluation to determine the plausible ecological receptors for potential impacts of the unmitigated proposed development has been conducted in the Screening for Appropriate Assessment. This evaluation has determined that certain qualifying features (listed in **Table 9**, below) should be selected for further assessment by virtue of constituting plausible ecological receptors.

6.1 NATURA 2000 SITES

6.1.1 Qualifying Features of Interest

It has been concluded during the screening stage that the proposed development may potentially impact on ten of the eighteen Natura 2000 sites within the zone of impact of the proposal site. These sites are:

- Baldoyle Bay SAC (000199)
- Rockabill to Dalkey Island SAC (003000)
- Lambay Island SAC (000204)
- Rogerstown Estuary SPA (004015)
- Lambay Island SPA (004069)
- Malahide Estuary SPA (004025)
- North Bull Island SPA (004006)
- Baldoyle Bay SPA (004016)
- Ireland's Eye SPA (004117)
- South Dublin Bay and River Tolka Estuary SPA (004024)

The following table outlines the qualifying features of the above Natura 2000 sites which have been selected for further assessment including rationale for inclusion. Each qualifying feature is then discussed after which an assessment is carried out of potentially significant impacts arising from the proposed development.

Table 8 Qualifying features selected for further assessment

Qualifying Feature	Potential for Significant Impacts	Rationale
Rockabill to Dalkey Island SAC		
Reefs	No	<ul style="list-style-type: none"> No spatial overlap. There is a separation distance of approximately 800m of open water (dilution factor), between this protected habitat within this designated site, and the proposed works at Howth Harbour. Additionally, the results of the hydrodynamic report showed that potential for the spread of contaminants during dredging is minimal, with the dredging simulation showing that the impact of the proposed dredging in the harbour will be small and confined to the immediate area of the harbour. Therefore, due to the aforementioned, there will be no significant impacts on Reefs [1170] within this designated site as a result of the proposed works at Howth Harbour. No significant water quality impacts predicted during operational phase of the project which could result in indirect habitat impacts is predicted. The harbour will continue to be subject to best practice operational guidelines and protocols which are outlined within the Howth FHC Environmental Management Plan.
Harbour porpoise	Yes	<ul style="list-style-type: none"> Mobile species with high concentration of sightings³ around Howth Head (NPWS, 2013). Rely on sound for navigation, communication and sensory cues. Potential disturbance/displacement of foraging/commuting animals during construction phase.
Lambay Island SAC		
Reefs	No	<ul style="list-style-type: none"> No spatial overlap. There is a separation distance of

³ <http://maps.biodiversityireland.ie/#/Map>

Qualifying Feature	Potential for Significant Impacts	Rationale
		<p>approximately 10km of open water (dilution factor), between this protected habitat within this designated site, and the proposed works at Howth Harbour. Additionally, the results of the hydrodynamic report showed that potential for the spread of contaminants during dredging is minimal, with the dredging simulation showing that the impact of the proposed dredging in the harbour will be small and confined to the immediate area of the harbour. Therefore, due to the aforementioned, there will be no significant impacts on Reefs [1170] within this designated site as a result of the proposed works at Howth Harbour.</p> <ul style="list-style-type: none"> No significant water quality impacts predicted during operational phase of the project which could result in indirect habitat impacts is predicted. The harbour will continue to be subject to best practice operational guidelines and protocols which are outlined within the Howth FHC Environmental Management Plan.
Vegetated sea cliffs of Atlantic and Baltic coasts	No	<ul style="list-style-type: none"> No spatial overlap. Nature of works. No plausible impact pathway.
Grey seal	Yes	<ul style="list-style-type: none"> Mobile species. NBDC records and previous site surveys from Howth Harbour and surrounding area. Potential disturbance/displacement to resting/foraging/commuting animals during construction phase.
Harbour seal	Yes	<ul style="list-style-type: none"> Mobile species. NBDC records in the vicinity of Howth Harbour. Potential disturbance/displacement to resting/foraging/commuting animals during construction phase.
Baldoyle Bay SAC		
Mudflats and sandflats not covered by seawater at low tide	Yes	<ul style="list-style-type: none"> No spatial overlap. However, potential for alteration of the inter-tidal habitats and associated species within the SAC in

Qualifying Feature	Potential for Significant Impacts	Rationale
		immediate proximity to the reclamation area due to deposition of re-suspended sediments, hydrocarbon contamination and impacts on hydrodynamic regime (See Figure 20 below).
Salicornia and other annuals colonising mud and sand	No	<ul style="list-style-type: none"> No spatial overlap. No significant water quality impacts predicted during either construction or operational phases which could result in indirect habitat impacts.
Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	No	<ul style="list-style-type: none"> No spatial overlap. No significant water quality impacts predicted during either construction or operational phases which could result in indirect habitat impacts.
Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	No	<ul style="list-style-type: none"> No spatial overlap. No significant water quality impacts predicted during either construction or operational phases which could result in indirect habitat impacts.
Baldoyle Bay SPA		
Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	Yes	<ul style="list-style-type: none"> Recorded roosting in nationally important numbers within Howth Harbour and proposed works area (Woodrow, 2020a), therefore disturbance/displacement to roosting birds during construction and operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle.
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]	No	<ul style="list-style-type: none"> No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. No roosting birds and/or regularly occurring roosting birds in numbers of importance, were recorded within or adjacent to the site during the recent bird surveys (Woodrow, 2020a). Therefore, no potential for displacement effects which

Qualifying Feature	Potential for Significant Impacts	Rationale
		<p>could impact on the conservation objectives for the SPA i.e. population trend. While Bar-tailed Godwit have been recorded roosting within Howth Harbour in the past (NPWS, 2012c), this species was recorded irregularly and in extremely low numbers i.e. max of three individuals. Bar-tailed Godwit are a species which exhibit high site fidelity and as such due to the irregularity of occurrence and relative low abundance in relation to recorded roosts within the SPA (NPWS, 2012c), Howth Harbour is not deemed an established or critical roosting resource for this species.</p> <ul style="list-style-type: none"> Based on the results of a noise survey conducted as part of the Environmental Impact Assessment Report (EIAR), see Chapter 12 of the EIAR, excessive noise emissions above ambient levels are not predicted given the nature and scale of the proposal. Birds foraging in proximity to the Harbour are unlikely to be significantly disturbed. Any impact on foraging and/or roosting birds within the SPA will not be significant due to the intervening distance of 2.2km No significant noise sources are proposed for the operational phase of the project. Very low numbers of foraging Brent Geese were recorded within Howth Harbour (Woodrow, 2020a), however these Brent Geese, like many others within the wider Dublin area are habituated to disturbance which is evident by the fact Brent Geese now regularly feed amongst dog walkers and football players in Dublin parks (Fox & Madsen, 2017).
Wetlands & Waterbirds [A999]	No	<ul style="list-style-type: none"> No spatial overlap.
Rogerstown Estuary SPA		
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Dunlin (<i>Calidris alpina</i>) [A149]	Yes	<ul style="list-style-type: none"> Recorded roosting within the site and proposed works area in small numbers, with exception of Ringed Plover, who were recorded roosting in nationally important numbers (Woodrow, 2020a). Therefore,

Qualifying Feature	Potential for Significant Impacts	Rationale
Redshank (<i>Tringa totanus</i>) [A162]		<p>potential disturbance/displacement to roosting birds during construction and operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle.</p> <ul style="list-style-type: none"> •
Greylag Goose (<i>Anser anser</i>) [A043] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Shoveler (<i>Anas clypeata</i>) [A056] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Black-tailed Godwit (<i>Limosa limosa</i>) [A156]	No	<ul style="list-style-type: none"> • No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. • No roosting birds and/or regularly occurring roosting birds in numbers of importance, were recorded within or adjacent to the site during the recent bird surveys (Woodrow, 2020a). Therefore, no potential for displacement effects which could impact on the conservation objectives for the SPA i.e. population trend. • Excessive noise emissions above ambient levels are not predicted given the nature and scale of the proposal. Birds foraging in proximity to the Harbour are unlikely to be significantly disturbed and any impact on foraging birds within the SPA will be imperceptible. • Very low numbers of foraging Brent Geese were recorded within Howth Harbour, however these Brent Geese, like many others within the wider Dublin area are habituated to disturbance which is evident by the fact Brent Geese now regularly feed amongst dog walkers and football players in Dublin parks (Fox & Madsen, 2017).
Wetlands & Waterbirds [A999]	No	<ul style="list-style-type: none"> • No spatial overlap
Ireland's Eye SPA		
Herring Gull (<i>Larus argentatus</i>) [A184] Cormorant (<i>Phalacrocorax carbo</i>) [A017]	Yes	<ul style="list-style-type: none"> • Recorded roosting / loafing within the site and proposed works area, therefore disturbance/displacement to roosting / loafing birds during construction and

Qualifying Feature	Potential for Significant Impacts	Rationale
		<p>operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle.</p> <ul style="list-style-type: none"> •
Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200]	No	<ul style="list-style-type: none"> • No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. • No roosting birds were recorded within or adjacent to the site, therefore no potential for displacement effects. •
North Bull Island SPA		
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169]	Yes	<ul style="list-style-type: none"> • Recorded roosting within the site and proposed works area in small numbers, therefore disturbance/displacement to roosting birds during construction and operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle. •
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>)	No	<ul style="list-style-type: none"> • No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. • No roosting birds, with the exception of a single Sanderling and Curlew, both on one occasion, were recorded within or adjacent to the site. No potential for displacement effects which would constitute a risk to survival or population trends of these species within the SPA is predicted. • Very low numbers of foraging Brent Geese were recorded within Howth Harbour, however these Brent Geese, like many others within the wider Dublin area are habituated to disturbance which is evident

Qualifying Feature	Potential for Significant Impacts	Rationale
[A160] Black-headed Gull (<i>Larus ridibundus</i>) [A179]		by the fact Brent Geese now regularly feed amongst dog walkers and football players in Dublin parks (Fox & Madsen, 2017).
Wetlands & Waterbirds [A999]	No	<ul style="list-style-type: none"> No spatial overlap
Malahide Estuary SPA		
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162]	Yes	<ul style="list-style-type: none"> Recorded roosting within the site and proposed works area in small numbers, therefore disturbance/displacement to roosting birds during construction and operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle.
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Shelduck (<i>Tadorna tadorna</i>) [A048] Pintail (<i>Anas acuta</i>) [A054] Goldeneye (<i>Bucephala clangula</i>) [A067] Red-breasted Merganser (<i>Mergus serrator</i>) [A069] Great Crested Grebe (<i>Podiceps cristatus</i>) [A005]	No	<ul style="list-style-type: none"> No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. No roosting birds were recorded within or adjacent to the site, therefore no potential for displacement effects. Very low numbers of foraging Brent Geese were recorded within Howth Harbour; however, these Brent Geese, like many others within the wider Dublin area are habituated to disturbance which is evident by the fact Brent Geese now regularly feed amongst dog walkers and football players in Dublin parks (Fox & Madsen, 2017).
Wetlands & Waterbirds [A999]	No	<ul style="list-style-type: none"> No spatial overlap
South Dublin Bay and River Tolka Estuary SPA		
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Dunlin (<i>Calidris alpina</i>) [A149]	Yes	<ul style="list-style-type: none"> Recorded roosting within the site and proposed works area in small numbers, with exception of Ringed Plover, therefore disturbance/displacement to roosting birds during construction and operational

Qualifying Feature	Potential for Significant Impacts	Rationale
Redshank (<i>Tringa totanus</i>) [A162]		<p>phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle.</p> <ul style="list-style-type: none"> •
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Grey Plover (<i>Pluvialis squatarola</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Black-headed Gull (<i>Croicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194]	No	<ul style="list-style-type: none"> • No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development. • No roosting birds, with the exception of a single Sanderling on one occasion, were recorded within or adjacent to the site. No potential for displacement effects which would constitute a risk to survival or population trends of this species within the SPA is predicted. • Very low numbers of foraging Brent Geese were recorded within Howth Harbour, however these Brent Geese, like many others within the wider Dublin area are habituated to disturbance which is evident by the fact Brent Geese now regularly feed amongst dog walkers and football players in Dublin parks (Fox & Madsen, 2017).
Wetlands & Waterbirds [A999]	No	<ul style="list-style-type: none"> • No spatial overlap
Lambay Island SPA		
Cormorant (<i>Phalacrocorax carbo</i>) [A017] Shag (<i>Phalacrocorax aristotelis</i>) [A018] Herring Gull (<i>Larus argentatus</i>) [A184]	Yes	<ul style="list-style-type: none"> • Recorded roosting / loafing within the site and proposed works area, therefore disturbance/displacement to roosting / loafing birds during construction and operational phase. While birds recorded within Howth Harbour cannot be traced to individuals associated with the SPA, the birds recorded will be deemed as qualifying species of the SPA as a precautionary principle. •
Fulmar (<i>Fulmarus glacialis</i>) [A009] Greylag Goose (<i>Anser anser</i>) [A043] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]	No	<ul style="list-style-type: none"> • No decrease in the range, timing or intensity of use of areas by each species within the SPA due to the proposed development.

Qualifying Feature	Potential for Significant Impacts	Rationale
Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200] Puffin (<i>Fratercula arctica</i>) [A204]		<ul style="list-style-type: none"> No roosting birds and/or regularly occurring roosting birds in numbers of importance, were recorded within or adjacent to the site during the recent bird surveys (Woodrow, 2020a). Therefore, no potential for displacement effects which could impact on the conservation objectives for the SPA i.e. population trend.

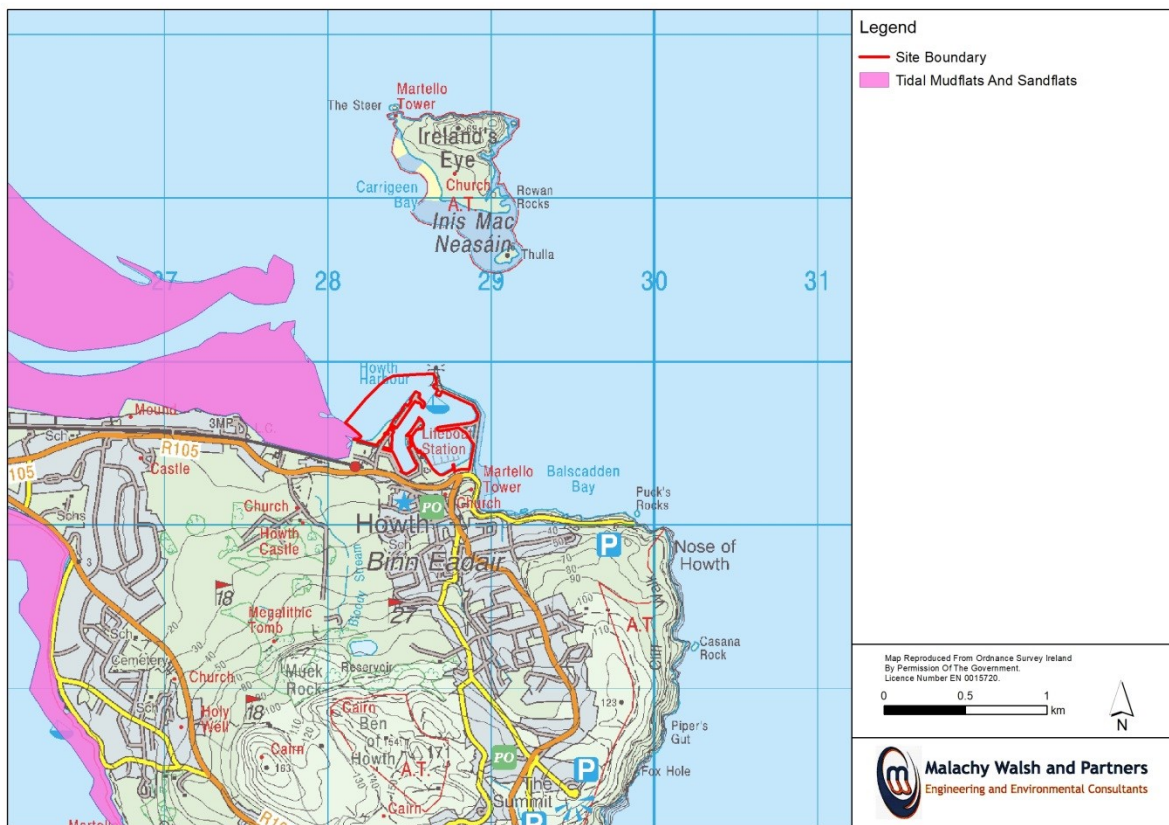


Figure 20 Mudflat and sandflat habitat of the Baldoye Bay SAC immediately adjacent to the proposed reclamation area.

6.1.2 Qualifying Features Selected for Further Assessment

Baldoye Bay SAC is designated for the marine Annex I qualifying interest of ‘Mudflats and sandflats not covered by sea water at low tide (1140)’. Within Baldoye Bay SAC two community types are recorded in this Annex I habitat i.e. Fine sand dominated by *Angulus tenuis* community complex and

Estuarine sandy mud with *Pygospio elegans* and *Tubificoides benedii* community complex (NPWS, 2012a).

