3 Description Of The Proposed Development

This section of the EIS provides a description of the proposed development which is subject to planning permission, including associated construction works and the requirements for further maintenance. The precise details of this proposal are covered by the plans, drawings and related particulars, which accompany this planning application.

3.1 Project Rationale

The Dun Laoghaire Harbour Company, representing the interests of the wider Dun Laoghaire Cruise Stakeholder Group, is seeking to enhance the existing cruise berthing facilities at Dun Laoghaire Harbour in order to ensure Dun Laoghaire Harbour is in a position to attract next generation cruise ships. The existing berthing facilities are not capable of catering for the c. 340m long next generation cruise ships and a new facility is required so as to attract these ships to Dun Laoghaire Harbour.

3.1.1 Dun Laoghaire Harbour as a Cruise Ship Destination

Dun Laoghaire is already an established destination for cruise ships and currently provides berthing arrangements for cruise ships. There were 9no. cruise calls to Dun Laoghaire Harbour in 2013; 4no. cruise calls in 2014; and 12no. cruise visits scheduled for 2015. These cruise visits to Dun Laoghaire Harbour are detailed in Table 3.1.1, 3.1.2 and 3.1.3 below.

Table 3.1.1 Cruise Visits to Dun Laoghaire Harbour, 2013

Date	Vessel	Details
27th March 2013	Sea Explorer	120 passengers / 72 crew
16th May 2013	Queen Mary 2	3000 passengers / 1328 crew
16th May 2013	Serenissima	100 passengers / 48 crew
09th July 2013	Arcadia	2388 passengers / 976 crew
18th July 2013	Wind Surf	312 passengers / 312 crew
26th July 2013	Oriana	1928 passengers / 794 crew
07th August 2013	Queen Elizabeth	2547 passengers / 1040 crew
08th August 2013	Corinthian	112 passengers
31st August 2013	Wind Surf	312 passengers / 312 crew

Source: Dun Laoghaire Harbour Company

Table 3.1.2 Cruise Visits to Dun Laoghaire Harbour, 2014

Date	Vessel	Details
29th April 2014	Island Sky	116 passengers / 66 crew
12th July 2014	Wind Surf	312 passengers / 312 crew
31st August 2014	Seabourn Legend	212 passengers / 160 crew
04th September 2014	Wind Surf	312 passengers / 312 crew

Source: Dun Laoghaire Harbour Company

Table 3.1.3 Confirmed Cruise Visits to Dun Laoghaire Harbour, 2015

Date	Vessel	Details
12th May 2015	Royal Princess	3600 passengers/1346 crew
20th May 2015	Queen Mary 2	3000 passengers / 1328 crew
14th June 2015	Celebrity Silhouette	2886 passengers / 1525 crew
19th June 2015	Island Sky	116 passengers / 66 crew
26th June 2015	Star Legend	208 passengers / 164 crew
29th June 2015	Wind Surf	312 passengers / 312 crew
12th July 2015	Star Legend	208 passengers / 164 crew
14th July 2015	Brittania	3647 passengers / 1350 crew
23rd July 2015	Celebrity Silhouette	2886 passengers / 1525 crew
15th and 16th August 2015	Celebrity Silhouette	3145 passengers / 1525 crew
29th August 2015	Splendida	3900 passengers / 1313 crew
18th September 2015	Mein Schiff 4	2500 passengers / 1000 crew

Source: Dun Laoghaire Harbour Company (23rd June 2015)

The cruise line business is a growing market sector in the tourism industry. Ireland has recently begun to capitalise on this market and over the last few years has succeeded in attracting a growing number of visits by cruise liners. However, the number of trips to Ireland represents a very small share of this potential market and the opportunity exists to grow this business to the Irish economy quite significantly.

Dun Laoghaire Harbour offers a large, sheltered harbour, that is largely a leisure and recreation harbour. As noted above, the Harbour is already catering for some significant cruise visits and is well placed to meet the growing demand for next generation cruise visits to the region.

In general, cruise liners are getting bigger. Whereas the average length of a large cruise liner used to be c. 290 metres, the next generation of cruise liners is up to 340 metres in length. The absence of a harbour in Dublin Bay with the capacity to handle the 340m next generation cruise liners has been identified as a serious inhibitor to growing Ireland's market share in this sector.

3.1.2 Policy Context

As detailed in Section 4 of this EIS (Planning & Development Context), there are a number of policy documents that support the development of Dun Laoghaire Harbour for niche uses such as luxury cruise shipping, including:

The National Ports Policy 2013

In relation to Dun Laoghaire Harbour, this policy document states that:-

> *In recent years the harbour has moved away from commercial port related business and is increasingly viewed as a centre for marine-related tourism and recreational activities.*

This policy document goes on to state:-

> *While the port's location in the heart of Dun Laoghaire limits its potential as a transport hub, it provides significant opportunities. It has become increasingly clear over the past decade that the long-term future of Dun Laoghaire Harbour Company will be in terms of marine leisure, maritime tourism, cultural amenity and urban redevelopment.*

The proposed development accords with this vision by providing a gateway to Ireland for luxury cruise ships at Dun Laoghaire Harbour, thus cementing the harbour as a leisure / tourism harbour in accordance with vision for Dun Laoghaire Harbour as set out in the National Ports Policy.

Destination Dublin - A Collective Strategy for Tourism Growth to 2020

This strategy identifies five sectors that offer potential for significant growth and the best return on investment for Dublin's tourism sector. One of the sectors identified is 'cruise visitors' who come to Dublin as part of a European cruise. The proposed development seeks to provide a new cruise berthing facility within Dun Laoghaire Harbour to attract the next generation cruise ships to Dun Laoghaire. The proposed development would therefore directly contribute to the aspirations of the Destination Dublin Strategy as it would attract cruise visitors to the Dublin region who are viewed as offering significant growth within Dublin's tourist economy.

Regional Planning Guidelines for the Greater Dublin Area 2010-2022

Section 6.3.4 'Ports' of the Regional Planning Guidelines concludes that there is a requirement for '*increased port capacity in Ireland by 2025-2030'* and that Dun Laoghaire has '*a role to play in port capacity at a smaller scale and in relation to specialist needs.'*

The proposed development will contribute substantially to this objective of the Regional Planning Guidelines by facilitating the niche market of luxury cruise shipping to be developed at Dun Laoghaire Harbour.

Dun Laoghaire – Rathdown County Development Plan 2010-2016

The Dun Laoghaire Harbour area is zoned Objective "W" which is to *"To provide for waterfront development and harbour related uses".*

Chapter 4 of the Written Statement of the County Development Plan 'Dun Laoghaire Urban Framework Plan' sets out the vision for Dun Laoghaire which includes *"to protect the harbour for harbour based uses (4.3.1)"*

Specific Local Objective 13 provides for the development of Dun Laoghaire Harbour in accordance with a Harbour Masterplan. The Dun Laoghaire Harbour Masterplan 2011-2030 has been completed in accordance with Special Local Objective 13 of the County Development Plan.

The proposed development conforms with the zoning objectives, local objectives and specific local objectives of the Dun Laoghaire-Rathdown County Council Development Plan 2010-2016 in relation to the development of Dun Laoghaire Harbour.

Dun Laoghaire Harbour Masterplan 2011-2030

The Harbour Masterplan was completed in accordance with Special Local Objective 13 of the County Development Plan.

Strategic Objective 5 of the Dun Laoghaire Harbour Masterplan under the heading of 'Harbour Functions' is as follows:-

> *Accommodate cruise liner facilities, having regard to the needs of other harbour users, potential environmental impacts and the feasibility of providing such facilities*

The proposed development meets Strategic Objective 5 of the Dun Laoghaire Harbour Masterplan 2011-2030 by providing a cruise facility that would be beneficial to national, regional and local economy and where environmental impacts have been fully considered.

