The sediments will be dredged using a dredging barge and excavator. For areas that will require rock to be broken out, a rock breaker will be attached to the excavator. Working under water the rock breaker will not be as loud as one operating on land. The rock will then be dug out by the excavator. When full, the barge will be brought to an unloading point on the Middle Pier within the trawler basin of the harbour. The dredge material will be treated at a mixing plant on the Middle Pier. Dredge spoil will be comprised predominantly of silt, with some sand, gravel and rock.

Rock spoil and coarser (>20mm) material will be screened out from the dredge spoil and temporarily stockpiled on the Middle Pier. This coarse material will then be transferred to the reclamation area by truck where it will be directly placed into the infill area or used in temporary bunds or in the perimeter embankment.

Element 3: Reclamation of land up to ground level

Fine material such as the silty sand, will undergo engineering stabilisation and solidification treatment prior to placement into the reclaimed infill area. Such finer material will be pumped into a mixing plant. A binder will be added to this dredge spoil within the mixing plant. 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 on the Middle Pier via an underwater pipeline to the West Pier. On the West Pier, an intermediate pump station will pump the mix via pipeline to the reclamation area, where it will be deposited and solidify.

Element 4: Finishings

The finished reclamation area (approx. 4.8 Ha) will include landscaping, access road, pathways, parking, surface water drainage, mains water supply, electricity supply, viewing areas and water access points. Landscaping works will involve importing and depositing topsoil and planting/grass seeding. Hardstanding areas will be fenced and used as storage areas for harbour activities. The hardstand areas may be developed in the future under a separate planning applciation for recreational and/or commercial purposes. These future possible developments are not included in this project. The main purpose of this project is to dredge Howth harbour and create the reclamation area.

2.5 Project Need

While minor dredging is currently taking place for some works on Middle Pier, the last major dredge happened in the early 1980s. Since then, the sea bed levels have in places gradually risen up as a result of sediment deposition onto the sea bed. Due to increased draft size in fishing vessels, in order to maintain vessel safety and the commercial viability of the harbour into the future, increased depths are required beyond previous designed harbour depths. Together with increasing vessel drafts, the bed levels are becoming an increasing hazard to vessels using the harbour. Continued deposition of sediments in the harbour will further raise the bed level and decrease the available water depth navigation in/out and around the harbour. The shallow water depths in the vicinity of the RNLI slipway constrains access to the water for rescue craft and the public towards low tide.

It is necessary therefore to dredge the existing basins and approach channels in Howth Harbour in order to provide safe access, navigation and berthing to the vessels currently using the harbour. The proposed project is also necessary as without action the harbour will suffer reduced functionality which will worsen over time.

2.6 Consideration of Alternatives

The following alternatives were considered:

1. **Do Nothing Scenario**

As discussed in section 2.5 above, the do nothing scenario is not considered feasible for the DAFM as the harbour would lose its functionality in time.

2. **Disposal at Sea**

The conventional route to dispose of dredged material is to dispose of it at sea. The dredge material in Howth Harbour has been found to contain levels of contamination such that the vast majority of the material cannot be disposed of at sea directly. It is therefore considered that direct disposal at sea is not a feasible disposal option. In addition, dumping at sea is not considered a beneficial re-use of dredge material.

3. **Burial of Dredge Material at Sea**

Dumping at sea could be permitted if the contaminants can be contained. Out of the two possible options for burial of dredge material at sea, the option of Contained Aquatic Disposal (CAD) is considered potentially feasible. The alternative option, Level-Bottom Capping (LBC), is considered to have limitations due to the extent of environmentally designated areas around the Irish coast. There are considerable uncertainties regarding the feasibility and costs and potential environmental impacts of these two methods and such alternatives were not considered to be the most cost effective or sustainable use of resources.

4. **Disposal at a licensed landfill facility in Ireland;**

The options and permitting requirements for disposal of dredge spoil to landfill or other land based options depend on the material classification under prescribed Waste Acceptance Criteria of Inert, non-hazardous and hazardous for disposal. Most of the 2015 sediment samples tested were found to be within the non-hazardous range. The non-hazardous nature of the dredge spoil means that the materials can potentially be disposed of to a landfill that is licenced to accept non-hazardous material. The possibility of disposing the material to a landfill that is licenced to accept non-hazardous material was considered, however based on the estimated costs and the potential impact of the large number of traffic movements required, this is not considered the most effective option. Disposal to landfill is also not considered beneficial/sustainable re-use of dredge material.

5. **Disposal of the Dredge Spoil at a Contaminated Dredge Spoil Facility Abroad;**

Disposal abroad at a specialist facility known as a Confined Disposal Facilities (CDFs) in Germany or the Netherlands was considered as an option for the disposal of the dredge material. Concerns were raised regarding this option, including the overall carbon footprint associated with the export, the cost, and the licensing requirement for transborder shipment of contaminated material. Based on

the estimated cost and environmental considerations, this is not considered a cost effective option. Disposal abroad is also not considered beneficial/sustainable re-use of dredge material.

6. **Reuse of the dredge spoil locally through land reclamation.**

The re-use of dredge spoil for the purpose of land reclamation is one of the most common beneficial uses of dredge material. A number of potential areas of reclamation were considered including reclamation to the west of the West Pier, east of the East Pier, and the east section inside the Marina Area. The East Pier would require more costly sea defences due to its exposure to the Irish Sea, reclaiming inside the Marina Area would not provide enough area for the dredged sediment and would also lower the usable area within the harbour. The reclamation off the West Pier provides sufficient volume to deposit the full dredge quantities. This and the potential of the West Pier for further commercial and fisheries use resulted in the West Pier being the preferred option for reuse of the dredge spoil. Based on the cost estimate and the sustainable re-use of dredge material this option of reusing the dredge spoil is considered the preferred option.

Alternative layouts were considered based on planning policies, natural heritage context, built heritage context, preliminary photomontages and harbour character. Reclamation to the west of the West Pier was selected as the preferred method of disposal of dredge spoil for the following reasons:

- Disposal at sea is not feasible;
- Disposal to land/landfill is not considered to be feasible, cost effective or sustainable;
- It is considered to be of greater benefit in terms of future development of the harbour;
- It is less exposed than the East Pier and therefore less costly to reclaim and to protect; Reclamation of areas within the harbour would reduce the water area potentially reducing the value of the harbour. There is also limited potential storage volume within the harbour.

3. ENVIRONMENTAL ASSESSMENT

The main objective of the EIA process is to ensure that all direct, indirect and cumulative environmental effects of the project are anticipated. Where effects are identified as unacceptable, these will be avoided or reduced during the design process through the implementation of practical mitigation measures. The main chronological stages of the EIA process include:

- Screening, scoping and consultation in order to help identify impacts;
- Carrying out baseline studies and collecting data on the existing receiving environment;
- Identifying and assessing potential for significant environmental effects (impact assessment); and
- Prescribing or designing mitigation measures to avoid or minimize environmental effects.

The EIAR has been carried out in accordance with the relevant legislative requirements and guidelines, including the Environmental Protection Agency (EPA) - 'Guidelines on Information to be contained in an Environmental Impact Statement, 2002 and draft 2017'. Specialist input as required for each of the environmental topics has also been used where appropriate.

3.1 Screening and Scoping

As part of the scoping process, informal consultation was carried out with a number of relevant parties. Consultation through meetings, letters, email and telephone calls with various statutory and non-statutory consultees was undertaken during the EIA process. Discussions have been held with representatives of Fingal County Council at a number of levels, including planners, heritage officer, biodiversity officer and the Howth area manager. Formal preplanning meetings (06.03.19, 30.05.19 and 03.12.19) were held with Fingal County Council. The aim of these initial meetings was to present the project and to receive initial feedback on any potential issues of relevance that should be addressed through the EIA process. The meetings were held with:

1. FCC Chief Executive Officer, Chief Scientist, Howth Area Manager, Head of Water Services and Environment; and a Senior Executive Planner.
2. FCC Planning and Traffic representatives
3. FCC local area councillors.

Written notifications were circulated to a number of identified stakeholders (both statutory and non-statutory consultees), which set out an overview of the project proposal. The notifications invited feedback from the consultees on any key issues and concerns which they consider should be addressed. The issues raised were subsequently taken into account in the EIA process.

3.2 Public Consultation

There have been a number of meetings with Fingal County Council personnel during which the proposed development has been discussed. In addition, DAFM have informally spoken with the stakeholders within the harbour i.e. the fishermen, yacht clubs and ferry operators with regard to the proposed development on a number of occasions.

DAFM held a harbour users forum meeting on the 2nd May 2019 when the harbour stakeholders were updated on various works around the harbour including the proposed development.

On the 30th May 2019, a specific presentation was made in relation to the dredging project to Fingal County Council planners. Subsequently there was a meeting on the 3rd December 2019 with the Fingal County Council Biodiversity Officer during which the project was outlined.

As part of the EIA consultation process, letters, including a summary of the project were circulated to a number of identified government and non-government stakeholder organisations who may be affected or wish to input into the proposed project. Written feedback was received from Failte Ireland, the Department of Culture, Heritage and the Gaeltacht, the Geological Society of Ireland and Transport Infrastructure Ireland (TII).

It had been intended to hold public information meetings to discuss the project information with interested members of the public. In accordance with Government led restrictions on public gatherings in response to the Covid-19 outbreak this was not possible.

In place of a public meeting, a project presentation was made available on-line (12th March 2021 at https://www.gov.ie/en/consultation/8dad4-howth-harbour-dredging/) to inform people of the proposed development and the planning application. A press notice informing the public of the on-line information was published in the local newspaper and email notifications sent to local Councillors and community groups. The public had the opportunity to submit comments on the

proposed application to the project representatives. All public consultation feedback has been taken account of and any relevant feedback has been incorporated into the various chapters of the EIAR.

The feedback obtained from the consultation process and responses received from stakeholders were taken on board and addressed in the relevant assessments during the preparation of this EIAR. All consultation responses and meeting outputs informed the final design of this project, as appropriate.

3.3 Population and Human Health

An assessment of the potential impacts to population and human health arising from the proposed development was conducted. One of the principal concerns in the development process is that people, as individuals or communities, should not experience any reduction in their quality of life from direct or indirect effects arising from the construction and operation of a development. The key issues examined in this section of the EIAR include population and settlement patterns, economic activities, land-uses, human health, tourism and amenity resources.

Howth Harbour is a multi-purpose harbour facilitating both commercial fishing and recreational activities, providing mooring facilities and pontoons for private enterprises such as Howth Yacht Club and Howth Sailing and Boating Club. Howth Harbour operates as a Fishery Harbour Centre under the Department of Agriculture, Food and the Marine. The West and Middle Piers are primarily used by fishing trawlers for commercial purposes, while the East Pier is used primarily for recreational purposes, including boaters and walkers.

Land use surrounding the site is varied, however the primary use is regarded as residential. The second biggest primary land-use on the Howth peninsula is the sport and leisure/ recreational facilities which consist predominantly of golf facilities. These are located in the centre of the peninsula. Following on from this, there is mixed land use in the form of commercial premises such as shops and restaurants, the harbour itself, agricultural and areas of natural vegetation, broad-leaved and mixed forest, moors and heath, and intertidal flats which are located to the north-west and south-west of the peninsula.

The construction phase of the proposed development is estimated to take approximately 24 months and is anticipated to commence in the summer of 2022. The main impacts identified in this assessment were construction phase impacts on access for users of the Harbour, including the commercial fishermen, Howth Yacht Club, the RNLI and tourists. The users of the Harbour will have to accommodate the short-term construction works. The areas of temporary reduced access are a 100m section of walkway on top of the pier wall near the end of the East Pier, a small section of West Pier for a compound and potentially the whole of Middle Pier (needed for a treatment plant and stockpiling dredged coarse material). The potential need for the whole of Middle Pier is a worst-case scenario within this assessment that depends on the amount of stockpiling required during the dredge. The mitigation to reduce this impact is communication and co-operation before and during the construction phase between DAFM and the stakeholders. Once mitigation measures are implemented, there will be a short term slight negative effect on access for all users.

In terms of health and safety during construction, there is the potential for construction related hazards or injuries, as with any project during the construction phase. Serious risks to human health and safety are not envisaged as the site will be managed in accordance with all applicable legislation and guidelines. Similarly during operation, appropriate safeguards will be in place. The proposed improvements represent a positive impact as the proposed plan intends to improve on existing safety conditions.

During the operational phase, the proposed development will create a land use where there currently is none and improve the useability of the harbour. The development will add to the potential area for development by DAFM within the harbour as well as creating an amenity area on the west pier that would be on a par with the current high value amenity area on the east pier. The likely impact of this will be a permanent significant positive impact on land use and amenity resources in the harbour area.

3.4 Biodiversity

Potential impacts on biodiversity have been assessed as part of the EIAR. The biodiversity chapter describes the ecology of the proposed development site and the surrounding environment in terms of designated sites, habitats, flora, fauna and biological water quality. It also specifies mitigation measures to ensure that significant impacts on these features do not occur. The information on the existing environment was obtained using publicly available information sources and by field surveys.

Designated Sites

Howth Harbour and the proposed reclamation area do not lie within the boundary of any designated site. Thus, the site of the proposed development does not form part of any Natural Heritage Area (NHA), Special Protection Area (SPA), Special Area of Conservation (SAC) or candidate Special Area of Conservation (cSAC), Nature Reserve, or National Park.

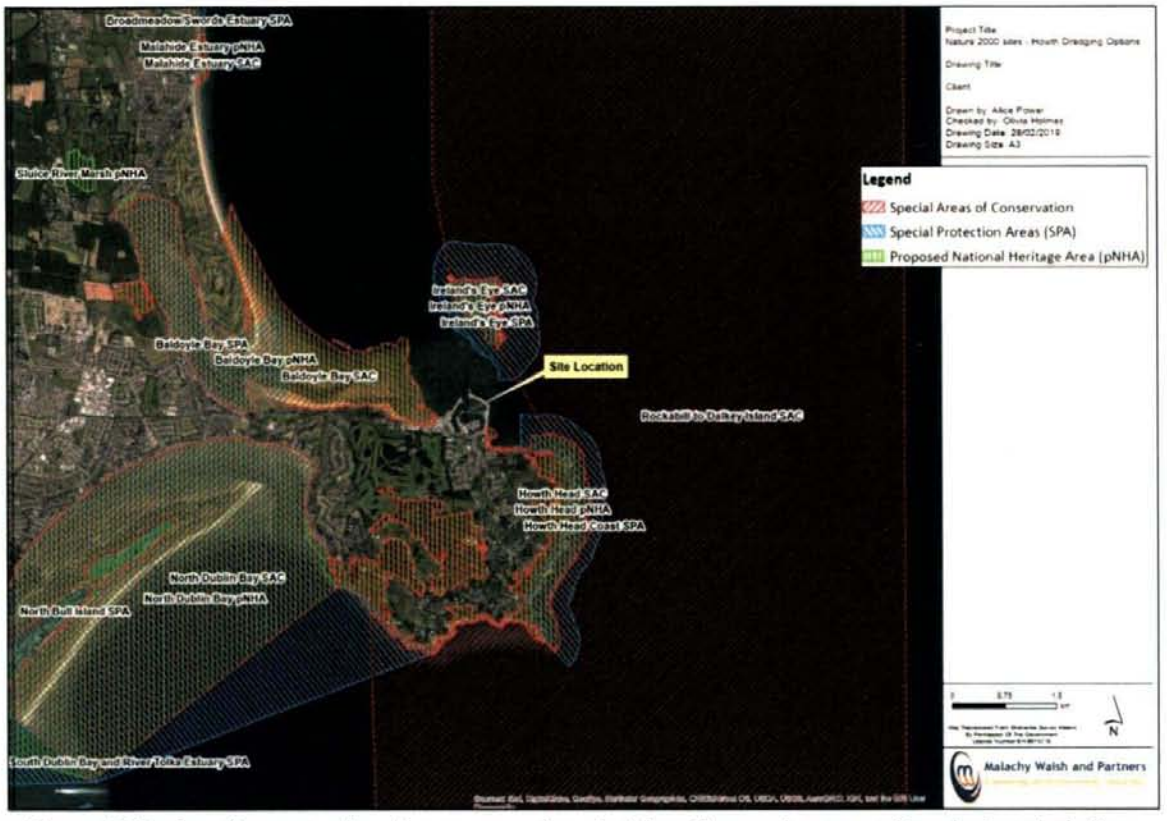

Figure 5 Site location map showing proposed project location and surrounding designated sites

The development is surrounded by a number of designated sites as referenced in the above **Figure 5.** The development lies adjacent to the Baldoyle Bay SAC (which includes Claremont Beach) with the project design going around its border. Impacts from the project on relevant habitats within the Baldoyle SAC were assessed and are described below in the different habitat and wildlife sections. The Baldoyle Bay SAC is also a Natura 2000 site.

Potential impacts on designated Natura 2000 sites (SAC / SPA) are specifically addressed in a Natura Impact Statement which has been submitted as part of this planning application. The Natura Impact Statement notes that following a comprehensive evaluation of the potential direct, indirect and

cumulative impacts on the qualifying interests and conservation objectives for Natura 2000 sites, it has been concluded that the proposed development will not have an adverse effect on the integrity of Natura 2000 sites.

Terrestrial & Marine Habitats

Field surveys identified thirteen terrestrial habitat types across Howth Harbour and the surrounding environs. The vast majority of the application site is comprised of built structures, hardstanding, and amenity grassland and parkland habitats which have low species diversity in general and are of a low to no intrinsic ecological value. On the outskirts of the survey area, there are areas of coastal habitat which support a more diverse flora.

Three shoreline habitats were noted within or in close proximity to Howth Harbour, namely; Exposed Rocky Shores (LR1), Shingle and Gravel Shores (LS1) and Sand Shores (LS2).

Of the habitats recorded, five correspond to or have links to Annex 1 Habitats (Annex 1 is a list of EU natural habitat types) of the EU Habitats Directive, three of which occur adjacent to the Western Pier. All three are shoreline habitats that occur on the dunes and gravel banks at Claremont Beach southwest of the proposed development.

During construction, the principal concern relates to direct impacts on shoreline habitats and potential impacts on coastal processes due to sediment plumes during dredging. A hydrodynamic model was developed for the project which predicted the amount of sediment leaving the harbour and where it would disperse. It predicted the area at the east of Claremont Beach to be the most sensitive receptor potentially impacted by sediment. The model predicted annual sediment deposition of 0.4mm resulting from the proposed dredging. A risk assessment concluded that this would undergo re-suspension under wave and tidal action. This will result in the sediment spreading further and under dilution reducing the risk to the habitats. There will be a low risk to habitats from the deposition of the dredge sediments. There was also a level of suspended solids in the water at Claremont Beach predicted by the hydrodynamic model. The risk assessment found that the levels would be above environmental quality standards for two contaminants of concern within the sediment. Mitigation measure to reduce the potential impact are as follows:

- Environmental buckets to be fitted to the dredge excavator;
- 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
- Should monitoring indicate exceedances of agreed limits, further management of the dredging methods will be undertaken to bring concentrations below the exceedance limits.

Once mitigations are in place the risk assessment found that the risk to water quality will be low. The impact from dredging will have a short term not significant negative effect on habitats (including Claremont Beach).

The area of permanent marine habitat loss (Muddy Sands (SS2)) will be approximately 4.8Ha under the footprint of the proposed reclamation area. The loss of the habitat at the proposed reclamation area is considered to be of local significance. However, there will only be a small number of foraging

birds permanently displaced and the habitat only has common benthic or seabed species. The loss of the 4.8Ha of the habitat would be permanent, however taken into the broader context that the Muddy Sands habitat is common in the adjacent area and with better quality of the habitat within the Baldoyle Bay SAC, the effect on the habitat from the proposed development is considered negative, permanent and not significant.

Potential impacts on terrestrial habitats i.e. buildings and artificial surfaces (BL3) or amenity grassland (GA2) is damage and disturbance arising from vehicular activities and storage of overburden and materials. The proposed development is situated adjacent to the Baldoyle SAC and there is a potential impact from construction works on this habitat through construction machinery egressing onto the SAC. Mitigations will include exclusion zones to prevent accidental movement of machinery onto the SAC. Once mitigations are in place the impact from the proposed development will have a short term not significant negative effect on habitats.

During the operational phase, the principal concern relates to the project having any potential indirect habitat alteration impacts on coastal habitats through sediment transport processes. The hydrodynamic model predicted little impact on the tidal currents except to a slight degree in the area just off Claremont Beach to the west of the proposed works, where the currents appear to be reduced slightly. The proposed development would appear to slightly reduce wave heights in this area. This would result in a slight increase in any tendency for sand to settle in this area. However, given that the impacts on waves and currents are minimal, the general nature of the beach materials will not change in a significant way. Wave action at Claremont Beach will still be sufficient to move sand sized material and there will be minimal change in deposition and erosion patterns due to the proposed development. Impacts on other areas of coastline are considered imperceptible.

During the operational phase, there will be leaching of minor amounts of contaminants from the stabilised and solidified sediments in the reclamation area. The levels of leaching have been determined to be within the environmental quality standards. The low levels of leaching will happen principally because of the extremely low permeability of the stabilised and solidified dredge spoil. The impact from this leaching will be a permanent imperceptible negative effect on the water quality.

Marine Benthic Fauna

Two groups of seabed (benthic) marine life were identified in surveys within the proposed site. The distribution of these two groups is relative to their positions within or outside the Howth Harbour basin.

- The area within the existing harbour is species poor, containing a low number of benthic species and individuals.
- Outside the harbour, there was higher biodiversity than inside the harbour. All species found were common. Individual benthic species occurring within the reclamation area will likely be lost.

Within the harbour the benthic fauna from the adjacent dredge area will recolonise the dredged area in about two years and the existing communities, will be re-established. Areas located outside the harbour consist of sands and muddy sands, with no differences in habitat noted between the

proposed reclamation area and the adjacent areas. All species and habitats identified in the survey area are common in Irish coastal waters. The presence of these species in the surrounding areas means that any loss of the overall biomass of benthic fauna will be imperceptible taking into account the similar habitats and colonies in the surrounding environment. The proposed project will have a permanent imperceptible negative effect on the marine benthic fauna.

Marine Mammals

A Marine Mammal Risk Assessment (MMRA) in relation to the proposed works at Howth Harbour was carried out. Without mitigation the assessment noted the following in relation to the proposed project;

- The project will not cause injury or death to marine mammals but could lead to very local disturbance, from noise associated with the project.
- The dredging activities (including rock breaking) proposed during this project will occur through a long reach excavator on a barge with some increased marine traffic associated with sea-going barges. It is very unlikely any noise generated will be capable of causing permanent or temporary hearing injury to a marine mammal.
- While grey seals frequently and regularly occur inside Howth Harbour in small numbers there may be local disturbance to these but they are accommodated to human activities and are likely to not be affected. Outside Howth Harbour, it is unlikely there will be any disturbance to cetaceans or seals.