Marine mammals listed as qualifying interests of both the Rockabill to Dalkey Island SAC and Lambay Island SAC are by their nature highly mobile species, typically with large habitat ranges and distributions. Marine mammals of conservation interest, namely Harbour porpoise, Grey and Common (Harbour) seal, utilise the Howth Harbour area for foraging/commuting and in the case of seals, potentially for hauling out and resting; therefore, may potentially be subject to impacts from the proposal.

Birds listed as qualifying interests (see **Table 9** above for SCI's potentially impacted) of the; Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA were noted utilising the middle pier, eastern pier, western pier of Howth Harbour and the adjacent section of Claremont Beach. Therefore, these species may be subject to impacts from the proposal.

6.1.2.1 Baldoyle Bay SAC (000199)

Baldoyle Bay SAC comprises a relatively small estuarine and bay system in north County Dublin. The site receives the flows of the Mayne and Sluice rivers, both of which drain an agricultural / suburban catchment. The inner part of the site is sheltered from the sea by a large sand dune peninsula, though most of the dunes are now used as a golf course. Sediments in the inner sheltered areas are mostly muds or muddy sands, often with a high organic content. Part of the tidal section of the Mayne River and adjoining brackish marshes are included in the site. The outer part of the SAC is exposed to the open sea and the sediments here are predominantly well-aerated sands. In addition to the intertidal and salt marsh habitats, small areas of sand dunes and sandy beaches are included.

6.1.2.1.1 Mudflats and sandflats not covered by seawater at low tide

Baldoyle Bay SAC is designated for the marine Annex I qualifying interest 'Mudflats and sandflats not covered by seawater at low tide'. The Interpretation Manual of European Union Habitats - EUR28 defines the habitat as '*Sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders. The diverse intertidal communities of invertebrates and algae that occupy them can be used to define subdivisions of 11.27, eelgrass communities that may be exposed for a few hours in the course of every tide have been listed under 11.3, brackish water vegetation of permanent pools by use of those of 11.4.*'

Within Baldoyle Bay SAC, two community types are recorded i.e. Fine sand dominated by *Angulus tenuis* community complex and Estuarine sandy mud with *Pygospio elegans* and *Tubificoides benedii* community complex. Of these two community types, Fine sand dominated by *Angulus tenuis* community complex occurs adjacent to the proposed reclamation area. This complex is located on the eastern

reaches of the SAC from Claremont Beach at Howth in the south, north to Velvet Strand at Portmarnock; it extends westward as far as Portmarnock Point and Cush Point (NPWS, 2012a).

The sediment of this community complex is largely that of fine sand which ranges from 63.9% to 93%; medium sand ranges from 0.4% to 30.1%. The distinguishing species of this complex is the bivalve *Angulus tenuis* which occurs in high to moderate abundances here. The bivalve *Angulus fabula* and the polychaetes *Nephtys cirrosa*, *Scoloplos armiger*, *Sigalion mathildae*, *Lanice conchilega* are also recorded within this complex. The amphipod *Bathyporeia pelagica* and the bivalve *Donax vittatus* occur in high abundance at Claremont Beach, while unidentified species of the oligochaete family Enchytraeidae are recorded on Velvet Strand and west of Howth (NPWS, 2012a).

The specific conservation objectives for Mudflats and sandflats not covered by seawater at low tide in Baldoyle Bay SAC (**Table 10**) is to maintain a favourable conservation condition in addition to conserving the community type Fine sand dominated by *Angulus tenuis* community complex, in a natural condition.

During the construction phase of the reclamation area there is the potential for silt deposition and hydrocarbon contamination thus potentially impacting on the ecology of the habitat.

Table 9. Specific conservation objective Attributes and Targets for Mudflats and sandflats not covered by seawater at low tide in the Baldoyle Bay SAC [000199] (NPWS, 2012b)

Attribute	Measure	Target
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Community distribution	Hectares	Conserve the following community types in a natural condition: Fine sand dominated by <i>Angulus tenuis</i> community complex; and Estuarine sandy mud with <i>Pygospio elegans</i> and <i>Tubificoides benedii</i> community complex

6.1.2.2 Rockabill to Dalkey Island SAC (003000)

This site includes a range of dynamic inshore and coastal waters in the western Irish Sea. These include sandy and muddy seabed, reefs, sandbanks and islands. This site extends southwards, in a strip approximately 7 km wide and 40 km in length, from Rockabill, running adjacent to Howth Head, and crosses Dublin Bay to Frazer Bank in south Co. Dublin. The site encompasses Dalkey, Muglins and Rockabill islands. Reef habitat is uncommon along the eastern seaboard of Ireland due to prevailing geology and hydrographical conditions. Expansive surveys of the Irish coast have indicated that the greatest resource of this habitat within the Irish Sea is found fringing offshore islands which are concentrated along the Dublin coast. A detailed survey of selected suitable islands has shown areas with typical biodiversity for this habitat both intertidally and subtidally. The area selected for designation represents a key habitat for the Annex II species Harbour porpoise within the Irish Sea. Population survey data show that porpoise occurrence within the site boundary meets suitable reference values for

other designated sites in Ireland. The species occurs year-round within the site and comparatively high group sizes have been recorded. Porpoises with young (i.e. calves) are observed at favourable, typical reference values for the species. Casual and effort-related sighting rates from coastal observation stations are significant for the east coast of Ireland and the latter appear to be relatively stable across all seasons. The selected site contains a wide array of habitats believed to be important for Harbour Porpoise including inshore shallow sand and mudbanks and rocky reefs scoured by strong current flow. The site also supports Common Seal and Grey Seal (NPWS Site Synopsis).

6.1.2.2.1 Harbour porpoise (*Phocoena phocoena*)

Harbour porpoise occurs in estuarine, coastal and offshore waters where it carries out breeding, foraging, resting, social activity and other life history functions. Its distribution extends predominantly throughout continental shelf waters and the species may range over many hundreds or thousands of kilometres. Harbour porpoises utilise the Howth Harbour area for foraging; therefore, may potentially be subject to impacts from the proposal.

The Harbour porpoise is a relatively small cetacean, up to two metres in length. While they can be difficult to see, particularly off-shore, they are still the most frequently recorded cetacean around Irish coasts (Berrow *et al.*, 2010). The population size is estimated to be anywhere between 29,519 and 51,840 (NPWS, 2019). It is Ireland's only species of porpoise and is widely distributed around the Irish coast throughout the year with concentrations of sightings in counties Dublin and Cork in particular. In Dublin, the main concentration of live animals is at Howth Head and along the coast between Dalkey and Bray. The overall status of Harbour porpoise is considered stable and there is little evidence of population growth or decline in this species (NPWS, 2019).

Harbour porpoise has a well-defined breeding season but does not show any indication of possessing defined breeding areas, and calves may be born anywhere within its range. Typically, porpoises give birth between April and September with a distinct peak in mid-summer. Harbour porpoise is widely recorded in Irish waters, occurring as far out as the continental shelf and also in many enclosed bays and the outer reaches of some estuaries. Given the mobility of the Harbour porpoise and, in particular, the potential for seasonal movements in response to breeding requirements, prey distribution and abundance, and other natural processes, it is likely that individuals and/or groups of this species move between Irish waters and adjacent marine jurisdictions (NPWS, 2013a).

Marine mammals like Harbour porpoise rely on sound to navigate, to communicate with one another as well as to sense and interpret their environment. Hearing can be particularly sensitive at lower frequency ranges while newborn and young animals may have greater hearing sensitivity. Porpoise hearing ranges from between 200Hz and 180kHz.

Site-specific conservation objectives aim to define the favourable conservation condition for particular habitats and species at a site. The conservation objective for the Rockabill to Dalkey Island SAC, in relation to qualifying interest species, is to maintain the favourable conservation condition of Harbour porpoise, as defined by specific Attributes and Targets. The following table outlines the Attributes and Targets for Harbour porpoise, based on the detailed conservation objectives which have been prepared for Rockabill to Dalkey Island SAC (NPWS, 2013b).

Table 10. Specific conservation objective Attributes and Targets for Harbour porpoise in the Rockabill to Dalkey Island SAC [003000] (NPWS, 2013b)

Attribute	Measure	Target
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site

6.1.2.3 Lambay Island cSAC (000204)

Lambay Island is a large (250 ha) inhabited island lying 4 km off Portrane on the north Co. Dublin coast. The island rises to 127 m and is surrounded by steep cliffs on the north, east and south slopes. These cliffs contain good diversity in height, slope and aspect. The west shore is low-lying and the land slopes gently eastwards to the summit in the centre of the island. The underlying geology is varied, but is dominated by igneous rocks (of andesitic type) and ash. The bedrock is exposed on the fringing cliffs and in rocky outcrops; elsewhere it is overlain by varying depths of glacial drift. Much of the western third of the island is intensively farmed (mostly pasture), and there are small areas of parkland, deciduous and coniferous woodland, buildings, walled gardens and the harbour. The rest of the island is a mixture of less intensively grazed land, rocky outcrops, patches of Bracken (*Pteridium aquilinum*) and Bramble (*Rubus fruticosus* agg.), and cliff slopes with typical maritime vegetation. Lambay Island is flanked by extensive areas of reef habitat. Lambay supports the principal breeding colony of Grey seal on the east coast of Ireland, numbering 196-252 seals, across all ages. It also contains regionally significant numbers of Common (Harbour) seal, of which up to 47 individuals have been counted at the site. Grey seals and Common seals occur year-round and the island's intertidal shorelines, coves and caves are used by resting and moulting seals. Lambay Island has good examples of vegetated sea cliffs, a habitat listed on Annex I of the E.U. Habitats Directive, and these cliffs hold internationally important populations of seabirds. The site is also of conservation importance for the populations of Grey seal and Common seal, species listed on Annex II of this Directive that it supports.

6.1.2.3.1 Grey seal (*Halichoerus grypus*) and Common (Harbour) seal (*Phoca vitulina*)

The Grey seal and Harbour or Common seal commonly breed along the coast inhabiting inshore and offshore waters. Grey seal is the larger of the two seal species.

The 'Conservation objectives supporting document – Marine habitats and species' for Lambay Island cSAC (NPWS, 2013h) notes that Grey seal and Harbour seal occur in estuarine, coastal and offshore waters but also utilises a range of intertidal and terrestrial habitats for important life history functions such as breeding, moulting, resting and social activity. Their aquatic range for foraging and inter-site movement extends into continental shelf waters and slope waters (Grey seal).

Both species inhabit established terrestrial colonies, known as haul-out sites at which they breed, moult, rest and engage in social activity. In Ireland there is a tendency by the Grey seal to select uninhabited islands, offshore rocky skerries, caves and isolated cliff-bound beaches (NPWS, 2013). Harbour or Common seal similarly breeds along the coast, also inhabiting inshore and offshore waters, and tends to select less remote locations such as inshore bays, coves and estuaries as haul-out sites (NPWS, 2013). The breeding season of Grey seal runs from August until December with large numbers gathering at haul-out sites throughout the season. The breeding season of Harbour seal commences in May and lasts until approximately July (NPWS, 2013a).

Both species are vulnerable to disturbance during periods when time is spent ashore by individuals or groups of animals. This occurs immediately prior to and during the annual breeding season. Pups of both Grey and Harbour seal are born on land, usually in sheltered locations and areas generally removed from the risk of predation and human interference e.g. uninhabited islands. While there may be outliers in any year, specific established sites are used annually for breeding-associated behaviour by adult females, adult males and their newborn pups. Such habitats are critical to the maintenance of the species within any site. The overall status of Grey and Harbour seal is considered favourable with the trend in conservation status of Grey seal improving and that of Harbour seal stable (NPWS, 2019).

Lambay Island supports the principal breeding colony of Grey seal on the east coast of Ireland, numbering 196-252 seals. The site also contains regionally significant numbers of Harbour seal, of which up to 47 individuals have been counted at the site. Both species occur all year round and the island's intertidal shorelines, coves and caves are used by resting and moulting seals.

While Lambay Island is at a remove of approximately 10km from Howth Harbour and while any terrestrial colonies are considered unlikely to be disturbed by any anthropogenic disturbances emanating from the harbour, like Harbour porpoise, seals are aquatically highly mobile and rely on sound to navigate, communicate and interpret sensory cues. Seals hearing ranges from 75Hz to 75kHz in water and 75Hz to 30kHz out of water (DAHG, 2014).

The conservation objective for the Lambay Island SAC, in relation to qualifying interest species, is to maintain the favourable conservation condition of Grey seal and Harbour seal, as defined by specific Attributes and Targets. The following tables outline the Attributes and Targets for Grey seal and Harbour seal, based on the detailed conservation objectives which have been prepared for Lambay Island SAC (NPWS, 2013c).

Table 11. Specific conservation objective Attributes and Targets for Grey seal in Lambay Island SAC [000204] (NPWS, 2013c)

Attribute	Measure	Target
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the grey seal population at the site

Table 12. Specific conservation objective Attributes and Targets for Harbour seal in Lambay Island SAC [000204] (NPWS, 2013c)

Attribute	Measure	Target
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site

6.1.2.4 *Baldoye Bay SPA (004016), Malahide Estuary SPA (004025), South Dublin Bay & River Tolka Estuary SPA (004024), Ireland's Eye SPA (004117), North Bull Island SPA (004006), Lambay Island SPA (004069) and the Rogerstown Estuary SPA (004015).*

Ireland's Eye SPA is an uninhabited island located to the north of Howth Head. The site boundary, which lies approximately 0.5km north-east of the harbour at the closest point, encompasses the island and several rocky outcrops surrounding it, as well as the marine area extending 0.2km west and 0.5km north and east of the island (NPWS, 2011a). The SPA is designated for the protection of five species, namely Cormorant, Herring Gull, Kittiwake, Guillemot and Razorbill. These species all either breed or winter within the SPA. Additionally, although not a qualifying feature of the site, Gannet also breeds on the island. This is a recently established population of Gannet which is one of only two on the east coast⁴.

⁴ <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004117.pdf> [Accessed 12/02/2020]

There is an intervening distance of approximately 1.0km between the area of works and the nearest potential breeding habitat within the SAC.

North Bull Island SPA is located approximately 1.9km to the south-west of the subject site. The site, which is designated for eleven wintering bird species, as outlined in **Table 9** above, encompasses all of north Dublin Bay including North Bull Island. This sand-spit, formed as a result of historic improvement works to Dublin Port, contains salt-marsh on its landward side which comprises the main winter roosting grounds for SCI species within the site (NPWS, 2014a). The SPA is separated from the works by the breadth of the Howth Head peninsula.

Baldoyle Bay SPA comprises a narrow estuary largely separated from the sea by a dune system. The SPA is located approximately 2.2km to the west of the subject area. The site contains both winter roosting and foraging grounds for a variety of species with large mud and sandflats exposed at low tide (NPWS, 2014b). The SPA is designated for the protection of six wintering bird species, namely Light-bellied Brent Goose, Shelduck, Ringed Plover, Golden Plover, Grey Plover and Bar-tailed Godwit, as outlined in **Table 9** above.

South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay and is located approximately 7.3km south-west of the subject area. The site, which is designated for thirteen bird species, as outlined in **Table 9**. The site is composed of intertidal habitats that vary from soft muds to well-aerated sands that are utilised by wintering birds as foraging grounds. Sand bars found within the site are used as roosts by waders, gulls and terns as the tide floods and ebbs in the south bay. Common Tern and Arctic Tern breed in Dublin Docks on a man-made mooring structure known as the E.S.B. dolphin and this is also included within the designated area (NPWS, 2014c).

Lambay Island SPA lies approximately 4 km off the north Co. Dublin coastline and 10km north-east of the subject site. The site, which is designated for ten bird species, as outlined in **Table 9**, holds an internationally important seabird colony and is one of the top seabird sites in Ireland. Three seabird species have breeding populations of international importance and a further six have populations of national importance. In addition to the seabirds, the island also supports nationally important wintering populations of Greylag Goose and Herring Gull (NPWS, 2011b).

Malahide Estuary SPA is located approximately 6.4km to the north-west of the subject site. The site, which is designated for fourteen wintering bird species, as outlined in **Table 9** above, is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The site is of high conservation importance, with internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit, and nationally important populations of a further 12 species. Two of the species which occur regularly (Golden Plover and Bar-tailed Godwit) are listed on Annex I of the E.U. Birds Directive (NPWS, 2013g).

Rogerstown Estuary SPA is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula. At low tide extensive intertidal sand and mud flats are exposed and these provide the main food resource for the wintering waterfowl that use the site, in addition to providing an important link in the chain of estuaries along the east coast (NPWS, 2014d). The SPA is designated for the protection of eleven wintering bird species, as outlined in **Table 9** above, and is located approximately 10.7km north-west of the subject site.