Draft Dun Laoghaire Rathdown County Development Plan 2016 – 2022

Under the draft plan, Dun Laoghaire Harbour remains zoned Objective W: "*To provide for waterfront development and harbour related uses"*.

Policy E14 under Tourism and Recreation has been introduced to the Draft Plan and states:-

> *"It is Council policy to co-operate with the appropriate agencies in promoting sustainable tourism and securing the development of tourist and recreation orientated facilities in the County."*

In the discussion that follows relating Policy E14, the Draft Plan states:-

> *Dun Laoghaire has been designated as a centre for marine-related tourism under the National Ports Policy. The strong growth in cruise tourism in the town has the potential to deliver a significant economic benefit to both the town itself and the wider County. The cruise business is a growing market sector in the tourism industry and Ireland has recently begun to capitalise on this market and has succeeded in attracting a growing number of visits by cruise liners.*
>
> *Dun Laoghaire has been important to attracting these cruise calls, and in 2015, Dun Laoghaire Harbour Company estimate that over 100,000 passengers/ crew will visit the town as part of their cruise tour.*

The proposed development supports this draft policy by providing a new cruise berthing

facility within Dun Laoghaire Harbour, capable of catering for the larger new generation cruise ships. The proposed development will therefore greatly contribute to the growth of cruise tourism in the county in accordance with the above policy aspirations.

3.1.3 Economic Considerations

In relation to economic feasibility, an economic impact assessment has been prepared by DKM Economic Consultants and is included in this planning application. In summary, the report advises that the following economic benefits would arise from the proposed development:

- The construction of the proposed cruise berth will contribute approximately €21 million to the national economy.

- Approximately 200 FTE jobs will be provided by the construction phase of the cruise berth, taking direct, indirect and induced impacts into account.

- The economic impacts for Dun Laoghaire are considerable and are estimated to lie between €16 million and €41 million after twenty years, depending on the number of vessels coming into Dublin Bay.

- After twenty years, it is estimated that the number of permanent jobs created in Dun Laoghaire as a result of the project will be between 70 and 250, based on the expenditure of the cruise passengers and crew under the scenarios described in the Economic Impact Assessment that is included with this application.

This indicates that the proposed development would contribute to the national, regional and local economy and would also assist in the making Dun Laoghaire Harbour a financially viable harbour.

In conclusion, there is a strong development rationale supporting the proposed development from a locational, economic and policy viewpoint. It is worth noting that the current proposals for the new quay and berthing arrangements have been devised following several years analysis of the technical requirements of similar facilities, including review of research by others into the subject. The design evolution of the scheme and the alternatives considered are set out in Section 3.6 of this EIS.

3.2 General Description Of The Works And Uses Proposed

3.2.1 Location of the Project

The proposed cruise facility is located within Dun Laoghaire Harbour and the navigation channel approaching Dun Laoghaire Harbour, as indicated on Figure 3.2.1

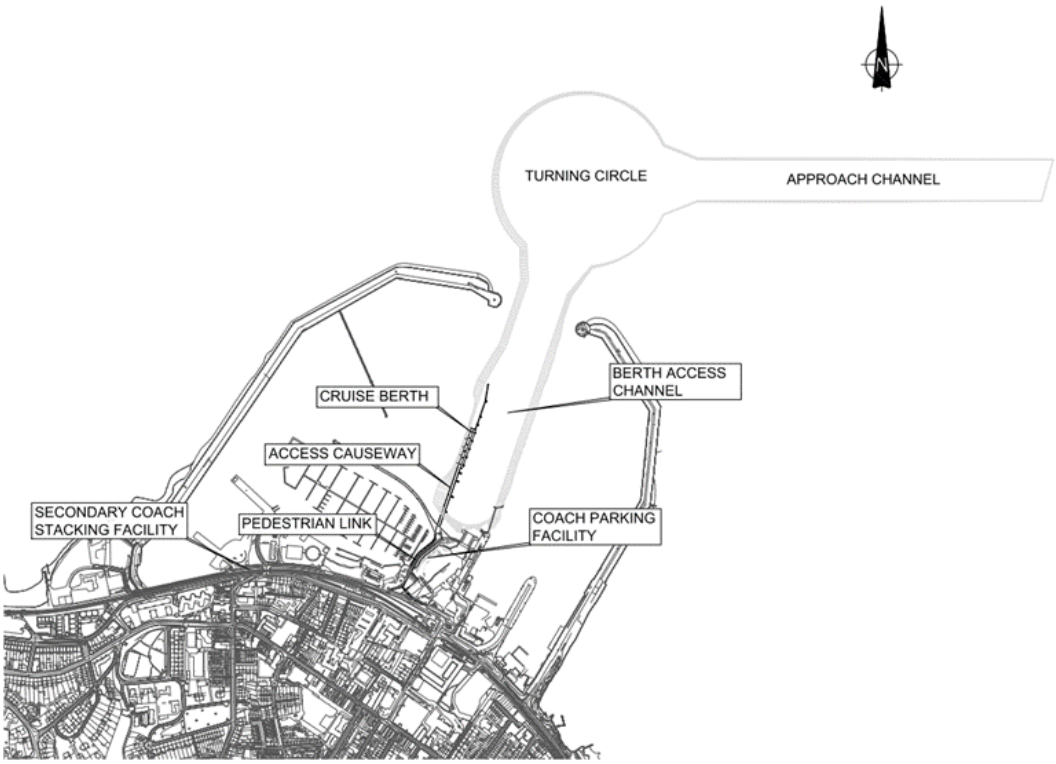


Figure 3.2.1 – Site Location

3.2.2 Proposed Development Works

The development as illustrated on the planning drawings comprises of:

Maritime Works

- An approach navigation channel approximately 1,150m long situated beyond the existing Harbour breakwaters
- A vessel turning circle approximately 500m diameter, situated outside the existing Harbour breakwaters
- An inner navigation channel approximately 850m long within the existing Harbour breakwaters
- A new quay approximately 435m long constructed in the west of the harbour water body

The engineering characteristices of the proposal relate to making provision to berth Freedon Class cruise liners which may have a displacement of 71,200 Tonnes, with a length of 340m, beam of 48m and draught of 8.8m. The PIANC (1995) guielines for sizing the approach channel dimensions for this type of vessel stipulate a channel width of 120m and depth of approach channels and turning circle, as discussed below.

Vessel manoeuvring computer simulations have been undertaken (Moffatt & Nichol, 2014 – refer EIS Volume 2, Appendix 3.1) to ascertain the feasibility of bringing these very large ships into Dun Laoghaire Haroubr under a range of tide and wind conditions. These simulation models incorporate bathymetry and channel dimensions as there is an interaction between the vessel and these surfaces.

The new navigation channels and turning circle will comprise dredging below the existing bed surface to -10.5m Chart Datum (CD). This will allow entry of the anticipated 340m class cruise vessels to enter the harbour at all states of the tide.

To help mitigate the effects of dredging a small amount of dredged material will be excavated and deposited locally in an existing scour hole. This will have the further beneficial impact of reducing the risk of instabilty in the nearby existing harbour structures.

The methodology for the dredging of sediments from the sea bed is discussed in this chapter section 3.5, but reference can also be made to Chapter 5.3 Soils in relation to sediment material quality.

Two additional visible navigation aids are proposed at the outermost entry to the outer channel, relying additionaly on a recharted system of virtual buoys to help navigate the turning circle. A further navigation light will be affixed to the outermost mooring dolphin with the Harbour walls.