A number of mitigation measures in relation to marine mammals have been prescribed in order to reduce any possible impacts. These mitigations include the presence of a trained and experienced Marine Observer (MMO) during the dredging and the use of "ramp up" procedures for noise and vibration emitting operations.

Once mitigations are in place there will be a short term not significant effect on the marine mammal life in the construction phase and a likely neutral effect in the operational phase.

Terrestrial Fauna

It is noted that the proposed development site is largely marine in nature and thus generally lacks the ecological requirements for terrestrial species. A single Irish Stoat was noted on West Pier. No signs of other terrestrial mammals including otter, amphibians or lizard were recorded during the site surveys conducted in 2019.

Bat activity, recorded in the vicinity of the harbour, was low. No bats were recorded foraging or commuting during the bat survey. No bat roost was found on the West Pier during the bat survey, the existing buildings and structures within and in the immediate vicinity of Howth Harbour were deemed to be of low bat roost potential. Overall, the proposal will not result in a net loss of linear foraging habitat for bats. Mitigations are not required. It is concluded that as a result of the proposed development there will be a permanent imperceptible negative effect on foraging/commuting/roosting of any bat species.

Birds

A total of three bird species were confirmed as breeding within Howth Harbour, including 3 to 4 pairs of Black Guillemot breeding within the harbour walls and 1 to 2 pairs in buildings facing onto the proposed reclamation area. The other species were pied wagtail (1 pair) and rock pipit (1 pair). The dredging and construction of the reclamation area is predicted to result in the direct loss of currently used nesting sites in the buildings on West Pier. Mitigations to reduce the impact on the Black Guillemot will include the installation of nest boxes in appropriate locations on the pier walls before construction starts so that the Black Guillemot will have alternative nesting sites. The nest sites in the buildings on West Pier will be removed to prevent them being used and then abandoned through disturbance. Once mitigations are in place, the proposed development will have a short term not significant effect on the Black Guillemots.

Several seabird species were recorded breeding in the environs of Howth Harbour and were largely confined to both Ireland's Eye (SPA) and Howth Head Cliffs. The impact of the proposed development will have a permanent imperceptible negative effect on these species.

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 during the winter period of 2019/2020. Ringed plover was the most numerous species of wader recorded. There is the potential for disturbance to roosting birds arising from disturbance from workers, plant and machinery and from noise emissions from machinery on site, particularly within or adjacent to the harbour. There will also be the short-term loss of a winter roost location at the end of west pier for the duration of the construction works. The environs surrounding Howth Harbour contain numerous alternative roosting sites and as such offer alternative roosting locations during the construction phase of the project. Additionally, certain bird species may habituate to noise and activities associated with the construction work. Mitigations will be carried out involving construction site exclusion zones and screening/fencing off the remaining two winter roosts to reduce disturbance during the construction period. A project ecologist will oversee all mitigations. During construction, once mitigations are in place there will be a short term not significant effect on the wintering birds from the proposed development.

During the operational phase of the proposed development, a permanent winter roost area will be established on the newly constructed revetment pier. This will provide a continuation of the existing winter roost area on the West Pier. The roost area will be fenced or screened off to reduce disturbance as agreed with the project ecologist. Once mitigations are in place, there will be a permanent not significant negative effect on the wintering birds from the proposed development.

The disturbance of sediments during construction also has the potential to indirectly impact on fishing 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 the species. However, the impact on foraging birds, particularly fishing birds such as plunge and pursuit divers e.g. Razorbill and Common Guillemot, is predicted to have a short-term not-significant effect.

Bird species in general are expected to continue utilising habitats within the development area once construction is completed. It is expected that any bird species that are displaced as a result of the

construction phase will use the alternative habitats readily available to these species in the area surrounding the site.

Overall, both breeding and wintering birds in Howth harbour have habituated to disturbance associated with the daily activity of a busy harbour. This habituation and implementation of the required mitigations will ensure significant negative effects on key ecological bird species will not occur.

3.5 Lands and Soils

The potential impacts to the land and soil have been assessed and any direct or indirect effects on these resources arising from the proposed dredging and reclamation works at Howth Harbour have been considered. The proposed development is on an active marine site with ongoing industrial, commercial and leisure activity throughout.

A 2019 geotechnical survey found the soil in the reclamation area comprised fine to medium brown sand. Underneath the sand strata, material described as grey, slightly gravelly clay with some cobble and shell content was encountered. Bedrock encountered is predominantly described as strong grey limestone.

The soil within the dredge footprint was found to consist of very soft to soft, black, slightly sandy slightly gravelly silt. The black silt had an organic odour to it. 23 samples were taken from sediments within the harbour and sent for laboratory analysis. The analysis confirmed that the sediment was not suitable for dumping at sea due to elevated concentrations of some heavy metals and organotins (from the now disused organotin antifoul paints on boat hulls).

The rock underneath the sediments consists of limestone with some locations of mudstone.

Importation of Materials

The construction of the perimeter embankment and rock armour revetment will require the importation of granular stone fill which will be used to fill the core of the bund. The outer layers will require the importation of large rock material for use as outer-layer primary rock armour and smaller rock material for use as under-layer below the primary rock armour. Relevant materials imported for surface finishing following reclamation of land will comprise of stone fill, concrete, paving setts and/or bituminous flexible pavement for the construction of pedestrian, road and parking paving and a slipway.

The minimum amount of materials required will be stored on-site and will be managed to minimise waste generation. All materials will be stored within the on-site construction compound.

Dredging

The project will require the excavation of approximately 240,000m^3 dredge spoil from the harbour. A bathymetric survey will be undertaken to confirm the correct dredge depths are achieved. Approximately 10% of the dredge material will be bedrock. The project may require some rock-breaking to be carried out which once broken, will be excavated from the bed by a long reach excavator with a bucket attachment.

Reclaimed Land

Dredged material will be treated by stabilisation and solidification prior to re-use as fill material in the reclamation area. The treatment eliminates the potential for release of contaminants into the surrounding areas. Testing of treated samples has shown that the material has very low permeability which confirms that the contaminants will be contained within the treated material.

The perimeter embankment and rock armour revetment will have a geosynthetic clay liner on the inside to ensure that any potential contaminants are not released through the perimeter embankment beyond the proposed reclamation area.

The area of reclaimed land will be suitably covered by hardstanding material and landscaped areas will be grassed.

Likely Potential Impacts

There will be some loss of contaminated dredged sediments outside of the dredging area, this material will deposit onto the seabed over a wide area. A minute amount will deposit over a wide area with the material dissipating as it gets further away from the dredge. As the material disperses it reduces in risk and its effect on the environment is reduced. The impact from the sediments will have a short term imperceptible negative effect on the soils. The mitigations outlined earlier, including the use of an environmental bucket and silt curtains to reduce the loss of sediment from the dredge area will also reduce the impact of the deposited sediment on the surrounding seabed.

Within the reclamation area, mitigation by design has been incorporated into the proposed project whereby the contaminated sediments are treated through stabilisation and solidification in order to contain the contaminants. Once treated, the sediment will be a solid material of low permeability that will contain the contaminants within them. The treatment process will prevent any potential impact on the underlying seabed at the land reclamation area from the contaminants within the sediments. The removal of the contaminated sediments from the harbour which currently have the potential to become mobile and impact on surrounding sediment will have a positive effect on the seabed. The impact of the treatment of the sediments and their use in the land reclamation area will be a permanent not significant positive effect on the soils in the area.

There is a potential impact on the imported soils placed on top of the reclamation area from contaminants potentially leaching from the treated sediments. The treated dredge sediment samples for Howth FHC dredge have a permeability similar to a clay liner. This permeability is enough to protect the soils above from cross contamination. There will be an imperceptible effect on the above soils.

The proposed works will require the use of long reach excavators, barges and other vessels and machinery associated with the project. The presence of such machinery increases the risk of fuels/oils being released due to accidental spillage. A Construction Environmental Management Plan will be followed to reduce this risk. There will be a short term not significant effect on the soil and geological environment as a result of the use of machinery associated with the proposed works.

Residual Impacts

During the construction phase, once the mitigation measures are implemented, there will be a short term not significant negative effect on the land and soil environment from the proposed development.

During the operational phase, once the mitigations are implemented, the impacts on the land and soils from the proposed development range from a permanent not significant negative effect to a permanent not significant positive effect on the land and soils.

3.6 Water

The potential impacts of the proposed development on surface water and groundwater have been identified and assessed as part of this EIAR.

The main hydrological feature of Howth Harbour is the Irish Sea within the harbour. There is an ebb and flow of sea water in and out of the tidal basins. The water body is classified as the Irish Sea Dublin (EPA code HA 09). The water quality is given as a good status that is not at risk.

Gray's Brook (or Boggeen Stream) is a stream entering the Harbour at the slipway south of the marina area. The stream originates 1.3km to the south in Thormanby Woods. It is within the EPA water body Howth_010 and has a water quality status that is unassigned.

There are three storm water over flows that flow into the harbour. One enters the harbour at the southern end of the trawler basin while the other two are south of the marina area. A site visit at low tide found another storm water overflow in the south western corner of the Trawler Basin. The site visit also confirmed that the storm water overflow just east of the Howth Yacht Club is the mouth of Gray's Stream.

Existing Site Drainage

The existing site drainage on the west pier and middle pier happens in two ways. There are roadside storm water drains on both the west and middle pier. These lead to the storm water outflows. The other drainage is surface runoff immediately back into the sea from across the surface of the piers.

Flood Risk

There have been no flood reports in the site area within the Harbour. The land reclamation area is designed so that any water that may enter the site during storm conditions will tend to flow back into the sea with no repercussions to flooding in the area. The proposed development will not increase flood risk outside the confines of the site. General ground levels of the reclamation area have been designed to take into account future 200 year estimated water levels.

Likely Potential Impacts

During the construction phase, the principal issues relating to the water environment is the potential reduction of surface water and/or groundwater quality associated with surface water run-off, de-watering, mobilisation of sediments, existing contamination within sediments and accidental spillages / leaks of substances used at construction sites such as lubricants, fuels and oils.

During the dredging, there is potential for sediment to become suspended and spread through the water column. A hydrodynamic model predicted the amount of sediment leaving the harbour and where it would go. It predicted the area at the east of Claremont Beach to be the most sensitive receptor potentially impacted by suspended solids. The model predicted an average of 3mg/l for suspended solids with a max of 18mg/l for suspended solids at Claremont Beach. The risk assessment found that the levels would be above environmental quality standards for two contaminants of concern within the sediment, the risk to water quality was high. Mitigations are as follows:

- Environmental buckets to be fitted to the dredge excavator;
- 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
- Should monitoring indicate exceedances of agreed limits, further management of the dredging methods will be undertaken to bring concentrations below the agreed limits.

Once mitigations are in place the risk assessment found that the risk to water quality will be low. The impact from dredging will have a short term not significant negative effect on water quality at Claremont Beach.

The risk assessment also looked at the human health aspect of the suspended solids at Claremont Beach which is a popular swimming location. It compared the predicted levels of contaminants of concern to the drinking water standards and it found that there were no exceedances. The risk assessment calculations were based on unmitigated dredging, so when the above mitigations are in place the risk will be even less. The risk to human health from the water quality was assessed as low.

During the construction phase there are a number of potential impacts on receiving waters from stockpile runoff and waste water discharge from construction works. A construction environmental management plan will be implemented. Runoff will be managed and all discharge of treated wastewater will be via licence from the appropriate authority. Once these measures are in place there will be a short term not significant effect on water quality from the proposed development.

During the operational phase, there is the potential for leaching of minor amounts of contaminants from the stabilised and solidified sediments in the reclamation area. The majority of the contaminants will be held within the treated sediments which has a very low permeability, however there will be a minor amount of potential leaching from the outer surface of the treated sediment which will be exposed to water. The levels of leaching have been predicted to be below the relevant environmental quality standards. The impact from this leaching will be a permanent imperceptible negative effect on the water quality.

During the operational phase, the majority of the contaminated sediments will have been removed from the harbour. This will reduce the potential for suspended solids and contaminants to impact on water quality in the area. The removal of the sediment from the harbour will have a permanent not significant positive effect on water quality.

There will be an impact on current and wave action from the proposed development. The results of the hydrodynamic assessment predict that there will be a minor slowing in the current in the immediate vicinity of the perimeter of the proposed reclamation area. Away from the perimeter of the reclamation area impacts are considered minimal. There will also be a minor reduction in wave height impacting on Claremont strand. The minor changes are considered to impact on Claremont strand by reducing very slightly the erosion potential on embryo dunes on the beach. Impacts on wave driven erosion / deposition patterns on the west of the harbour are considered to be minimal. Impacts on other areas of coastline are considered imperceptible.

Residual Impacts

Once mitigation measures have been employed, the residual impact of the land reclamation and dredging works will have a permanent imperceptible negative impact on the water environment due to the potential limited release of contaminants from the solidified dredge material used in the reclamation area.

3.7 Air and Climate

An assessment on the effects to Air and Climate that may occur as a result of the proposed development at Howth Harbour was carried out.

A comprehensive desktop review was completed which aimed to assess baseline air quality and determine the likely significant impacts that the proposed development could have on air quality. Environmental Protection Agency (EPA) air quality data, and relevant assessment criteria and guidelines were considered. The main air quality impacts relating to the proposed development which are likely to occur relate mainly to the use of machinery associated with the dredging and reclamation works during the construction phase.

The air quality at Howth Harbour and its surrounding environs to the west (Dublin) is currently ranked as '3 - Good' by the EPA's Air Quality Index for Health (AQIH).

Sensitive receptors in this case are people or wildlife that could potentially be impacted by the development. The nearest residential receptors are located along the R105 to the south of the proposed site. The nearest ecologically sensitive areas include the nearby Natura 2000 sites located in close proximity to the site.

Construction Phase

The main potential impacts of the proposed development on air quality in the receiving environment during the construction stage are from escaping dust and vehicle emissions associated with the following activities:

- Generation of airborne dust from construction activities

- Deposition of material on public roads during off-site transportation
- Transportation and unloading of materials on, off and around the site.

The movement of machinery, construction vehicles and the use of generators during the construction phase will generate exhaust fumes containing predominantly carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM_{10}). Best practice guidelines will be followed during operation to minimise fugitive dust emissions.

Operational Phase

Once operational, there will be no direct impact from emissions to the atmosphere from the proposed development.

Mitigation

The following mitigation measures will be employed during the construction phase:

- Dampening of exposed earthwork activities and site access route during dry weather;
- Provision of wheel washes at exit points;
- Covering of stockpiles and/or dampened during dry weather;
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads.
- Internal and public roads will be inspected regularly for cleanliness and cleaned as necessary; and
- Daily site inspections should take place to examine dust measures and their effectiveness.

In addition, the following measures will be implemented during the construction phase:

- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.
  Monthly dust monitoring will be undertaken at the nearest sensitive receptor during the construction phase.

Once mitigation measures are implemented there will be a short term not significant effect on air quality during the construction phase. Once operational, there will be a neutral impact on air quality from the proposed development.

3.8 Landscape and Visual

The potential impacts of the proposed harbour dredging and land reclamation works on the landscape and seascape of the receiving environment have been identified and assessed.

The coastal setting of Howth peninsula consists of a series of cliffs, deep inlets, stony coves and rocky caves and outcrops. The shoreline generally rises in high and steep cliffs and coastal spurs. The coastline along the northeast of the peninsula is defined by four long, sandy beaches (Burrow, Claremont, Quarry and Hole-in-the-wall beaches) that run in a line from Howth harbour's West Pier for approx. 2.5km until reaching Sutton.

The visual baseline is solely about the proposed West Pier Reclamation Area, which will be located along the western edge and northern tip of the West Pier. There are several views of recognised scenic value within both the site and the study area. There is the designated need to preserve views along the following areas:

- Northern & north-western tip of the West Pier;
- All of the East Pier;
- Within and south of Howth village;
- Within the grounds of Howth Castle and Deerpark Golf Course;
- Between Howth village and the Nose of Howth (i.e. ≥1km east of the village).
- Owing to the proximity and openness of view, combined with their frequency of use, the most prescient of these protected views are those from the northern and north-western tip of the West Pier, as well as those from the most northern sections of the East Pier.

The most important visual receptors in relation to this project are those people visiting or working along the popular West Pier. Aside from walkers and sightseers, these include the numerous people visiting or working in the variety of seafood wholesale processors/retail shops, cafes/restaurants along the West Pier, along with those servicing or working on fishing vessels docked along that pier. However, other important visual receptors are those numerous people who regularly frequent Claremont Beach, particularly when it is at or near low tide, which is within 200-600m west/southwest of the proposed development, as well as Quarry Beach a little further west. There are also a number of sailors, recreational fisher folk, kayakers and paddle boarders who enjoy the waters directly west and north of the West Pier.

The assessment found that:

- There is a healthy interdependence between the coastal landscape and the vibrant community it supports through the marine industry, tourism and water-based recreation.
- The scenic quality of the harbour, including the mix of recreational and small or moderate sized fishing boats, creating a more localised aesthetic to the peninsula is a further reason why people chose to visit it or live close-by.
- Howth's seascape of high, dramatic cliffs and spurs is geologically and scenically less tame and consistent than Dublin's coastline to the north. The overall landscape of Howth peninsula represents somewhat of an anomaly along Leinster's east-facing coastline. Howth's vivid quality is both enriched and compounded by its proximity to the nation's capital.
- The surrounding coastline has a high recreation value as a result of its popularity among residents, Dublin day-trippers and international tourists.
- There is a long-established perception of the peninsula as a much-cherished and picturesque antidote to the urban clutter and pace of the city's heart.
- It is considered that whilst the landscape / seascape contained within the study area has a relatively high degree of uniqueness and sensitivity, Howth harbour and its immediate environs are much more robust. The landscape sensitivity is judged to be **High-medium**.

The proposed project will have a conspicuous physical impact on the current, man-made, shoreline and this impact will be permanent and irreversible. The proposed development helps to solidify and

blend the broader multi-functional identity and appeal of the harbour, introducing a large and more tangible sense of recreation and seaward aesthetics to the West Pier. A harbour facility can be an important hub for coastal communities such as this one, providing direct and indirect employment; a recreational nucleus for the coastline and a seasonal terminal attracting additional visitors and tourists to the village. A certain degree of local pride is often felt towards bustling harbours, which makes the intensification of development and associated activities more acceptable, or even welcomed.

In terms of landscape/seascape character, the proposed development represents an extension that will serve to strengthen the popularity, functionality and future of the harbour itself. On balance of these reasons, the magnitude of landscape/seascape impact is deemed to be **Medium-low.** When the magnitude judgement of Low is coupled with the earlier sensitivity judgement of 'High-medium,' the overall significance of landscape / seascape impact is deemed to be **Moderate-slight.**

Mitigation Measures

Specific landscape and visual mitigation measures are not considered necessary.

Residual Impacts

It is not considered that the proposed development will contribute significant cumulative impacts in this landscape / seascape and visual context.

Overall, it is not considered that the proposed development will give rise to any significant landscape / seascape or visual impacts.

3.9 Cultural Heritage

The potential effects on the archaeological, underwater archaeology, cultural heritage and architectural heritage of the proposed development at Howth Harbour have been assessed.

Howth Harbour is not a registered archaeological monument, although the harbour and its nineteenth-century structures are registered in the National Inventory of Architectural Heritage (NIAH) and are protected structures. The registered terrestrial archaeological sites that exist in Howth all lie to the south of the harbour and outside the proposed development area for the Howth FHC project.

Previous archaeological excavations in the wider study area indicate that the area appears to have been beach or foreshore up until the period when the harbour was developed.

There are a total of nine sites of architectural heritage interest directly associated with the Harbour and these are protected structures. The nineteenth-century pier walls are protected structures, as are the nineteenth-century buildings that survive on the West Pier.

The marine geophysical survey and a side-scan sonar survey carried out, in conjunction with the magnetometer survey recorded a series of targets in the area west of the West Pier and these were subsequently inspected by diving. Underwater archaeological survey took place on 18th June 2020 and focused on the proposed reclamation area off the West Pier and included the inspection of the

targets identified in the marine geophysical survey report. No features of archaeological interest were observed on the seabed.

Likely Potential Impacts

The dredging of the harbour basin represents a direct and permanent impact on the harbour silts. However, this area was substantially dredged in the 1980s after the harbour was dewatered in 1979 to facilitate those works. It is unlikely that archaeologically significant material will be present in those areas that were dredged previously. It remains possible that archaeological material is *in situ* in areas and depths that were not dredged previously, and archaeological monitoring will be conducted of such areas to ensure that any cultural heritage material that may be retained in those deposits are recovered.

The exposed length of sloping rock face on the west side of the West Pier poses an archaeological constraint. As the face of the rock embankment will be permanently buried, it is necessary to ensure that suitable archaeological record of the rock face is made prior to construction commencing. It is also necessary to ensure that there is a suitable barrier membrane laid down to separate the *in situ* remains from the reclaimed deposits to be laid above.

No impacts on archaeological assets are anticipated during the operational phase.

A section of wall will be removed near the end of the West Pier in order to provide access to the new reclamation area from the end of the West Pier. The wall is not original to the West Pier so its removal will only have a permanent moderate negative effect on the historic character of the pier.

Mitigation

Pre-construction phase mitigation measures will include a detailed archaeological survey of the face of the rock facing of the West Pier that will extend from the structure toe to the rear of the buildings that populate the West Pier.

Archaeological monitoring licensed by the National Monuments Service will be conducted of all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development, with the proviso to resolve fully any archaeological material observed at that point.

Residual Impacts

Residual impacts on archaeological assets will have a neutral effect.

3.10 Material Assets

Material assets are defined as 'resources that are valued and that are intrinsic to specific places. They may be either human or of natural origin and the value may arise for either economic or cultural reasons'. The consideration of the projects impact on material assets is discussed in the context of built services and waste management, e.g.:

- Electricity;
- Water Supply, Wastewater and Gas Infrastructure

- Resource Use and Waste Management

The proposed development is mostly over water and there are no existing utilities within the area of the land reclamation or the dredge footprint within the harbour. The two proposed construction compound areas will be located on the Middle Pier and the West Pier. Both the Middle Pier and the West Pier have electricity which is supplied by the local ESB network. The West Pier has a gas line for use by the existing premises if required. There is a water main line on both the middle and West Pier and a foul water line on the West Pier.

Electricity

A new electrical network will be created for the land reclamation area and will be supplied by connection to the mains. The proposal will not require any modification to the overall local ESB infrastructure. During the construction phase of the proposed project, connections will be made to the mains and generators may also be used where required. Electrical ducting will be installed to facilitate low level lighting along footpaths, lighting along the road and to enable future electrical connections. There will be no impact on electrical resources from the proposed works.