6.1.2.4.1 Species of Conservation Interest (SCI) potentially impacted (See Table 9 above)

The conservation objectives for the Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA, in relation to qualifying interest species potentially impacted by the proposal (see **Table 9** above), is to maintain or restore the favourable conservation condition of each SCI, as defined by specific Attributes and Targets. The following tables outline the Attributes and Targets for each SCI, based on the conservation objectives which have been prepared for the SPA's (NPWS 2020a, NPWS 2020b, NPWS 2015a, NPWS 2015b, NPWS 2013d, NPWS 2013e, NPWS 2013f).

Table 13 Specific conservation objective Attributes and Targets for SCI's of the Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA, potentially impacted by the proposal

Baldoyle Bay SPA			
SCI	Attribute	Measure	Target
Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	Population trend	Percentage change	Long term population trend stable or increasing
	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation.
Rogerstown Estuary SPA			
SCI	Attribute	Measure	Target
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162]	Population trend	Percentage change	Long term population trend stable or increasing
	Distribution	Number, range, timing and intensity of use of areas. Note: Timing and intensity of use not considered a measure in relation to ringed plover	No significant decrease in the range, timing or intensity of use of areas by oystercatcher, ringed plover, dunlin & redshank other than that occurring from natural patterns of variation.

North Bull Island SPA			
SCI	Attribute	Measure	Target
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162]	Population trend	Percentage change	Long term population trend stable or increasing
Turnstone (<i>Arenaria interpres</i>) [A169]	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by oystercatcher, dunlin, redshank & turnstone other than that occurring from natural patterns of variation.
Malahide Estuary SPA			
SCI	Attribute	Measure	Target
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162]	Population trend	Percentage change	Long term population trend stable or increasing
	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by oystercatcher, dunlin & redshank other than that occurring from natural patterns of variation.
South Dublin Bay and River Tolka Estuary SPA			
SCI	Attribute	Measure	Target
Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Dunlin (<i>Calidris alpina</i>) [A149] Redshank (<i>Tringa totanus</i>) [A162]	Population trend	Percentage change	Long term population trend stable or increasing
	Distribution	Range, timing and intensity of use of areas.	No significant decrease in the range, timing or intensity of use of areas by oystercatcher, ringed plover, dunlin & redshank other than that occurring from natural patterns of variation.
Lambay Island SPA			
SCI	Generic Conservation Objectives for each Species		
Cormorant (<i>Phalacrocorax carbo</i>) [A017] Shag (<i>Phalacrocorax aristotelis</i>) [A018] Herring Gull (<i>Larus argentatus</i>) [A184]	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA		
Ireland's Eye SPA			
SCI	Generic Conservation Objectives for each Species		
Herring Gull (<i>Larus argentatus</i>) [A184] Cormorant (<i>Phalacrocorax carbo</i>) [A017]	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA		

7 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS

7.1 BALDOYLE BAY SAC

7.1.1 Habitat Loss & Alteration

There is no spatial overlap between the proposed area of works and the Baldoyle Bay SAC; therefore, there will be no direct loss of qualifying habitats. While the proposal will result in the loss of an area (c.4.8ha) of fine sand to slightly muddy gravelly sand (ASU, 2019) adjacent to the existing west pier and Baldoyle Bay SAC via the construction of the reclamation area, this area of inter-tidal habitat is not considered to be of high ecological value in relation to that available within the SAC and has not been identified in the Conservation Objectives or the SAC supporting documentation.

Habitat alteration arising from the project is considered to be a potential indirect effect through water quality impacts. There are two sources of suspended and deposited dredge material which could settle on and alter the baseline condition of the existing habitats in the SAC:

1. Dredging
2. Reclamation

Because habitat alteration effects can only plausibly occur indirectly through water quality impacts, this is discussed in **Section 7.1.2** Water Quality below.

7.1.2 Water quality

7.1.2.1 Construction Phase

Potential water quality effects to habitats and species are twofold, suspended sediment in the water column, which can cause increased turbidity, and sedimentation effects i.e. deposition of sediment over benthic habitat measured as overburden thickness (millimetres above the pre-existing sediment horizon).

Extensive mudflats occupy 79% of the Baldoyle Bay SAC. This habitat can support diverse invertebrate and algal communities which are important feeding grounds for wintering wildfowl and waders for which the bay is also designated as a SPA. According to the Natura 2000 data form, the overall conservation status of the mudflat habitat in Baldoyle Bay is good.

The habitats that are likely to be altered as a result of the proposed works are the benthic communities within the mudflat habitat adjacent to Howth Harbour. In addition, the construction of the reclamation area could impact on the equilibrium of the SAC. While the dredging and construction of the reclamation area are outside the Baldoyle Bay SAC, they could potentially impact ecological processes in the vicinity of the development such as shoreline wave action, tidal currents, suspended sediment load and sedimentation. Changes to the hydrodynamic regime could cause secondary changes in proximity and away from the reclamation area, such as mudflat erosion.

Dredging activity is likely to generate the greatest amount of additional suspended sediment. In order to quantify the likely effect of the dredging activity a Hydrodynamic and Sediment Regime Assessment was carried out (**Appendix 4 Volume 3 of the EIAR**) and also a Generic Quantitative Risk Assessment (GQRA) (**Appendix 10 Volume 3 of the EIAR**) was completed.

The Hydrodynamic assessment found the following relevant information;

- There will be an increase in suspended solids in the area of the dredging works:
- There will be dispersion of sediments to sensitive receptor areas outside the harbour. The main impact will be an annual deposition at Claremont Beach within the Baldoyle SAC in the order of 0.4mm. This deposition will be removed from the beach on a daily basis through tidal and wave action:
- There will be a minor decrease in the wave action on Claremont beach due to the reclamation area. This would have the effect of potentially slowing the natural erosion of embryo dunes on Claremont beach.

The Hydrodynamic and Sediment Regime Assessment report and the GQRA outlines the dredging impact in relation to the transport of suspended solids from the inner harbour to outside the harbour. The nearest sensitive receptor of concern potentially impacted was identified as Claremont Beach in the Baldoyle SAC. The hydrodynamic assessment states that any deposition of sediments at Claremont beach will be fine particulates that will be resuspended under wave and tidal action and transported further on. As the particulates or suspended solids move further on they will reduce in concentration and impact. The GQRA indicates that if unmitigated, there will be concentrations of Tributyltin (TBT) and Benzo (g, h, i)- perylene within the suspended solids at Claremont Beach that are above the environmental quality standards. Without mitigations the Annual Average (AA) Environmental Quality Standards (EQS) for TBT will be exceeded by a factor of 6.8 for TBT, the Maximum Allowable Concentration (MAC) EQS for TBT is calculated to be exceeded by a factor of 78. The MAC EQS for Benzo(g,h,i)-perylene will be exceeded by a factor of 11.8. The MAC EQS exceedances will only happen when the high contaminated areas are dredged in combination with a high tide on Claremont Beach. Unmitigated, the impact of these levels will have a potential adverse effect on the water quality at Claremont Beach. Mitigations are outlined in **Section 8.3.1** below.

The section of Baldoyle Bay SAC located near the southern perimeter of the proposed reclamation area is classified as Mudflats and sandflats not covered by sea water at low tide (1140). Within this Annex I habitat the community type 'Fine sand dominated by *Angulus tenuis* community complex' is noted to occur. This community complex is distinguished by the bivalve *Angulus tenuis*. The bivalve *Angulus fabula* and the polychaetes *Nephtys cirrosa*, *Scoloplos armiger*, *Sigalion mathildae*, *Lanice conchilega* are also recorded within this complex. The amphipod *Bathyporeia pelagica* and the bivalve *Donax vittatus* occur in high abundance at Claremont Beach, while unidentified species of the oligochaete family Enchytraeidae are recorded on Velvet Strand and west of Howth (NPWS, 2012a).

Marine benthic faunal communities are most likely to experience the greatest impact as a result of the proposed reclamation works. However, the grab samples show that in general the organisms recorded e.g. molluscs, polychaetes etc. are common in Irish coastal waters. Of the species recorded within the proposed reclamation area, only three species were noted to correspond to that of the 'Fine sand dominated by *Angulus tenuis* community complex', i.e. *Fabulina fibula* (*Angulus fibula*), *Macomangulus tenuis* (*Angulus tenuis*) and *Lanice conchilega* (See **Appendix 6** of Volume 3 of the EIAR). A distinguishing feature of the complex 'Fine sand dominated by *Angulus tenuis* community complex' is the dominance of the mollusc *Angulus tenuis*. This species was noted to occur in low numbers with both *Fabulina fibula* (*Angulus fibula*) and *Lanice conchilega* recorded in higher abundance. The bivalve mollusc *Abra alba* was the most common taxa within the overall survey area, being present at 13 sites with 384 individuals identified.

It is noted that the sediment being dredged (fine sand to slightly muddy gravelly sand (ASU, 2019)) is similar in composition to much of the soft shallow intertidal/subtidal sediments in proximity to the development area (fine sands and muddy sands). Accordingly, any sediment which is to settle in proximity to the works area will readily assimilate into this existing sediment pool without adversely affecting its physical composition or ecological function. While there will be increased turbidity arising from the dredging works, this will be temporary in nature and is similar to a naturally occurring feature of marine environments, with no potential to give rise to significant negative ecological effects. Habitats which are estuarine and marine in nature (Estuaries, Mudflats and sandflats etc.) are very unlikely to be affected by fluctuations in sediment movement. The risk of significant silt levels being generated from the project is low given the scope of the project, the nature of the receiving environment and due to the design and mitigation measures to be implemented.

Sediment movement is a natural process that occurs within the marine environment and benthic organisms are adapted to the natural processes of sediment movement, erosion and deposition, including the increased levels of sediment movement reached during storms (Miller et al., 2002). Sediment transport during the construction works is based around the movement of sediment during the dredging phase where heavier particles lost into the water column during dredging settle out immediately in the area of the dredging while some smaller particles go into suspension and are transported further including out of the harbour mouth on the ebb tide. The hydrodynamic and sediment regime assessment outlines the impacts and assesses the quantity of this sediment transport. The receptor of concern was Claremount strand where a 0.4mm annual deposition was modelled. This material will undergo removal by tide and wave action. Therefore, the potential deposition in intertidal habitats caused by the proposed construction works will not result in any change to the existing infaunal communities in these habitats as burrowing organisms are adapted to the natural deposition of sediments in estuarine/marine environments. With regard to the habitat associated species recorded within the development footprint and in close proximity i.e. within the Baldoyle Bay SAC, they are expected to recover rapidly following cessation of dredging, i.e. within 1 to 2 years.

Upon completion of the perimeter embankment, the external face of the embankment will be protected from erosion with a rock armourstone revetment. When the external face is complete the internal face will be lined with an impermeable clay liner to act as a barrier to movement of water and contaminants in and out of the reclaimed land. Geosynthetic Clay Liners (GCLs) are reinforced composites which combine two durable geotextile outer layers with a uniform core of natural bentonite clay to form a hydraulic barrier. This impermeable perimeter will stop the loss of dredge spoil and supernatant water into the surrounding environment during the later stages of construction.

Once the dredge material is treated with binder, the treated dredge material will then be pumped as a wet mix from the treatment plant to the bunded reclaimed land area where it will be deposited as backfill where it will stabilise and solidify (see **Section 5.2.6.3** for further details). During this process there is a risk of spillage of cementitious materials. Cementitious materials are highly alkaline and, consequently, can drastically alter the pH of the receiving waters. This can lead to profound ecological impacts and can affect the condition of habitats by causing damage to pH-sensitive species. The use and management of cementitious materials in or close to watercourses will be carefully controlled to avoid spillage which as stated earlier has a deleterious effect on water chemistry and aquatic habitats and species. Due to the short duration of pumping and the confined layout of Howth Harbour any such impacts would be unlikely to constitute adverse effects on the integrity of nearby Annex I habitats e.g. Mudflats and sandflats not covered by sea water at low tide. Notwithstanding this, mitigation has been devised in order to ensure beyond reasonable scientific doubt that such effects do not occur as a result of the construction of the proposed development.

The potential risk of the stabilised and solidified (S/S) sediments to water quality is in relation to contaminant leaching rather than increased suspended sediment. The GQRA indicates that the S/S sediments will undergo a minor amount of leaching in the outer surface of the S/S sediments. The impermeable solidified material locks in the contaminants within the inner layers of the stabilised and solidified sediments. The leachate will be contained within the impermeable layer of the revetment wall. If any leachate leaves the revetment wall structure it will have undergone mixing within the revetment wall pore space. The level of contamination within the waters when the leachate leaves the revetment wall will be below the environmental quality standards (EQS) for surface waters.

Therefore, it is considered that the remediation technology which will be employed to treat dredge spoil will significantly reduce the mobility of any contaminants present, such that contaminants are contained within the material through interaction with a binding agent. This will ensure that contaminants are prevented from leaching out into the aquatic environment and will render dredge spoil suitable for re-use as infill in the reclamation of land to the west of the west pier. It is noted that upon completion of the perimeter embankment the internal face will be lined with an impermeable clay liner to act as a barrier to movement of water and contaminants in and out of the reclaimed land. This impermeable perimeter will stop the loss of dredge spoil and supernatant water into the surrounding environment during the later stages of construction.

All plant e.g. excavators, dumpers etc will be refuelled on site, while rigid and articulated vehicles will be fuelled off site as would all site vehicles (jeeps, cars and vans). At construction stage, a fuel management plan will be developed specific to the site and the particular plant and equipment required for construction. Concrete works will only be undertaken when suitable sea conditions are forecast such that any concrete used will be dry and chemically inert before being exposed to wave action, minimising any potential risk of ingress to the marine environment.

Therefore, adverse effects to the Conservation Objectives of the Baldoyle Bay SAC through water quality impacts during the construction phase of the project are not envisaged.

7.1.2.2 Operational Phase

Operational phase impacts could potentially affect the Baldoyle SAC through changes to the baseline hydrodynamic regime and through fuel and oil spills from vessels and vehicles during operation. It is not envisaged that the project will result in any direct loss of qualifying interest habitats of any Natura 2000 site due to the nature of the project and the lack of spatial overlap between the harbour and any Natura 2000 site. With regard to the potential for indirect alteration of Annex I marine habitats via potential water quality effects, significant water quality effects are not envisaged during the project's operational phase due to the proposed and existing water quality protection controls which will continue to be used within the harbour once works are complete.

During the operational phase there will be a change in tidal currents from the new reclamation area. As outlined in the Hydrodynamic and sediment regime assessment the impact will be localised and in the order of less than 0.1m/s in the area just west of the proposed development. Impacts towards the beach areas are much less.

As outlined in the Hydrodynamic and sediment regime assessment wave action is going to slightly reduce in the area of Claremont Beach west of the proposed reclamation area. This will have the effect of reducing the erosion of embryo dunes on Claremont beach. However, the impact is expected to be not significant as the reduction in wave action is considered minimal. The overall impact of wave action on biodiversity is considered a positive imperceptible long term impact on the dunes habitats on Claremont beach.

During the operational phase, day-to-day vessel operations have the potential to result in water quality impacts as a result of fuel or oil spill, wash down of boats, discharge of wastewater, fish waste or other sources of potential pollution to which fishing harbours may be subject. However, Howth FHC operates within the operational guidelines and protocols outlined within the "Fishery Harbour Centres Best Practice Manual", and will continue to do so. A harbour spill kit is available in the event of any accidental fuel or oil spill. Fishing vessels are not permitted to discharge any form of waste into the harbour. Dedicated waste storage areas are located on the piers. The operational guidelines to which trawlers are currently subject within the harbour will continue once the West Pier and reclamation works are

complete. Surface water within the reclaimed area will be collected via gullies and discharged to the sea via a hydrocarbon interceptor/silt trap. Therefore, it is not expected that the proposed upgrade works will have any potential for significant water quality impacts during the project's operational phase.

Overall, adverse effects to the Conservation Objectives of the Baldoyle Bay SAC through water quality or resource impacts during the operation phase of the project are not envisaged.

7.2 ROCKABILL TO DALKEY ISLAND SAC

7.2.1 Habitat Loss & Alteration

There is no spatial overlap between the proposed area of works and the Rockabill to Dalkey Island SAC; therefore, there will be no direct loss or alteration of 'Reef' habitat. No significant water quality impacts are predicted during either the construction or operational phases of the project; therefore, indirect alteration of 'Reef' habitat is not envisaged as a result of the proposal.

Habitat alteration arising from the project is considered to be an indirect effect through water quality impacts. There are two sources of suspended and deposited dredge material which could settle on and alter the baseline condition of the existing habitats in the SAC:

1. Dredging
2. Reclamation

Because habitat alteration effects can only plausibly occur indirectly through water quality impacts, this is discussed in Water Quality section below.

7.2.2 Water Quality

At Rockabill to Dalkey Island SAC no significant water quality impacts are predicted as a result of either the construction or operational phases of the proposal. With regard to the Rockabill to Dalkey Island SAC, any volumes of sediment which do exit the harbour will become further diluted in the wider marine environment and so significant sedimentation or turbidity effects are envisaged. Any sediment which does exit the harbour on the ebbing tide following dredging will spread over an area sufficient to result in very low levels of contaminants away from the harbour.