Concrete mattresses will be provided at the landward end of the dredged channel to provide scour protection of the existing marina eastern breakwater, and locally where it is necessary to steepen the dredged side slopes.The anticipated form of construction of the new quay will be an open pile structures with suspended concrete quay platforms. A series of breasting and mooring monopiles will be connected using a steel walkway structure. The final choice of suspended quay construction will be decided at detailed design stage subsequent to further site investigation.

Local adjustments to the marina eastern breakwater are required at the interface of the marina eastern breakwater structure and the proposed new quay structure, however no significant change in breakwater level is envisaged.

Local repair of a small number of dislodged masonry blocks from the West Pier Roundhead will be carried out.

Landside Works

As indicated in Figure 3.2.2 the proposed landside works comprise:

- A shared use pedestrian and private vehicle access zone located adjacent to the existing Marina together with a new boardwalk parallel to this shared area, complete with new feature lighting
- A new pedestrian footpath with high quality concrete pavement along Harbour Road providing linkage with the existing Terminal Plaza complete with new feature lighting
- A 22 coach drop off/ pick up area within a dedicated section of the existing HSS ferry marshalling area, plus a further 5 minibus spaces
- A net extra 9 pay-and-display parking spaces off Harbour Road
- A security kiosk and office building on the existing Eastern Breakwater
- A coach overflow holding area placed within Accommodation Walk which straddles the Old Quay Bridge at the west of the Harbour
- Local modifications to an existing retaining wall adjoining the car park located adjacent to the Old Quay area also at the west of the Harbour
- Demolition of certain harbour infrastructure such as an RC boundary wall along the HSS Yard boundary, the motorist's administration building, a section of the Porte cohere canopy structure, plus tree removal and replacement
- Construction of new buried utilities and services, and miscellaneous lighting columns and signage for vehicles and non-motorised users.

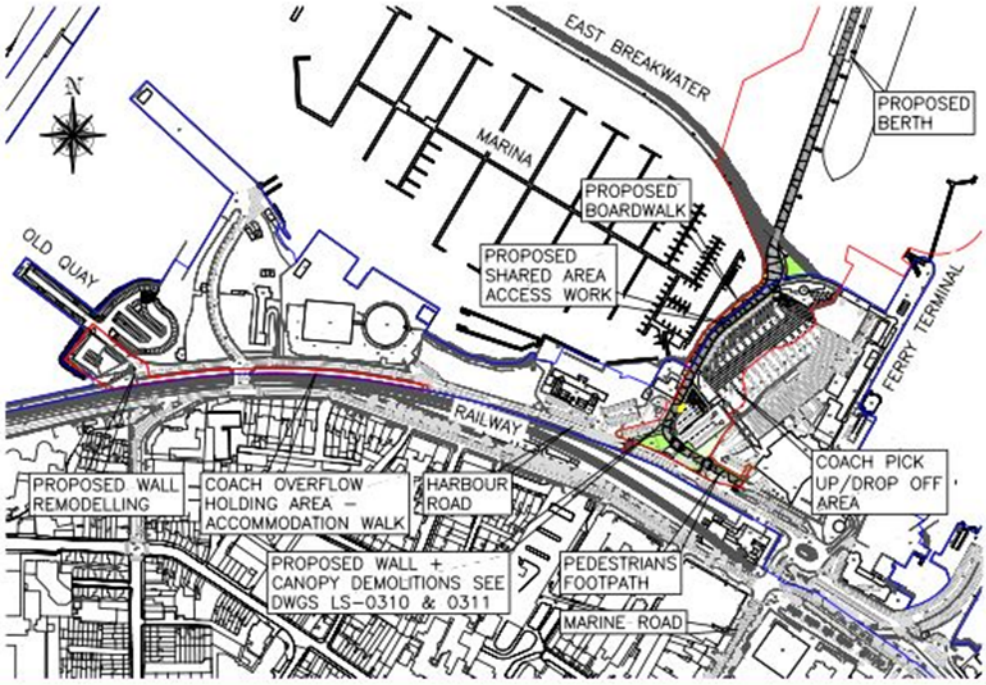


Figure 3.2.2 – Landside Works Locations

The existing public access to the marina eastern breakwater facing the marina will be reinstated on completion of the cruise facility.

Materials arising from demolition will be screened and reused on site within the Harbour where practicable, however refer also to Section 5.9 of the EIS (Material Assets – Waste) for further details regarding the waste strategy adopted for the cruise facility construction.

3.2.3 Removal of Existing Stena Line HSS Infrastructure

There is currently no ferry service in operation from Dun Laoghaire Harbour. Stena Line ceased operating a seasonal service to Holyhead with its HSS catamaran in 2014. The existing Stena Line infrastructure, including the linkspan and dolphins off St Michaels Pier, is shown on the planning drawings as being removed when the cruise berth is in place. Following the departure of Stena Line from Dun Laoghaire Harbour in recent months, discussions have commenced between the Harbour Company and Stena Line to have this infrastructure removed in line with the agreement in place. That process, including all necessary consents, is being undertaken independently of this cruise berth proposal. As a result, the proposal drawings and the EIS have assumed that this infrastructure will have been removed before the cruise berth is operational.

3.3 Site Layout And Proposed Built Form

3.3.1 Approach Channel

It is proposed to dredge a new approach channel from deep water in Dublin Bay to the proposed new berth to a depth of -10.5m Chart Datum (CD). Chart Datum is a reference level on Admiralty Charts, which approximately equates to the lowest astronomical tide, and all water depths are related to this datum. A depth of -10.5m CD will allow cruise ships up to the selected class to access the berth at all states of the tide.

The current seabed shallows to approximately -7m CD outside the existing harbour, and to a minimum depth of around -4m CD along the approach within the harbour, although a deep scour hole exists in front of the HSS berth which will be filled as part of this project. The

bathymetry, or sea bed slope, outside the harbour is oriented approximately east/west. The shortest route from the berth to deep water involves turning the ship just outside the harbour and then heading in an easterly direction until the -10.5m CD contour is reached.

Within the harbour the approach channel will be positioned so that the centreline of the berth will be located 120m to the west of St Michaels Pier. This is considered to be the easternmost location possible without the dredged channel having an adverse effect on St Michaels Pier itself. The channel and berth will be oriented to align with the centre of the existing harbour entrance so that the cruise ship will not have to undertake any turns within the harbour itself. The cruise vessel would either turn outside the harbour and back down the channel onto the berth, or steam onto the berth and back out into the turning circle, depending on conditions.

The proposed alignment results in an approach channel approximately 2.5km long, with a dredged turning circle outside the harbour. The position of the turning circle has been optimised to limit the volume of dredge material, and has been located away from the shallow water present just outside the western roundhead.

A channel width of 120m is proposed and the turning circle will be 500m in diameter. A local widening of the channel tapers the intersection between the channel and the turning circle. Simulated navigation studies have been undertaken, and the channel width and turning circle are sufficient to permit the selected cruise vessel class to navigate the approach, un-assisted by tugs, in conditions up to the tested wind limits. With their large windage areas cruise ships are highly sensitive to the effects of wind and slow speed manoeuvres of these vessels are typically restricted to wind speeds of 25 knots or less, depending on propulsion capabilities. A wind speed of 15 knots (hourly average) was simulated for vessels with fixed propulsion systems, and a wind speed of 25 knots (hourly average) was simulated for vessels equipped with azipod propulsion systems (which is the case for the selected cruise ship class). Based on available data an hourly average wind speed of 25 knots is considered to have a very low probability of exceedance at Dun Laoghaire, and that should it be exceeded vessels would not approach the harbour and would wait for lighter air.