Water Supply

There is a water requirement for the treatment process, welfare facilities and cleaning. During the construction phase, approximately 500m^3/day of water will be used for mixing during the dredge spoil treatment process. The majority of this water will be sea water, however there will be a need for circa 10% freshwater supplied by the mains water system at a rate sufficient to create a homogeneous and pumpable slurry. Up to 100 m^3/day of mains water may be required for welfare facilities and other uses during the construction phase. During the operational phase, outdoor showers and taps will be provided which will be connected to the mains water on the West Pier. Water connection and usage during the construction and operational phases will be in accordance with necessary permissions obtained from Irish Water.

Wastewater

During construction, the wastewater from the welfare facilities within the construction compounds will collected and disposed of off site at a suitably licensed waste facility.

During reclamation works, excess water will rise to the surface of the stabilised mass. This water will be contained within the impermeable perimeter bund of the reclaimed land area. The excess water will be re-circulated by pump back into the processing plant for re-use in mixing the dredge material and binder. Disposal or discharge of excess water that is not needed for re-circulation purposes may be required. The excess water will be treated onsite and discharged to the sewer/stormwater system as a treated trade effluent. All discharge of the treated excess water or trade effluent will be carried out under applicable consents from Irish Water, Fingal County Council and/or the EPA.

The current wastewater system will have an increase in load due to this trade effluent. The increase in load on the waste water system will be short term as it will only last for the duration of the dredging works. Any discharge of trade effluent will be within the capacity limits and permission of

Irish Water. As the discharge will only taking place if Irish Water can accommodate it, the impact on the waste water system is have a short term not significant effect.

There will be no operational phase generated waste water from the project.

Resource Use and Waste Management

All excavated dredged material will be re-used in the development of the reclaimed area. The avoidance of waste production by the beneficial reuse of circa 240,000m^3 of dredged material for the benefit of land reclamation is considered a significant positive impact in terms of resource use and waste management.

It is envisaged that the waste generated will be minimal and will also be strictly controlled. Any waste generated on site will be segregated at source and will be taken off site to an appropriate facility by an authorised contractor.

Mitigation

Good site practice and careful management on site will ensure efficient resource management and a reduction in waste. Any waste generated on site will be segregated at source and will be taken off site to an appropriate facility by an authorised contractor. All waste streams will be identified within the contractors' waste management plan at the outset.

The waste treatment activity and placement of the treated material will be undertaken in accordance with the conditions of a waste or IE licence from the EPA.

Controls as part of the contractors Construction and Environmental Management Plan will ensure minimal waste being generated and minimise the risk of pollution. Fully registered waste management companies will only be used for waste coming from the site. Standard good practice of only ordering the required amount of materials will be implemented.

The small quantities of solid waste (packaging, surplus construction materials, etc) generated during the construction stage of the project will be sorted on site prior to disposal/recycling as appropriate off site by a licensed waste contractor.

Residual impacts

The impact of the proposed project on resource use is a permanent significant positive effect. The impact of the proposed project on other material assets will be a short term not significant effect.

3.11 Noise and Vibration

The potential noise and vibration impact from the proposed Howth Harbour Dredge Project on the receiving environment has been assessed.

Existing environment

The existing noise environment includes the 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.

Due to the COVID 19 restrictions, typical baseline noise levels were not representative primarily because traffic volumes in the Howth area were significantly reduced. This meant that it was not possible to carry out meaningful baseline noise measurements in the environs of the marina. In the absence of baseline measurements, a review of existing noise data was undertaken.

In order to determine existing noise levels, previous noise monitoring measurement results were utilised that were taken as part of planning application for a mixed used (200 residential units and 6 commercial units) development at Howth Road (planning ref. F15A/0362), these are considered representative. As part of that project, Day, Evening and Night time measurements were undertaken between the 3rd and 6th February 2015 at three residential locations in proximity to the works area.

Threshold levels

The noise threshold or limit levels applied during the construction phase are based on standards applied to construction sites. The existing noise levels are used to help predict the noise levels during the construction works. Based on the above mentioned monitoring levels and the standard construction thresholds, the following threshold values have been applied to the development.

Table 1: Appropriate Noise Limits for the proposed construction works

Assessment category and threshold value period (T)	Threshold values, $L_{Aeq,T}$ dB
Night-time (23:00 to 07:00hrs)	50
Evening and Weekends Note A	55
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	65

Note A: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

Likely Potential Impacts

The noise assessment is primarily concerned with the temporary dredging and construction works. The potential noise sources include noise and vibration from the plant and machinery employed to undertake the works. The main items of plant will include a long reach excavator, a smaller excavator, the pumps to transfer material and the process plant.

There are two types of Noise Sensitive Receptors (NSRs) in the immediate area. These are high value amenity (which include the east, middle and West Piers within the harbour) and residential NSRs which are dwellings along the R105 close to the harbour (see **Figure 6** below).

While the piers and marina are considered as NSRs, their success is largely dependent on a functional harbour with enough depth to allow fishing, pleasure and tourist boats to navigate and berth safely within. These proposed works are likely to be perceived as a benefit and necessity rather than a nuisance by those who use and depend on the harbour.

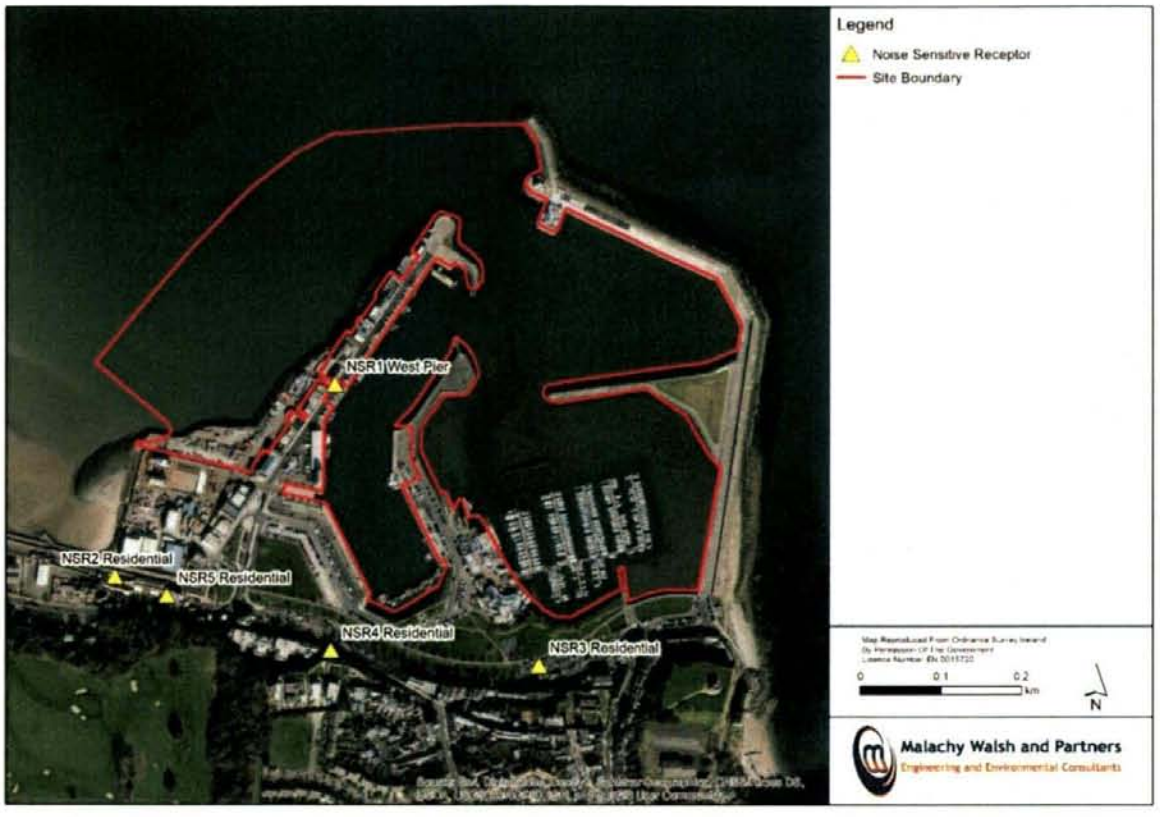

Figure 6 Noise Sensitive Receptors

The potential noise impact on the harbour area i.e. the piers, is difficult to accurately quantify. This is because the barge with mounted long reach excavator will be continually moving around the harbour as different areas are dredged. Additionally, people on the piers (who are the actual receptors) will generally only be exposed for momentary periods of time. The number of people on any pier will vary considerably from hour to hour and day to day.

The West Pier, with cafes and restaurants is likely to be the most sensitive receptor when dredge works are taking place nearby. However, the works will be of short term duration.

The predicted results show that the daytime construction noise threshold criteria can be achieved at the nearest noise sensitive receptors (**See Figure 7** below). The existing buildings on the West Pier will act as a barrier to noise propagation from the infill construction works. The sediment treatment plant has been located at the middle of the Middle Pier. The dredging barge is modelled in the harbour channel between Middle and West Piers. This represents a relatively worst case scenario. When the dredge barge is elsewhere in the harbour noise levels on the West Pier will be lower.

Daytime Land Reclamation and Dredging Construction Works

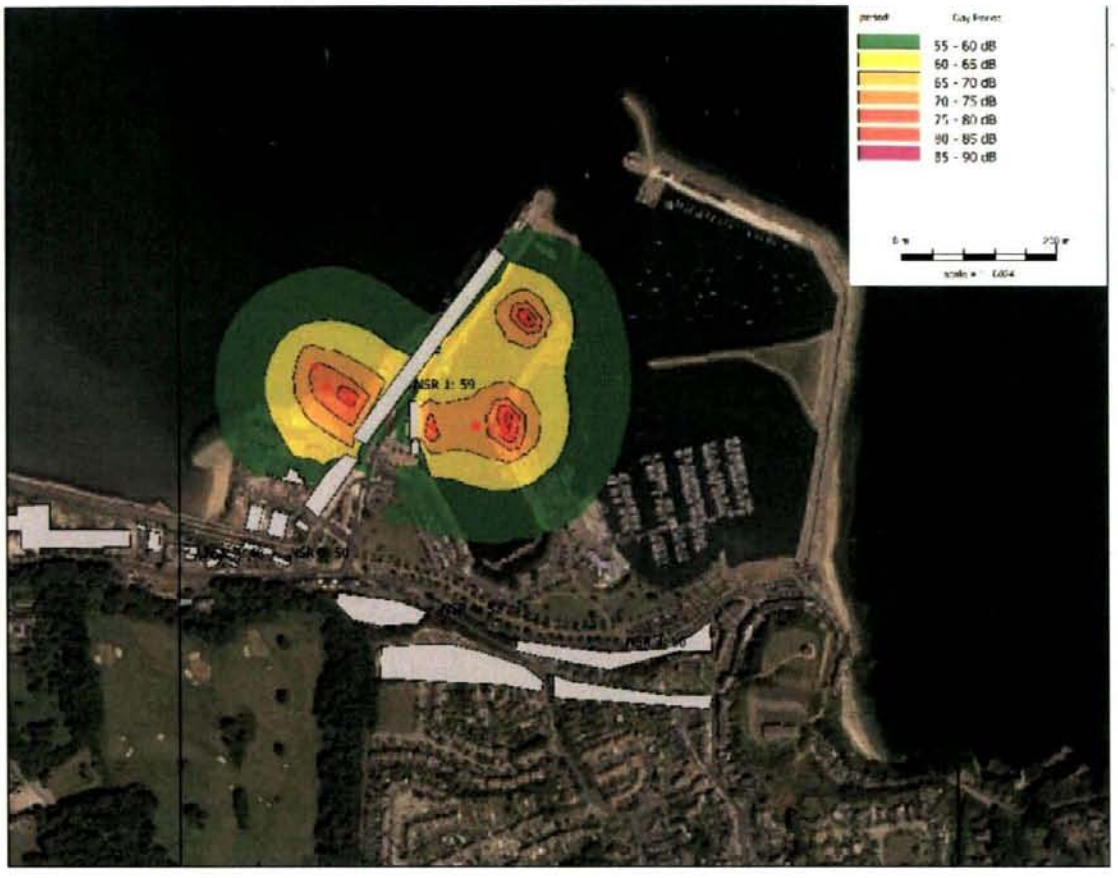

Figure 7 Daytime Noise Prediction Contour Map

The results show (**Figure 5** above) that the noise limit criteria will not be exceeded. Noise levels in the order of 59dB(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.

Evening Time Dredging Works

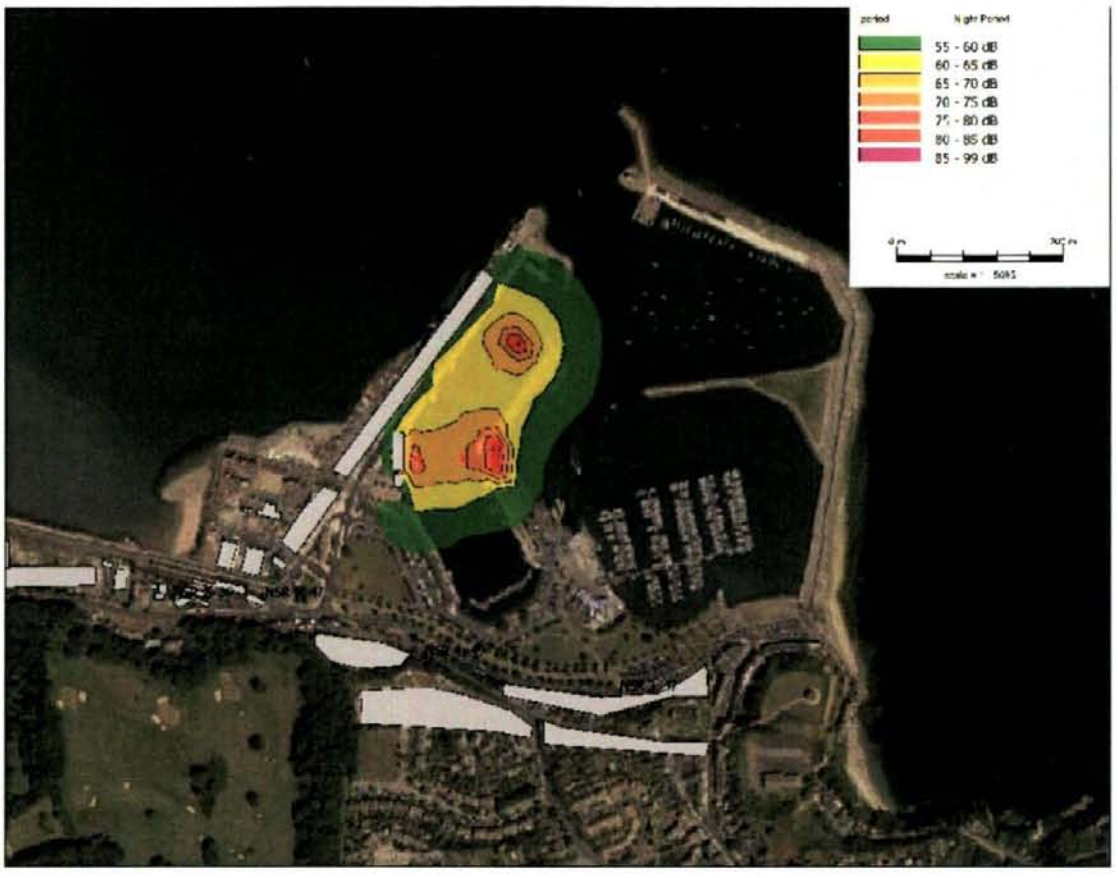

Figure 8 Evening Noise Prediction Contour Map

The predicted results (see **Figure 8** above) show that the evening-time construction noise threshold criteria can be complied with at the nearest residential noise sensitive receptors.

There is a predicted exceedance of the evening limit criteria at NSR 1 the West Pier. The exceedance is predicted to be in the evening hours between 7pm and 9pm when dredging and treatment activities will be continuing until 9pm. The potential exceedance depends on what businesses are open after 7pm, where they are located and the location of the dredging barge at that time. It is assumed that there will be an amount of tolerance from the businesses on West Pier to noise, as they will have a beneficial impact from the project. This will have a short term slight effect on businesses the West Pier in the evening. Mitigation measures outlined below will reduce the severity of this impact.

The predicted noise exceedance at NSR 1 will also impact on visitors who are walking the pier. Once they are passed the construction works and reach an area on the pier that is within the noise limit they will no longer be effected. The effect will only last minutes as the person walks on past the construction works. This will have a momentary not significant effect on visitors walking the West Pier in the evening. Mitigation measures outlined below will reduce this impact.

During the finishing phase on the reclamation area, the predicted results show that the construction noise threshold criteria can be achieved at the nearest noise sensitive receptors.

Operational Phase Noise

No significant noise sources are proposed for the finished phase.

Mitigation

To address potential impacts of predicted exceedances of evening time noise limits on West Pier businesses and visitors, the mitigations are as follows;

- Onsite noise monitoring will be undertaken once the works have started. This will assess the level of noise impacting on the West Pier. This will occur at different times depending on the location of the dredging barge. The results of this monitoring will define a working area between the hours of 7pm and 9pm in order to comply with the evening time noise limit.
- Liaison with the businesses on the West Pier to let them know what works are taking place, when and to get feedback.
- Solid hoarding will be put up around the pump compound on West Pier in order to reduce noise impact coming from equipment at that location.

Residual Impacts

Once mitigation measures are implemented there will be a short term not significant effect on businesses and visitors at West Pier.

3.12 Traffic and Transportation

The traffic and transportation study quantifies and assesses the impact of construction and operational traffic generated by the proposed development on the existing local road network, and recommends mitigation measures, as appropriate.

The proposed development lies on the north side of Howth Peninsula, to the north of Dublin Bay. It is accessed via the R105 Howth Road Regional Road, as shown in **Figure 9** below.

Existing environment

Due to Covid-19 restrictions, typical baseline traffic volumes in the Howth area and along haul routes could not be established. Baseline traffic volumes on the surrounding local road network have been established on the basis of previous on-site traffic surveys for planning applications to Fingal County Council and An Bord Pleanála. Annual Average Daily Traffic (AADT) volumes have been estimated on the basis of Transport Infrastructure Ireland (TII) automatic traffic counter data.

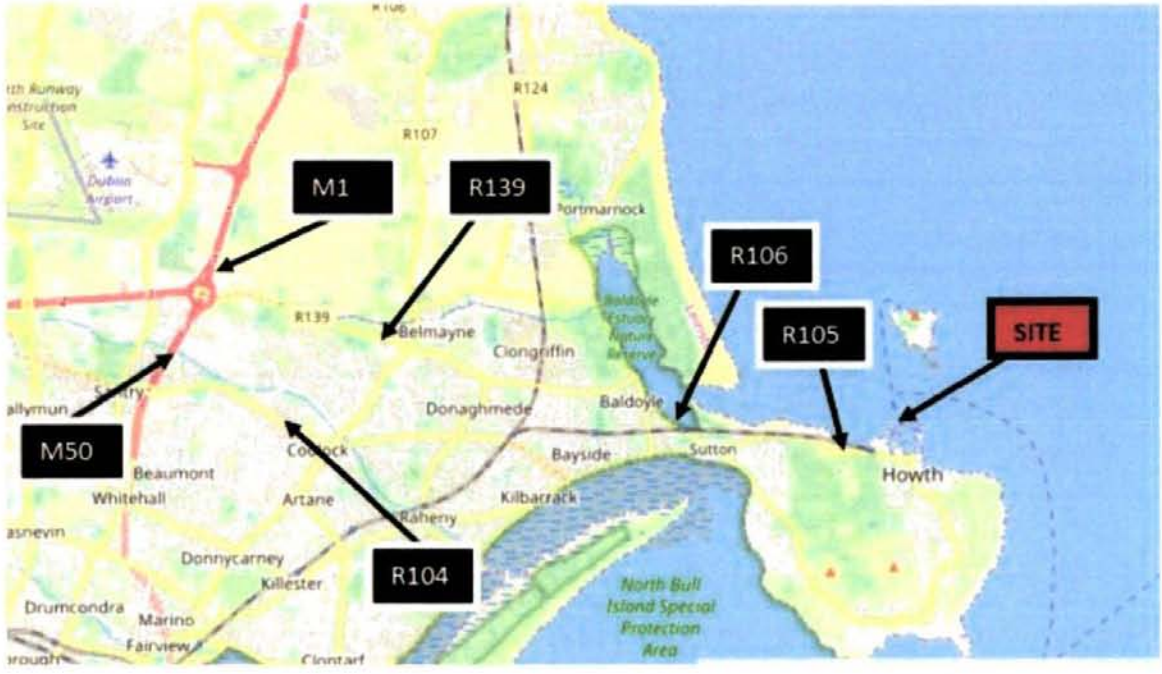

Figure 9 Local Road and Transport Network Map

The R105 and R106 are operating well within their estimated suburban road link capacity with the highest volume/capacity ratios during the morning peak hour of 40.19% and 31.15%, respectively.

The R104 and R139/N32 are also operating within their estimated suburban road link capacity with the highest volume/capacity ratios during the morning peak hour of 65.46% and 79.90%.

Likely Potential Impacts

Construction Phase Impacts

A detailed Construction Traffic Management Plan will be prepared by the main contractor prior to works commencing. In terms of access and vehicle routing, it is envisaged most delivery vehicles will return by the same route.

Site personnel will travel to site prior to 7.00am and depart from site from 7.00pm, on weekdays, outside the peak traffic hours. The expected peak staff will be up to 66 personnel, who will generate approximately 53 car and van trips, both to and from site each working day, based on an average worst case vehicle occupancy rate of 1.25 personnel per vehicle.

The 24 month construction programme will require the importation of up to 12,527 loads of construction materials. Peak heavy vehicle traffic volumes generated by the delivery of construction vehicles will be up to 55 heavy vehicles per day, both to and from the site. This peak will occur during months 4-9 of the construction programme, where there is an overlap between Elements 1, 2 and 3 of the construction works.

The predicted 2023 TII Urban Road Link Peak Hour Volume indicate that the R105 and R106 will continue to operate within its estimated urban rural road link peak hour capacity.

Heavy vehicle traffic volumes generated by the proposed development construction could result in damage to existing and proposed road pavements on public roads, including at vehicle turning, accelerating and decelerating locations. Road pavements will be regularly monitored and reinstated in accordance with the requirements of Fingal County Council.

It has been assessed that the proposed construction works will have slight to moderate short-term negative effects.

Operational Phase Impacts

It is proposed as part of the development to provide landscaping on the reclaimed area to provide an amenity walking area, a slipway for access to the water, storage areas for harbour activities and additional car parking facilities. The reclaimed area is located west of the existing pier and will be accessed via a proposed road to the rear of the existing facilities. The proposed road is a single carriageway of 6.0m in width, with a footpath on each side of approximately 2.0m wide. The proposed road forms a T-junction with the existing West Pier local road.

The proposed water sports and slipway access is to facilitate an existing activity within Howth Harbour. Access to the proposed slipway is provided from West Pier local road and the new proposed road. An amenity walking area is also proposed as part of the development. This will result in no significant overall change to the generated traffic in the area, as amenity walking is already prevalent. The existing priority T-junction between the West Pier and the R105 will continue to operate within its capacity for the plan years 2024, 2029 and 2039.