Re-suspension of sediment outside the harbour due to dredging operation and/or the placement of larger diameter rocks into the underlying silt material and the perimeter embankment construction will fall quickly through the water column and will remain near the work site until moved by wave action. Finer material in particular which escapes into the water column will remain in suspension until it reaches an area of quiet water where it is deposited out.

The sediment being dredged is similar in composition to much of the soft shallow intertidal/subtidal sediments in proximity to the development area. Accordingly, it will readily assimilate into this existing sediment pool without adversely affecting its physical composition or ecological function. While there will be increased turbidity arising from the dredging works, this will be temporary in nature and is a naturally occurring feature of marine environments with no potential to give rise to negative ecological effects.

Once dredge material is stabilised and re-deposited within the retaining structure the mobility of any contaminants will be significantly reduced such that contaminants are contained and prevented from leaching into the marine environment. Fuels, oils and other such substances will at all times be handled in a controlled manner. Regard will be given to sea and weather conditions in relation to concrete works such that the risk to the marine environment is minimised.

Significant water quality impacts during the operational phase of the proposal are not predicted as harbour usage by trawlers is not predicted to intensify and any trawlers operating out of the harbour will continue to be subject to best practice operational guidelines and protocols which are outlined within the Howth FHC Environmental Management Plan. Surface water within the reclaimed area will be collected via gullies and discharged to the sea via a hydrocarbon interceptor/silt trap.

Therefore, significant water quality effects to the Rockabill to Dalkey Island SAC during either the construction or operational phases of the proposal are not considered likely to occur as a result of the proposed works. Adverse is the test change the text to match the Baldoyle SAC conclusion throughout.

7.2.3 Disturbance and/or displacement of species

The main threats to Harbour porpoise, defined as being of medium importance, are fishing and harvesting of aquatic resources and seismic explorations/explosions, while noise nuisance, death or injury by collision, marine water pollution and changes in abiotic conditions are considered to be of low importance (NPWS, 2013a). The level of risk to a marine mammal from particular anthropogenic sound may be evaluated by relating the characteristics of a sound to the animals hearing ability at the operating signal frequency/frequencies. It makes sense that the closer an animal is to a high energy sound source the greater the potential impact (e.g. damage to ears). With increasing distance from the sound source, the effect is likely to diminish producing relatively lower magnitude impacts (e.g. hearing threshold shift, masking) (DAHG, 2014).

The potential significant impacts to marine mammals associated with the noise related aspects of the construction phase of the proposal may include the following (DAHG, 2014):

- Physical (Non-auditory):
 - Damage to body tissue
 - Induction of gas embolism or decompression sickness

- Physical (Auditory):
 - Gross damage to ears
 - Permanent threshold shift (PTS) in hearing
 - Temporary threshold shift (TTS) in hearing
- Perceptual:
 - Masking of communication, other biologically important sounds
 - Interference with ability to acoustically interpret environment
- Behavioural:
 - Gross interruption of normal behaviour
 - Behaviour modified
 - Displacement from an area (short or long term)
 - Disruption of social bonds, including mother-young associations
- Chronic/Stress:
 - Increased vulnerability to disease
 - Increased potential for impacts from negative cumulative effects
 - Sensitisation to sound
 - Habituation to sound
- Indirect Effects:
 - Reduced availability of prey
 - Increased vulnerability to predation
 - Behavioural changes leading to physical damage and/or physiological effects

“Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters”, produced by the DAHG in 2014, has outlined several specific maritime activities that are sources of introduced sound and which potentially pose risks to marine mammals, although in any case sound-producing activities may be variable and case-specific. These activities include dredging, drilling, pile driving, geophysical acoustic surveys and blasting, (DAHG, 2014).

Marine mammals, especially cetaceans, have well developed acoustic capabilities and are sensitive to sound at much higher frequencies than humans. 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. Received levels of dredging noise by marine mammals can exceed ambient levels to considerable distances depending on the type of dredger used (Richardson *et al.* 1995).

Auditory capabilities are frequency dependent and vary between species (Southall *et al.* 2007). **Table 15** below provides details the relevant auditory bandwidth as defined by Southall *et al.* (2007) and NMFS (2016), and the broadband injury threshold sound pressure levels proposed by Southall *et al.* (2007) and Lucke *et al.* (2009), for Harbour porpoise.

Table 14 Harbour porpoise auditory capabilities

Cetacean	Hearing range	Proposed injury threshold
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		criteria to non-pulsed sounds (SPL)
High-frequency cetaceans	200Hz to 180kHz a	200 dB re 1µPa c
Harbour porpoise	275Hz to 160kHz b	

Notes: Injury is defined as the level at which a single exposure is likely to cause onset of permanent hearing loss¹. SPL = Sound Pressure Level.

Sources: a Southall *et al.* (2007); b NMFS (2016); c Lucke *et al.* (2009).

Todd *et al.* (2014) reviewed the impacts of dredging on marine mammals and suggested a back-calculated source level of 163 dB re 1 mPa at 1 metre (bandwidth ¼ 20 Hz–100 kHz) for a backhoe dredging operation off the Shetlands of 179 dB re 1 mPa at 1 metre (bandwidth ¼ 3 Hz – 20 kHz). A second study estimated a source level of 179 dB re 1 mPa at 1 metre (bandwidth ¼ 3 Hz – 20 kHz) but used different scaling. Despite these elevated levels, they are mainly low frequency and below the peak frequency for echolocation and would attenuate quickly. There are no measurements available for long reach excavators but it's likely to be considerably less than these levels reported. As can be seen these suggested levels are below the injury threshold criteria to non-pulsed sounds for Harbour porpoise as detailed in Lucke *et al.* (2009).

While the proposal does not require any drilling/piling or other high-energy construction activities, dredging, excavation works and rock-breaking, installation of rock armour, and other construction activities required as part of the proposal are expected to result in the generation of some fugitive underwater noise emissions. A study utilising acoustic monitoring of Harbour porpoises off the Island of Sylt in Germany found that where sand extraction via trailing suction hopper dredging took place, Harbour porpoises would temporarily avoid this area and when the dredger was closer than 600m to the monitoring location, it took three times longer before a Harbour porpoise was detected again compared with times without sand extraction Diederichs *et al.* (2010). Thus, dredging has the potential to cause disturbance/displacement impacts to Harbour porpoise, and other marine mammals, potentially in the surrounding waters. Therefore, on the basis of the precautionary principle, mitigation is required.

In relation to potential impacts on foraging capabilities of harbour porpoise, the species is an aquatic predator that feeds on a wide variety of fish, cephalopod and crustacean species occurring in the water column or close to the seabed, with dive depths in excess of 200m having been recorded for the species. Foraging areas for harbour porpoise are often associated with areas of strong tidal current and associated eddies; and the occurrence of porpoises close to shore or adjacent to islands and prominent headlands is commonly reported (RPS, 2019b).

It is noted that the prey species on which harbour porpoise rely on are mobile in nature and as such will not be concentrated within areas potentially impacted by dredge plumes which may escape from the harbour. These potentially elevated concentrations of sediment within the water column will decrease over time and across the normal tidal cycle as sediments disperse and dilute to background levels. As such any potential significant decrease in prey availability as a result of the project due to dredging activities can be ruled out.

In summary, while there is the potential to cause significant disturbance/displacement impacts to Harbour porpoise during the construction phase of the proposed works, *without mitigation*, the presence of a trained MMO in conjunction with the additional mitigation measures listed in **Section 8.3** below will minimise any potential impact as to not affect the conservation objectives of the Rockabill to Dalkey Island SAC. It is noted that the area of the Rockabill to Dalkey Island SAC for which the species is protected, covers an area of 273 km². Overall, there will likely be some temporary avoidance of the area around Howth Harbour during the construction phase with no further effects during the operation phase are envisaged. There is no aspect of the project that is predicted to cause a permanent exclusion of Harbour porpoise from part of its range within Rockabill to Dalkey Island SAC, or permanently prevent access for the species to suitable habitat within SAC. Overall, no significant impact on Harbour porpoise recorded within the Rockabill to Dalkey Island SAC is predicted.

7.2.4 Habitat or Species Fragmentation

Given the nature and location of the works, situated at Howth Harbour, and the lack of spatial overlap between the subject site and any Natura 2000 site, habitat or species fragmentation is not envisaged as a result of either the construction or operational phases of the proposal. Therefore, significant habitat or species fragmentation impacts are not likely to occur.

7.3 LAMBAY ISLAND SAC

7.3.1 Habitat Loss and Alteration

There is no spatial overlap between the proposed area of works and the Lambay Island SAC; therefore, there will be no direct loss or alteration of 'Reef' or 'Vegetated sea cliffs of Atlantic and Baltic coasts' habitats. No significant water quality impacts are predicted during either the construction or operational phases of the project; therefore, indirect alteration of 'Reef' or 'Vegetated sea cliffs of Atlantic and Baltic coasts' habitats are not envisaged as a result of the proposal.

Habitat alteration arising from the project is considered to be an indirect effect through water quality impacts. There are two sources of suspended and deposited dredge material which could settle on and alter the baseline condition of the existing habitats in the SAC:

1. Dredging
2. Reclamation

Because habitat alteration effects can only plausibly occur indirectly through water quality impacts, this is discussed in Water Quality section below.

7.3.2 Water Quality

At Lambay Island SAC, no significant water quality impacts are predicted as a result of either the construction or operational phases of the proposal. With regard to the Lambay Island SAC, any volumes of sediment which do exit the harbour will become further diluted in the wider marine environment and

so significant sedimentation or turbidity effects are envisaged. Any sediment which does exit the harbour on the ebbing tide following dredging will spread over an area sufficient to result in very low levels of contaminants away from the harbour.

Re-suspension of sediment outside the harbour due to dredging operation and/or the placement of larger diameter rocks into the underlying silt material and the perimeter embankment construction will fall quickly through the water column and will remain near the work site until moved by wave action. Finer material in particular which escapes into the water column will remain in suspension until it reaches an area of quiet water where it is deposited out. The volumes of such material in the proposed dredging operation and/or the placement of larger diameter rocks into the underlying silt material will have the ability to be dispersed over a very large area.

The sediment being dredged is similar in composition to much of the soft shallow intertidal/subtidal sediments in proximity to the development area. Accordingly, it will readily assimilate into this existing sediment pool without adversely affecting its physical composition or ecological function. While there will be increased turbidity arising from the dredging works, this will be temporary in nature and is a naturally occurring feature of marine environments with no potential to give rise to negative ecological effects.

Once dredge material is stabilised and re-deposited within the retaining structure the mobility of any contaminants will be significantly reduced such that contaminants are contained and prevented from leaching into the marine environment. Fuels, oils and other such substances will at all times be handled in a controlled manner. Regard will be given to sea and weather conditions in relation to concrete works such that the risk to the marine environment is minimised.

Significant water quality impacts during the operational phase of the proposal are not predicted as harbour usage by trawlers is not predicted to intensify and any trawlers operating out of the harbour will continue to be subject to best practice operational guidelines and protocols which are outlined within the Howth FHC Environmental Management Plan. Surface water within the reclaimed area will be collected via gullies and discharged to the sea via a hydrocarbon interceptor/silt trap.

Therefore, significant water quality effects to the Lambay Island SAC during either the construction or operational phases of the proposal are not considered likely to occur as a result of the proposed works.

7.3.3 Disturbance and/or Displacement of Species

Lambay Island SAC is designated to protect the breeding and resting places of Grey and Harbour seals. The main threats to Grey seal, defined as being of medium importance, are fishing and harvesting of aquatic resources and seismic explorations/explosions, while illegal taking of marine fauna, marine water pollution, noise nuisance/pollution and changes in abiotic conditions are considered to be of low importance (NPWS, 2013). These activities have also been identified as being the main threats posed to

Harbour seal, with the addition of marine and freshwater aquaculture and outdoor sports/recreational activities (low importance) (NPWS, 2013).

While the SAC is located over 10km to the north-east of the proposal site, due to their mobile nature, Grey and Harbour seals have the potential to occur in the vicinity of Howth Harbour. Grey seals have been found to occur regularly within Howth Harbour, foraging and scavenging around fishing boats and have become accustomed to human presence and boat traffic (Berrow, 2019). During previous Marine Mammal Observer (MMO) contracts carried out at Howth Harbour in 2015 and 2016 by Meade and Levesque respectively, Grey seals were sighted regularly swimming, socialising and feeding within the inner harbour during construction works to the trawler basin and trawler pontoon, which included drilling works (Meade, 2015 and Levesque, 2016 as cited in Berrow, 2019).



Figure 21 Two Grey seals within an operational Howth Harbour on the 03/09/2020

Studies so far suggest that effects of dredging sound on pinnipeds may be limited. Between 2002 and 2003, during observations of dredging operations in Geraldton, Western Australia, it was reported that New Zealand fur seals (*Arctocephalus forsteri*) and Australian sea lions (*Neophoca cinerea*) showed no sign of disturbance reactions, despite the relative closeness of the dredging to popular haul-out sights (Todd *et. al.*, 2014). Noise measurements taken using an underwater noise recorder, moored less than 300m from the dredging activity, during Dublin Port maintenance dredging in July 2016 found that sound levels for the dredging operations at ranges of 213 and 268m were below the disturbance threshold for pinnipeds (160 dB re 1 μ Pa) (RPS, 2019b). This study confirmed that noise emitted from dredging operations does not significantly impact seals at a range exceeding 200m.

While sound exposure levels from rock breaking are thought to be well below that expected to cause injury to a marine mammal, disturbance, from the noise generated by rock breaking has the potential to cause lower level disturbance, masking or behavioural impacts (NPWS, 2014), especially to seals within the harbour (Berrow, 2019). Based on the precautionary principle, *without mitigation*, there is potential for significant disturbance/displacement effects to Grey seal and Harbour seal as a result of potential impacts associated with the construction phase of the proposal which could potentially result in an adverse impact to the conservation objectives of the Lambay Island SAC.

The presence of a trained MMO in conjunction with the additional mitigation measures listed in **Section 8.3** below will minimise any potential impact as to not affect the conservation objectives of the Lambay Island SAC.

No significant disturbance/displacement impacts to Grey and Harbour seals are reasonably foreseeable during the project's operational phase. It is noted that the project is not predicted to result in any considerable increase or intensification of activity within the harbour over and above that which already occurs. Additionally, Grey seal regularly occur within and in the vicinity of the existing operational harbour and therefore can be expected to be accustomed to existing levels of vessel/harbour activity (See **Appendix 2** Screening for Appropriate Assessment for further details).

7.3.4 Habitat or Species Fragmentation

Given the nature and location of the works, situated at Howth Harbour, and the lack of spatial overlap between the subject site and any Natura 2000 site, habitat or species fragmentation is not envisaged as a result of either the construction or operational phases of the proposal. Therefore, significant habitat or species fragmentation impacts are not likely to occur.

7.4 SPECIAL PROTECTION AREAS (SPA'S)

7.4.1 Habitat Loss and Alteration

There is no spatial overlap between the proposed area of works and any Special Protection Area's, namely; Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA. Therefore, there will be no direct loss or alteration of habitats within these SPA's.

Dredging will deepen the harbour and as a result there will be less exposed substrate at low tide and this has the potential to displace any birds, waders in particular, that forage in this type of intertidal habitat within the harbour. While there were Gulls, Brent Geese, Redshanks, Turnstones and the occasional Oystercatcher utilising intertidal mud within the harbour, numbers were low. Any alteration in habitat availability will not have an impact beyond displacement of a very small number of birds and would not be considered significant at anything more than a local level. In addition, the areas within the harbour

recorded as being used by birds foraging at low tide will not be directly targeted by the dredging works, specifically the south-eastern corner of the harbour (backing the Marina) (Woodrow, 2020a).

Similarly, the loss of potential foraging habitat for waterbirds that would occur as a result of reclamation along the outer section of the western pier, was considered to be of local significance, with small numbers of foraging birds permanently displaced. Over time the new rock armouring would provide similar intertidal foraging habitats, both in terms of function and area. The loss of any intertidal muddy sand shores as a result of the land reclamation is considered imperceptible in relation to similar available habitat in the adjoining landscape i.e. along Claremont Strand. The loss of open water, particularly at high tide, would be permanent, however recorded usage of this area by species of divers, grebes and sawbills was periodic and by small numbers and therefore any displacement effect of foraging birds would not be considered significant (Woodrow, 2020a).

As discussed in **Section 7.1.2.1** above, significant water quality impacts are not predicted as a result of either the construction or operational phases of the proposal. Some mitigation measures are required to lessen potential impact on the Claremont Beach area of the Baldoyle SAC. No significant impact is expected on the Baldoyle SPA. Any volumes of sediment which do exit the harbour will become further diluted in the wider marine environment and so significant sedimentation or turbidity effects are not envisaged. Any sediment which does exit the harbour on the ebbing tide following dredging will spread over an area sufficient to result in very low levels of contaminants away from the harbour.