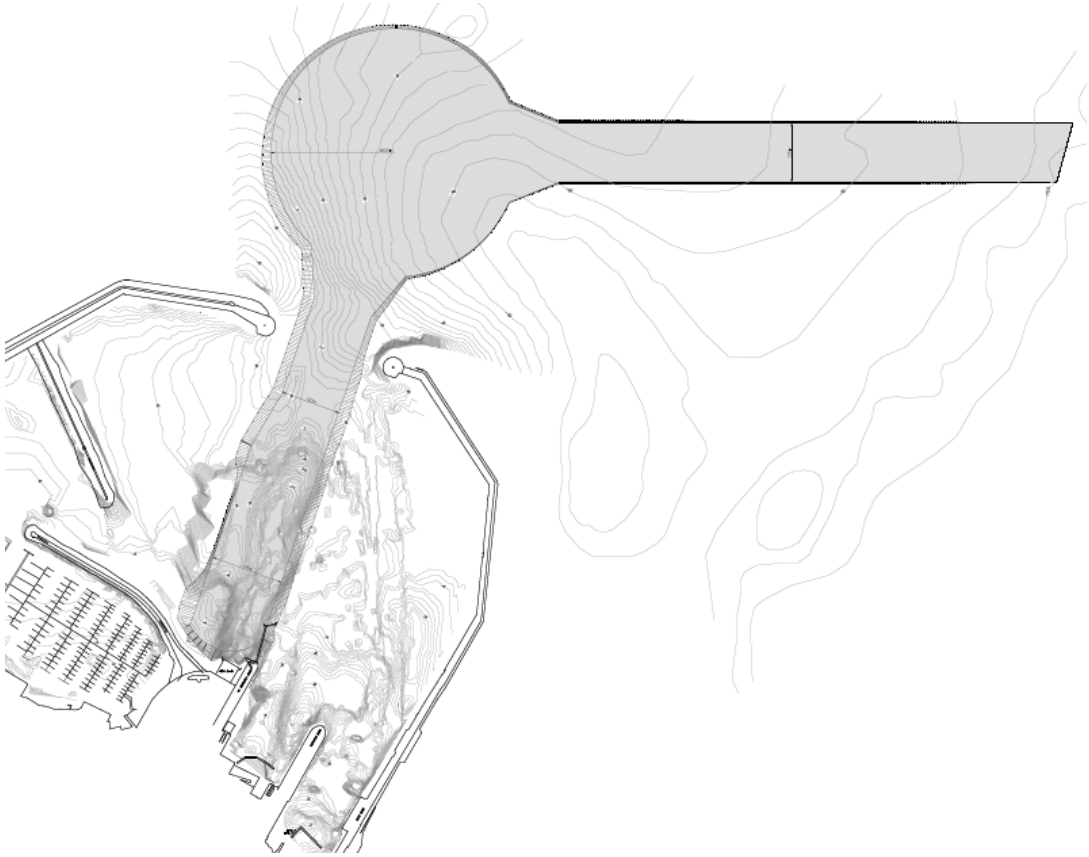


Figure 3.3.1 – The Approach Channel

Larger vessels will navigate the approach channel using a system of 'virtual buoys'. There will be two additional visible navigation aids outside the harbour. Inside the harbour, a navigation light will be added to the outermost part of the proposed structure. Other amendments to navigation within the harbour will be repositioning of the fairway line in the western harbour, so that it runs directly from the harbour entrance to the entrance of the inner harbour (discussed in further detail in section 3.5.1 below).

The side slopes of the dredged channel are generally shown at a gradient of 1:5, and are discussed in further detail in section 5.3 - Soil. Including the side slopes and an allowance for dredging tolerance, the approach channel will have a total dredge volume of approximately 710,000m^3, and cover an area of approximately 472,000m^2.

The cruise ship will berth close to the end of the new dredged pocket and scour of the side slopes at this location is a potential problem. Scour protection will be installed below the waterline to protect the area defined in Figure 3.3.2.

3.3.2 Quay Structure

A new quay structure is to be constructed along the western side of the dredged channel. The centreline of the structure will be positioned 120m to the west of St Michaels Pier, and it will be oriented to align with the berth and approach channel as discussed in section 3.3.1 above. The structure will extend approximately 435m north-northwest into Dun Laoghaire Harbour from the shore, and is comprised of three sections: the quay itself, a causeway for access, and the mooring dolphins. The structure has been designed to accommodate vessels up to the size of the selected class.

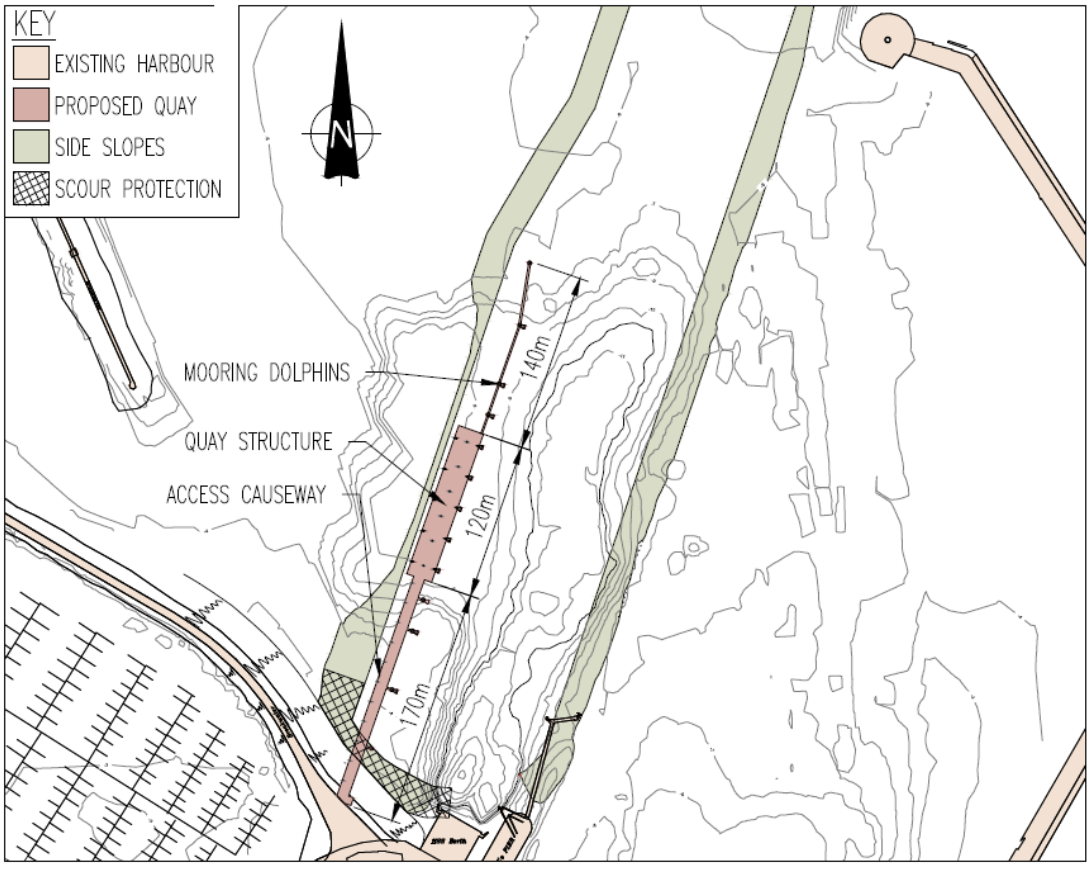


Figure 3.3.2 – Plan of the Quay Structure

The main quay will consist of a 120m long, 20m wide concrete deck, set at a level of +6.9m CD (the same level as the existing inner eastern breakwater). This level will provide 2.8m freeboard at mean high water springs (MHWS) and 6.1m at mean low water springs (MLWS).

During more extreme tidal events the freeboard will be reduced, but during the highest astronomical tide of 4.6m CD combined with a storm surge with a 20 year return period (0.93m) the freeboard will still be 1.37m.