It has been assessed that the proposed operation phase will have slight to moderate traffic effects.

Mitigation

The Main contractor will prepare and implement a construction traffic management plan for the duration of the works. The traffic management plan will take into account all health and safety construction traffic guidelines. The plan will include delivery routes for the construction materials. No additional measures are proposed as no significant negative impacts are envisaged.

The operation phase of the proposed development will not have a significant operational traffic impact; therefore, no mitigation measures are proposed.

Residual Impacts

The proposed construction works will have slight to moderate short-term negative effects in the construction phase.

It has been assessed that the proposed development will have slight to moderate long-term negative effects in the operational phase.

3.13 Cumulative Effects

The cumulative impact assessments were specific to each chapter of the EIAR. A search of the Fingal County Council Planning register identified permitted and proposed developments. These along with existing developments in the vicinity of the Howth FHC dredge and reclamation project were considered for identifying potential cumulative impacts.

Potential cumulative impacts mainly relate to water quality with identified existing and permitted sewage outflow pipes. There was also a potential impact with other works planned and ongoing within Howth harbour. There was a potential cumulative traffic impact with the permitted Claremont residential development. The assessments found there will be no overlapping of construction phases with other development within Howth harbour. There are traffic mitigations already required such as traffic management plans. Mitigations were also already required such as those reducing suspended solids leaving the dredge area. No additional mitigations were required. It is summarised here that it is unlikely there will be any significant negative cumulative effects.

3.14 Interaction of Effects

There is potential for interactions between one aspect of the environment and another which can result in direct or indirect impacts, and which may be positive or negative. While all environmental aspects can be inter-related to some extent, the following outlines the key interactions identified between each of the various environmental subject areas considered in the EIAR for both the construction and operational phases of the proposed development. Where relevant, interactions between specific environmental aspects and effects are already addressed within each of the individual assessment topic areas of this EIAR.

Population and Human Health

The additional employment of staff workers during the proposed dredging and site infrastructure works will have a positive impact on the local economy, impacting on material assets and traffic. The impacts associated with each individual aspect are discussed earlier in this Non-Technical Summary.

Land and Soils

The dredging and reclamation works associated with the proposed development have the potential to impact on air quality and climate, surface and ground water, population and human health, landscape and visual, heritage, biodiversity, noise and vibration and traffic and transportation. The associated impacts for each aspect are discussed earlier.

Water

There is potential for the impacts associated with surface and groundwater to interact with population and human health, land and soils and biodiversity. The potential impacts associated with surface and ground waters due to the construction and operational phases of the proposed development are discussed earlier in this Non-Technical Summary.

Air and Climate

There is potential for emissions to air during the construction phase in the forms of temporary fugitive dust and vehicle emissions. This has the potential to impact population and human health and biodiversity in the vicinity of the site. The potential and predicted effects of emissions associated with the project are discussed earlier.

Landscape and Visual Resource

The change in landscape during the construction and operational phase has the potential to impact on population and human health through local residents, tourists and the general public. The impact on biodiversity is via the change in existing wildlife habitats in the West Pier. The heritage interaction is through the change in landscape in the immediate vicinity of protected structures.

Noise and Vibration

Noise impacts will occur during the dredging and construction phases of the project as a result of increased levels of site associated traffic, dredging and process/pump machinery during the works. Noise and Vibration has the potential to impact on population and human health and biodiversity, which are addressed individually and in detail within the EIAR.

Traffic and Transportation

The increase in traffic associated with the proposed dredging and site infrastructure works has the potential to have an impact on air quality and climate, landscape and visual, population and human health, land and soils and biodiversity. The impacts associated with each aspect are addressed individually within the EIAR.

Volume 2:
Environmental Impact Assessment Report
EIAR

Howth FHC Harbour Dredging and Reclamation Project
(Howth, Co. Dublin)
Environmental Impact Assessment Report (EIAR)

Project No. 19934
July 2021

Malachy Walsh and Partners
Engineering and Environmental Consultants

Volume 2 Table of Contents

6 LAND AND SOILS

1 INTRODUCTION

1.1 INTRODUCTION

Chapter 1 introduces the project and describes the scope and methodology of the Environmental Impact Assessment (EIA) process. The consultation process which was undertaken is outlined and the competencies of the environmental assessment team are provided.

Howth Fishery Harbour Centre (Howth FHC) was last dredged in the 1980s, and due to build-up of siltation, it is necessary to dredge the existing basins & approach channels in Howth Harbour 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 240,000m^3 of marine sediment and rock from the harbour and treat and re-use the material to the West of the West pier in order to create an additional circa 48,000m^2 of land area. It is envisaged that, like the rest of the FHC, this reclaimed area will facilitate future beneficial uses incorporating a mixture of fishing and industrial elements, light industrial / commercial and public realm spaces.

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

1.2 BACKROUND AND PURPOSE OF THE EIAR

EIA is derived from European Communities Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. The 85/337/EEC has been amended a number of times and then repealed by Directive 2011/92/EU and this in turn has been amended by Directive 2014/52/EU. The main goal of the EIA Directive is to ensure that projects which are likely to have significant effects on the environment are subject to an assessment of their likely impacts. The EIA Directive applies to a wide range of defined public and private projects, which are defined in Annexes I and II to the Directive.

In Ireland, a number of pieces of legislation have been used to implement the EU Directive, but for the majority of projects in Ireland it is the Planning and Development Acts, Planning and Development Regulations 2001 as amended, and European Communities (Environmental Impact Assessment) Regulations 1989 - as amended that are the key legal instruments at present.

This proposed development falls within the categories of development types requiring an EIA under Schedule 5 to the Planning and Development Regulations 2001. The proposed development is subject to the following category:

Schedule 5 Part 2 Category 2 (d) - Extraction of stone, gravel, sand or clay by marine dredging (other than maintenance dredging), where the area involved would be greater than 5 hectares or, in the

case of fluvial dredging (other than maintenance dredging), where the length of river involved would be greater than 500 metres.

The area of dredging is 14 hectares. Therefore, the project is over the mandatory threshold for EIA.

EIA is a process for anticipating the effects on the environment caused by a development; the document produced as a result is termed the EIAR. Article 1(2)(g) of the 2014 EIA Directive (2014/52/EU) states that:

"environmental impact assessment" means a process consisting of:

(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);
(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;
(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;
(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and
(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."

The EIAR is a presentation of the potential environmental impacts of the proposed development with a focus on significant impacts. This report is based on the data gathered during the assessment process. It applies accepted methodologies in determining if impacts will be significant and recommends mitigation measures to avoid or reduce impacts where possible.

1.3 OVERVIEW OF THE PROPOSED DEVELOPMENT

The proposed development consists of the following main elements:

- Dredging the harbour;
- Treatment of the dredged marine material;
- Reclaiming land (4.8 Ha) on the west side of the west pier using treated dredge material;
- Construction of an embankment and rock armour revetment around the perimeter of the reclaimed area;
- Landscaping of the reclaimed area and provision of pavements, including footways, roadways and parking areas;
- Construction of a slipway access to the water;
- Provision of storage areas for harbour activities; and
- Provision of services, including surface water drainage, mains water supply, lighting, and associated underground ducting.

1.4 SITE LOCATION

Howth Harbour is situated on the north side of Howth Peninsula, to the north of Dublin Bay (**Figure 1.1**). 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.

Howth Harbour operates as a Fishery Harbour Centre under the charge of the Department of Agriculture, Food and the Marine. The core fishing fleet is in the order of 50 vessels, and there is significant marine leisure activity in the harbour, 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 undertaken on the harbour.

Figure 1.1 Site location map showing proposed project location

1.5 APPLICANT AND APPLICATION AREA

The applicant is the Department of Agriculture, Food and the Marine (DAFM). DAFM is the government agency responsible for the management, operation and maintenance of the harbour interior.

There are six Harbour Fishery Centres in Ireland, and Howth is one of these centres. These harbours are managed and operated in accordance with the Fishery Harbour Centres Acts 1968 (as amended). This Act provides for the establishment and operation of these harbours to promote, develop and carry on sea fishing, fish processing, fish related activities and matters connected with the fish industry as well as any other purpose, including the provision, improvement and development of leisure or amenity facilities or for facilitating or promoting the social or economic development of the area in which the Fishery Harbour Centre is located.

The Minister for Agriculture, Food and Marine now overall responsibility for the development of infrastructure at the Fishery Harbour Centres and for the leasing of property within the harbours. The responsibility was transferred to this Department on 19 October 2007. The Harbours are managed via a statutory fund, known as the Fishery Harbour Centres' Fund, which the Comptroller & Auditor General audits on an annual basis. The Sea Fisheries Administration Division (SFAD) of DAFM, which is based in Clonakilty, Co Cork, is responsible for the line management of these fishery harbours.

The planning application area spans the interior of Howth harbour and the 4.8ha sea area west of the west pier. The proposed development area within the harbour is under the control of DAFM.
See **Figure 1.2** showing the redline planning boundary for the development.

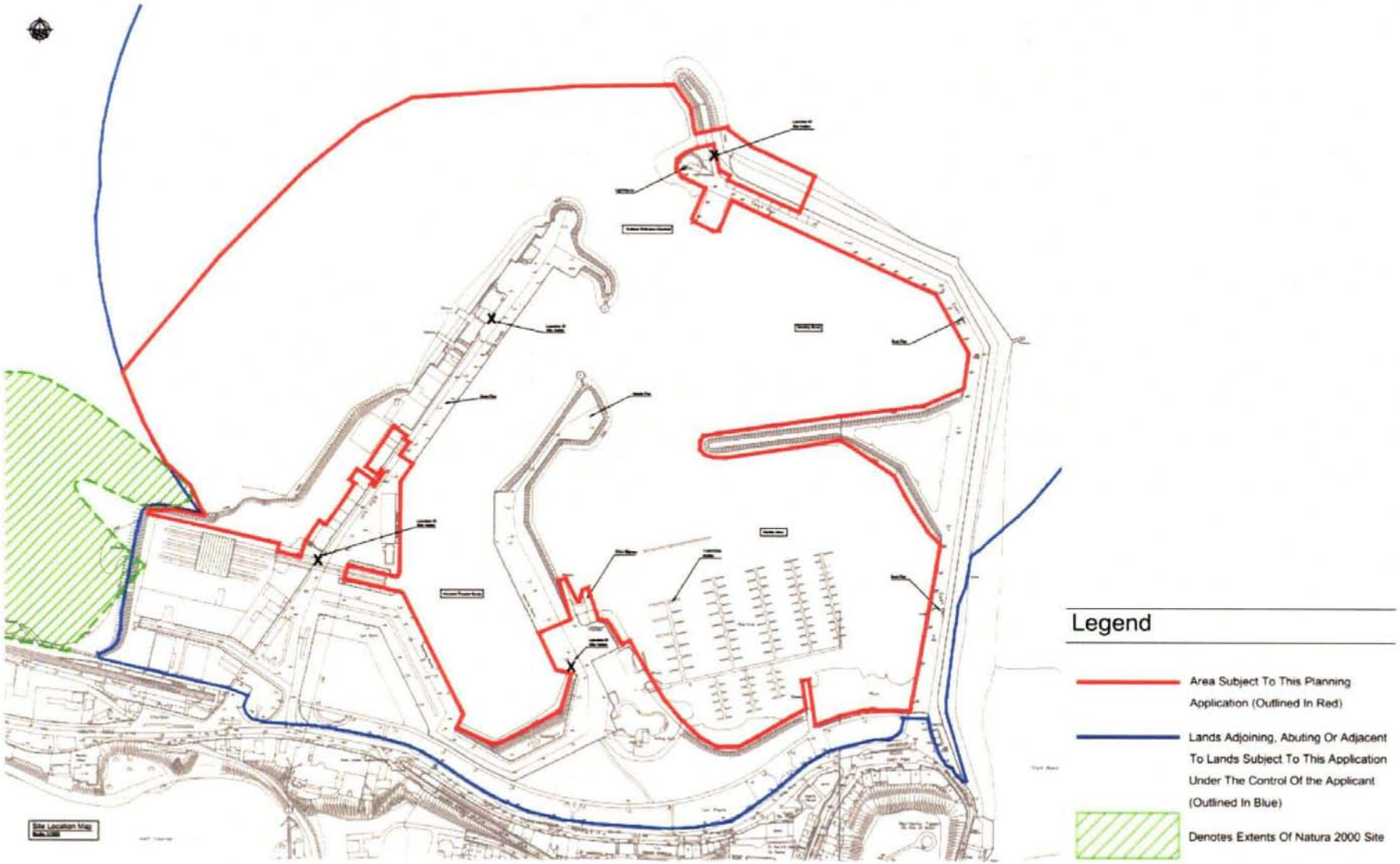

Figure 1.2 Red Line Boundary site area. (Planning Drawing ref. no. 19934-5001 Site location map).

1.6 METHODOLOGY

The EIAR has been prepared in accordance with the requirements set out in the Planning and Development Act 2001, (as amended) and in Council Directive 2011/92/EU as amended by Directive 2014/52/EU (the EIA Directive).

Annex IX of the EIA Directive and Schedule 6 of the European Union (Planning and Development) (Environmental Impact Assessment) (Amendment) Regulations 2018 specify the information to be contained in EIAR.

These requirements identify a range of prescribed environmental factors, the significant effects of which have been addressed in this EIAR. These include population and human health, biodiversity, land and soil, water, air and climate, noise, landscape, cultural heritage and material assets as well as the inter-relationship between the above topics.
The preparation of this EIAR was also undertaken in accordance with the following guidance:

- Department of Housing, Planning, Community and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Department of Housing, Planning, Community and Local Government (2017) Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;
- Department of Housing, Planning, Community and Local Government (2017) Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive): Advice on the Administrative Provisions in Advance of Transposition;
- Environmental Protection Agency (2017) Revised Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017);
- Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements Draft September 2015;
- Environmental Protection Agency (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements; and,
- Environmental Protection Agency (EPA) - *'Guidelines on information to be contained in an environmental impact statement, 2002' and* the EPA draft *'Guidelines on information to be contained in an environmental impact statement, 2017'.*

Scoping was carried out by the competent experts who have the appropriate expertise and relevant prior experience of the environmental topics (see **Section 1.9** for a list of the project study team).

The scoping process determined the content and extent of matters which should be covered in the environmental information to be submitted in the EIAR.

1.7 CONSULTATION

As part of the scoping process, informal consultation was carried out with a number of relevant parties. Consultation through meetings, letters, email and telephone calls with various statutory and non-statutory consultees was undertaken during the EIA process. Discussions have been held with representatives of Fingal County Council at a number of levels, including planners, heritage officer,

biodiversity officer and the Howth area manager. Formal preplanning meetings (06.03.19, 30.05.19 and 03.12.19) were held with Fingal County Council. The aim of these initial meetings was to present the project and to receive initial feedback on any potential issues of relevance that should be addressed through the EIA process. The meetings were held with:

1. FCC Chief Executive Officer, Chief Scientist, Howth Area Manager, Head of Water Services and Environment; and a Senior Executive Planner.
2. FCC Planning and Traffic representatives
3. FCC local area councillors.

1.7.1 Statutory / Non statutory Consultations

Written notifications were circulated to a number of identified stakeholders (both statutory and non-statutory consultees), which set out an overview of the project proposal.

Written feedback was received from the HSE, Failte Ireland, Department of Culture, Heritage and the Gaeltacht, the Geological Society of Ireland and Transport Infrastructure Ireland (TII). Refer to **Appendix 1.2** in Volume 3 of this EIAR. The feedback obtained from the consultation process and responses received from statutory and non-statutory stakeholders were taken on board and addressed in the relevant assessments during the preparation of this EIAR. All consultation responses and meeting outputs informed the final design of this project.

1.7.2 Public Consultation

Due to covid restrictions, open meetings as part of the public consultation could not take place. It was decided to undertake public consultation via an online presentation and an online facility for feedback to be sent to DAFM for consideration in the EIAR and NIS.

The presentation went live on the 12th March 2021 at https://www.gov.ie/en/consultation/8dad4-howth-harbour-dredging/. The presentation was advertised in local newspapers and 64 notifications were sent to local and national stakeholders. The public consultation closed for submissions from the public on the 9th April 2021. 55 submissions came in from the public, each with one or more views or comments in relation to the project. It was ensured that all comments that were relevant to the project were taken on board and that the EIAR addressed any of the relevant views or comments. The main issues raised which are relevant to the project in the submissions are summarised as follows:

- The main theme was the desire for different kinds of facilities/uses to be made available on the reclaimed land. Some of these are included in the proposed development such as the slip way, water access and appropriate road/lighting/water infrastructure. The future land use (i.e. recreational and/or commercial use) of the hardstand areas on the proposed reclamation area is outside the remit of this project but will be addressed via separate planning application(s) in the future, as appropriate.
- Concern over the potential impact of a change in erosion and sedimentation processes on the surrounding environment was included. This is addressed in **Chapter 7 Water** and the hydrodynamic and sediment regime assessment (**Appendix 4**).
- Concern that the project would potentially impact on water quality in general or for sea swimmers. This was addressed in **Chapter 7 Water** and in the generic quantitative risk assessment (**Appendix 10**).

- The project proposes specific areas within the harbour to be dredged. The proposed dredge area is based on cost issues. There was an interest in expanding the proposed dredging area in the marina area of the harbour.
- There was interest in access for sea swimming.
- Increasing biodiversity within the revetment wall and on the reclaimed land itself was a theme.
- The possibility for an open water tidal pool for sea swimming was expressed, to replace the lost seawater pool at Balscadden Bay.
- The need for the project was questioned and impact on biodiversity. The project need is addressed in **Chapter 3 Project Need and Alternatives.** The Impact on Biodiversity is addresed in **Chapter 5.**

1.8 OVERVIEW OF THE STRUCTURE OF THE EIAR

The EIAR is divided into three Volumes as follows:

- Volume 1: Non-Tech Summary
- Volume 2: Main Environmental Impact Assessment Report
- Volume 3: Appendices to the Main Environmental Impact Assessment Report
- Volume 4: Photomontages

The detail of the three volumes of the EIAR is presented in the following sections.

1.8.1 Volume 1: Non-Technical Summary

The Non-Technical Summary provides an overview of the project and the EIAR in non-technical terms. The summary is presented similar to the grouped format structure which discusses each environmental topic separately.

1.8.2 Volume 2: Environmental Impact Assessment Report (EIAR)

The EIAR volume provides the detailed information on the proposed development and the relevant environmental topics, with technical and detailed investigations of the topic areas as appropriate. This volume is prepared in the grouped format structure as it allows specialist studies to be completed for environmental topics in chapters. This volume also includes an introductory chapter (**Chapter 1**), and a chapter on the description of the development (**Chapter 2**). The topic chapters describe the existing environment, the likely significant impacts and the recommended mitigation measures specific to the environmental topic. The inter-relationship between the topics has been outlined in the last chapter on the Interaction of the Foregoing (**Chapter 14**). This is followed by a summary of the overall environmental effects.

1.8.3 Volume 3: Appendices to the EIAR

The Appendices volume contains supporting documentation and information on the EIAR.

1.8.4 Volume 4: Photomontages

Photomontages have been compiled of several different views before and after the development and are presented in this volume.

1.8.5 EIAR Topics and Chapters

The relevant environmental topics are considered within the EIAR chapters with regard to the EIA Directive (Directive 2014/52/EU) as follows:

- **Chapter 1** is an Introduction and contains the information typically included in the EIAR preamble.
- **Chapter 2** is a description of the development and construction methodology. It also examines other projects and plans considered during the assessment of cumulative impacts.
- The need for the Project and Alternatives considered are discussed in **Chapter 3.**
- Impacts on Population are addressed in **Chapter 4**, Population and Human Health.
- Flora and Fauna are assessed within **Chapter 5**, Biodiversity.
- Land and Soils, including geology are assessed in **Chapter 6**.
- Water is assessed in **Chapter 7**, Water.
- Air Quality and Climate are assessed within **Chapter 8**.
- The landscape and visual effects are assessed in **Chapter 9**, Landscape.
- The Archaeological and Cultural Heritage impacts are assessed in **Chapter 10**.
- Material Assets are assessed in **Chapter 11.**
- Noise and vibration effects are assessed in **Chapter 12**.
- Traffic and Transportation are assessed in **Chapter 13.**
- The cumulative effect and interaction between the environmental topics is assessed in **Chapter 14**.
- A schedule of Environmental Mitigation Measures is provided in **Chapter 15.**

The pertinent information on the results of the assessment of the impacts is contained within the EIAR (**Volume 2**).

1.9 TECHNICAL DIFFICULTIES AND AVAILABILITY OF DATA

There were no major difficulties in obtaining baseline and other data during the course of the EIA process.

1.10 NOTE ON QUOTATION

Environmental Impact Assessment Reports contain statements describing the positive and negative aspects of a proposed development. Selective quotation out of context is not advisable as a misinterpretation of the overall findings of the study may arise. Where possible, quotations should be taken from the residual impacts of specialist reports.