Re-suspension of sediment outside the harbour due to dredging operation and/or the placement of larger diameter rocks into the underlying silt material and the perimeter embankment construction will fall quickly through the water column and will remain near the work site until moved by wave action. Finer material in particular which escapes into the water column will remain in suspension until it reaches an area of quiet water where it is deposited out. The volumes of such material in the proposed dredging operation and/or the placement of larger diameter rocks into the underlying silt material will have the ability to be dispersed over a very large area.

The sediment being dredged is similar in composition to much of the soft shallow intertidal/subtidal sediments in proximity to the development area. Accordingly, it will readily assimilate into this existing sediment pool without adversely affecting its physical composition or ecological function. While there will be increased turbidity arising from the dredging works, this will be temporary in nature and is a naturally occurring feature of marine environments with no potential to give rise to negative ecological effects.

Once dredge material is stabilised and re-deposited within the retaining structure the mobility of any contaminants will be significantly reduced such that contaminants are contained and prevented from leaching into the marine environment. Fuels, oils and other such substances will at all times be handled in a controlled manner. Regard will be given to sea and weather conditions in relation to concrete works such that the risk to the marine environment is minimised.

Significant water quality impacts during the operational phase of the proposal are not predicted as harbour usage by trawlers is not predicted to intensify and any trawlers operating out of the harbour will continue to be subject to best practice operational guidelines and protocols which are outlined within the Howth FHC Environmental Management Plan. Surface water within the reclaimed area will be collected via gullies and discharged to the sea via a hydrocarbon interceptor/silt trap.

Therefore, no significant water quality impacts are predicted during either the construction or operational phases of the project; thus, indirect alteration of 'wetland' habitats is not envisaged as a result of the proposal. No significant impacts to the Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA during either the construction or operational phases of the proposal are predicted to occur as a result of the proposed works.

7.4.2 Disturbance and/or Displacement of Species

Disturbance

The proposed development works, expected to last 24 months, will give rise to noise emissions, and may potentially generate local ground borne vibration. Such emissions may result in impacts to onsite and offsite receptors. The Noise and Vibration impact assessment undertaken as part of the EIA is presented in **Chapter 12**, Volume 2 of the EIAR. Relevant parts of the assessment have been summarised below as appropriate.

The existing noise environment is robust. There is a constant flow of patrons to the piers, restaurants, cafes and retail outlets. Tourists come to Howth to walk on the piers and hill and also to take boat trips from the harbour. Car parks facilitate patrons and tourists at the pedestrian entrance to the harbour piers. A passenger ferry pontoon is located on the West Pier. Howth Yacht Club marina is a private member sailing club with a 250-berth marina. Many of these vessels have noise generating inboard and outboard motors louder than the plant and machinery proposed for the works. The DART terminates at the entrance to the harbour. There is a functioning shipyard for use to all types of vessels where noisy work takes place including cutting and welding metal.

Likely noise sources during the proposed works include long reach excavators, floating pontoon barge/ floating dump barge, working and safety boats, excavators, dump and delivery trucks and the dredge material treatment plant.

There will be underwater rock breaking and 10% of the dredge material will be rock broken out under water (approx. 24,000 tonnes). Breaking will be carried out by a long reach excavator using a rock breaker attachment such as a Sandvik G130. The broken rock will then be excavated from the bed by the long reach excavator with a bucket attachment.

Following completion of the works, no significant residual noise is predicted.

Potentially increased noise and disturbance associated with the site works could cause disturbance/displacement of SCI's. Disturbance can cause sensitive species, such as birds, to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality. In an estuarine environment for example, disturbance can manifest in a number of forms of varying severity depending on the nature, duration and intensity of the disturbance source:

- Birds looking up or heads raised, temporarily stopping feeding or roosting
- Birds moving away from the cause of the disturbance by walking or swimming before resuming previous activity
- Birds taking flight and landing somewhere in the same feeding area or roosting site
- Birds taking flight and leaving their preferred foraging or roosting area completely (RPS. 2019b)

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Article 4.4 of the Bird's Directive (79/409/EEC) requires member states to *"take appropriate steps to avoid... any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article"*. This specifically relates to conservation measures concerning Annex I species.

Theoretically disturbance of important qualifying bird species could potentially occur during the construction phase of the project. However, predicting potential impacts on birds from disturbance can be problematic. Although there are many instances where waterfowl and people appear to co-exist on estuaries, there are widespread examples where effects and impacts of varying severity have been described.

Noise levels of 70dB and above are regularly cited within the literature as being the threshold beyond which disturbance to estuarine bird species can be predicted to occur (Cutts et al.,2013). However, the greatest levels of disturbance response typically occur when the difference between ambient noise levels and peak noise levels is greatest, and when combined with visual human presence (Cutts et al 2013).

Burger (1981), in a study of a coastal bay, found that birds were present 42% of the time when people were present, but birds were present 72% of the time when people were absent. Human activities such as jogging or grass mowing, which involved rapid movement or close proximity to roosting birds, usually caused them to flush (fly away). Slow-walking birdwatchers and clammers did not usually cause birds to flush. Gulls and terns were least affected and usually returned to where they had been; ducks usually flushed and flew to the centre of the pond; and herons, egrets and shorebirds were most disturbed and flushed to distant marshes.

The magnitude and predictability of impacts as a result of disturbance ranges between species, seasons, weather, source and duration of disturbance, degree of previous exposure of the individuals to disturbance and the occurrence of additional disturbances. Most disturbances to wetland birds result in an interruption to normal activity and the displacement of birds over variable distances, often into sub-optimal habitats. This can be critical during severe winters and can lead to a reduction in the carrying capacities of important wintering wetland sites. However, in general studies show that most bird species have the ability to habituate to regular and continual sources of noise and visual disturbances providing there is no large 'startling' component.

Migratory birds generally have to cope with narrow physiological and energetic balances and are often bound to fixed time-schedules (e.g. Piersma 1994). Hence, they heavily depend on the resources they find at their stop-over sites en route between breeding and wintering areas, and any serious disturbance or other human impact may easily disturb the precarious balance the birds are subject to. Eventually winter survival and breeding success, and thus population levels, might be affected as well (e.g. Madsen & Fox 1995).

As part of the Environmental Impact Assessment Report (EIAR), a noise chapter was completed, modelling the potential noise emitted by the proposed construction phase of the development. A number of noise sensitive receptors were chosen, one of which was the Western Pier, the two others were nearby residential estates. The modelling was based on the soil treatment area being located on the middle pier. The dredging barge was modelled in the harbour channel between middle and west piers.

It is noted that the proposed development site is outside the boundaries of the nearby SPA's and is located on the outskirts on an existing urban environment and within a functional harbour. This area is subject to noise disturbance and light pollution from existing harbour infrastructure and nearby urban development. During the construction stage, there may be short-term increases in disturbance but it will not be significant in the context of existing noise levels. The results of the noise modelling show that the noise limit criteria (65dB) will not be exceeded during the daytime land reclamation works at adjoining habitats outside the proposed development site, see **Figure 22** below. Noise levels in the order of 56dB(A) are expected along the West pier. This may vary to some extent depending on the proximity of the barge to the pier, however noise levels are very unlikely to exceed the daytime noise limit criteria. The existing buildings on the West Pier were noted to act as a barrier to noise propagation from the infill construction works to within the harbour and from dredging works within the harbour to Claremont Strand.

A study was of the effects of piling noise and vibration disturbance on birds within the Humber Estuary SPA, Eastern England, showed that despite consistent periods of double hydraulic piling activity on the landward side of the seawall on the Humber, birds appeared to be largely unaffected by the noise of piling. On some occasions, birds were recorded arriving to feed during periods of piling activity. It was

extensive seismic operations in the North Sea and elsewhere, and the dredging and reclamation operations will have noise sources significantly less than these. While very high amplitude low frequency underwater noise may result in acute trauma to diving seabirds (i.e. with tens of metres of underwater explosions; Danil & St Leger 2011), their region of greatest hearing sensitivity suggests a low potential for disturbance due to dredging activities (see **Section 7.2.2** above for potential frequency ranges of dredging activities). As such, and given the short-term duration of construction phase of the project, including rock placement activities, in the context of many decades of shipping and fishing activity in the region, significant disturbance to diving seabirds is assessed as highly unlikely.

Many species are seen to mitigate the effects of continued but harmless disturbance by habituation; as they become used to disturbance they react less strongly. Certain species are more sensitive to disturbance than others. An ambient noise levels threshold of 70dB(A) has been developed over a period of years based on published data as it was found birds will habituate to regular noise below this level (IECS, 2013).

Wintering birds in Howth Harbour have habituated to moderate levels of disturbance associated with daily activity of a busy harbour. Sources of anthropogenic disturbance within the harbour include port activities including shipping, road traffic including trucks and commercial vehicles, recreational vessels, and activities associated with residential, urban areas and commercial/industrial areas on the shorelines. The Noise and Vibration impact assessment undertaken as part of the EIA is presented in **Chapter 12**, Volume 2 of the EIAR notes the following in relation to noise during the construction phase *‘During the daytime, the works are unlikely to be distinguishable over existing traffic and rail noise and harbour activities. There is potential for disturbance at night when these noise sources reduce. However, given the location, there will always be some level of background traffic noise’*.

Displacement

The main potential impact as a result of the proposed works is the displacement of species. During the onsite bird usage studies (see **Section 5.2.5.7** above) a number of species were noted roosting within the site in moderate numbers, namely Ringed Plover, Turnstone, Oystercatcher, Herring Gull, Redshank etc. Therefore, environmental nuisances i.e. noise and vibration, generated during the construction phase, primarily during that of the reclamation area, could cause displacement of SCI’s utilising the Middle Pier, Western Pier and the adjacent section of Claremont Beach. Studies have shown that in some cases this may lead to reduced survival in SCI or have indirect impacts on population trends of species within the SPA’s. Several authors have tentatively suggested a link between the usage of foraging areas and the availability of high-tide roosts in their vicinity, therefore the loss of roosts may affect the carrying capacity of surrounding habitats for birds, with negative consequences for shorebird populations (Dias et al, 2006).

A roost site is generally considered to be a place where birds congregate when feeding on intertidal mud or other estuarine habitats is not possible due to the depth of water. In many cases, birds will be at rest, but not if other non-estuarine feeding habitats are available to them. A range of areas in a site will be

used by shorebirds for roosting depending on several factors, including the height of the high tide and prevailing weather conditions. Sites can also be used differently at night compared to daylight hours. Shorebirds need to be secure from predators while roosting and the sites will often be at least partially isolated by water and/or have good visibility away from tall trees where birds of prey can seek cover. The best roost sites have little or no disturbance, are close to feeding sites and have particular physical characteristics that encourage their use by shorebirds. Different shorebird species have different preferences for the surface of the roost⁵.

Of the species recorded, Ringed Plover was noted to be roosting in numbers of national importance near the northern tip of the West Pier, with Dunlin and Turnstone occasionally recorded within the flock. See **Figure 24 & 25** below. The roost is currently not accessible by walkers and this will remain the same way under the redesigned layout. There will be a short term moderate impact on the roost due to potential disturbance/displacement during the construction phase. However, disturbance/displacement effects are expected to be short term, as once construction has finished the construction disturbance will end. Mitigation measures are outlined in **Section 8.2** below in order to lessen the disturbance effects on the winter roost for the ringed plover. Smaller roosts of Redshank and Turnstone were also noted within the harbour on the middle pier, in close proximity to the proposed dredge material treatment plant. A mixed flock high tide roost (Grey Heron, Oystercatcher, Greenshank, Turnstone, Curlew, Great Black-Backed Gull, Herring Gull, Black-Headed Gull) near the southwestern tip of the proposed reclamation area is noted to be less fixed in terms of location and birds sometimes gathered further south or actually spread more in the deposition area. This roost site was also noted during the NPWS waterbird survey programme, with gulls (Herring Gull, Black-headed Gull, Common Gull), Ringed Plover and Oystercatcher noted (NPWS, 2012c).

⁵ <https://wetlandinfo.des.qld.gov.au/wetlands/management/bird-management/other-waterbirds/roosting.html>



Figure 23 Notable Winter Roosts at Howth Harbour in 2019 / 2020 (Woodrow, 2020a)



Figure 24 Ringed Plover roost on West Pier – includes small numbers of Dunlin (Woodrow, 2020 - Photo courtesy of John Fox).

Several other studies have linked local population declines with loss of high tide roosting sites. For example, in the Tagus estuary (Portugal) decreases of wintering populations of Dunlin, Grey Plover and Redshank have been attributed to the loss and degradation of roost sites, as there were no changes in the quality of intertidal area that could explain such declines (Catry et al. 2011). Roost fidelity and preferences are variable among waders (Rehfishch et al. 2003, Conklin et al. 2008) and thus, the loss of roosting sites will have a greater negative effect in species that show strong roost fidelity (e.g. Oystercatcher, Ringed Plover, Purple Sandpiper, Redshank).

During a study conducted on the fidelity of overwintering shorebirds (Oystercatcher, Ringed Plover, Knot, Purple Sandpiper, Dunlin, Bar-tailed Godwit, Curlew, Redshank and Turnstone) to roosts on the Moray Basin in Scotland, Rehfishch et al. 2003 noted that with the exception of Ringed Plover and Knot, half of the adult populations of all species used roosts 3.8 – 9.9km or more apart throughout the year. Ringed Plover were noted to show high site fidelity with a mean movement of approximately 1km between roost sites.

It is noted that within the wider Howth area there are numerous recorded roost sites, within the commuting distance of many of the recorded species, see **Figure 26** below. Species like Ringed Plover, Dunlin and Turnstone for example are known to show low sensitivities to disturbance and are thought to be extremely tolerant species that habituate to anthropogenic activities rapidly (Cutts et al, 2013). Ringed Plover are very tolerant of moderate and high-level visual disturbance and appear not to be very sensitive to noise stimuli and to habituate rapidly, especially in conjunction with visual stimuli. A noise level of up to 75dB is considered acceptable at the bird, but with caution given above 60dB levels (65dB in a highly disturbed area). They will forage extremely close to plant machinery (<50m), and a source noise threshold of 107-112dB can be tolerated but with caution at levels above 93-98dB (Cutts et al, 2013).

Within Howth Harbour it appears that northern tip roost location utilised by Ringed Plover is interchangeable with another roost on the East Pier; however, based on occupancy levels the location on the West Pier appears to be a favoured option. It is noted that the roost on the East Pier will not be impacted by disturbance from the dredging works, as the pier wall and associated buildings provide a barrier, screening the roost from any activities within the harbour.

During the NPWS waterbird survey programme 2011/2012 an additional roost location, to the two noted along the West Pier, was found outside the proposed development site, southwest of the proposed reclamation area. Ringed Plover was also recorded at this roost site (NPWS, 2012c), thus offering another alternative roosting location during the construction phase. Previous studies have shown that the western shore of the NPWS waterbird survey programme 'Stapolin' is a regularly used roost site, together with saltmarsh habitat at Portmarnock Point, with the shoreline of Velvet Strand being used as an occasional roost (NPWS, 2012c). These sites are all located within approximately 4km

of Howth Harbour and provide alternative existing roosting locations for Ringed Plover during the construction phase when there will likely be temporary avoidance and disturbance.

The high tide roost at the south-western tip of the proposed reclamation area is noted as a roost location in the supported information for the Baldoyle Bay SPA and was categorised as a roost supporting between 50 to 99 birds (NPWS, 2012c). Counts over 2019-20 confirmed the occupation of this roost at high tide and found that the roost was less fixed in terms of location and birds sometimes gathered further south or actually spread more in the deposition area. A wider range of species utilised this roost than the one further north, although attendance was by relatively small numbers and the assemblage of species at the roost was highly variable across all the counts. It is noted that this area receives periodic disturbance from walkers and dogs, which limits usage on occasion and as such birds roosting at this location will be tolerant to some degree of disturbance (Woodrow, 2020a).

Gulls were noted roosting at the high tide roost at the south-western tip of the proposed reclamation area during the 2019-20 counts, and comprised three fifths of the species recorded during the waterbird survey programme. Gulls in general, utilise the harbour during both low and high tides, with Herring Gull being the most frequently recorded species. Gulls along with Grey Heron are attracted to the fish landing and processing activities in the area, with the roofs providing a convenient roosting spot with commanding views over the harbour and surrounding waters. The presence of gulls within the site is largely due to their opportunistic behaviour, with scavenging being an increasingly important feeding strategy. It is noted that birds e.g. gulls and Grey Heron, displaced from the high tide roost at the south-western tip of the proposed reclamation area will be able to continue to utilise the buildings along the West Pier as a roost site. Gulls are generally highly tolerant of human disturbance, with the ability to switch to alternative roost sites. Birds that currently roost/loaf on the buildings within the harbour are habituated to constant levels of daily activities within Howth Harbour and are not likely to be adversely affected by the construction works at this location.



Figure 25 High tide roosts of Grey heron and Gulls on buildings within Howth Harbour on the 03/09/2020.