The main quay will be connected to the shore by an access causeway. The 9.1m wide concrete causeway will incorporate integrated pedestrian/traffic barriers and a service duct for water and electricity. The road and pedestrian walkway are designed as a 'shared surface'. The quay structure and the causeway are 'open quay structures', and will be supported on an arrangement of concrete filled tubular steel piles 750-1000mm in diameter.

Mooring and berthing requirements beyond the length of the main quay will be provided by the mooring dolphins. 8 mooring dolphins are proposed, 4 between the quay and the shore, and 4 beyond the quay extending in a line into the harbour. The mooring dolphins will consist of 3m diameter concrete filled steel mono-piles, driven into the seabed to a suitable depth. The piles and mono-piles are discussed in further detail in section 5.3 - Soils. Each of the mooring dolphins will be structurally independent.

The main quay structure and the mooring dolphins will incorporate a fender system and T-head bollards for the mooring of vessels up to the design class. The outer mono-piles will be accessed from the end of the quay using a series of long walkways, while the shoreward mono-piles will each be accessed from the causeway.

Local repair of a small number of dislodged masonry blocks from the West Pier Roundhead will be carried out, is isolation from the adjacent dredging works.The main quay construction will include tall lighting columns on the centreline that will provide an average light intensity of 20 lux. The structure will also accommodate water connections / firefighting hydrants, power connection for maintenance work, rescue buoys, ladders for emergency access from the water, CCTV cameras, and a navigation light on the outermost monopile.

Further details of the construction of the quay structure can be found in Section 3.5 – Construction and Phasing.

3.3.3 Landside Works

The land side works will comprise access ways and infrastructure required to handle passengers transferring to and from the cruise ships once they have arrived off the vessel at berth (see Figure 3.2.2). These shall be designed to be consistent with a normal port of call designation for cruise liners entering Dun Laoghaire Harbour.

Passenger traffic between vessel and shore will comprise a combination of pedestrians, shuttle bus and/or shuttle cars. It is envisaged their onward journey will be a made up of a combination of:

a. Pedestrians exiting onto Harbour Road and thereon to Marine Road into Dun Laoghaire town;
b. Coach passengers exiting via Harbour Road and onward through the Harbour road system to the public road system;
c. Taxi and minibuses for passengers who generally will have already made pre-booked travel arrangements.

Attention has been made to making the pedestrian experience as open and user friendly, as possible. Further details of the design approach taken in this regard are provided in section 5.9 of the EIS (Material Assets – Transportation) and EIS section 5.11 (Architectural).

Broadly, three separate areas make up the proposed landside works, as follows:

1) A vehicle pedestrian shared access corridor running north-south connecting Harbour Road adjacent to the existing ferry terminal with the landward end of the proposed access causeway located at the Eastern Breakwater; A proposed new boardwalk will be added facing the Marina; Also, a new security checking office for passengers will be situated at the landward end of the access causeway;

2) A pedestrian footpath running east-west parallel to the Harbour Road;

3) Overflow coach parking located in the existing Accommodation Walk running east-west parallel to the Iarnrod Eireann train line.

The proposed shared access road corridor running north-south adjacent to the existing Marina frontage will cater for pedestrian cruise passengers whilst also retaining the existing public access to the Eastern Breakwater and the proposed boardwalk.

The envisaged electric shuttle cars will bring some passengers from the vessel to a set-down transfer area at the north of the access corridor.

The overflow parking area would cater for the temporary parking of coaches before they proceed, only when required, along Harbour Road to the new access corridor road.

A net addition of 9 pay-and-display parking spaces off Harbour Road will result from the relocation of 10 existing spaces.

Spaces for coaches will be provided off the Harbour Road in the existing HSS yard to pick up passengers on arrival and then proceed driving back to Harbour Road and onward to the connected public road system.

3.3.4 Landside Demolitions

The proposed road access corridor works areas described above requires general site clearance within its footprint and also demolition of the following existing structures:

1) The boundary wall running north-south facing the Marina; provision is made however in the new boundary treatment to maintain an emergency access route and gate;
2) A stretched fabric porte cochere framed structure and associated gates;
3) A motorists' administration building opposite the existing Marina Amenity building
4) Miscellaneous lighting columns and signage, relocating items where feasible
5) Removal of a number of existing trees on Harbour Road (with tree replacement in the immediate area)

Once demolition has been substantially completed construction of the shared access road corridor and boardwalk can be expedited.

No demolition or significant works are envisaged along the Accommodation Walk overflow bus park. However to facilitate the easier movement of buses between this and Accommodation Road a section of boundary wall bordering the Old Quay car park requires demolition to ease bus turning movements in the roadway. A replacement wall is to be provided immediately inside the present boundary making this a relatively minor boundary adjustment providing improved public pedestrian space locally here (Refer EIS Vol 2, Drawing LS-0110).

3.3.5 Access Corridor

Provision within this north-south corridor has been made for:

1) A proposed 6.5m to 7.0m wide shared pedestrian vehicle access from the existing Terminal Plaza subsuming the existing public walkway, parallel to the Marina waterfront;
2) A proposed 3.5m wide pedestrian boardwalk, with tiered seating;
3) A 6.0m wide pedestrian area for coach tour pickup/drop off, with chevron herringbone bus parking arrangement;
4) A new security kiosk and office building on the Eastern Breakwater
5) A 2.4m high temporary screen with a bund wall base.

The landside works will also accommodate the necessary services and utilities envisaged for a port of call cruise vessels berthing at Dun Laoghaire Harbour.

The new pavement, replacing the old, will be designed to cater for the envisaged coach traffic together with construction and use vehicles normally associated with operation of a cruise service, and for ongoing maintenance access with the Eastern Breakwater.

The road catchment area will be designed to provide a new replacement surface water drainage system intended to outfall to the existing sea outfall locations via the existing interceptors. No increase in catchment area is envisaged.

A proposed new 100 Dia watermain will be designed running from a connection point on the public supply system at Harbour Road, running parallel to the new access road and ultimately projecting along the access causeway to the cruise vessels at berth. The watermain will be buried within a trench and will be provided with all the normally associated access chambers, valves, thrust blocks, fire hydrants, and the like.

A new electrical power supply line will be designed running in trench from Harbour Road to the berth along the access corridor. This will provide the necessary power to operate landside equipment compatible with a port of call service, and will be provided with the normally associated pillars and metering apparatus.

The completed access corridor will be provided with the normally associated road lighting (replacing existing) new feature lighting, new road markings, directional and regulatory signage consistent with the new road layout. New replacement pedestrian fencing will be provided along the Marina boardwalk, together with a 2.4m high boundary screen along the realigned HSS Yard perimeter.

The junction with Harbour Road will be provided with retractable bollards to restrict public vehicle usage of the north-south shared surface.

3.3.6 Finishes

The existing concrete road and paving surfaces will be replaced with a high quality concrete paving shared surface, whilst the pedestrian pedestrian boardwalk will be finished with high quality timber decking. The finishedquality envisaged has been described in more detail in the architectural heritage Section 5.11 of the EIS.

3.3.7 Utilities and Street Lighting

On the landside reference has been made above to normally associated road lighting (replacing existing), new feature lighting, new road markings, directional and regulatory signage consistent with the new road layout.

A 100 Diameter watermain will also extend from a connection at Harbour Road along the access corridor, full length of the causeway and quay, where it is proposed to terminate on an end-loop – refer to Drawing SA-0051. Hydrants at key positions along the quay structures have been indicated.