1.11 STUDY TEAM AND CONTRIBUTORS TO THE EIA

This EIAR has been prepared by a team of competent experts led by Malachy Walsh and Partners on behalf of DAFM. The team of experts who have undertaken the environmental impact assessment and prepared the EIAR are presented below in **Table 1.1.**

Table 1.1 EIAR Contributors to the Project

NAME & QUALIFICATIONS	RELEVANT EXPERIENCE	COMPANY	CONTRIBUTION TO EIAR
Pat Parle BE., MSc., CEng., MIEI	Pat is a civil engineer with an MSc in Maritime Civil Engineering and has over 30 years experience on harbour and coastal projects, from study, through permitting, design and contract administration.	Malachy Walsh & Partners	**Chapter 1**, Introduction **Chapter 2**, Description of the Proposed Development **Chapter 3**, Project Need and Alternatives **Chapter 4**, Population and Human Health **Chapter 6**, Land and Soil **Chapter 7**, Water (Surface water section) **Chapter 8**, Air and Climate **Chapter 11**, Material Assets **Chapter 14**, Cumulative Impacts an Interaction of Effects **Chapter 15**, Schedule of Environmental Mitigation Measures
Olivia Holmes B.Sc. M.Sc., CEng MIEI, MCIWEM, C.WEM	Olivia Holmes has over twenty years' experience in Environmental Engineering focussing primarily on Environmental Impact Assessment (EIA), Appropriate Assessment (AA), and planning. She has led the preparation of a number of large-scale multi-disciplinary EIA projects and planning and other consent applications.		
Graeme Thornton B.Sc., Dip OSH	Graeme is a senior environmental scientist. He has 17 years' experience working on environmental projects ranging from emergency hazardous waste spills to the project management of environmental impact assessment reports. Environmental site assessment is a speciality on both greenfield and brownfield sites.		
Áine Ryan Dip., BSc., MSc	Áine is an Environmental Scientist with over 20 years post graduate experience in the environment and waste fields. She has significant experience in the management of the environmental component of large-scale infrastructural projects for the public and private sectors. She has managed EIAs for major infrastructural projects including roads, waste facilities and wind farms.		
Fergus Doyle B.A, M.Sc, AMIEnvSc	Fergus is an environmental scientist with Malachy Walsh and Partners. He has experience working on a number of multi-disciplinary EIAR projects. Fergus has been a contributing author on a number of EIARs, Appropriate Assessment Reports, Natura Impact Statements and Ornithology Reports.	Malachy Walsh & Partners	**Chapter 6**, Land and Soil **Chapter 8**, Air and Climate
Monica Kane B.Sc., M.Sc.	Monica is a Senior Environmental and Ecological Consultant with over 14 years consultancy experience. She is also an environmental impact assessment practitioner having managed and been a contributing author on a number of EIA and AA projects.	Malachy Walsh & Partners	**Chapter 5**, Biodiversity
Muiréad Kelly B.Sc., M.Sc.	Muiréad is a Senior Ecologist with over 10yrs experience in environmental consultancy. Field survey experience includes habitat survey/mapping, bird surveys, bat surveys, mammal surveys, Kerry slug surveys, invasive plant species surveys. Muiréad has analytical experience having worked in an environmental laboratory. Muiréad has experience in survey licence acquisition, client orientation, stakeholder consultation, data collation, data analysis, ecological mitigation, environmental design, compliance and monitoring. Muiréad has carried out extensive reporting		

NAME & QUALIFICATIONS	RELEVANT EXPERIENCE	COMPANY	CONTRIBUTION TO EIAR
	for EIA, EcIA, EA, NIS and AA Screening.		
Ian McDermott B.Sc., M.Sc.	Ian is an experienced ecologist with extensive experience in the completion of Appropriate Assessment Stage 1 and 2 and EIA projects. These have covered a wide range of projects which have varied in size and complexity. He has a particular expertise in surveying for invasive species, mammals (Otter, Badger & Bats) and birds. He is a licensed bird ringer. Ian is also widely experienced in habitat surveys and mapping techniques at both broad and fine scales across the range of habitat types.		
Róisín NigFhloinn BA Mod (Hons) MSc, MCIEEM	Róisín NigFhloinn is a Senior Ecologist with Woodrow. Róisín has completed an honours B.Sc. specialising in Botany and a M.Sc. in Ecology and Management of the Natural Environment. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). She regularly carries out reporting on Ecological Impact Assessment and to inform Natura Impact Assessments / Appropriate Assessments carried out by statutory authorities. Furthermore, she has more than ten years' experience in habitat, mammal, bird and bat surveys for a number of large infrastructure schemes, commercial and residential projects. Róisín is an experienced Ecological Clerk of Works (ECoW).	Woodrow Sustainable Solutions Ltd Woodrow Sustainable Solutions Ltd	
Mike Trewby BSc, MCIEEM	Mike Trewby is a Senior Ecologist and Field Work Manager for Woodrow. He is an experienced ecologist with over 20 year's fieldwork & research experience. He is a full member of the CIEEM and conducts detailed, technical ecological assessments of projects. Mike is an experienced ornithologist, with more than 20 years bird surveys experience in bird surveying for non-governmental organisations, as well as for ecological consultancy. As a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM), he employs a high degree of competence and professional standard in his approach to environmental assessment.		
Will Woodrow MSc MSc(Arch) CEcol MCIEEM	Will Woodrow is an experienced ecologist, and ornithologist, with over 30 years of experience in ecological surveys and assessment. Will is a full member of the Chartered Institute of Ecology and Environmental Management and a Chartered Ecologist.		
Niall Brady, BA MA PhD FSA	Niall is company founding director and secretary of The Archaeological Diving Company, with more than 30 years' experience in research and field archaeology, specialising in Medieval Archaeology and Underwater Archaeology.	The Archaeological Diving Company Ltd	**Chapter 10**, Cultural Heritage
Katherine McClatchie BA, MUBC	Katherine is a conservation consultant and architectural historian with 25 years' postgraduate experience. She holds a degree in	JCA Architects	**Architectural impact assessment**

NAME & QUALIFICATIONS	RELEVANT EXPERIENCE	COMPANY	CONTRIBUTION TO EIAR
	the History of Art & Architecture from Trinity College Dublin and a Masters degree in Urban and Building Conservation from University College Dublin. She has worked on a wide variety of architectural heritage projects, including architectural inventories and conservation plans, and has developed extensive experience in the preparation of Architectural Heritage Impact Assessments.		
Jamie Ball BA LA (Hons) MILI	Having qualified with an Honours degree in Landscape Architecture in 1998, Jamie is a Senior Landscape Architect at Macrow Works and member of the Irish Landscape Institute. He has extensive professional experience in the industry, but specialises in the production of Landscape & Visual Impacts Assessments (LVIA) for a broad spectrum of energy, infrastructure and commercial developments.	Macroworks	**Chapter 9**, Landscape
Peter Barry B.Sc. M.Sc. AIEMA, AIOA	Peter is an Environmental Scientist with significant experience in Environmental Impact Assessment and Acoustics. Peter is a member of the Institute of Environmental Management and Assessment (AIEMA) and the Institute of Acoustics (AIOA). In addition to contributing to numerous Environmental Impact Statements as a specialist contributor, Peter has experience in managing EIS teams, EIS compilation and EIS co-ordination.	Malachy Walsh & Partners	**Chapter 12**, Noise and Vibration
Karen Concannon BE MSc CEng MIEI	Karen Concannon has 7 years' experience in traffic engineering projects, traffic management studies, feasibility studies and road safety audits. She is a Chartered Engineer with Engineers Ireland.	Malachy Walsh & Partners	**Chapter 13**, Traffic and Transportation
Seamus Quigley BE, CEng, MIEI, CIHT	Seamus has extensive experience in Transport planning and traffic engineering projects including traffic impact assessments, traffic management studies, Feasibility Studies and Road Safety Audits.		
Mike O'Shea BEng, M Eng Sc, PhD, C Eng MIEI, Research Fellow – ERI MaREI	Michael is a Chartered Engineer with a PhD in coastal erosion modeling, he has over 14 years' experience in coastal, civil and offshore engineering. In particular, he has experience in offshore and marine structural analysis, coastal erosion, wave energy, dredging, morphodynamic modeling and sediment transport. Michael has led a range of projects, including harbour construction, coastal flood modeling, overtopping, modeling river and coastal sediment transport, dredging and pollutant transport. He has experience in design and construction sectors of Coastal and Marine Development works. He has published peer reviewed research on dredging, wave modeling, coastal processes, wave signal analysis and sediment transport.	MaREI, UCC.	Hydrodynamic Modelling

1.12 REFERENCES

Department of Housing, Planning, Community and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);*

Department of Housing, Planning, Community and Local Government (2017) *Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;*

Department of Housing, Planning, Community and Local Government (2017) *Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive): Advice on the Administrative Provisions in Advance of Transposition;*

Environmental Protection Agency (2017) *Revised Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017);*

Environmental Protection Agency (2015) *Advice Notes for Preparing Environmental Impact Statements Draft September 2015;*

Environmental Protection Agency (2003) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;*

Environmental Protection Agency (EPA) (2017) - *Guidelines on information to be contained in an environmental impact statement, 2002' and* the EPA draft *'Guidelines on information to be contained in an environmental impact statement, 2017;*

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) presents the main components of the proposed works at Howth Harbour. The purpose of this chapter is to provide an appropriate level of detail on the proposed development to present a basis for the EIAR. Its aim is to clearly outline and describe the objectives, scope and overall proposed execution of the project, while also providing details of the various stages of the project including construction, operation and maintenance.

Howth Fishery Harbour Centre (FHC) was last dredged in the 1980s, and due to build-up of siltation, it is necessary to dredge the existing basins & approach channels in Howth Harbour in order to provide safe access, navigation and berthing to the vessels currently using the harbour.

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 treatment and placement of the dredge material will take place in accordance with either an industrial emissions (IE) or waste licence to be obtained from the EPA.

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 process and re-use or dispose of dredge material in an environmentally sustainable and cost effective manner.

2.2 SUMMARY OF THE PROJECT

The proposed development (see **Figure 2.1** below) involves the following main elements:

- Dredging the harbour (see **Figure 2.2** below);
- 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;
- Provision of pavements e.g. footways, roadways and parking areas;
- Construction of slipway for access to the water;
- Provision of storage areas for harbour activities; and
- Provision of services.

The finished reclamation area will include landscaping, access road, pathways, parking, surface water drainage, mains water supply, electricity supply, viewing areas and water access points. Landscaping works will involve importing and depositing topsoil and planting/grass seeding. Hardstanding areas will be fenced and used as storage areas for harbour activities. The hardstand areas may be developed by future planning applications for recreational and/or commercial purposes. These future possible developments are not included in this project. The main purpose of this project is to dredge Howth harbour.

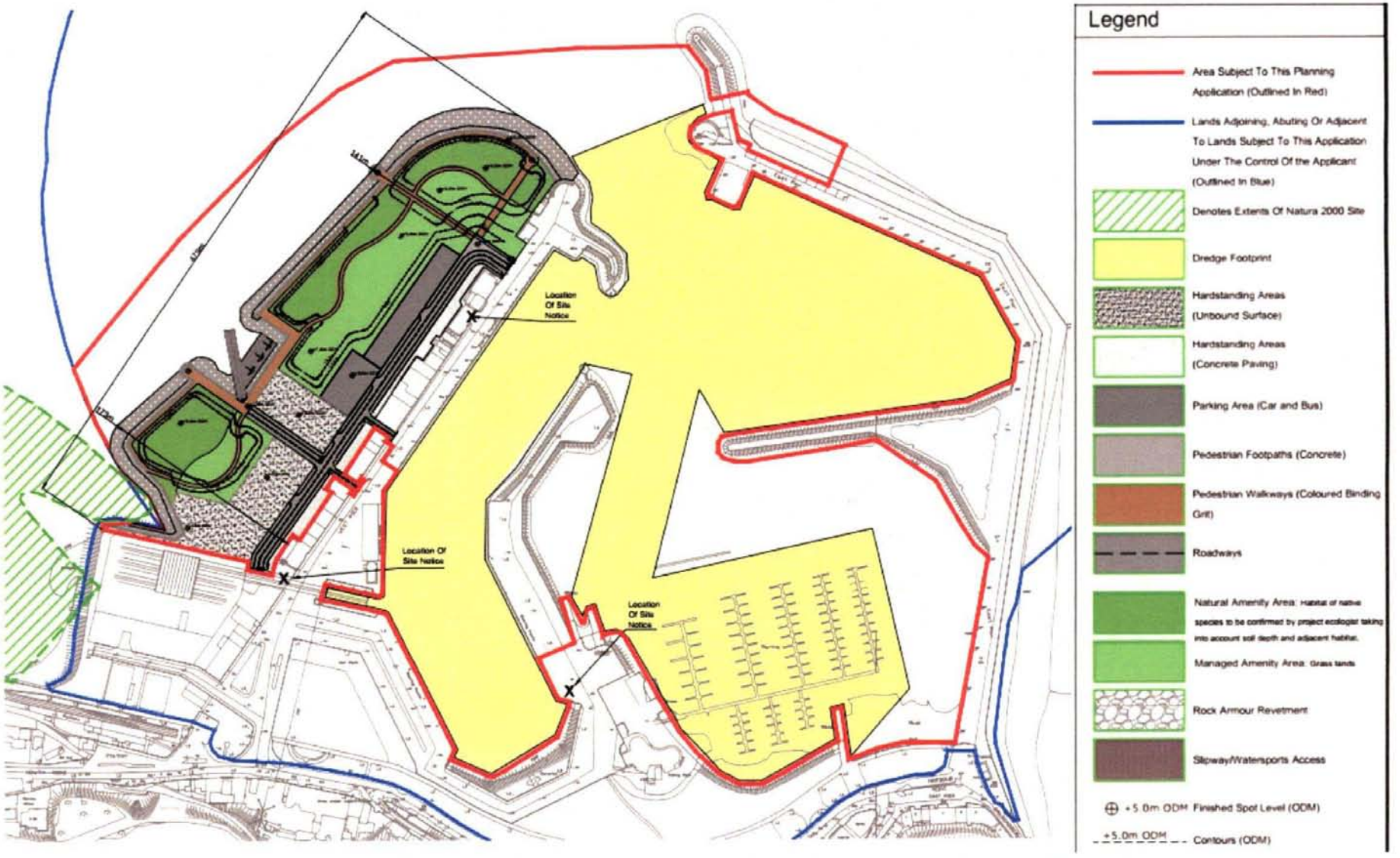

Figure 2.1 Proposed site layout with red line boundary of proposed construction works

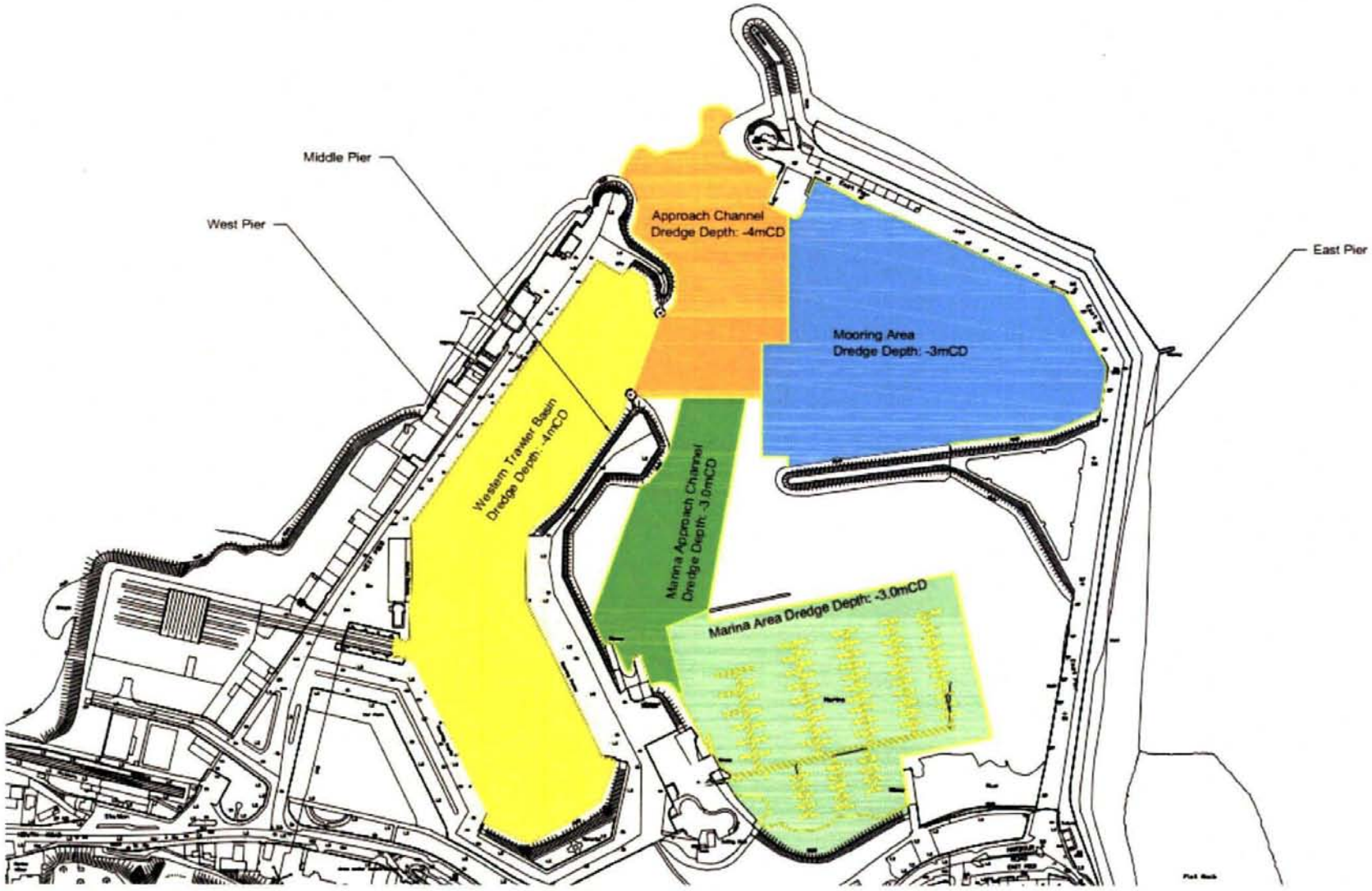

Figure 2.2 Dredging area and depth (meters Chart Datum

2.3 EXISTING ENVIRONMENT

2.3.1 Site and Project Context

Howth Harbour is situated on the north side of Howth Peninsula, to the north of Dublin Bay (**Figure 2.3** below). 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 the yacht club marina.

For the purposes of the dredging project the harbour is considered to comprise of five areas (see **Figure 2.2** above); :

1. Western 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 core fishing fleet is in the order of 50 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 (see **Figure 2.1** above). Fish processing and boat repair works are also undertaken on the harbour.

Figure 2.3 Site location map showing proposed site location

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 SAC, Ireland's Eye SPA and Howth Head Coast SPA. There is a total of eighteen designated Natura 2000 sites within 15km of the proposed works. The specific habitat and species designations for each site are discussed in detail in **Chapter 5 Biodiversity.**

There are several Recorded Monuments located in the immediate area surrounding the site. The relative significance of these monuments and the potential impacts that the proposal could have on these monuments are discussed in detail in **Chapter 10 Archaeology and Cultural Heritage.**

2.3.2 Existing Ground Conditions

The majority of the area to be dredged consists of a sandy silt overlying rock. The ground conditions in the reclamation area comprise fine to medium brown sand with underlying fine to course grey, silty gravelly sand. For a full description of the existing ground conditions refer to **Chapter 6 Land and Soils**. Based on sediment sampling and testing results, the dredge material has been found to contain both Class 2 and Class 3 (Marine Institute, 2006) contamination levels. The class three contaminants of concern are DBT, TBT, copper and lead. These contaminant levels are such that the vast majority of the material cannot be disposed of at sea directly. For a full analysis of the dredge material refer to the Quantitative Risk Assessment in **Appendix 10** of this EIAR.

2.3.3 Existing Harbour Activities

Fisheries

BIM statistics from 2019 (BIM "The Business of Food", 2019) valued the landings of fish at Howth at €11 million. Howth FHC was 5th in terms of fishery landings at Fishery Harbour Centres in 2019. The harbour has 650m of berthing quay face available and an ice plant. There are about 50 fishing vessels that use the harbour as a home port.

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 sightsee 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. Estimates from Fingal County Council are that between 750,000 and 1,000,000 people visit Howth on an annual basis. The active harbour is a major draw for visitors.

Leisure

Howth Yacht Club marina is a private members sailing club with a 250 berth marina.

There are also swing moorings available within the harbour for leisure users.

RNLI

The RNLI operate an inshore lifeboat from a station situated within the Marina Area, just west of the Yacht Club Marina.

2.3.4 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 (see below **Figure 2.4**). The west and east piers are of masonry construction.

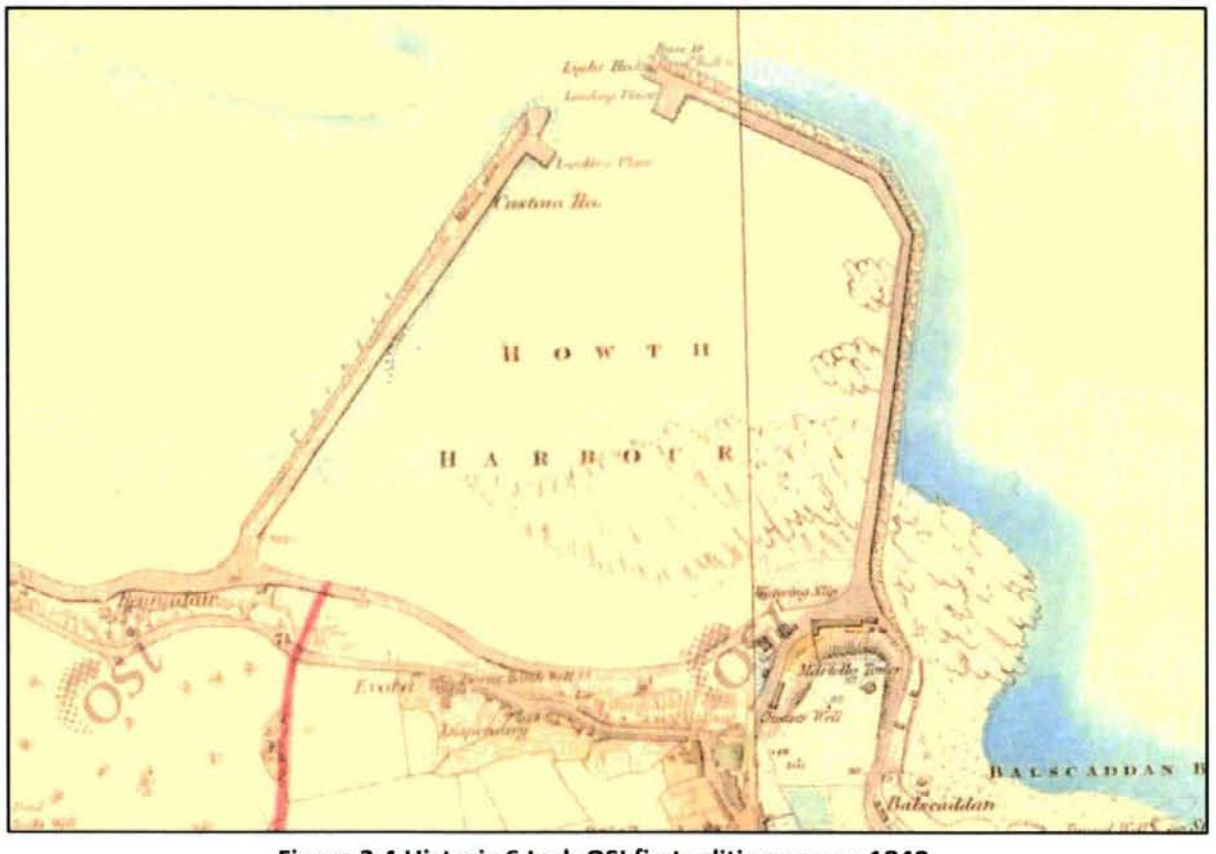

Figure 2.4 Historic 6 Inch OSI first edition map c. 1840.

The current harbour layout was developed in the early 1980s with the construction of the Middle Pier and East Pier internal breakwater. These works provided segregated areas for fisheries and leisure users i.e. western trawler basin, swing mooring area and marina area. The marina approach channel was bunded between the new middle pier and east pier internal breakwater. This allowed the drying out of the marina area by pumping out water. The marina area was then dredged and the marina constructed in the dry (See **Figure 2.5** below). The proposed dredge levels in this project are in some areas of the harbour similar to the levels that were previously dredged to in the 1980s. These works similarly made beneficial re-use of the dredge material in the reclamation of lands around the harbour which resulted in additional facilities, employment and public amenity.