Both Cormorant and Shag were also noted roosting/loafing within the harbour (Woodrow, 2020a). Both species can roost in shoreline and terrestrial habitats and generally use separate locations for daytime and nocturnal roosts. During the day, they roost on piers, jetties, gravel banks, etc. The birds recorded during the site surveys were noted roosting/loafing along the pier walls during the daytime. Given that the harbour is already operational, it is safe to assume that these birds are already subject to and tolerant to a certain level of boat traffic and activity within the harbour itself. In Wexford Harbour, Cormorants roosting on the training walls along the navigation channel generally showed no disturbance response to marine traffic (Atkins, 2019).

In general, Cormorants and Shags disturbed by boats from one day roost are likely to be able to resettle on another day roost nearby without significant energy expenditure and the disturbance impact is unlikely to be significant. Cormorants and Shag are mobile species and any displacement of roosting/loafing birds is unlikely to have a significant effect to the Conservation Objectives of the SPA for which these species are listed as SCI's.

Redshanks were recorded roosting in proximity to the proposed treatment location. Redshank are a relatively tolerant species that habituates to some disturbances rapidly, particularly visual stimuli. Redshanks are conversely particularly sensitive to noise stimuli, especially in conjunction with visual stimuli. As such a noise of up to 70dB is acceptable at the bird but with caution above 55dB (60dB in a highly disturbed area). As Redshank will forage extremely close to plant (<50m) and >75m to workers, this means that a source noise threshold of 100-105dB should be applied, with caution above 87-92dB (Cutts et al, 2013). It is likely that during the construction phase, Redshank will be displaced from the Middle Pier, however, this will be temporary in nature. Redshank was also noted to be roosting elsewhere within the site, with birds recorded roosting on the inner harbour wall between the Marina and the approach channel. Thus, it is likely that any birds displaced from the Middle Pier will be redistributed around the Harbour. Rehfishch et al. 2003 noted that species travelled a mean distance of 0.5 – 2.7km amongst roost sites. Therefore, temporary disturbance/displacement effects will not adversely affect the conservation objectives of the surrounding SPA's populations. It is noted that due to the intervening distances (see **Table 1** above) no direct or indirect disturbance/displacement of birds utilising habitats within the boundaries of the nearby SPA's will occur.

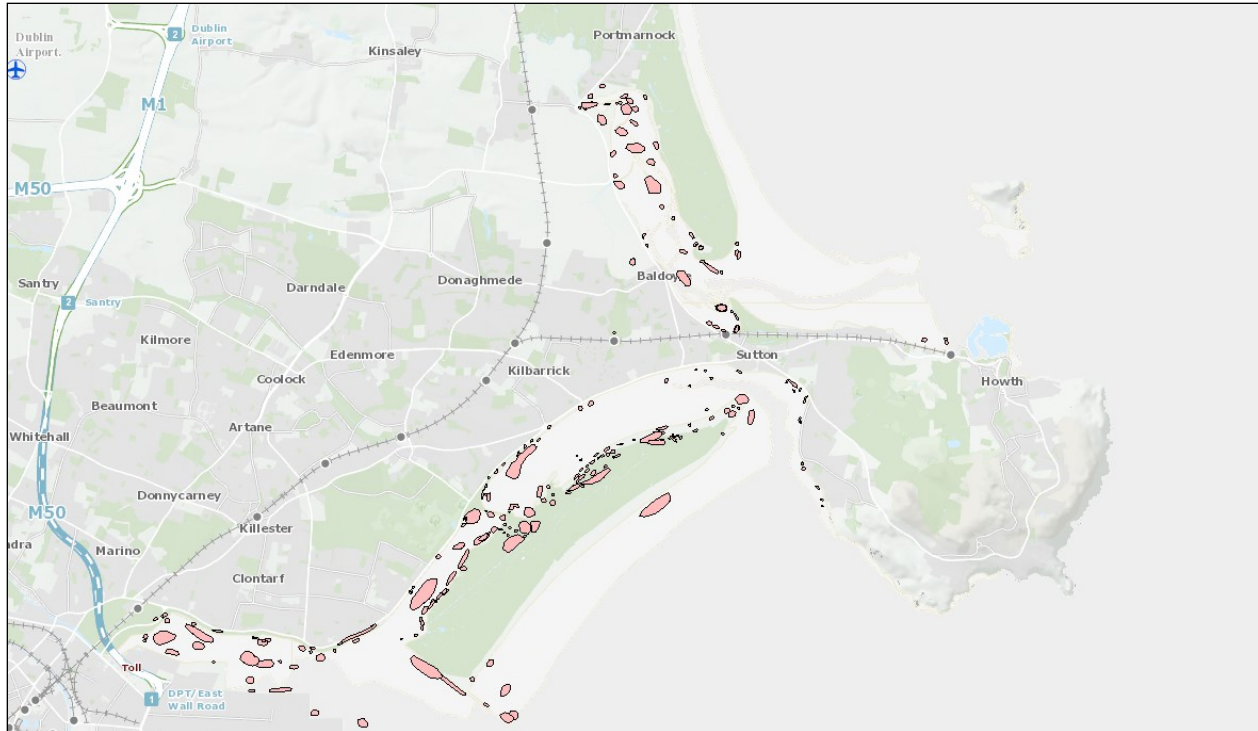


Figure 26 Recorded high tide roost locations in the surrounding environs⁶

In general shorebirds migrate considerable distances between wintering and breeding grounds and thus have the capacity to move relatively long distances between roosting sites. It is noted that the environs surrounding Howth Harbour contain numerous alternative roosting sites and as such offer alternative roosting locations for each species. Additionally, certain species may habituate to noise and activities associated with the construction work. The impact of disturbance on the bird population will also depend on the availability of alternative habitat. Given the extent of the 24-month working period, it is likely that construction work will extend over two wintering periods. Further mitigation measures are included in **Section 8.2** below. These will also help prevent adverse disturbance/displacement effects on wintering birds/SCI's within and outside Howth Harbour.

The disturbance of sediments during construction also has the potential to indirectly impact on piscivorous bird foraging activity through elevated suspended solid concentrations in the water column which could lead to a reduction in visibility and/or avoidance of turbid waters by these species. Deposition of suspended solids in intertidal habitats on which wading birds rely on is a natural occurrence which occurs over a number of tidal cycles and as such is a process in which wading birds are accustomed to. Furthermore, as discussed in preceding sections, any minor increase as a result of the proposed project will not result in any change to the existing infaunal communities in these habitats and therefore will not impact on the foraging recourses and capabilities of these species.

⁶ <http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=63b6a14f5b164b289ad87048f71532b8>

Species of both pelagic fish (Herring (*Clupea harengus*) and Mackerel (*Scomber scombrus*) etc) and demersal fish (Cod (*Gadus morhua*), Whiting (*Merlangius merlangus*), Plaice (*Pleuronectes platessa*), Sole (*Soleidae*) etc) can be found in the waters of the Irish Sea, off the Fingal coast (Ecoserve, 2006). Plumes of sediment generated as a result of dredging activities could cause behavioural shifts i.e. avoidance or at a worst-case scenario mortality in fish species in proximity to the harbour, which in turn could have a knock-on effect on piscivorous bird species. The effects of suspended solids depends principally on a combination of the concentration and duration of exposure. The higher the concentration of solids and the longer the exposure period, the higher the risk is of adverse impacts for fish. Direct mortalities from high suspended solids in nature is likely to be rare because in experiments these effects are not normally observed until concentrations of tens or hundreds of thousands of milligrams per litre of suspended solids are in question and these levels rarely occur in nature (Alabaster and Lloyd 1980, Newcombe & Jensen 1996).

While species of pelagic and demersal fish are known to display behavioural shifts in response to increased levels of suspended solids. The suspended solids generated by the dredging activity that will exit the harbour will be diluted and assimilated quickly into the open marine environment and as such will not be large enough to cause indirect adverse effects to prey species. The dilution provided in the marine environment is substantial and there is no evidence that limited volume of suspended sediments kicked up during dredging operations affect small shoaling fish (RPS, 2019).

Furthermore, as fish are mobile, they can and do avoid turbidity plumes e.g. Herring and Cod (Westerberg et al, 1996). Bottom dwelling species such as flat fish tend to be more tolerant of solids exposure than pelagic species (Moore, 1977), presumably because they are more likely to be routinely exposed to more turbid conditions close to the sediment–water interface. Species like Whiting and Plaice for example are found at depths ranging from 10-200m over soft sediments e.g. sandy and muddy ground, and as such are accustomed to shifts in sediments. Therefore, while there may be a localised increase in turbidity during the construction phase of the project, this is unlikely to have significant impacts on prey species i.e. fish, on which piscivorous SCI rely.

The hydrodynamic report outlines that tidal flows within the Howth Harbour development area are strongly bi-directional and that the coastal, intertidal and sub-tidal communities are already pre-adapted to wave and current-induced disturbances. This would suggest that any sediment release (particularly of fine sandy sediments) will be rapidly dispersed by existing tidal currents and would re-settle within the near-field environment, thus limiting the potential range of turbidity in which piscivorous species may forage.

The impact on foraging birds, particularly piscivorous plunge and pursuit divers is predicted to be non-significant. **Table 16** below notes the foraging range of each piscivorous species found in the surrounding relevant SPA's. While a number of the species shown in **Table 16** core foraging range could include the area around Howth Harbour, the maximum distance in which they could potentially forage is well beyond any potential influence in increased sediment suspended as a result of the proposed works.

Table 15 Foraging range of piscivorous species potentially impacted by the proposed development. Distances based on breeding season when birds are more restricted in movements.

SPA	Distance from Proposed Development (km)	SCI Piscivorous Species	Foraging Range (km) ⁷		
			Core / Mean	Mean Max	Max
Ireland's Eye	0.5	Cormorant	5.2	25	35
		Herring Gull	10.5	61.1	92
		Kittiwake	24.8	60	120
		Common Guillemot	37.8	84.2	135
		Razorbill	23.7	48.5	95
Howth Head Coast	0.5	Kittiwake	24.8	60	120
North Bull Island	1.9	Black-headed Gull	11.4	25.5	40
South Dublin Bay & River Tolka Estuary	7.3	Black-headed Gull	11.4	25.5	40
		Roseate Tern	12.2	16.6	30
		Common Tern	4.5	15.2	30
		Artic Tern	7.1	24.2	30
Lambay Island	10.0	Fulmar	47	400	580
		Shag	5.9	14.5	17
		Lesser Blacked-backed Gull	71.9	141	181
		Cormorant	5.2	25	35
		Herring Gull	10.5	61.1	92
		Kittiwake	24.8	60	120
		Common Guillemot	37.8	84.2	135
		Razorbill	23.7	48.5	95
Malahide Estuary	6.4	Puffin	30.4	62.2	200
		Red-breasted Merganser	This species mainly occurs in waters of less than 3-5 m depth (Cramp and Simmons, 2004). Therefore, the potential extent of suitable foraging habitat potentially impacted within the coastal water outside the harbour is imperceptible and thus no impact is predicted to occur.		

During the operational phase of the proposal, it is considered unlikely that the proposal will result in significant impacts on shore and water birds. It is noted that any potential loss of roosting habitat will be negated by the construction of a similar environment e.g. rock armouring. Additionally, numerous roosting sites located within the surrounding area will be unaffected by the proposed development and as such not impact on the conservation objectives of the surrounding SPA's. Mitigation measures shown in **Section 8.2** below will also ensure that similar roosting habitat will be available after the construction phase.

⁷ Foraging ranges are from those detailed in Thaxter et al. (2012)

Lighting

Artificial lighting can affect birds in numerous ways, it can affect the quality of breeding habitat along with breeding timing, prey availability, foraging patterns and by increasing exposure to predators. The main risk to the breeding Black Guillemot and roosting winter birds is from lighting during dusk, dawn and night hours, which could increase the risk of predation from mammalian predators, particularly during high tide periods when birds are roosting. The major threat to nesting Black Guillemots is predatory mammals, which strongly influence their breeding distribution and success, and human disturbance is not considered to be a major threat to this species (Johnston et al., 2018). An Irish stoat (*Mustela erminea hibernica*) was noted on West Pier hunting starling chicks from a nest in a building (Woodrow, 2020a).

During construction and potentially during operation artificial illumination may spill onto the adjoining intertidal habitats. Large areas of natural and semi-natural habitats are exposed to artificial illumination on a daily basis from adjacent urban areas and roads. Estuarine and coastal wetlands are particularly exposed to such illumination because shorelines often are heavily utilized by man (Dwyer et. al., 2013). Intertidal habitats provide important feeding areas for migratory and wintering shorebirds. Anthropogenic developments along coasts can increase ambient light levels at night across these adjacent inter-tidal habitats. The introduction of artificial lighting therefore may disturb some coastal bird species whilst benefitting others.

Numerous studies have shown that light emitted from an industrial complex have had positive effects on many waterbird species by primarily improving nocturnal visibility. This allowed sight-based foraging in place of tactile foraging, implying both a preference for sight-feeding and enhanced night-time foraging opportunities under these conditions (Dwyer et. al., 2013). Santos et. al., found that areas illuminated by streetlights were used more during the night by visual foragers, and to a lesser extent by mixed foragers, than non-illuminated areas. Visual foragers increased their foraging effort in illuminated areas, and mixed foragers changed to more efficient visual foraging strategies. These behavioural shifts improved prey intake rate by an average of 83% in visual and mixed foragers and 78% across all studied wader species (Santos, et. al., 2010). Dunlin for example, an Annex I species under the Birds Directive, have been shown to benefit from the artificial illumination of intertidal habitats which allows continuation of foraging during hours of darkness in winter months (Rehfisch et al. 1993). Dwyer et al. found that localised artificial illumination affects foraging behaviour in Redshank in a manner similar to elevated natural light. Several studies on wetland birds under wholly natural light, including many wildfowl, have similarly shown that many species take advantage of moonlight to increase foraging opportunities (e.g. Robert, McNeil & Leduc 1989; Sitters 2000; Tinkler, Montgomery & Elwood 2009).

While artificial light can have a negative effect, e.g. increased risk of predation, it can also have a positive effect on wintering shorebirds by helping to improve the foraging conditions of intertidal areas for waders. Estuaries close to major urban and industrialised regions, artificial illumination should be considered as an important environmental factor driving nocturnal habitat selection, foraging behaviour and potentially the structuring of animal communities. It is noted that the majority of the Howth

Harbour is well-lit by street lights at night time, particularly along the promenade of West Pier (Woodrow, 2020) and as such any birds utilising the site will be accustomed to some levels of artificial illumination. With regard to the introduction of lighting during the construction stage within the harbour, mitigation measures to address this aspect of the proposal are included below. Overall, the impact from lighting will not have an adverse effect on the Conservation Objectives of the surrounding SPA's.

Overall, the disturbance / displacement to SCIs caused by the proposed development will not adversely affect the conservation objectives of the Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay & River Tolka Estuary SPA, Ireland's Eye SPA, North Bull Island SPA, Lambay Island SPA and the Rogerstown Estuary SPA.

7.4.3 Habitat or Species Fragmentation

Given the nature and location of the works, situated at Howth Harbour, and the lack of spatial overlap between the subject site and any Natura 2000 site, habitat or species fragmentation is not envisaged as a result of either the construction or operational phases of the proposal. Therefore, significant habitat or species fragmentation impacts are not likely to occur.

7.5 ASSESSMENT OF POTENTIALLY SIGNIFICANT CUMULATIVE EFFECTS

Projects/activities that could act in-combination with the project include the normal day-to-day operations within Howth Harbour, as well as other potential sources arising from existing activities in the area. These include commercial fishing, sailing, recreation and urban generated activities from the local village and residential areas. Furthermore, there is potential for overlap in the timing of the construction activities required to carry out this project with proposed development in other parts of the harbour.