Lighting has been designed on each service area per the following table:

Table 3.3.1 Proposed Street Lighting Designs

Location	Existing	Proposed	Design (Lux)
Harbour Road	Standard Road Lanterns	Reused and Relocated	As Existing
Shared Pedestrian Area/ Boardwalk	N/A	As Above and Column Feature	20
Access Causeway	N/A	Column Feature	10

Quay Berth	N/A	Standard Lanterns	20
Monopiles	N/A	Down Lighters	20
Walkways to Monopiles	N/A	Down Lighters	20

Where mitigation may be required lanterns can be chosen as part of the detail design to minimise light overspill down to water level, for example those on the main quay structure have been positioned centrally on the deck automatically achieveing the desired mitigation.

Over the same extent to the outer quay it is also proposed to provide new power supply, a CCTV supply, and spare ducting for future provision.

3.3.8 Off-Season Uses / Community Gains

During the off-season period, the proposed cruise berth has the potential to be used to berth other ships. The cruise berth has the ability to take visiting naval ships, tall ships, and any other type of vessel that might be seeking a temporary berth in the Dublin Bay area. The size of the berth and depth of water means it will allow Dun Laoghaire Harbour to facilitate bigger visiting ships than can currently be accommodated on the Carlisle Pier or St Michaels Pier. The proposed cruise berth can also be used for boat storage during the off-season winter months. These alternative off-seasons uses can be viewed as a public gain to the Dun Laoghaire Harbour community.

Other community gains include the significant upgrades to the pedestrian network and public realm improvements in the harbour area as a result of this project. Particularly the proposal provides for upgraded pedestrian linkages from Dun Laoghaire Harbour to nearby public transport links (including the DART Station and Dublin Bus Stop) and to Dun Laoghaire town centre. These pedestrian routes will be available to both cruise passengers and the general public. The scheme allows for public access and use of the proposed boardwalk, the shared access route and the connecting footpaths.

3.4 Other Developments in the Harbour

3.4.1 St. Michaels Pier

Dun Laoghaire Harbour Company's overall aspirations for St. Michael's Pier will be delivered through a number of projects including the cruise berth project that is the subject of this planning application; St. Michael's Plaza Project; and the National Diaspora Centre Project. These latter two projects are future projects envisaged for Dun Laoghaire Harbour and are not the subject of this planning application and would therefore be subject to future planning applications, independent of this current planning application. The overall re-development of the waterfront will not all happen at once, rather it will be delivered in a phased manner, that will occur over time in accordance with the Dun Laoghaire Harbour Masterplan 2011-2030. The provision of a cruise berth is just one element of the re-development of the harbour. Figure 3.4.1 below is a visual representation of the redeveloped St. Michael's Pier, contained within the Dun Laoghaire Harbour Masterplan 2011-2030.

Figure 3.4.1: Extract from Dun Laoghaire Harbour Masterplan 2011-2030.

Furthermore, we draw attention to the presentation entitled 'Dun Laoghaire Harbour: St. Michael's Projects' that was made to Dun Laoghaire-Rathdown County Council in January 2015 and provided at Appendix 1.4 of this EIS. Particularly, this presentation sets out the proposed cruise berth's connection to the town via the west side of the pier and the longer-term aspirational connection to the town centre via the east side of the pier, achieved through the delivery of the St. Michael's Plaza Project.

An upgraded pedestrian route to public transport links and to Dun Laoghaire Town Centre is an integral part of the proposed development. The objective is to provide a pleasant pedestrian experience for passengers and to link them as closely as possible to the tourist and commercial attractions in Dun Laoghaire town. The upgraded pedestrian linkages will be available to both cruise passengers and the general public. As detailed on the plans submitted as part of this planning application, these pedestrian linkages will be attractive, part-boardwalk pedestrian routes, located along the waterfront, that will guide cruise visitors to Marine Road and the town centre, thus achieving the desired physical connection between the proposed development and the town centre.

The proposed cruise berth's pedestrian connection to the town via the west side of the pier and the longer-term aspirational pedestrian connection to the town centre via the east side of the pier, achieved through the delivery of the St. Michael's Plaza Project, is detailed in the figures below.

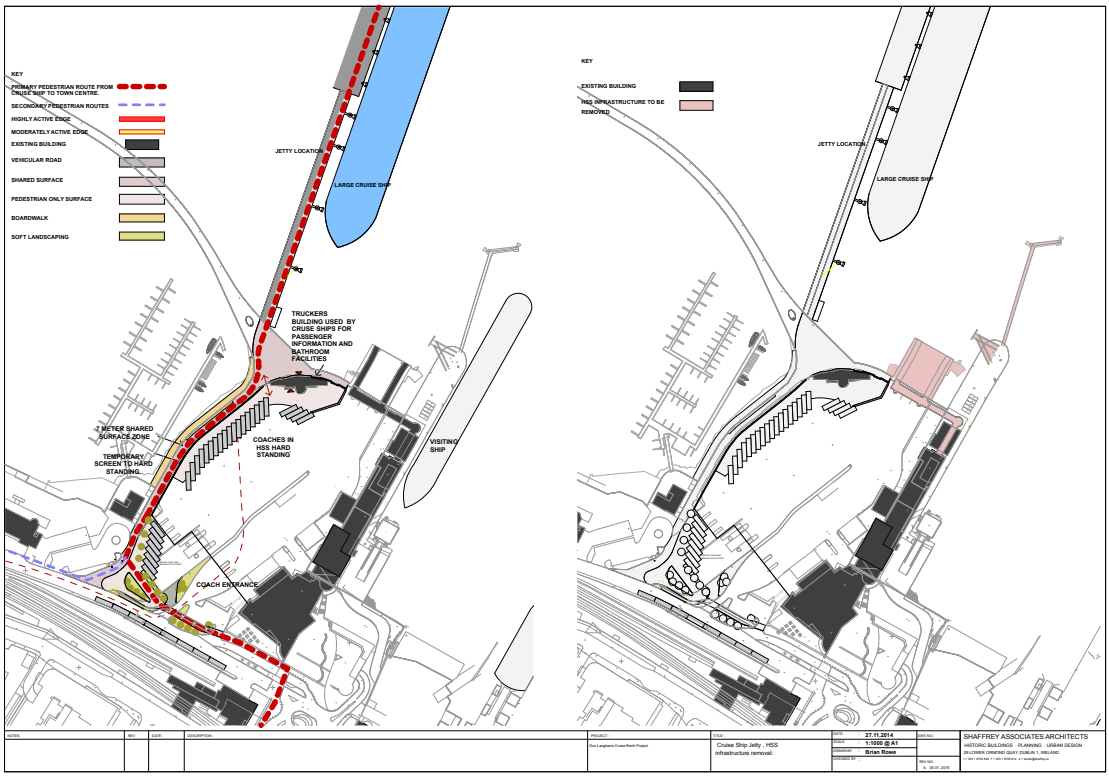


Figure 3.4.2 Pedestrian route from cruise ship to town centre proposed under this planning application.