Figure 2.5 Construction of the marina area in the 1980s. Dredging was carried out in the dry.

2.4 CHARACTERISTICS OF THE PROPOSED PROJECT

The proposed works as summarized in **Section 2.2** and detailed in **Section 2.5** below is the project for which this EIAR has been prepared. Refer to **Appendix 13** for drawings of full details of the proposed works.

2.5 CONSTRUCTION PHASE OF THE PROJECT

2.5.1 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.

2.5.2 Construction Elements

A preliminary programme of works is presented below in **Table 1**. The proposed works can be divided into 4 key elements 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 the Inner Harbour;
- Element 3: Land Reclamation;
- Element 4: Finishings.

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.

Table 1 Preliminary Programme of Works

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
Element 1 – Perimeter Embankment																								
Element 2 – Dredging of the Inner Harbour																								
Element 3 – Land Reclamation																								
Element 4 - Finishings																								

Element 1: Construction of the perimeter embankment and rock armour revetment to reclaimed land area – 6 Months Duration

Works to the perimeter embankment will begin at the intersection locations of the perimeter embankment with the existing West Pier (see **Figure 2.6** below). Works can begin from either or both ends or at intermediate points. It is envisaged that the embankment core material (class 6A stone fill) 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.

A foundation of larger stones will be provided within the matrix of the existing silt layer using 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 tides.

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.

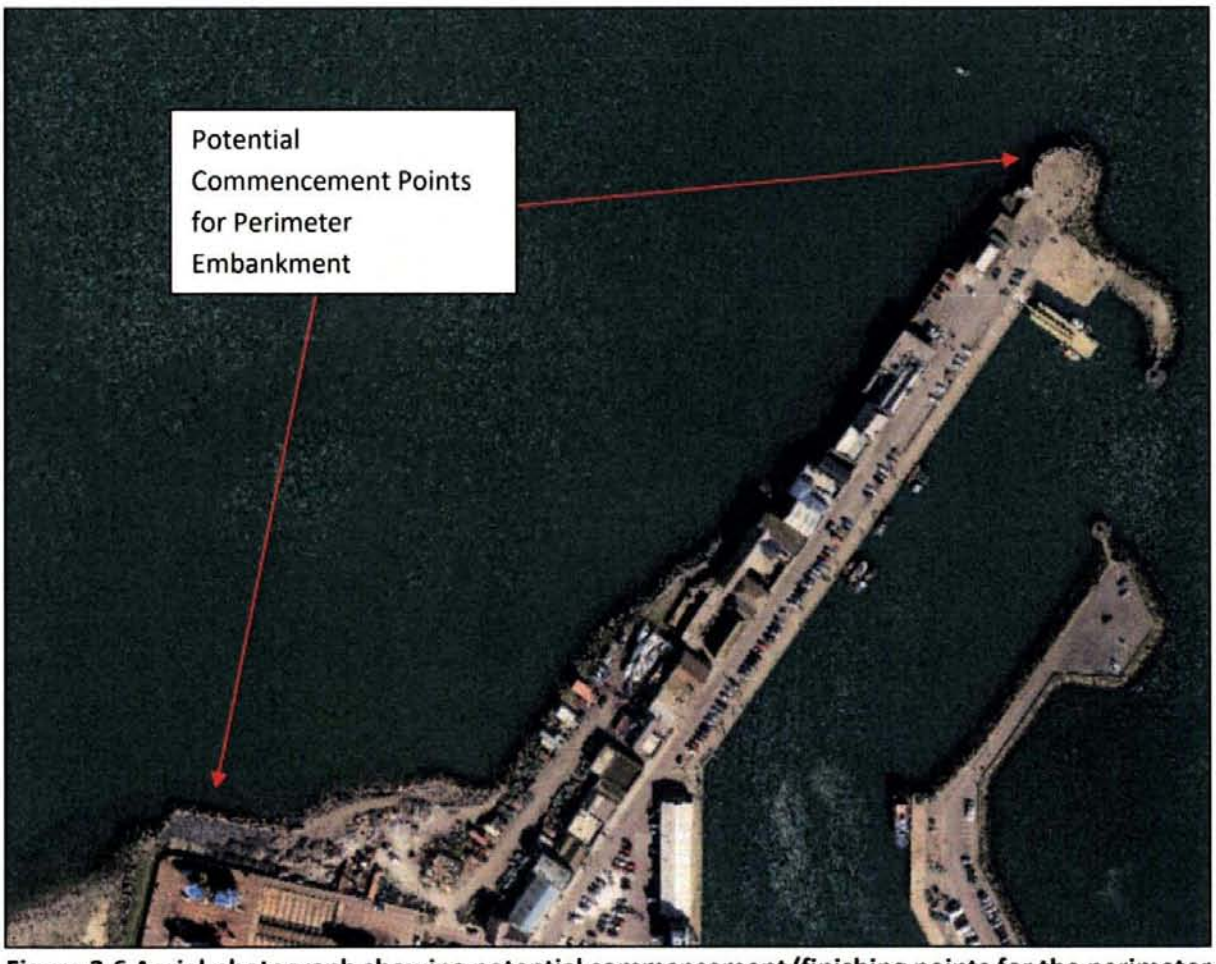

Figure 2.6 Aerial photograph showing potential commencement/finishing points for the perimeter embankment.

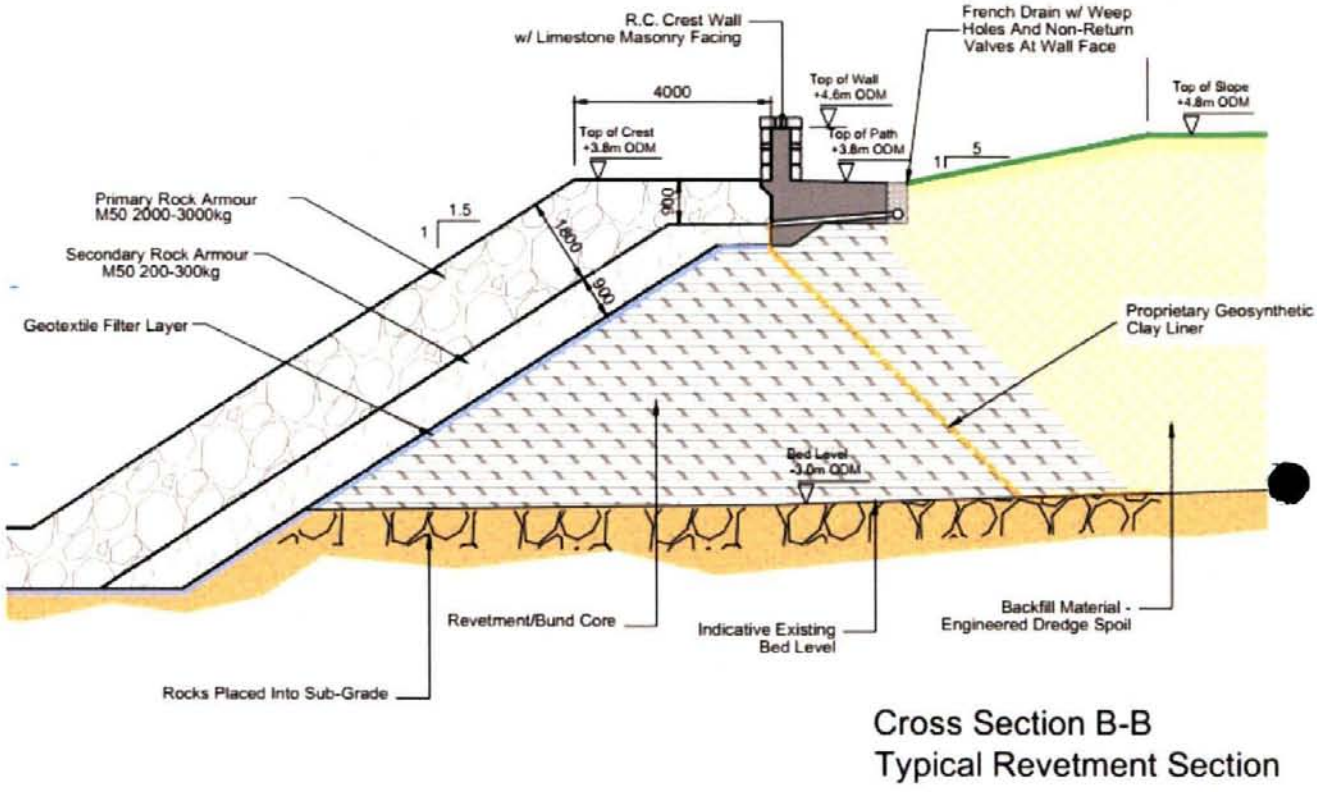

Figure 2.7 Plan of revetment section B-B showing internal layers (drawing no. 19934-5005).

Figure 2.7 above shows the internal layers of the revetment 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 (see below **Figure 2.8**). 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.

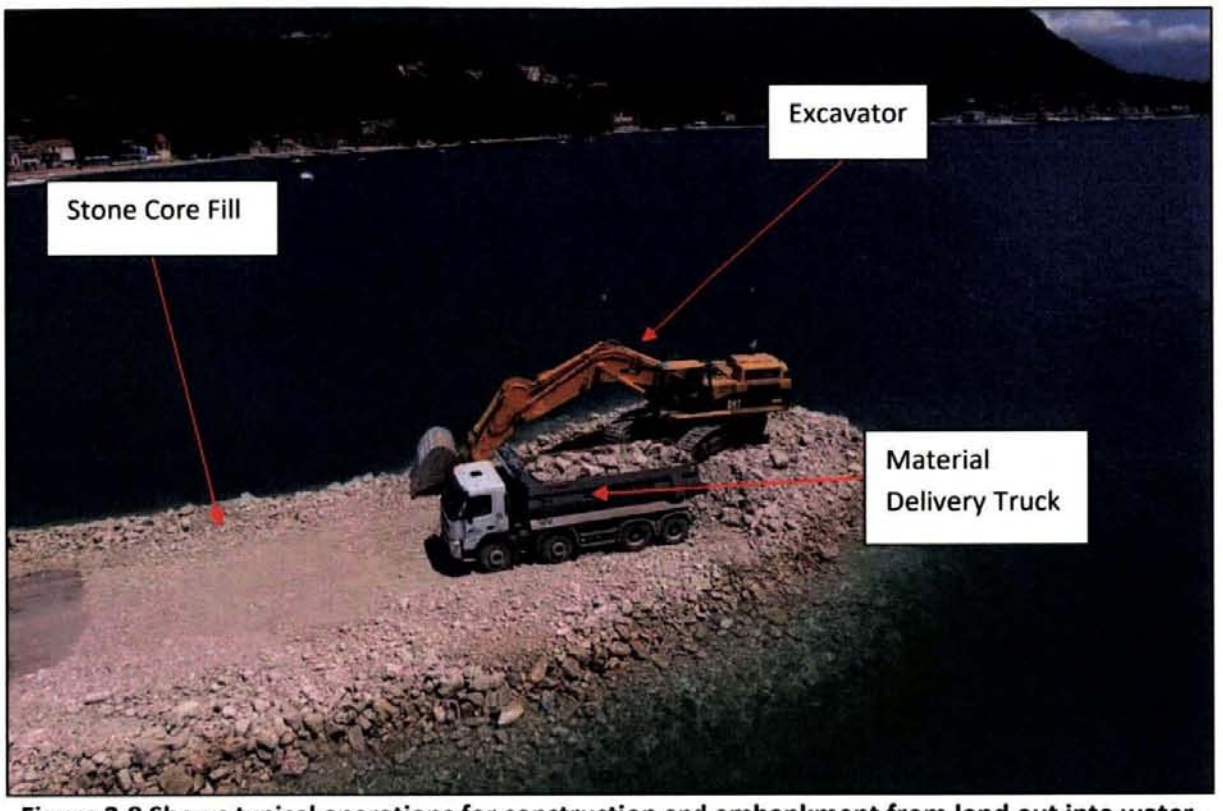

Figure 2.8 Shows typical operations for construction and embankment from land out into water.

The revetment geotextile filter layer will be placed on the outer face of the profiled embankment (see **Figure 2.9** below). 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.

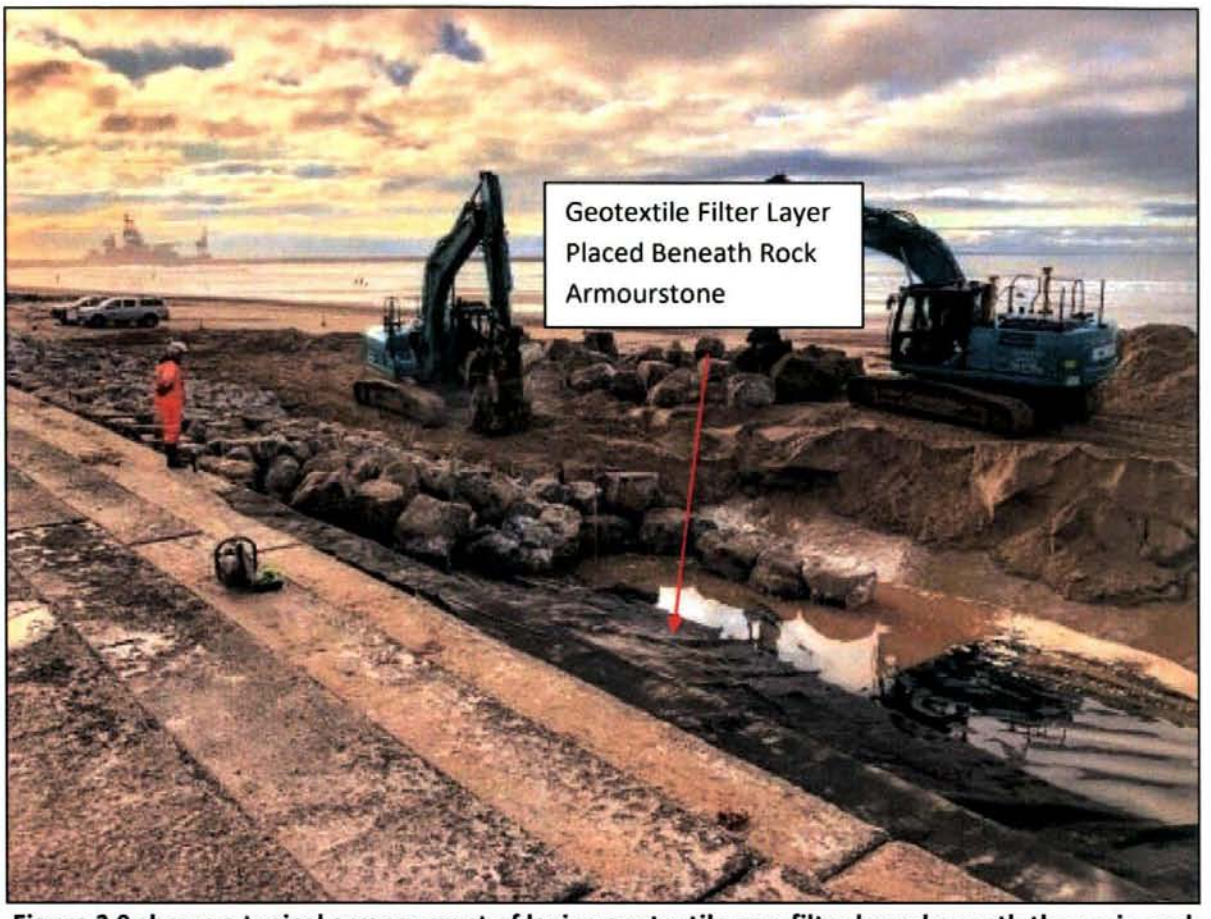

Figure 2.9 shows a typical arrangement of laying geotextile as a filter layer beneath the main rock armourstone in a coastal revetment.

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 underlayer 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 within the reclamation area to allow the phased infill of the full reclamation area. This phased infilling can happen in conjunction with the building of the perimeter embankment so that reclamation of the land can happen at the same time as the perimeter embankment is being built and extending into the sea (see below **Figure 2.10**).

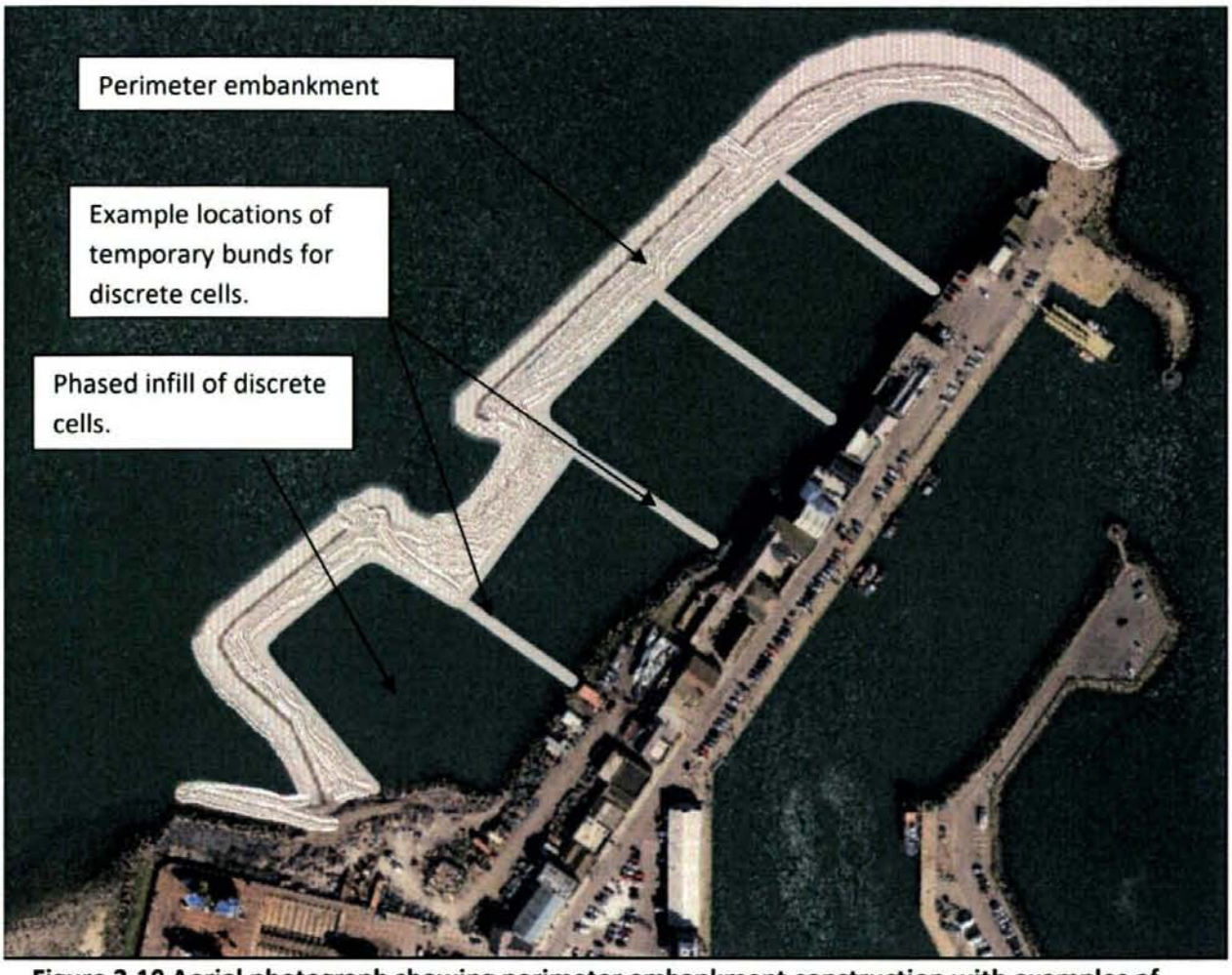

Figure 2.10 Aerial photograph showing perimeter embankment construction with examples of temporary bunds. As perimeter construction progresses, discrete cells are made and infilling can take place. Locations of the temporary bunds are not final.

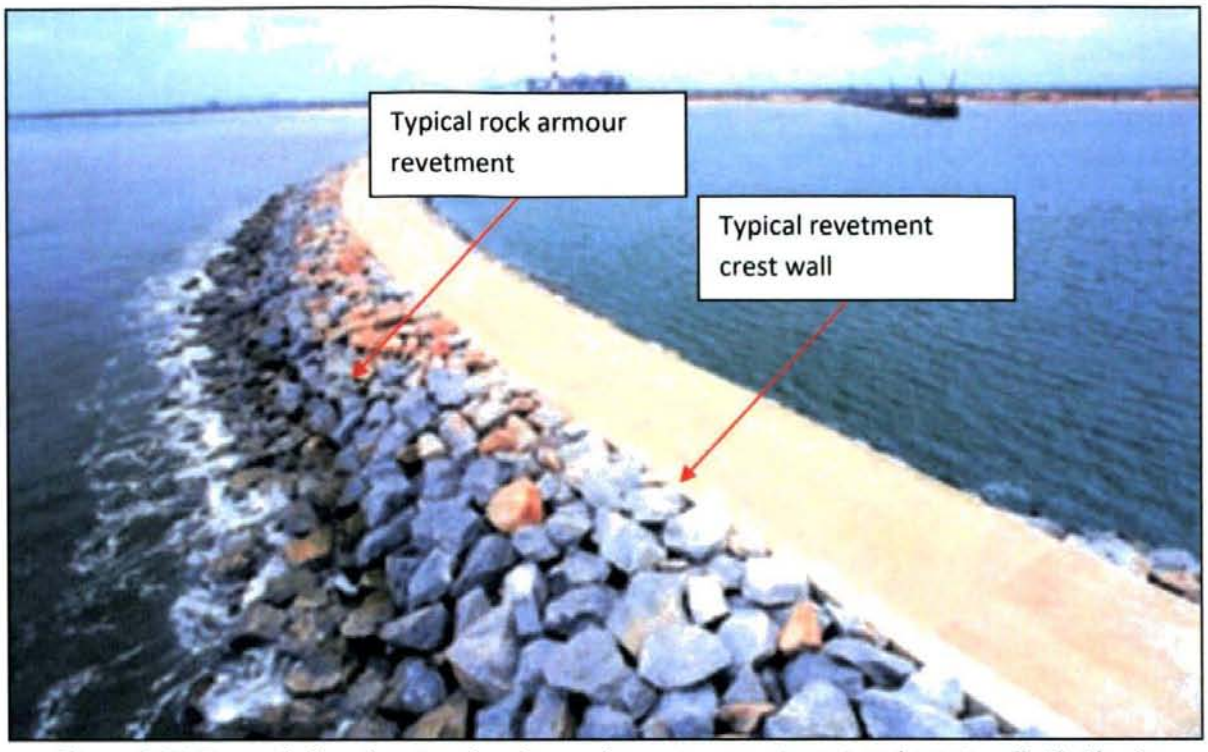

Figure 2.11 Example breakwater showing rock armour revetment and crest wall. Similar in construction to the proposed perimeter embankment.