The following permitted, or in progress, developments within the vicinity of the proposed development were reviewed and considered for possible cumulative impacts with the proposed development;

Table 16 Permitted applications within Howth and its surrounding environs

Howth Permitted Planning Applications							
Search Info	Criteria/	Ref No.	Date of Application	Description	Applicant	Location	Notes
Pg 4 - Howth Permitted Planning Applications 01/01/19 - 16/03/20		19DR/006	25/06/2019 Granted 22/08/19	Construction of a pump station and disinfection building to house control panels	Irish Water	Dungriffen Pump Station, Dungriffen Reservoir, Howth, Co. Dublin	Significant because of proximity to project
Pg 5 - Howth Permitted Planning Applications 01/01/19 - 16/03/20		F19A/0287	04/07/2019 Granted 17/09/19	Reinstatement of the existing boat shed to match the previous building complete with domed roof, on the northern end of the East Pier of Howth Fishery Harbour Centre (Protected Structure No. RPS 595).	Minister for Agriculture Food & The Marine	East Pier, Howth Fishery Harbour Centre, Howth, Co. Dublin.	Significant because of proximity to project
p11 - Howth Permitted Planning Applications 01/01/19 - 16/03/20		F19A/0405	02/09/2019 Granted 04/03/20	Development will consist of 1) Demolition of existing 3 storey dwelling house. 2) Construction of a new 3 storey over basement apartment development consisting of 8 no. 2 bedroom apartments. 3) New vehicular entrance, roads, footpaths, landscaping, services consisting of storm and foul water disposal, mains water supply and all associated site works. Add info received 7th February 2020	Emmet McLoughlin	Osprey, Kilrock Road, Howth, Co. Dublin, D13 N259	
Sutton Permitted Planning Applications							
p1 - Sutton Permitted Planning Applications 1/03/18		DAC/028/19	01/03/2019. Granted 26/07/19	Neighbourhood Mall in which it has the following facilities. Medical Centre, Gym, Office, Retail Units and Apartments.	Bayside Centre Management & Urban Pulse	Bayside Shopping Centre, Bayside, Sutton, Dublin 13.	
Baldoyle Permitted Planning Applications							
p1 - Baldoyle Permitted Planning Applications		SID/03/18	20/06/2018. Granted 11/11/19	Greater Dublin Drainage Project Proposed Wastewater Treatment Plant, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids	Irish Water	Blanchardstown to Clonshaugh/, Clonshaugh to	

01/03/18			stoorage facility. The proposed Project will be located in County Fingal and with a 60m section of pipeline in Dublin City and is approximately 25km long. The planning application proposes a new regional wastewater treatment facility to be located in the townland of Clonshaugh, an underground orbital sewer from Blanchardstown to Clonshaugh (to intercept existing flows to Ringsend), a new pumping station at Abbotsown, and an outfall pipeline to return the treated water to the Irish Sea. The project also includes a regional sludge treatment centre at the new GDD facility and an associated biosolids storage facility at Newtown near Kilshane Cross. To view documentation for this planning application please use the following website address: https://www.gddapplication.ie		Maynetown (Coast Rd R106)/, Baldoyle Estuary/, Portmarnock Golf Club, To Ireland's Eye	
p1 - Baldoyle Permitted Planning Applications 01/03/18	F19A/0045	05/02/18. Granted 17/09/19	Extension to the rear of the existing Lidl Licensed Discount Foodstore comprising of: a single storey rear extension to the existing single storey Lidl unit, associated reconfiguration of internal layout of existing store (including increase to net retail sales area), modifications to elevations, modification of licensed area, repositioning of signage, modified loading ramp, demolition of existing rear loading bay structure, and all associated and ancillary works and development. Add Info received 17th July 2019.	Lidl Ireland GmbH	Racecourse Shopping Centre, Grange Road, Baldoyle, Dublin 13, D13 K8K0	Size of extension not provided
p2 - Baldoyle Permitted Planning Applications 01/03/18	DAC/151/19	30/09/19. Granted 6/01/20	Three storey 16 classroom Primary School building in Baldoyle (Roll Number 20519G), including a two classroom SEN base. The design also includes a general-purpose hall, support teaching spaces and ancillary accommodation, external junior play areas, secure SEN hard and soft play area and a sensory	Department of Education and Skills	Myrtle Road, Baldoyle, Dublin 13	

			garden. The proposed project also incorporates associated car parking, access road, pedestrian access, bicycle lane, construction of 2 no. external ball courts, landscaping, connection to public services and all associated siteworks.			
p3 - Baldoyle Permitted Planning Applications 01/03/18	F19A/0636	23/12/19. Granted 20/02/20	(1) The demolition of the existing warehouse building (856m ²) and associated 1.8m high boundary wall at the front (southern) site boundary; (2) the construction of 1 no. three storey over basement apartment block comprising 1 no. three-bed residential units, 14 no. two-bed residential units and 6 no. one-bed residential units giving a total of 21 no. apartment units each with own balcony. (3) new vehicular and pedestrian entrance on the front (southern) site boundary off the existing public laneway; (4) provision of 23 no. basement car parking spaces and 62 no. on-site cycle parking spaces and bin storage located in basement also; (5) communal open space at ground level; (6) communal terrace at second floor level; associated boundary treatment, landscaping, SuDS drainage and all other ancillary development works necessary to facilitate the development.	LDC Developments Ltd	Lands to the rear of, 31-34 Baldoyle Road &, Elphin Licensed Premises, Baldoyle Road, Sutton, Dublin 13	
Major Applications – An Bord Pleanála						
Townland of County Fingal	PL06F.301908 & PL06F.302039	20/06/2018. Granted 11/11/2019	Development of a new wastewater treatment plant, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility. The proposed project will be located in County Fingal and with a 60-metre section of pipeline in Dublin City and is 25 kilometres long and consists of the following principal elements: <ul style="list-style-type: none"> Proposed wastewater treatment plant comprising a 	Irish Water	Townlands of Clonsagh, Dubber and Newtown, County Fingal and Dublin City	

			<p>regional wastewater treatment plant to be located on a 29.8-hectare site in the townland of Clonshagh (Clonshaugh) in Fingal. • Proposed Abbotstown pumping station comprising a pumping station to be located on a 0.4-hectare site in the grounds of the National Sports Campus (NSC) at Abbotstown. • Proposed orbital sewer route comprising an underground orbital sewer, the route of which will intercept the existing sewer at Blanchardstown and divert it from this point to the wastewater treatment plant at Clonshagh. ABP-301908-18 Board Order Page 2 of 24 • Proposed diversion of the North Fringe Sewer (NFS) which will be constructed from the junction of the access road to the wastewater treatment plant with the R139 Road (Dublin City Council administrative area). • Proposed outfall pipeline route (land-based section) to be constructed from the northern boundary of the wastewater treatment plant to the R106 Coast Road at Maynetown (townland). • Proposed outfall pipeline route (marine section) to be constructed from the R106 Coast Road (at Maynetown) and will terminate at a discharge location approximately one kilometre north-east of Ireland’s Eye (island). • Proposed regional biosolids storage facility (RBSF) located on an 11-hectare site at Newtown, Dublin.</p>			
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As can be seen there are a number of current grants of permission for remediation and extension works to existing dwellings and buildings in the greater area.

In addition permission has been granted for the provision of a 134m long quay wall, associated deck and hard standing area, road access, dredging to the front of the new quay wall to provide berthing depth and land reclamation of an approximate area of 0.30ha on the east side of the Middle Pier at Howth Harbour (F19A/0296). This development started in late 2020 and should take a total of 12-15 months. It is not intended that works to the Middle and East piers will be undertaken concurrently with this project.

Works to the Middle Pier in Howth are expected to be complete by March 2022. The proposed Howth FHC dredging and reclamation works are not due to being until the Summer of 2022. Depending on planning approval and funding it is intended that works to the Middle Pier and West Pier will be undertaken before works to the East Pier, although it is possible that there will be a minor overlap in timing. However, the East Pier works will be subject to Appropriate Assessment and a Natura Impact Statement has been prepared which will be submitted as part of the planning application. All works will be scheduled appropriately. With regard to the recommended mitigation measures for this project (see **Section 8** below), and the conclusions of this NIS of no adverse effects, significant cumulative impacts as a result of interaction between the three projects are not expected.

Any future development within the harbour will require Screening for Appropriate Assessment, and depending on the size and likely impact of the development, may be subject to Environmental Impact Assessment (EIA).

Within Howth itself, increased human presence at Howth Harbour and Claremont Beach during the operational phase of the proposed development could act cumulatively with other proposals which seek to provide residential properties. The increase in footfall at Howth Harbour and Claremont Beach could potentially result in habitat loss/alteration/fragmentation of habitats and the disturbance of species of nearby Natura 2000 sites. However, it is noted that as a result of the project activity within the harbour is not expected to significantly intensify and the planning applications within Howth i.e. F19A/0405 – construction of eight, two-bedroom apartments, will not see a significant increase in the population density of Howth.

The need for the Greater Dublin Drainage project is derived from the key findings of the Greater Dublin Strategic Drainage Study (GSDSDS) Final Strategy Report and its associated Strategic Environmental Assessment (SEA) which were prepared in 2005 - 2008 respectively on behalf of the seven local authorities that form the Greater Dublin Area (GDA). As part of the project the proposed Outfall Pipeline Route will cross under the estuary habitats of Baldoyle Bay SAC and Baldoyle Bay SPA from the Coast Road to approximately 600m offshore, where it exits the tunnel. It will then continue in an easterly direction where it terminates just north of Ireland's Eye within the Rockabill to Dalkey Island SAC Ireland's Eye SAC (002193) & Ireland's Eye SPA (004117) lies approximately 700m & 200m respectively

to the south of the outfall pipeline. The proposed multiport marine diffuser is located on the final section of the proposed Outfall pipeline. The proposed marine diffuser lies within the Rockabill to Dalkey Island SAC and lies approximately 700m and 200m respectively to the north east of Ireland's Eye SAC and Ireland's Eye SPA. The construction of the outfall will commence in 2022 with commissioning finishing in 2025.

Construction along the marine pipeline corridor requires dredging and subsequent burial of the main pipeline which will disrupt the benthos over a temporary period as well as create a source of anthropogenic noise through vessel activity and dredging operations during the period of construction. However, conclusions of the NIS which was submitted as part of the proposed project i.e. *Greater Dublin Drainage Project Natura Impact Statement*, noted that with the implementation of mitigation measures the project will not result in direct, indirect or cumulative impacts which would have the potential to adversely affect the qualifying interests/special conservation interests of the Natura 2000 sites within the study area with regard to the range, population densities or conservation status of the habitats and species for which these sites are designated (i.e. conservation objectives).

The water quality model developed for the project included consideration of flows from numerous WWTPs in the area and predicted that the project will have an imperceptible to slight impact on the water quality of the coastal waters off Co. Dublin during its operation.

In summary, it is noted that significant water quality effects are not envisaged during either the construction or operational phases of the project and that harbour operations in terms of the number of vessels or level of activity is not expected to significantly intensify following completion of the works. Any potentially significant impacts which have been identified, namely potential disturbance/displacement of marine mammals and birds during the construction phase, due mainly to increased noise emissions, will be mitigated such that residual significant impacts are not expected (See Section 8 below). In the unlikely event that there is an overlap in timing of construction works with the Middle and East Piers, it is considered that the recommended mitigation measures in relation to adjoining habitats and fauna will be adequate to ensure no significant cumulative impacts.

The project is not expected to result in adverse habitat alteration or disturbance/displacement effects to Natura 2000 sites as a result of the impacts of the project. Therefore, the impacts of the project in combination with the impacts of other projects or developments are not considered to have adverse cumulative effects to Natura 2000 sites.

8 MITIGATION

As with most maritime dredging/other large-scale projects, environmental monitoring and mitigation will be required throughout the project. The following sections outline the mitigations that will be in place during the construction phase and operational phase of project.

8.1.1 Environmental Management Plan

An Environmental Management Plan will be in place for the duration of the project. The following sections describe mitigation measures that will be in place to prevent significant impacts to nearby designated sites, and will be incorporated in the overall Environmental Management Plan.

8.2 Birds

Works will be supervised by a project ecologist/ornithologist. Bird monitoring will be undertaken prior to commencement of construction, during construction work and following completion of the construction works. Monitoring will follow a similar methodology to that employed by Woodrow (see **Appendix 7 'Howth Harbour FHC Proposed Dredging and Reclamation Works; Bird Surveys 2019 / 2020 Report'**), using similar techniques and point count locations with a particular focus on the Harbour itself and mudflat/sandflats and waters around Claremont Strand. Surveys conducted will be as follows:

- Breeding Bird Surveys – April to August
- High Tide / Low Tide Summer Surveys – May to August
- Winter Bird Surveys – October to March

This will allow for comparative analysis with the findings of the Woodrow surveys.

Lighting will be provided with the minimum luminosity sufficient for safety and security purposes both during the construction phase and operational phase of the project. Lights will be focused away from the intertidal areas which support feeding birds. Lights will be as low as possible and light spillage will be minimised. Designs to luminaires to help reduce light spillage and to direct light to the intended area only, particularly along the northern boundary, is by using accessories such as hoods, cowls, louvres and shields.

It is important to maintain Dark Zones for roosting intertidal bird species in areas where lighting is not necessary. However, where lighting is required, this lighting will be placed at a minimum height using the lowest lux value permitted for health and safety.

Construction works in the reclamation area will mean the short term disturbance / loss of the winter bird roost on the end of the east pier for the duration of the works. The wintering birds will move to alternative roosts. The short term disturbance / loss of the west pier winter roost will be mitigated by reducing disturbance on the other two identified winter roosts. To reduce disturbance on the remaining two identified winter roosts, screening will be erected along the south western boundary of the reclamation area. This will reduce disturbance on the southern winter roost near Claremont Beach. Screening or fencing will be erected around the winter roost at the end of the East Pier. The screening or fencing on the East Pier will happen over the period of time that the winter roosts are used by the birds (generally autumn and winter). The type of screening or fencing best suited and the requirement to close the walkway on the top of the pier wall at this location, will be agreed with the project ecologist before construction starts.

During the operational phase of the proposed development the existing roost area on the northern end of the West Pier will be available and a permanent winter roost area will be established. This will provide a continuation of the existing winter roost area on the West Pier. The roost area will remain inaccessible to humans during the operational phase as is its current form. Operation phase maintenance dredging of the water channel will cause temporary disturbance effects. The birds will likely utilise other roost sites should maintenance occur during winter high tides. This will not have an adverse affect on any SCI.

Exclusion zones will be established during the wintering bird period. These will be focused around the Claremont Beach to the southwest of the proposed reclamation area i.e. outside the proposed development boundary. Site personnel will avoid this area during rest periods e.g. breaks, as not to introduce a potential disturbance factor to foraging birds. This will allow for the continuance of exposed mudflat habitat, particularly during low tide, to be utilised as feeding ground for wading birds.

To mitigate the impact on the Black Guillemot and enhance breeding bird habitat on the site for Black Guillemot, 4 nesting tunnels / nest boxes will be incorporated into the proposed reclamation area and/or existing pier structures, at appropriate locations to encourage increased numbers of breeding pairs in the harbour. A qualified ecologist will be engaged to choose appropriate locations for nest boxes and supervise installation. Once the new nest boxes are in position a preconstruction survey will take place to ensure that the nest locations on the west pier are not in use before construction starts. Under licence and with agreement of the NPWS the black guillemot nests in the holes within structures on the west pier will be blocked. The purpose of this is to stop possible nesting that may be abandoned later due to construction works. It is expected that the Black Guillemots will find more suitable nesting locations within the new nest boxes.

No night time dredging works will be permitted at any stage within the *Approach Channel* in order to avoid disturbance of roosting Ringed Plover during the wintering period or nesting Black Guillemot during the breeding season. It is noted that increased illumination at night can also increase the risk of predation.

8.3 Marine Mammals

The mitigation measures recommended in the MMRA (see **Appendix 5**) include the presence of a trained and experienced Marine Mammal Observer (MMO) and the use of “ramp up” procedures for noise and vibration emitting operations. The proposed mitigation measures (Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters) recommended by the Department of Arts, Heritage and the Gaeltacht in 2014 are designed to mitigate any possible effects.

The MMO will determine the presence or absence of marine mammals in the area and will log all relevant events using standardised data forms (DAHG, 2014). The use of ‘ramp-up’ or ‘soft-start’ procedures for noise and vibration emitting operations are also recommended.

These measures are sufficient to mitigate any additional effects of rock breaking and no additional measures are recommended.

As per the MMRA carried out by IWDG in 2019, the following mitigation measures are proposed to minimise the potential impacts on marine mammals and to allow animals move away from the area:

1. All personnel will be appropriately trained about environmental issues prior to the start of the operation.
2. All equipment will be in good condition to avoid spillage or discharge of oil, smoke and excessive noise.
3. Refuelling will be carried out by competent and trained people away from any environmentally sensitive areas; and sea-going craft to be moored up securely.
4. An appropriate waste container will be placed to collect waste before the final disposal by authorised company and hazardous material storage areas will be identified, labelled, and properly marked and fitted with spill containment systems;
5. Excavators and barges will be checked for any fuel / oil leaks on a regular basis by the crew.
6. Any spills will be reported immediately to the site agent/authorities
7. In the event of a major spill due to damage to the sea-going craft. Locate and isolate, inform harbour authorities, Project Manager and environmental agency.
8. A dedicated Marine Mammal Observer will conduct a 15-minute watch for marine mammals within 200m of the dredger prior to start up. If a seal or cetacean (or otter) is sighted within 100m of the dredger, start-up must be delayed until the animal(s) is/are observed to move outside the mitigation zone or the 15 minutes has passed without the animal being sighted within the mitigation zone.
9. The long reach excavator will be started at lowest revs and increased over a 5-minute period to allow wildlife an opportunity to move further away from the excavator reaching full power.

All marine mammals monitoring should follow guidance outlined in “*Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*” (DAHG, 2014) and on the NPWS website⁸.

⁸ <http://www.npws.ie/marine/bestpracticeguidelines/> [Accessed 20/02/2020]

8.3.1 Water Quality Management during Dredging Activities

During the dredging activities, water quality management including the loss of suspended sediments will be controlled with the following mitigation measures:

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, seawater or groundwater. The Construction Industry Research and Information Association (CIRIA) in the UK has issued a guidance note on the control and management of water pollution from construction sites, Control of Water Pollution from Construction Sites, guidance for consultants and contractors (Masters-Williams et al 2001).