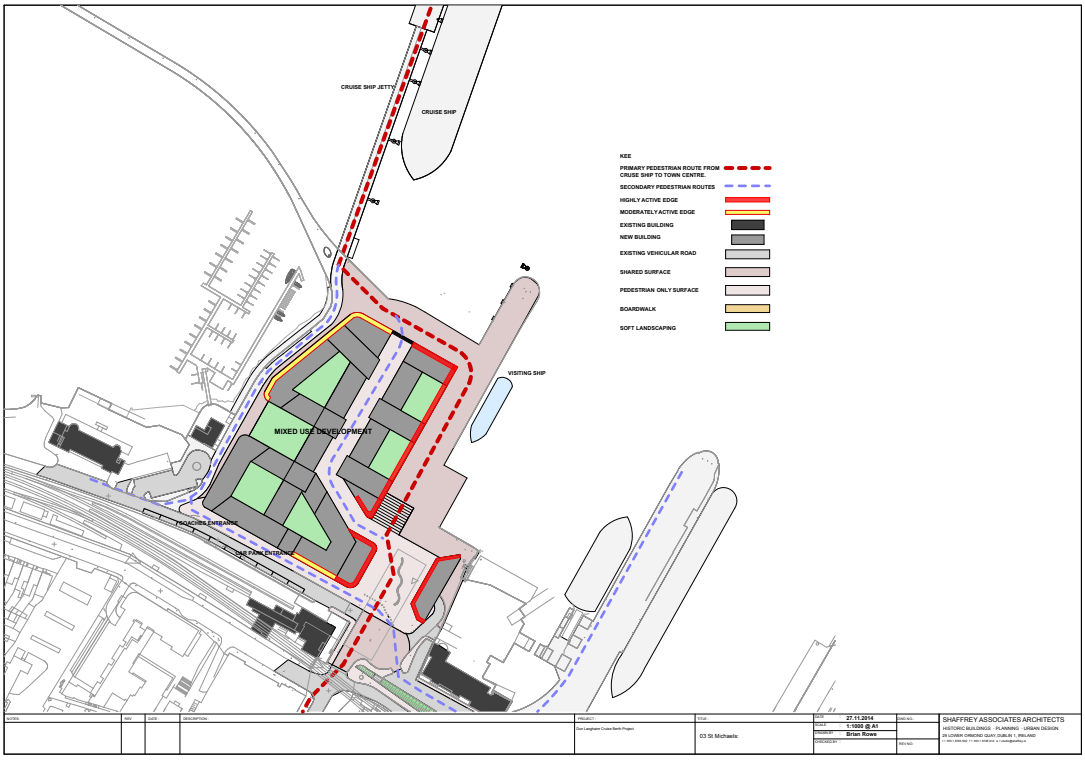


Figure 3.4.3 Pedestrian route from cruise ship to town centre, following delivery of St. Michaels Plaza Project.

3.4.2 Carlisle Pier Area

The following extant planning permissions are in place for the Carlisle Pier area:

D14A/0407 – Temporary permission for occasional event space, car parking and ancillary development

Planning permission Ref: D14A/0407 consists of a number of elements of temporary permission including:

- Permission for temporary continuance (3 years duration) of Carlisle Pier as a public pay and display car parking facility and occasional event space. Associated works include 35no. car parking spaces situated along the western fence on the pier, parking ticket machine and railings and gates around the facility;
- Permission for new temporary works including 4no. disabled car parking spaces and 2no. standard car parking spaces, situated towards the southern end of the pier;
- Permission of new temporary use of the northern end of pier area, beyond the car park area, as an occasional event space for cultural, social, recreational or sporting events;
- Permission for retention of temporary works including the existing reconfiguration of part of the car parking layout permitted under D10A/0606, including 12no. centrally situated car parking spaces and 28no. car parking spaces located along the eastern fence of the pier; the widening and use of the existing eastern gate to facilitate vehicular circulation through the car park; and the retention of the associated use of the ramp for vehicles using the widened eastern gate and for the retention of the associated ramp handrail.

Planning permission Ref: D14A/0407 was granted by the Planning Authority on 25 September 2014, for a period of three years, which allows the development to be retained until September 2017.

D13A/0682 & ABP PL06D.244306 New urban beach, floating pool facility and all associated works

This development provides a new urban beach and floating pool facility together with a café, toilets and changing rooms at Berth 1, East Pier, Dun Laoghaire Harbour. The general location of this proposal in respect of the wider harbour area is illustrated in Figure 3.6.4 below.

The main elements of the proposed development are summarised as follows:

Urban beach

- Café with outdoor seating area, changing rooms, toilets and showers.
- Tensile sail canopies/awnings on metal posts to be erected over the beach area.
- Wind break of transparent PVC to be erected between gangway and dry beach.
- Beach to consist of synthetic timber deck with a non-slip finish and will be overlaid on the existing reinforced concrete Berth 1. Further (wet) beach/pool user area to south formed using new surfaces laid on top of berth, (GFA 612m^2).

Floating swimming pool

- Heated, treated outdoor saltwater swimming pool constructed on a recycled barge (approx. 825m^2) to be moored beside Berth 1 and connected to Berth 1 by a changeable gangway (move with tide).
- Pool measures 75m long x 11m wide and together with gangway, would extend 16m from Berth 1.

- It would be split into a children's pool, leisure area and swimming channel. Pool will sit 2.9m above the water level, including a 1.4m high safety railing enclosing the pool area.
- Pool water will be taken from and discharged to the harbour following cooling and treatment by means of sand filters will remove chemicals.

Utility works

- Underground pumping station on East Pier adjacent to Berth 1.
- Local connection to DLR County Council gravity foul sewer in the Metals south of the pedestrian Bridge 95.
- Surface water will be discharged to the harbour.
- Installation of local electricity duct from the base of Carlisle Pier to the base of the East Pier.

Bicycle stands

- 68 no. new Sheffield stands at base of pier on upper and lower levels.

Restricted access

- Facilities available to public on payment of a fee. Glazed screens (2.3m high) and security gates will separate the area from the public promenade.

Temporary and seasonal

- Proposed works to be temporary and seasonal (spring and summer) and to involve minimal interference with East Pier Protected Structure.
- The structures will remain in place during the off-season, but canopies and screens may be removed.
- Public access may be available in off-season. Pool will remain in place and be filled with water to provide ballast.

Sustainable development

- Works to incorporate renewable energy and sustainable design features.

A Notification of Decision Grant Permission was issued by the Planning Authority on 28th November 2014 subject to 21 conditions. This decision was subject to a third party appeal to An Bord Pleanála who granted planning permission on 13th May 2015 subject to 20 conditions. In reaching this decision, the Board noted that

> *"Having regard to the coastal location of the site within Dun Laoghaire Harbour, to the historic, yet dynamic nature of the harbour which is designated as a candidate Architectural Conservation Area and within which the East Pier is a Protected Structure, to the 'W' zoning of the site in the current development plan for the area, to the range of policies and objectives contained in the development plan, including SL013 which seeks to facilitate the development of the harbour in accordance with the Harbour Masterplan, and to the temporary and seasonal nature of the proposed recreational facility, it is considered that the proposed development, subject to compliance with the conditions set out below, would be an appropriate form of development at this location, would not seriously injure the amenities of the area, would be in accordance with the zoning objective for the site, would not detract from the character or special interest of the Protected Structure, would preserve and enhance the character of the candidate Architectural Conservation Area and would not be likely to have significant adverse effects on the environment. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area".*

The proposed cruise berth facility that is the subject of this application, has been sited to have regard to this Urban Beach Project – refer to Section 3.6 of this EIS for further details (Main Alternatives Considered).

3.5 Construction And Phasing

3.5.1 Introduction (Maritime)

This section of the EIS refers to the Maritime aspects of the propsed works and is intended to set out an indicated construction methodology and sequence for the proposed new cruise berth.

The propsed cruise facility has two main components, namely the dredging of a 2.5km long approach channel, both inside and outside the harbour, and the construction of a new deep water berth. The proposed channel progresses from the east breakwater land end through the harbour mouth then turning generally eastward until the -10.5mCD existing contour level isintersected. Other channel routes to the north required far longer dredge lengths before reaching the -10.5mCD contour, and were eliminated for practical reasons including reduced dredge volumes.

The capital dredging work will be undertaken as the first activity and this will be followed by construction of the new quay structure and ancillary works within the harbour. In practice there will be some overlap of activities as the quay construction can commence once the dredging in the area has been completed.

An indicative programme has been provided below in Figure 3.5.4 Indicative Construction Programme.