At the crest of the revetment a reinforced concrete crest wall will be constructed (see **Figure 2.11** above). 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 in place the internal face will be lined with an impermeable clay liner to act as a barrier to movement of water, dredge slurry and contaminants in and out of the area to be reclaimed (see below **Figure 2.12**). This liner will continue to act for a number of years after the infilling of the reclamation area. 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 GCL to keep it in fixed in place during the in-filling process. The GCL 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 2.12 Showing a typical Geosynthetic Clay Liner (GCL) installation process.

When completed, the sealed embankment will retain a volume of seawater 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 25,000m^3 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 infilling the reclamation area, as a whole. In this way uncertainties with regard to sealing of the base of the perimeter and storms overtopping the perimeter will be much more manageable.

Element 2: Dredging of the Inner Harbour - 18 Months Duration

Dredging of Inner Harbour

The dredging works will be undertaken using a long reach excavator or grab operating from a floating pontoon barge or an equivalent configuration (see **Figure 2.13** below).

Figure 2.12 Example dredging operations using a floating barge and long reach excavator.

All excavators carrying out the dredging works can be fitted, if necessary, with environmental dredging buckets to contain finer materials and therefore minimise the loss of dredge spoil into the harbour during dredging (see **Figure 2.14** below).

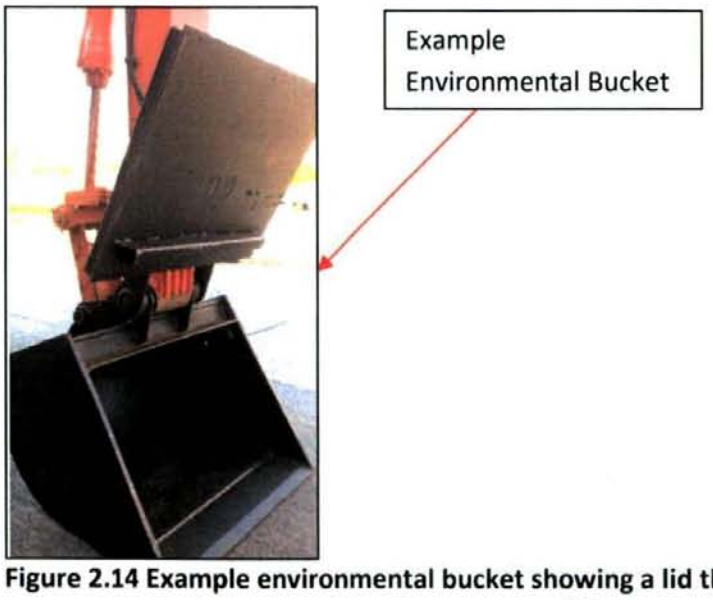

Figure 2.14 Example environmental bucket showing a lid that can be closed to seal contents during lifting.

In addition, silt curtains when required will be established around the dredging operations to further minimise the loss of dredge spoil from the site (see below **Figure 2.15**).

Figure 2.15 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. 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. No blasting will be allowed. The broken rock will then be excavated from the bed by the long reach excavator with a bucket attachment.

Table 2 below presents a breakdown of the estimated dredge volumes and durations by area and material type.

Table 2 Estimated dredge volumes and durations

Location	Design dredge Depth mODM	Estimate Overburden Volume to be dredged m^3	Weeks Dredging No.	Estimate Rock Volume to be removed m^3	Weeks Dredging No.	Total Volume m^3	Estimate No. Weeks Dredging
Trawler Basin	-6.5	31230	10	3270	1	34500	11
Harbour Approach Channel	-6.5	39730	11	2220	1	41950	12
Marina Approach Channel	-5.5	19430	7	3190	1	22620	8
Moorings	-5.5	74140	21	1730	1	75870	22
Marina	-5.5	47100	13	17960	10	65060	23
Totals	-	211,630	63	28,370	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 process facility located on the Middle Pier. 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.

Waste debris (such as discarded metal or plastic items) collected from the harbour during dredging works will be segregated and removed offsite by a licenced haulier to a licensed facility (see below **Figure 2.16** as example) .

Figure 2.16 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: Land Reclamation

Dredge material will be brought to an unloading point on the Middle Pier within the 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.

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 processing 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 processing 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 processed dredge material will then be pumped as a wet mix from the processing plant to the bunded reclaimed land area where it will be deposited as backfill. Excess water (supernatant) will be collected from the surface of deposits and returned to the treatment area for reuse to fluidise the dredge spoil as necessary to make it pumpable.

The below **Figure 2.17** shows an example treatment facility layout. The dredge spoil is brought to the quayside in a barge. Within the barge the material is agitated and fluidised to allow it to be pumped into the processing 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 mixing process plant in liquid form. Mixing is undertaken in an enclosed system. Dust emissions can be controlled within an enclosed plant operation. A controlled and consistent end-product can be produced with predicable engineering characteristics.

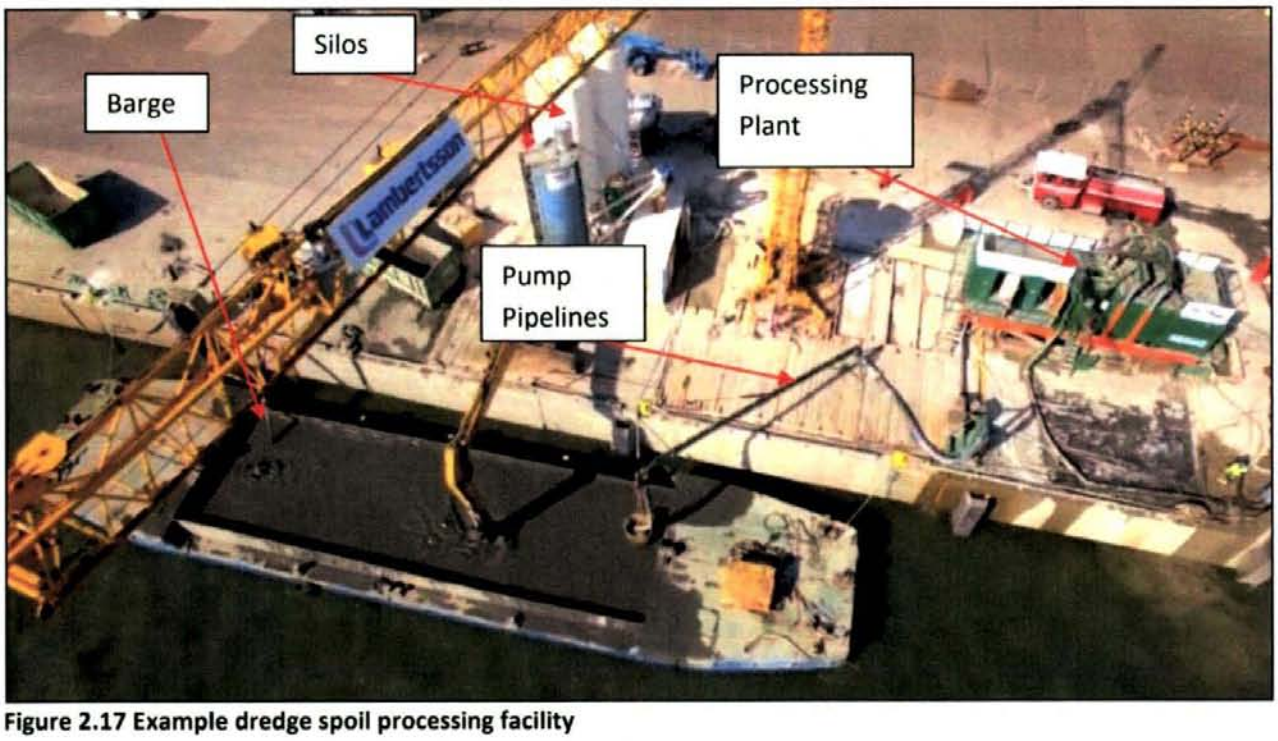

Figure 2.17 Example dredge spoil processing facility

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

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

Construction of the reclamation area will entail stone fill and the geosynthetic membrane to be placed on top of the existing West Pier revetment and there will be no removal or demolition required to the historic west pier structure.

Element 4: Finishings – 6 Months Duration

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

Landscaping works will involve importing and depositing topsoil and grass seeding. It will take approximately 1 to 2 months depending on the time of year. Grass seeding will be undertaken in the late summer/mid-autumn or mid-spring.

Pedestrian pathways will be constructed on a base of stone fill and paved with a bituminous flexible pavement. The pathways will be suitably edged. 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. Land drains will be used to drain surface water from landscaped areas.

Mains water will be supplied to the open 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 finishings will include fencing.

2.5.3 Temporary Site Compound

The site compound will include the following temporary buildings:

- Offices;
- Stores;
- Canteen;
- Toilets;

- Dry room; and
- Washroom.

In addition, the site compound will include areas for temporary lay down storage of materials, plant and some car parking for workers and visitors. See **Drawing no. 19934-5014. Site compounds will be fenced off to prevent access from the public and hoardings will be placed in appropriate areas to reduce construction impact on people passing by.**

2.5.4 Working Hours

Dredging and sediment treatment activities will be carried out from 7am to 9pm (Monday to Friday) and 7am to 5pm (Saturday) with no work on Sundays. All other activities such as construction of the perimeter embankment, rock armour protection, landscaping and drainage will be undertaken during normal working hours i.e. 7am to 7pm (Monday to Friday) and 7am to 5pm (Saturday) with no work on Sundays.

Rock breaking will be carried out during normal working hours i.e. 7am to 7pm.
Any works required outside these stipulated hours will be agreed in writing with the Planning Authority with not less than 10 working days' notice to undertake some necessary works at low water tides which usually occur at approximately 6am.

2.5.5 Cumulative Overlap

There are ongoing works to the Middle Pier in Howth that are expected to be complete by March 2022. The proposed Howth FHC Harbour dredge and reclamation project is not due to being until Summer 2022.

2.5.6 Abnormal loads

There is no requirement for abnormal loads.

2.5.7 Construction Plant Requirements

Table 3 below presents the estimated main construction equipment requirements on site.

Table 3 Estimated main construction equipment requirements

Construction Plant Type	**Construction Plant No.**	**Project Role**
Element 1 – Perimeter Embankment		
Long reach excavators (65T)	2	Construction of the perimeter embankment.
20 T excavator	2	Lighter excavating and lifting requirements e.g. laying clay liner, geotextile, shutters reinforcement etc
Floating pontoon barge	1	Construction of the perimeter embankment with long reach excavator
Work boat	1	Movement of unpowered floating plant.
Safety boat	1	Safety and Health requirements.
Landing craft (e.g. RIB)	1	Movement of people between land and floating plant.
Delivery trucks		Delivery of materials, plant etc to site
Element 2 – Dredging of the Inner Harbour		

Long reach excavator (65T)	2	Dredging.
Floating pontoon barge	2	Dredging.
Floating dump barges	3	Transport of dredge spoil to the quayside unloading point.
Work boat	1	Movement of unpowered floating plant.
Safety boat	1	Safety and Health requirements.
Landing craft (e.g. RIB)	1	Movement of people between land and floating plant.
Dump trucks	1	Transport of rock and gravel material on site.
Delivery trucks		Delivery of materials, plant etc to site
Element 3 – Land Reclamation		
Excavators	2	Excavating and lifting requirements on the quay and within the reclamation area.
Soil processing plant	1	Processing dredge spoil into suitable engineered fill
Binder storage silos	2	Storage of Portland cement and GGBS required for processing of dredge spoil.
Pumps and piping		Movement of unprocessed from the unprocessed storage area, through the processing plant and delivery of processed material to the reclaimed land area.
Delivery trucks		Delivery of materials, plant etc to site
Element 4 - Finishings		
20 T excavator	3	Excavating and lifting requirements during finishings.
Compactors	1	Compacting imported stone fill for placement under pavements
Pavers	1	Laying bituminous pavements
Rollers	1	Rolling bituminous pavements
Delivery trucks		Delivery of materials, plant etc to site

2.5.8 Human Resources

Table 4 below presents the estimated daily main human resources requirements on site during the construction phase.

Table 4 Estimated daily main human resources requirements

Staff Type	Staff No.	Details
Management, DAFM and Visitors		
Contractors Management	6	e.g. project director (off site), contracts manager, PSCS, site foreman, site engineer, waste facility manager, H&S manager, community liaison contact, traffic manager
DAFM Site Staff	2	Resident Engineer, Clerk of Works
Site visitors	2	Employer's representatives, DAFM management staff, local authority staff etc
Sub-Total	**10**	
Element 1 – Perimeter Embankment		
Excavator drivers	4	Long reach and 20T excavators

General operatives	4	General works
Element 1 Sub-Total	**8**	
Element 2 – Dredging of the Inner Harbour		
Excavator drivers	2	Long reach excavators
Floating pontoon crew	4	Captain and crew
Work boat crew	2	Captain and crew
Safety boat crew	1	General operative
General operatives	2	General works
Element 2 Sub-Total	**11**	
Element 3 – Land Reclamation		
Excavator drivers	2	
Dump truck drivers	1	
Soil processing plant operators	6	
General operatives	4	General works
Element 3 Sub-Total	**13**	
Element 4 - Finishings		
Excavator drivers	3	
Paving crew	5	
Carpenters	4	Reinforced concrete works
Steel fixers	4	Reinforced concrete works
General operatives	5	General works
Element 4 Sub-Total	**21**	

There will be an overlap between the different elements during different periods of the programme. **Table 5** below presents the total daily human resources estimates during each period. Please refer to the "Preliminary Programme of Works" outlined earlier.

Table 5 Human resources estimates during each period

Programme Period	Estimated Daily Staff No. on Site
Months 1 – 3	37
Months 4 – 9	66
Months 10 – 18	42
Months 19– 21	55
Months 22 – 24	26

2.5.9 Material Quantities

Table 6 presents the estimated main construction material quantities which will be required as part of the proposed works.

Table 6 estimated main construction material quantities

Material Type	Estimate Quantity	Estimate Truck Delivery No. Total	Truck Deliveries Daily Average
Element 1 – Perimeter Embankment			
6A Stone Fill (embankment core)	53,000m^3	5,300	30
Geotextile filter layer on seaward side	10,000m^2	20	<1
Rock armourstone	25,000m^3	2,500	14
Impermeable clay liner	10,000m^2	20	<1
Reinforced Concrete Crest Wall	1,800m^3	300	2
Masonry Facing Crest Wall	300m^3	30	<1
Surface water drains	700m	2	<1
Element 1 Sub-Total		**8,172**	**50**
Element 2 – Dredging of the Inner Harbour			
Dredge spoil	240,000m^3	Internal harbour movements by barge.	
Element 2 Sub-Total		N/A	N/A
Element 3 – Land Reclamation			
Processed dredge spoil	240,000m^3	Internal site movements by pump/pipe (sand/silt)	N/A
Cement/GGBS Binder	36,000 tonnes	1,800	5
Dredged rock/gravel	24,000m^3	1,200 (Internal site truck movements)	4
Element 3 Sub-Total		**1,800**	**5**
Element 4 - Finishings			
Surface water drains	8,000m	20	<1
Stone fill (surface water drains)	12,000m^3	1,200	10

Material Type	Estimate Quantity	Estimate Truck Delivery No. Total	Truck Deliveries Daily Average
Topsoil (landscaping)	8,100m^3	810	7
Stone fill (pavements)	3,500m^3	350	3
Pedestrian Paving	1,500m^2	30	<1
Tar and Chip Paving	7,200m^2	145	1
Element 4 Sub-Total		**2,555**	**23**

Table 7 presents the estimated daily trucks numbers for each main works period as per the outline programme.

Table 7 Estimated daily trucks numbers for each main works period.

Programme Period	Estimated Daily Delivery Truck No.
Months 1 – 3	50
Months 4 – 9	55
Months 10 – 18	5
Months 19– 21	28
Months 22 – 24	23

2.5.10 Construction Management

2.5.10.1 Construction and Environmental Management Plan

It is proposed that prior to commencement of the proposed development a detailed construction and environmental management plan (CEMP) will be issued to the local authority for agreement prior to commencement of the development. A preliminary CEMP has been prepared and is provided in **Appendix 8**.

2.5.10.2 Communication with the Local Community

In terms of local communication and engagement, before construction works start for each of the phases, a letter will be issued to the Harbour Users Forum members and local community groups. The letter will outline the timeframe and type of construction works taking place.

2.5.10.3 Traffic Management

Accesses to the site compounds are proposed as outlined in **Drawing no. 19934-5014.** It will include a vehicular access for construction traffic and a pedestrian access for construction personnel.

No public personnel, be it pedestrian or vehicular, will be permitted to enter the site. The contractor shall be responsible to maintain and keep the entrance area clean and tidy and free from construction debris. Appropriate signage shall be positioned at approach roads to the site area to inform the public of the site activities.

The Main contractor shall prepare and implement a construction traffic management plan for the duration of the works. The traffic management plan will consider all health and safety construction traffic guidelines.

2.5.10.4 Waste Management

Waste management procedures will be outlined in the construction environmental management plan (CEMP). Fully registered waste management companies will only be used for waste coming from the site. Standard good practice of only ordering the required amount of materials will be implemented.

2.5.10.5 Water requirement and supply

There is a water requirement for dredge spoil treatment, welfare facilities and cleaning.

Water will be supplied for welfare and cleaning by a combination of mains water and imported water in water bowsers.

Water for mixing during the dredge spoil process will be freshwater supplied by the mains water system at a rate sufficient to create a homogeneous and pumpable slurry.

Excess supernatant water will arise 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. Supernatant water will be re-circulated by pump back into the processing plant for further use in mixing the dredge material and binder.

Trucks will be cleaned in a wheel wash at the site exit. Dirty water will be collected and disposed of at a licensed waste facility.

2.5.11 Excavated Materials and Soil Management

Approximately 500m^3 of dredge spoil will be dredged, processed and reused in the reclamation area per day. This could range from 300m^3 to 1500m^3 per day depending on the dredge output and material consistency. Dredge spoil will be placed into floating dump barges from the floating pontoon/dredger. Once safely loaded, the barges will be towed to an unloading quay side point within the Trawler Basin of the harbour. The unloading point will be located adjacent to the processing facility on the Middle pier compound. The dredge material will be agitated within the barge or on the quay within a bunded storage area, with additional water if required, to provide a mix suitable for pumping. Materials greater than 20mm and other debris from the dredge material will be filtered, segregated and stored in a separate bunded area. Dredge material will be pumped to the onsite processing plant where mixing of the dredge material with binders and water within the processing plant at a water content sufficient to ensure a homogeneous mixing of the sediment and binders. The homogenous mixed dredged material and binders are then pumped to the reclamation area as a wet mix. Excess supernatant water will arise on the surface of the stabilised mass. This water will be re-circulated by pump back into the processing plant for further use in mixing dredge material and binder.

Rock and granular material (>20mm) will initially be stockpiled prior to permanent use in the reclamation area. All granular material will be reused in the reclamation area. The stockpiles will be kept in a bunded area. Stockpile runoff water will be treated before release under proper authorisation.

Stockpiles of imported topsoil will have the depth and storage time kept to a minimum to reduce degradation.

Stockpiles of other imported stone fill be graded to minimise run-off.

2.5.12 Waste Management

Refer to Appendix 8 the preliminary Construction Environmental Management Plan for a detailed description of the proposed waste management at the project. A Waste Management Plan will be agreed by DAFM and instituted during the works and the waste management measures for the project will include:

- Waste management targets
- The potential waste materials produced during the project;
- Waste handling procedures;
- Waste Permits where required;
- Waste reuse, recycling and disposal techniques; and
- A map showing designated waste handling areas.

Contractors working on site during the works will be responsible for the collection, control and disposal of all wastes generated by the works.

2.5.13 Construction Drainage

Construction drainage details are specifically outlined in **Chapter 7 Water**.

2.5.14 Storm Water Drainage System on the Reclaimed Land

Permanent storm water drainage on the reclaimed land will be collected through a network of French drains and gullies feeding into storm water drains. The drains will collect at several hydrocarbon/silt interceptors before out discharging to 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.

2.5.15 Fuel Management

All plant will be refuelled on site e.g. excavators, dumpers etc, 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. The plan outlined will have regard to the following elements:

- Mobile bowsers, tanks and drums should be stored in a secure, impermeable storage area, away from drains and open water;
- Fuel containers should be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- Ancillary equipment such as hoses, pipes must be contained within the bund;
- Taps, nozzles or valves should be fitted with a lock system;

- Fuel and oil stores, including tanks and drums, should be regularly inspected for leaks and signs of damage;
- Only designated trained operators should be authorised to refuel plant on site;
- Procedures and contingency plans should be set up to deal with an emergency accidents or spills; and
- An emergency spill kit with oil boom and absorbers is to be kept on site in the event of an accidental spill.

2.5.16 Invasive Species Management

Any of the soils being imported into the site will be checked to be invasive species free. The plant species of concern are as follows:

- Japanese knotweed
- Giant Hogweed
- Himalayan Balsam

Detailed biosecurity measures required during the construction works are outlined in **Chapter 5 Biodiversity** Section 5.8.8

2.5.17 Risk of Accidents

Project health and Safety is assessed in detail in Chapter 4 Population and Human Health, Section 4.3.2. All appropriate construction health and safety legislation will be followed during the construction works. The following standard items will reduce the risk of accidents:

- All works will be undertaken with a safety plan, risk assessment and method statement in place.
- The site will be secured to prevent public access.
- No public vehicular traffic shall be allowed enter the site.
- Contractors for each of the construction phases shall prepare a traffic management plan for the duration of their works. Such plans shall take cognisance of the Health & Safety of members of the public, be it vehicular traffic or pedestrian traffic.
- Access for visiting design team members and client representatives shall be controlled by the relevant Contractor and where required, the relevant site induction shall be complied with.

2.6 OPERATIONAL PHASE OF THE PROJECT

The operational phase will see the reclaimed land area as shown in **Figure 2.1** above, owned and managed by the DAFM.

The paths and amenity areas will be open to the public with some restrictions during storms. The paths will be monitored and maintained on an ongoing basis by the DAFM.

Landscaped areas will be grassed and maintained by the DAFM.

Roadways will be open to public traffic. The roadways will be monitored and maintained by the DAFM. Parking will be available for both cars and buses.

Access to water for water sports activities is to be provided by a slipway. Storage areas will also be provided for water sports equipment adjacent to the slipway. Water sports infrastructure will be monitored and maintained by the DAFM.

The treatment of the sediments and placement in the reclamation area, will be done under licence from the EPA. This will require continued environmental monitoring post completion of the works in accordance with the EPA licence. The licence will only be surrendered once the EPA are satisfied that the activity poses no long term environmental liabilities.