Strict controls will be put in place to prevent the dumping of construction vessel waste during the dredging operation. Also, a strict recovery plan will be put in place in the event of accidental spillage of oil/diesel from construction vessels.

Specific to the dredging works, loss of suspended sediments will be mitigated by;

- Environmental buckets to be fitted to the dredge digger;
- Silt curtains to be placed around the dredge as it is working;
- Monitoring of the waters outside the harbour in line with agreed parameters and limits from the licencing authority; and
- If monitoring indicates exceedances of agreed limits, further management of the dredging methods will be undertaken to bring concentrations below the exceedance limits.

A Water Quality Management Programme (WQMP) will be prepared and implemented to incorporate the mitigation measures outlined in this section.

The proposed dredging and reclamation works will be subject to the conditions and monitoring requirements of either an Industrial Emissions licence or a waste licence from the EPA. Limits on turbidity or suspended solids in the harbour during the construction phase will be agreed with the relevant authority prior to commencement of works. The water quality will be monitored during works by the following methods:

1. Fixed station in situ water quality monitoring
2. Boat-based in situ water quality monitoring
3. Visual water quality monitoring
4. Laboratory water quality monitoring

Fixed station in situ water quality monitoring

Turbidity sensors will be used to determine turbidity during the dredging operation using in-situ readings. Continuous, real-time, in situ water quality data will be collected through the use of sensors

deployed on a buoy near the construction site. High-frequency data is averaged at regular intervals and uploaded via telemetry to a website.

Fixed locations for turbidity sensors will be identified and agreed with the relevant authority.

Boat-based in situ water quality monitoring

Monthly mobile manual monitoring will also take place by boat-based water quality monitoring, the frequency of which will be approved by the relevant authority. The manual monitoring will be a combination of in situ testing and/or lab testing as agreed with the relevant authority.

Visual water quality monitoring

Daily visual monitoring will also be carried out from the shore and dredging vessel by the Contractor and Resident Engineer. The visual monitoring will include:

- Visual monitoring for suspended solids within and outside of the harbour.
- Daily inspection of surface water management systems including the stockpile drainage locations and any authorised discharge locations.
- A log will be kept of all visual monitoring.

Laboratory water quality testing

Samples will be collected at agreed regular intervals and locations to test for suspended solids. The plan will be approved by the relevant authority.

Treatment of dredge material will be carried out in an enclosed and controlled material treatment facility. The facility consisting of the mixing plant, binder silos, storage areas and pumps will be fully bunded. Any loss of dredge material within the bunded area will be collected and fed through the treatment facility again for disposal within the reclaimed area.

8.3.2 Dredging Activities

- The dredger will transfer/transport the material in an appropriate safe manner, to pre assigned location.
- Dredging operations will be carried out as per CEMP, and the Dredging Method Statement.

8.3.3 Concrete/Cementitious materials

It is important to prevent concrete from entering waterways. Among other things, concrete will be used for construction of the reclamation area, and cementitious materials during the treatment of contaminated dredge.

The following measures will be implemented during the use of concrete:

8.3.3.1 Concrete pours/use of concrete (reclamation area)

Concrete for the reclamation area works will be poured *in situ*.

- To reduce the potential for cementitious material entering the Harbour, concrete pours will be supervised by the Construction Manager/suitably qualified Engineer/Environmental Manager.
- The Construction Manager/Site Engineer will ensure that the formwork for the concrete works, are completely sealed prior to concrete pour, and there is no potential for concrete to enter the adjoining waters.
- Weather and tidal conditions will be monitored, as to allow sufficient time for the concrete to cure, preventing runoff.
- In the event of a spillage on site, the Environmental Manager/Site Engineer will shut down the supply of concrete immediately, temporarily seal off the area. Any spillage will be collected immediately, before entering marine waters, and deposited in appropriate manner/area/removed off site to an appropriate licensed landfill.
- If dewatering is required, all contaminated water will be pumped to suitably sized settlement area/tank/bowser and treated, in order to prevent solids/contaminants escaping to the Harbour.
- PH will be monitored continuously in the Water Quality Management Plan.

8.3.3.2 *Concrete Washout*

- To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site, at the batch area/source quarry.

8.3.3.3 *Use of Cementitious material for treatment of contaminated dredge*

The EIAR and the GQRA carried out for the proposed works, concluded that concentrations of contaminants, that would be dispersed outside the dredge area, would not have a significant effect on any of the ecological receptors located outside of Howth Harbour. However, due to the precautionary principle, the following mitigations will be in place, to ensure no significant water quality impacts will ensue on nearby designated sites as a result of poor water quality during the treatment/handling of contaminated sediments.

- The perimeter revetment and armours stone Pier will be lined with a Geo textile impermeable membrane to prevent significant escapement of contaminants to the harbour.
- Appropriate stabilisation of dredge spoil will be undertaken following best international practice.
- The treatment locations will be supervised by either the Site Engineer/ Environmental Clerk of Works / Environmental Manager.
- Any discharge of water from the treatment process will happen after treatment and under licence.
- The dredge spoil will be pumped from the water borne barge into the mixer and then the treated material will be pumped onwards to the reclamation area. If dredge spoil needs to be stored on land at any stage, it will be stored in an area where there is no risk of significant runoff to the harbour/watercourses as a result of heavy rainfall/tidal influx.
- During the treatment of the contaminated dredge material, this mixing procedure will be monitored continuously. If there is any spillage/leakage this procedure will be stopped

immediately and the leakage will be contained and immediately cleaned up and removed from area/reused. The treatment procedure will be supervised by either the Site Engineer/ Environmental Clerk of Works / Environmental Manager.

8.3.4 Fuel and Oil (Construction Phase)

8.3.4.1 Vessels/bergs

It is recommended that appropriate fuel management measures are put in place, and agreed with the Harbour Master prior to the works commencing, to ensure that no significant negative impacts occur to water quality.

Potential leaks from vessels/boats will be mitigated by contractually requiring the contractors to only operate/supply vessels/boats that are in good working order, up to date in servicing etc., and free of leaks.

The fuel management plan will be implemented, which will incorporate the following elements:

8.3.4.2 Machinery/equipment

- The potential for hydrocarbons getting into Howth Harbour will be mitigated by only refuelling construction machinery/vehicles in designated refuelling areas, using a prescribed re-fuelling procedure.
- Refuelling will be carried out using 110% capacity double banded mobile bowsers. The refuelling bower will be operated by trained personnel. The bower will have spill containment equipment which the operators will be fully trained in using.
- To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor.
- Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete/crushed stone to the site will be contractually required to supply their products using roadworthy vehicles.
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; any nearby drains/outfalls (if they occur), will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up, and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in an appropriate licensed facility.
- The Environmental Manager/Site Manager will be immediately informed of the oil leak/spill, and will assess the cause, and the management of the cleanup of the leak or spill. They will inspect nearby areas for the presence of oil, and initiate the clean-up if necessary.
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound, and also in site vehicles and machinery.

- Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and clean up kits.

8.3.4.3 Oil storage during the construction phase

- The scale of potential impacts on water quality will be reduced by only storing the required volume of oils for the works taking place at the time.
- Oil and fuel stored in bunded areas shall be stores an appropriate distance from any watercourse/discharge point etc, as to prevent accidental spills entering the harbour.
- Access to oil stores will be controlled by the storage of oils/fuels within a locked steel container/designated area, and cannot be accessed when there are no site personnel present.
- Collision with oil stores will be prevented by highly visible signs/posted.
- Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles, or valves will be fitted with a lock system.
- The volume of leakages will be prevented through monitoring oil storage tanks/drums for leaks and signs of damage. This will be carried out daily/regularly by the Environmental Manager.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers, and removed from the site for disposal, or re-cycling by an approved service provider.

8.3.4.4 Fuel and oil operational phase

Following completion of the remaining phases of the overall development, Howth Harbour should/will be operated following good management guidelines, in order to prevent pollution from fuel/oil spills and antifouling paints in particular.

8.3.5 Reclaimed area

8.3.5.1 Construction phase

The mitigations that may/will be required at these locations will prevent/reduce the suspended solids from entering the marine waters.

- Habitat degradation will be prevented, by controlling the movement of construction vehicles and machinery. Construction vehicles and machinery will not encroach onto habitats beyond the proposed development footprint.
- If there is the requirement, to reduce the potential for sediment runoff from these areas, runoff will be directed to the surface water drainage/other, for treatment, prior to entering the marine waters.
- When the external face of the embankment is in place the internal face will be lined with an Geosynthetic Clay Liner (GCL) to act as a barrier to movement of water, dredge slurry and contaminants in and out of the area to be reclaimed.
- Excess supernatant water which will arise on the surface of the stabilised mass within the reclamation area will be contained within the impermeable perimeter of the reclaimed land

area and prevented from loss into open water. This water will be re-circulated by pump back into the treatment plant for further use in mixing the dredge material and binder. Dewatering will occur under appropriate authorisations and will be monitored to ensure limit parameters are followed.

8.3.5.2 *Operational phase*

Surface water run-off will be collected through a network of gullies feeding into storm water drains. The drains will collect at a number of hydrocarbon/silt interceptors before outfalling into the sea through headwalls in the proposed revetment. Non-return valves will be constructed in the outfall headwalls to prevent any return of water up the storm water system during high tides.

8.3.6 **Waste control-construction phase**

- The work areas will be kept neat and tidy. Access to materials will be controlled. A dedicated storage area will be provided for; temporary works items, precast concrete elements, steel reinforcement, timber formworks, geotextiles, rock anchors, tools, and equipment etc.
- Access to stored materials will be restricted.
- To contain and manage construction phase waste, multiple skips will be provided at the storage compound/dedicated area; one for recyclable waste, and others for various construction wastes. These skips will be emptied when required, by a licensed waste management company. Waste oil, and waste oil drums will be collected, and stored in containers and on a bunded tray within the storage container.
- Waste debris collected during dredging works will be segregated and removed offsite by a licenced haulier to a licensed facility.
- Excess materials, if they occur, such as excess back fill/gravels /etc, will be removed off site immediately, and disposed of at an appropriate licensed landfill.
- Any other wastes, such as tyres, trolleys, traffic cones found in the dredge material will be collected, sorted into site skips, and removed to an appropriate licensed waste facility.

8.3.7 **Waste water Construction phase**

During the construction phase, staff facilities will be provided at the site compound/designated area. The sewage tank will be emptied as required by a vacuum tanker, and removed from site to a licensed facility. These staff facilities will be removed at the end of the construction phase.

8.3.8 **Risk Management**

The best way to manage pollution incidents is to prevent them. The contractor will identify and quantify risks associated with each part of the proposed works.

A programme of regular checking of equipment, materials storage and transfer areas, work area, checking quality of work will be designed, and implemented during the construction phase of the project. The purpose of this management control is to ensure that the measures that are put in place continue to operate effectively, to prevent accidental leakages, and to identify potential breaches in the protective retentions etc, during the construction phase. The formulation and design of the programme

of mitigation measures also take into consideration the observations and recommendations made by IWDG and Woodrow Sustainable Solutions Ltd in their reports. If it is required consultations shall also be carried out with NPWS/others, prior to commencement and during throughout the construction phase.

8.3.8.1 Emergency Plans and Procedures

The contractor will prepare an emergency response plan and set of procedures for events likely to cause pollution including the pollution of watercourses with fuels/oils, silt/sediment, cement spillages, etc. There will be a contingency plan in place during construction and displayed at appropriate locations.

8.4 Residual Impacts

Provided that the mitigation measures are implemented in full, it is not expected that significant residual impacts will result on the bird species, marine mammals or nearby qualifying interests of the Baldoyle Bay SAC, Rockabill to Dalkey Island SAC, Lambay Island SAC, Rogerstown Estuary SPA, Lambay Island SPA, Malahide Estuary SPA, North Bull Island SPA, Baldoyle Bay SPA, Ireland's Eye SPA and the South Dublin Bay and River Tolka Estuary SPA. Thus, it is not expected that the proposal will have significant adverse impacts on any Natura 2000 sites.

8.5 CONCLUSION

This statement for Appropriate Assessment (AA) has been prepared by Malachy Walsh and Partners, to determine the potential impacts, if any, of the plan for the proposed dredging and reclamation of land at Howth Fishery Harbour, Co. Dublin, on nearby sites with European conservation designation i.e. Natura 2000 sites. The proposed development is located adjacent to the Baldoyle Bay SAC and within 15km of a number of other Natura 2000 sites. The screening process objectively screened out eight of these sites on the basis that no significant negative impacts are likely to result from the proposed development. The remaining three Natura 2000 sites were included in Stage 2 of the Appropriate Assessment process.

The three Natura 2000 sites that were included in the Stage 2 of the Appropriate Assessment are;

1. Baldoyle Bay SAC (000199)
2. Rockabill to Dalkey Island SAC (003000)
3. Lambay Island SAC (000204)
4. Rogerstown Estuary SPA (004015)
5. Lambay Island SPA (004069)
6. Malahide Estuary SPA (004025)
7. North Bull Island SPA (004006)
8. Baldoyle Bay SPA (004016)
9. Ireland's Eye SPA (004117)
10. South Dublin Bay and River Tolka Estuary SPA (004024)

The main aspects of the proposed development that could possibly impact upon these designated sites were identified. This included habitat loss, habitat alteration (through water quality impairment) and disturbance and/or displacement of species. The main activities from the proposed development that would be responsible for these impacts are dredging and the construction of the reclamation area. Operational levels at the Harbour post construction are expected to increase slightly.

A range of mitigation measures have been incorporated into the project design, and other mitigation measures have been developed with the purpose of avoiding impacts on the qualifying interests and conservation objectives for the ten Natura 2000 sites listed above. Mitigation measures include use of environmental buckets and silt curtains, monitoring of water quality, the employment of a marine mammal observer (MMO) and the implementation of best practice guidelines in relation to managing the risk to marine mammals from man-made sources of underwater noise. The likely success of these measures was also considered and no difficulties in their effective implementation were identified.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines 'integrity' as the 'coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and / or population of species for which the site is or will be classified'. The European Commission publication *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (EC, 2018), states that the integrity of the site can be usefully defined as 'the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated'.

Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Baldoyle Bay SAC (000199), Rockabill to Dalkey Island SAC (003000), Lambay Island SAC (000204), Rogerstown Estuary SPA (004015), Lambay Island SPA (004069), Malahide Estuary SPA (004025), North Bull Island SPA (004006), Baldoyle Bay SPA (004016), Ireland's Eye SPA (004117) and the South Dublin Bay and River Tolka Estuary SPA (004024), provided the mitigation measures are fully and adequately implemented during the construction phase of the proposed development, it has been concluded that the proposed development will not have an adverse effect on the integrity of these sites or any other Natura 2000 sites.

On the basis of objective scientific information, the proposed development will not, either alone or in combination with other plans or projects, adversely affect any of the constitutive interests of these Natura 2000 sites, in light of these site's conservation objectives. Accordingly, the following has been concluded:

- all aspects of the proposed development project have been identified which, in the light of the best scientific knowledge in the field, can by themselves or in combination with other plans or projects, affect the European site in the light of its conservation objectives;

- there are complete, precise and definitive findings and conclusions regarding the identified potential effects on any relevant European site;
- on the basis of those findings and conclusions, the competent authorities are able to determine that no scientific doubt remains as to the absence of the identified potential effects; and
- thus, the competent authorities may determine that the proposed development will not adversely affect the integrity of any relevant European site.

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Appendix 1

Stages of Appropriate Assessment

Stage 1 - Screening

This is the first stage of the Appropriate Assessment process and that undertaken to determine the likelihood of significant impacts as a result of a proposed project or plan. It determines need for a full Appropriate Assessment.

If it can be concluded that no significant impacts to Natura 2000 sites are likely then the assessment can stop here. If not, it must proceed to Stage 2 for further more detailed assessment.

Stage 2 - Natura Impact Statement (NIS)

The second stage of the Appropriate Assessment process assesses the impact of the proposal (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and its ecological structure and function. This is a much more detailed assessment than Stage 1. A Natura Impact Statement containing a professional scientific examination of the proposal is required and includes any mitigation measure to avoid, reduce or offset negative impacts.

If the outcome of Stage 2 is negative i.e. adverse impacts to the sites cannot be scientifically ruled out, despite mitigation, the plan or project should proceed to Stage 3 or be abandoned.

Stage 3 - Assessment of alternative solutions

A detailed assessment must be undertaken to determine whether alternative ways of achieving the objective of the project/plan exists.

Where no alternatives exist the project/plan must proceed to Stage 4.

Stage 4 - Assessment where no alternative solutions exist and where adverse impacts remain

The final stage is the main derogation process examining whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project to adversely affect a Natura 2000 site where no less damaging solution exists.

Appendix 2

Screening for Appropriate Assessment