2.7 REFERENCES

BIM, 2019. The Business of Seafood 2019.

Marine Institute, 2006. Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters.

3. PROJECT NEED AND ALTERNATIVES

3.1 Introduction

This chapter of the EIAR explains the need for the overall Howth harbour dredging and land reclamation development in the context of the relevant planning policy framework. The main viable alternatives examined and considered during the project design process are outlined and the main reasons for choosing the proposed development are indicated.

3.2 Need for the Proposed Development

3.2.1 Introduction

Howth harbour bed was last dredged in the early 1980s during wider development works as discussed in **Chapter 2 Description of the Proposed Development**. Since that time, the bed levels have gradually risen as a result of sediment deposition onto the bed. Some dredging has occurred in late 2020 with the Middle Pier works but it is minor and does not address the main siltation issue. The need for the development is based around current and future issues. Current issues impacting the harbour due to the sedimentation are as follows:

- Together with increasing vessel drafts, the bed levels are becoming an increasing hazard to vessels using the harbour. This hazard is relevant to the commercial fishing fleet, the RNLI life boat and the pleasure craft that use the harbour.
- The shallow water depths due to sediment, in the vicinity of the RNLI slipway, constrains access to the water for the inshore lifeboat (rib) and the public during spring low tides.
- The use of the boat lift for the ship yard is currently restricted due to siltation under the lift itself.

The harbour will be impacted in the future by the sedimentation due to the following:

- The proposed project is necessary as without action the harbour will lose its functionality over time. The loss of functionality will impact on the commercial aspect of the whole harbour, the pleasure craft within the harbour and the functioning of the RNLI lifeboat station.
- Due to increased draft size in fishing vessels, in order to maintain vessel safety and the commercial viability of the harbour into the future, increased depths are required beyond previous designed harbour depths.

The Department of Agriculture, Food and the Marine (DAFM) is now proposing to dredge the harbour and to reuse the dredge spoil in the reclamation of an area of land on the west side of the west pier.

This sub-section outlines the current data that shows the need to dredge the harbour and the extent of the dredge required for it to be addressed.

3.2.2 Bathymetric Data.

Bathymetric data is available for the West Trawler Basin, the Moorings area, east of the East Pier and the Approach channel (see **Figure 3.1** below). Originally, the only seabed level data that was available for the Marina Area and for the seabed west of the West Pier was from the Admiralty Chart covering

Howth Harbour. In order to more accurately ascertain levels in these areas, further bathymetric surveying was undertaken.

Bathymetric data was used with design dredge levels given below to establish the total volume of dredging material.

3.2.3 Design Dredge Levels

Design dredge levels were established based on discussions with DAFM representatives, including the Howth Harbour Master (See **Figure 3.2** below). The levels chosen were based on existing tide levels and the provision of water depths appropriate to the harbour users in the various areas of the harbour.

Tide Levels in the Harbour are given in **Table 3.1** below. They have been obtained from the Admiralty Tide Tables for Astronomic tides. It should be noted that meteorological conditions can cause actual tide levels to be higher or lower than Astronomic tides.

Table 3.1: Howth FHC - Tide Levels

Tide	Water Level m Chart Datum	Water Level Meters Ordnance Datum Poolbeg (mODP)	Water Level Meters Ordnance Datum Malin Head (mODM)
Highest Astronomical Tide **(HAT)**	4.49	4.69	1.98
Mean High Water Spring **(MHWS)**	4.1	4.30	1.59
Mean High Water Neaps **(MHWN)**	3.3	3.50	0.79
Mean Low Water Neaps **(MLWN)**	1.3	1.50	-1.21
Mean Low Water Spring **(MLWS)**	0.5	0.70	-2.01
Lowest Astronomical Tide **(LAT)**	-0.37	-0.17	-2.88

Proposed dredge levels are given in **Table 3.2** below, as is the current sea bed depth range.

Table 3.2: Howth FHC Dredging - Design Dredge Depths

Location	Proposed Design Dredge Level mCD	Current Sea bed Depth range mCD
West Trawler Basin	-4	-1.3 to -5
Harbour Approach Channel	-4	-0.7 to -3.3
Moorings	-3	-0.1 to -2.5
Marina Approach Channel	-3	0.6 to -2.9
Marina	-3	-1 to -1.5

Figure 3.1 shows the latest bathymetric survey within the harbour.

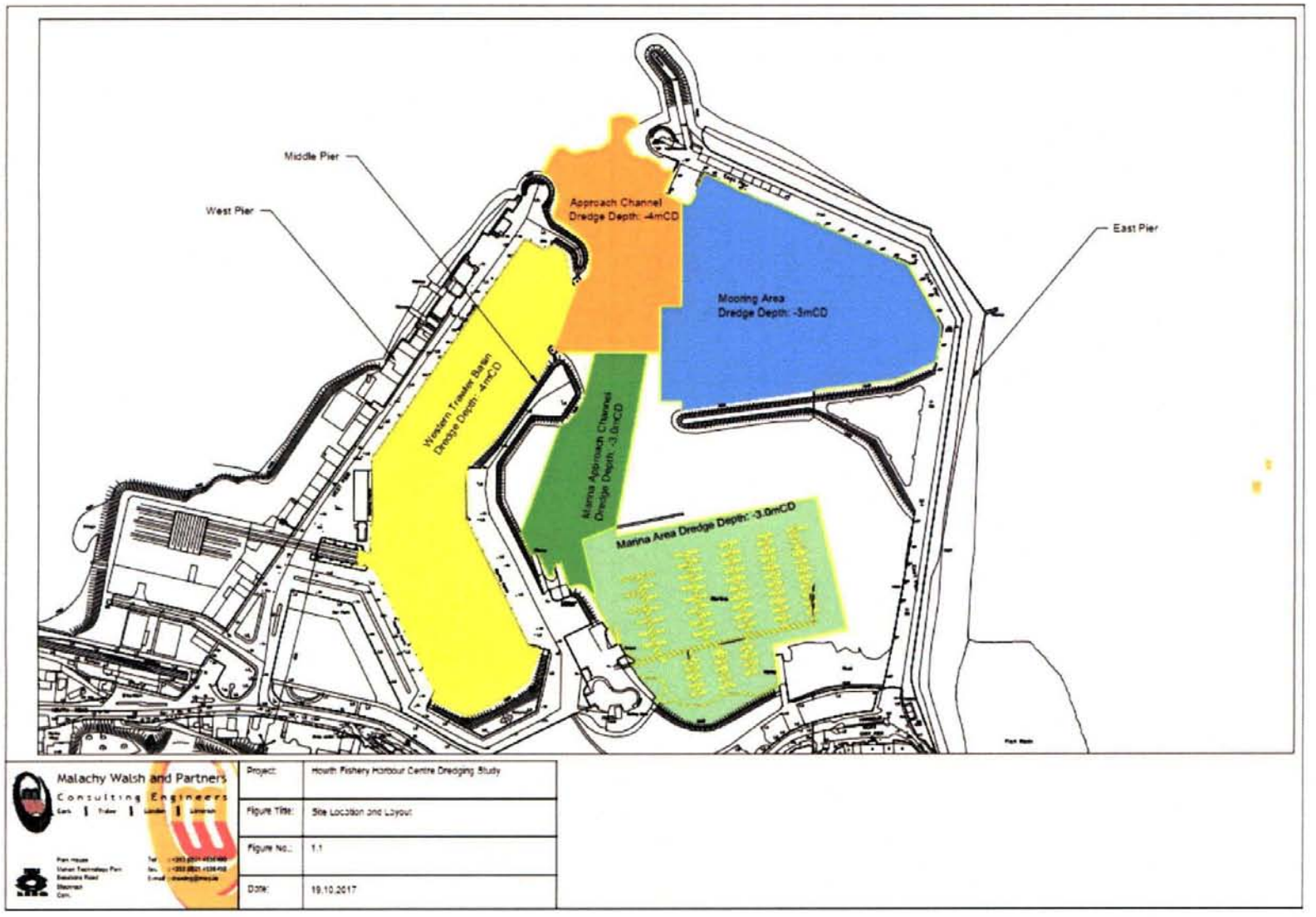

Figure 3.2 shows the design dredge levels by harbour area.

3.2.4 Ground Investigation Data - Rock Levels

The total volume of dredge material above the design dredge level includes overburden (sediment) and rock material. To estimate the various volumes of overburden and rock in the areas to be dredged an assessment was made of rock levels from a ground investigation undertaken in 2015 (See **Figure 3.3** below). These rock levels were then used to estimate rock volumes in the above design dredge levels. The volume of overburden to be dredged was then estimated by subtracting the rock volumes from the overall volume of material. It is estimated that 24,000m^3 is rock and 216,000m^3 is overburden. A total of 240,000m^3 of material is to be dredged of which an estimated 10% is rock.

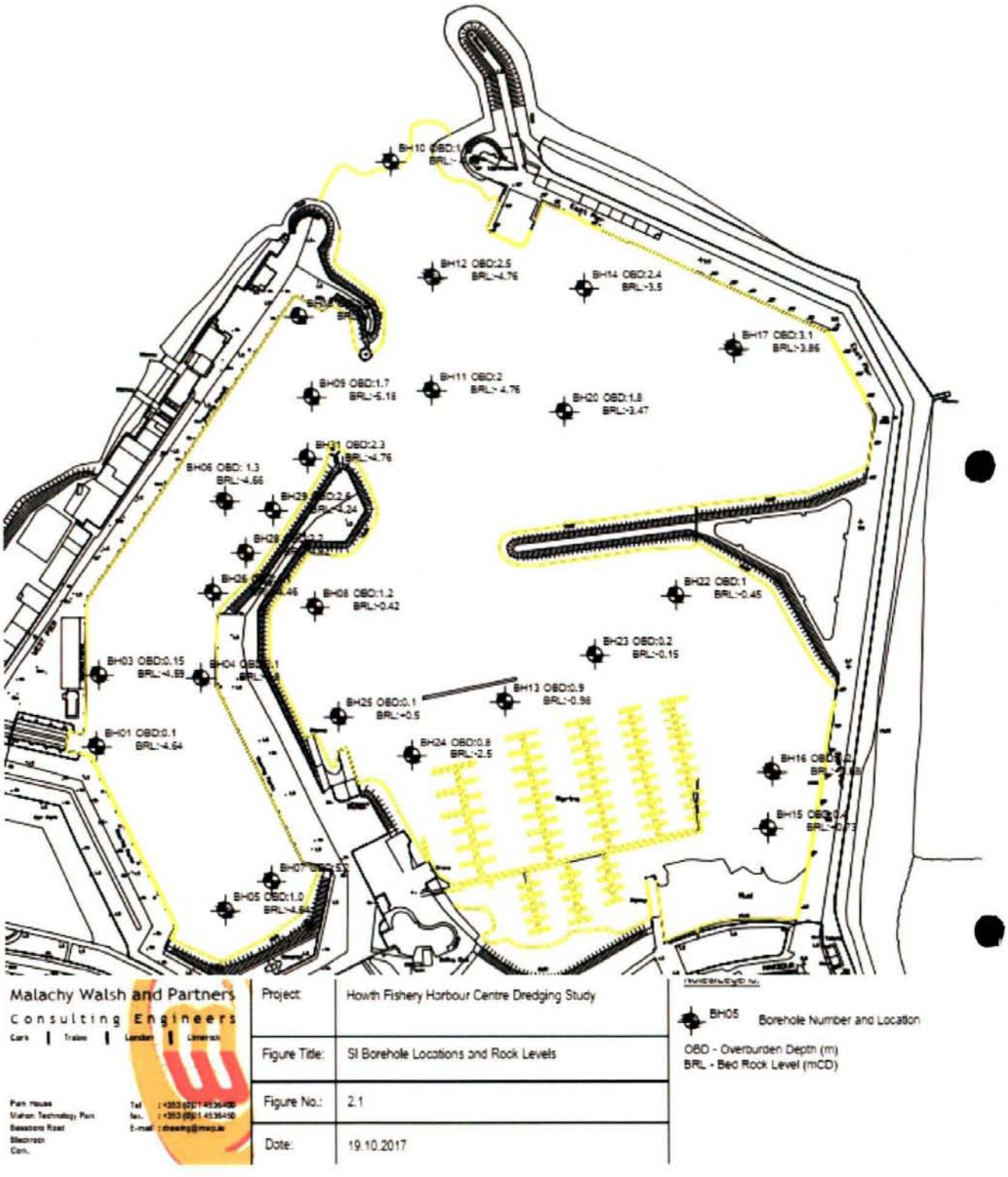

Figure 3.3 shows borehole locations and rock levels within the various harbour areas.

3.3 Alternatives Considered

3.3.1 Introduction

The following alternatives were considered with respect to the project and are discussed further in this chapter:

1. Do Nothing Scenario;
2. Disposal at Sea;
3. Burial of Dredge Material at Sea;
4. Disposal at a licensed landfill facility in Ireland;
5. Disposal of the Dredge Spoil at a Contaminated Dredge Spoil Facility Abroad;
6. Reuse of the dredge spoil locally through land reclamation.

Alternatives were considered under the following key categories:

- Feasibility;
- Cost;
- Environment;
- Beneficial re-use.

3.3.2 Do Nothing Scenario

The do nothing scenario would be not to dredge the harbour. Continued deposition of sediments in the harbour will further increase the bed level and decrease the available water depth for navigation in/out and around the harbour.

This option is not considered feasible as the harbour would lose its functionality in time.

3.3.3 Disposal at Sea

The EPA permitting criteria with regard to the disposal of dredge spoil at sea have been set down in guidance issued by the Marine Institute. Dredge material can be classified into three categories:

- **Class 1:** contaminant levels are so low that material can be disposed of at sea.
- **Class 2:** contaminant levels are above the class 1 criteria but below Class 3. In this case it is recommended that further testing could be undertaken - with a view to showing that the material is Class 1. If further testing does not show the material to be Class 1 the material is not suitable for disposal at sea.
- **Class 3:** contaminant levels are so high that material cannot be disposed of at sea.

Surveyed contaminant data was compared with the Marine Institute class limits. 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. There are pockets with lower levels of contaminants so there is a possibility that some of this material could be disposed of at sea. However, the volumes involved are small in the context of the overall dredging and it is likely to be technically difficult to prevent contaminated material from adjacent areas mixing with suitable material.

The class of contamination of the dredge material could cause biological effects to marine organisms. The Marine Institute recommends that alternative options are considered for Class 3 material.

It is therefore considered that direct disposal at sea is not a feasible option.

In addition, dumping at sea is not considered beneficial re-use of dredge material.

3.3.4 Burial of Dredge Material at Sea

Dumping at sea could be permitted if the contaminants can be contained.

There are two methods for the burial of sediments at sea, Level-Bottom Capping (LBC) and Contained Aquatic Disposal (CAD). Both methods involve capping of the contaminated sediments which consists of the controlled accurate placement of contaminated material at an open-water disposal site, followed by a covering or cap of clean isolating material.

Level-Bottom Capping (LBC) is defined as the placement of a contaminated material in a mounded configuration and the subsequent covering of the mound with clean sediment.

'Burial at sea' or Contained Aquatic Disposal (CAD) is similar to LBC but with the additional provision of some form of lateral confinement (e.g., placement in natural-bottom depressions, constructed subaqueous pits, or behind subaqueous berms) to minimize spread of the materials on the bottom.

Only the option of Contained Aquatic Disposal (CAD) will be further analysed. The theory behind this 'unlined' burial solution is that when the contaminants are attached to the sediment; and the sediment is surrounded by water on all sides so there is little chance of leachate generation as there is no hydraulic gradient.

Subaqueous capping is an attractive alternative for disposal of contaminated sediments from both an economic and environmental standpoint, given that the geochemical environment for subaqueous capping favours long-term stability of contaminants as compared with an upland environment where geochemical changes may favour increased mobility of contaminants.

There are limitations in relation to this option, because of the extent of environmentally designated areas around the Irish coast. Moreover, the Irish seabed is often rocky which makes excavation of a pit difficult. Long term monitoring of the condition of the stockpile is difficult and there is a risk of disturbance to the capping from vessels anchoring, bottom trawling etc and storm damage.

In February 2019, MWP consulted with the Marine Institute (MI) in relation to the burial at sea option for the Howth harbour contaminated sediments. In general, the MI would not object to the burial at sea option, subject to certain surveys being conducted and environmental factors assessed. The MI recommended that hydrodynamic surveys be undertaken at the disposal site and an assessment of the potential impact on the marine ecology, including spawning grounds, fish farms and marine mammals and an underwater archaeology. The MI also recommended that a report be prepared and submitted on the design of the burial pit, details of the proposed cap, construction methods and proposed ongoing monitoring.

It was decided not to carry out further detailed environmental investigations as this alternative was not considered the most cost effective or sustainable use of resources.

3.3.5 *Disposal at a licensed landfill facility in Ireland*

The options and permitting requirements for disposal of dredge spoil to landfill or other land based options depend on the material classification for disposal as per the Waste Acceptance Criteria (WAC) for the following class of landfills:

- Inert;
- Non hazardous;
- Hazardous.

Most of the 2015 samples were found to be within the non-hazardous range. However, a small number of samples (hotspots) were found to be potentially in the hazardous range. The principal concern related to the levels of zinc in the 2015 samples. If the origin of the zinc is inorganic the zinc levels are in the hazardous range. However, further sampling was undertaken in the vicinity of these hotspots and analysed to establish the origin of the zinc. It was found that the zinc levels did not relate to TBT's and as a consequence were organic in origin and the levels are therefore considered to be non-hazardous.

There were also some samples with potentially hazardous levels of TPH. However these levels were considered non-hazardous again, given that their origin is diesel rather than petrol.

Contaminant concentrations within the material to be dredged are therefore such that the material can be considered to be non-hazardous.

The non-hazardous nature of the dredge spoil means that the materials can potentially be disposed of to a landfill that is licenced to accept non-hazardous material. However, given the large quantities involved, the feasibility of such an option would depend on locating a non hazardous licenced facility with a large capacity to accept material.

There are some landfill facilities in Ireland that can accept the dredge spoil from Howth under their waste licences. The closest landfill to Howth is the IMS inert landfill in Naul, north County Dublin. IMS (formerly Murphy Environmental Hollywood) operate an inert landfill (EPA Licence W0129-03), just outside the Naul, in north County Dublin. IMS received approval from the EPA to increase their WAC limits for specific metals, salts and organics by 2/3 times.

The material would need to be transported by road in trucks and this would mean the material would require dewatering in advance.

Pre-treating of material may also be necessary to prevent leaching of the contaminants. The treatment would involve the mixing of the dredge material with cement in a temporary storage area and then removal to landfill site.

Material would be transported by licenced hauliers to licenced landfill sites satisfying the required environmental constraints.

Based on the estimated cost of disposal to landfill in Ireland, this is not considered the most cost effective option.

In addition, the off-site disposal to landfill of site-won material at Howth Harbour, which could alternatively be used as a valuable resource in the redevelopment works is in direct conflict with European and National legislation and European and National Policy, as outlined above. Disposal to landfill is not considered beneficial/sustainable re-use of dredge material.

3.3.6 Disposal of the Dredge Spoil at a Contaminated Dredge Spoil Facility Abroad

In Germany and the Netherlands, special facilities have been built to store contaminated dredge spoil. They are known as Confined Disposal Facilities (CDFs). As a result of new dredging practices, such as more precise dredging techniques, these facilities have surplus capacity and are accepting contaminated dredge spoil from abroad.

Regulating the movement of waste between EU Member States and between the EU and other countries is referred to as "transfrontier shipment", or TFS. Movement of waste between Member States is subject to Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14th June, 2006 on shipments of waste. This Regulation is supported in Irish law through the Waste Management (Shipments of Waste) Regulations, S.I. 419 of 2007. Dublin City Council is the designated the National Competent Authority for the export, import and transit of waste shipments under the Waste Management (Shipments of Waste) Regulations, 2007. All transfrontier shipments of waste originating in any local authority area in the State that are subject to the prior written notification procedures must be notified to and through Dublin City Council at the National TFS Office established to implement and enforce the Regulations.

Due to the transport distances, the overall carbon footprint of this solution is likely to be greater than for solutions that deal with the material in Ireland or locally. Additionally, the cost of transporting material to the landfill sites abroad is much greater. A further concern identified with this option is the licensing required for transborder shipment of contaminated material and the double handling required allowing for shipment over longer distances.

Material would be transported by licenced hauliers to licenced landfill sites satisfying the required environmental constraints.

Based on the potential carbon footprint and the estimated cost this is not considered a cost effective option.

In addition, disposal to landfill abroad is not considered a beneficial/sustainable re-use of dredge material.

3.3.7 Reuse of the dredge spoil locally through land reclamation

The re-use of dredge spoil for the purpose of land reclamation is one of the most common beneficial uses of dredge material. Information provided in the *Guidance on the Beneficial Use of Dredge Material in Ireland* produced by Cork Institute of Technology in 2013 on behalf of the EPA was considered.

Such a reuse option would in this case involve treating of the dredged material to achieve necessary engineering and environmental properties. The sampling and testing of sediments completed in 2015

and 2019 showed that the dredge material is non-hazardous. Treating and reuse of non-hazardous material requires licensing by the EPA.

A number of potential areas of reclamation were considered:

- Reclamation to the west of the West Pier;
- Reclamation to the east of the East Pier;
- Reclamation on east section of Marina Area.

Proposed reclamations will require erosion protection works:

- Reclamation off the West Pier can be protected by a relatively inexpensive rock armour revetment.
- Reclamation off the East Pier would require the use of more costly concrete armour units. Other construction costs would also be greater for an east pier reclamation because of the greater exposure to wave action.
- Reclamation within the harbour would require the construction of vertical quay walls to minimise loss of harbour area and to maximise the area for deposition of material.

The East Pier is in need of structural repairs and overtopping volumes need to be reduced to improve public safety, structural integrity of the pier and to allow any further development of the Moorings and Marina Areas within the harbour. However, such measures could be implemented in a more suitable and cost effective way without the need for additional land reclamation.

There is a relatively shallow depth area on the east side of the Marina which could be partially reclaimed to provide land based facilities, such as vehicular access to future development in the Moorings area. However the area is likely to take only a fraction of the total volume of dredge spoil in the order of at most 10%. It is noted that improved vehicular access to the Moorings Area could be provided with a much smaller reclamation, using only 2 to 3% of the total dredge spoil volume. It is also considered that there is sufficient car parking available in the immediate vicinity of the FHC that infilling of harbour water is not preferred at present.

In terms of beneficial use and development of the harbour, reclamation to the west is preferred. This is due to the existing uses on the West Pier. The East Pier is used almost exclusively by the public for leisure and social use whereas the West Pier can be further developed for commercial and fisheries use. Development off the west pier also provides sufficient volume to deposit the full dredge quantities.

Figure 3.4 below shows the potential extent of a reclamation area to the west of the West Pier based on dredge volumes from the different areas within the harbour.