3.5.2 Dredging

A preliminary bathymetric survey has been undertaken to establish the existing conditions and inform the EIS – Refer contour information Drawingg Nr SA-90-1018. Prior to commencement of any physical work the bathymetric survey of the area to be dredged will be repeated using a combination of sonar and magnetic resonance survey techniques. This will form the baseline for the physical dredging activities and a post dredge survey will be used to confirm final volumes on completion.

The capital dredging works consist of the construction of an approach channel and turning circle from deep water in Dublin Bay to the proposed cruise terminal to a depth of -10.5m Chart Datum (CD). Chart Datum is a reference level on Admiralty Charts, which approximately equates to the lowest astronomical tide, and all water depths are related to this datum. The depth of-10.5CD will allow the cruise ships to access the berth at all states of the tide. The current seabed shallows to approximately -7m CD outside the existing harbour and to a minimum depth of around -4m CD close to the existing High Speed Ferry (HSS) berth. The total dredge volume is approximately 710,000m^3, covering an area of approximately 472,000m^2.

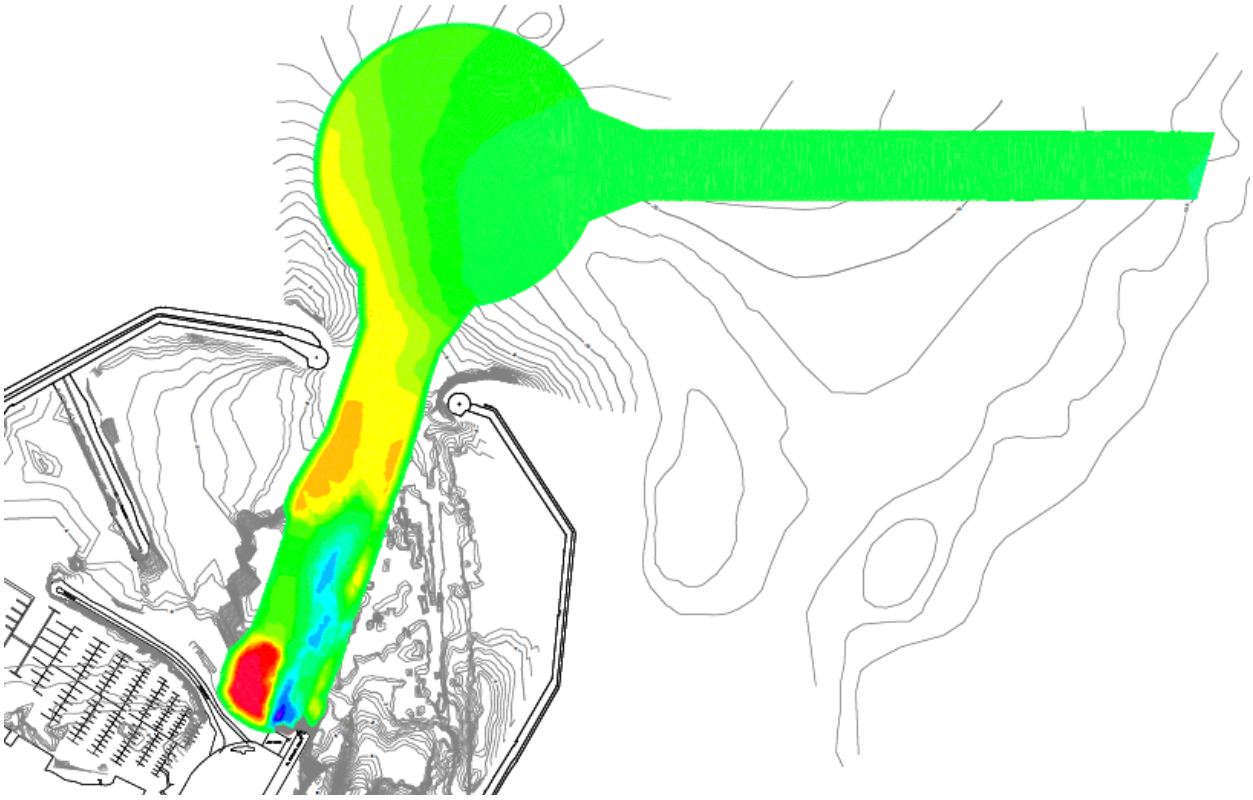


Figure 3.5.1: Dredging Plan (refer to appendix for detailed drawings).

The ground investigation shows that the dredge material is almost entirely (approximately 90%) unconsolidated sands with a very small amount of silt close to the HSS berth. These materials are suitable for excavation using trailer dredging methods. No rock outcrops were encountered in the bed deposits so eliminating the need for blasting techniques.

The works will be undertaken using a medium sized trailer dredger which is likely to have a loaded draft of approximately 7m and a hopper capacity of 5,000m³.

A trailing suction hopper dredger (TSHD) is a sea-going self-propelled ship equipped with one or two suction pipes, designed to hang along the side of the vessel. A draghead is fixed at the lower end of the suction pipe, which is then trailed along the bottom of the seabed. Suction is provided by a pump, which lifts the sand off the seabed and discharges the mixture of sand and water into the hopper well.

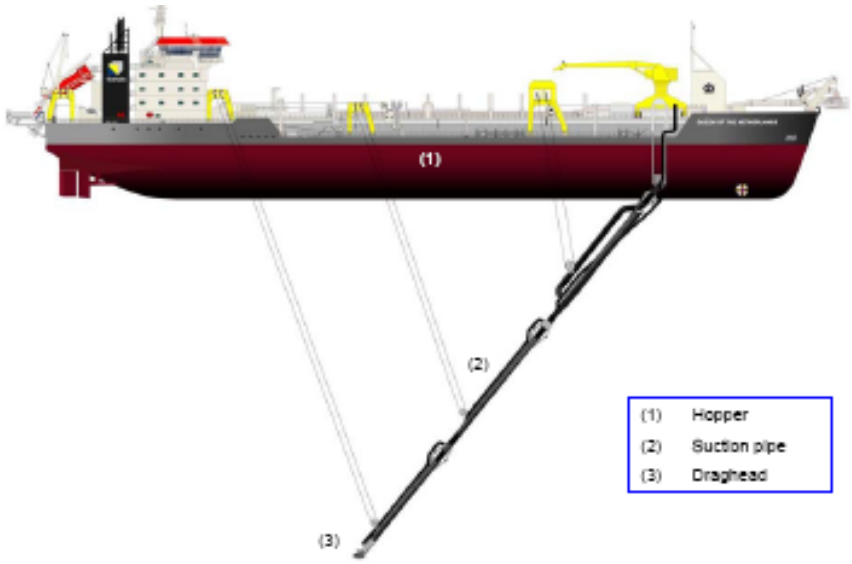


Figure 3.5.2: Typical Trailing Suction Hopper Dredger

Referring to Figure 3.5.2 above, the main mechanical plant aspects of the dredging processes are:

A. Hull: containing the engines, propulsion, deck pump, the crew quarters, the bridge with the navigational control etc;

B. Draghead: connected at the lower (bed) end of a suction pipe, which locally liquefies the sea bottom with the aid of a water jet system. Different types of dragheads can be fitted for efficiency consistent with ambient soil conditions so as to mitigate the effects of local liquefaction;

C. Suction Pipe: through which the water/sand mix is transported up to the pump;

D. Hopper Well: where the water/sand mix is stored during transportation. The coarse sand faction tends to settle within the hopper bottom almost immediately leaving a residual fraction of fines in suspension towards the top of the well;

E. Upper Overflow: and associated "weir" outlet facilitate water "decanted" in a controlled manner. For safety to ensure the vessel is not overloaded the outlet is located as low as practicable on the hull structure. Overflowing of the hopper water will take place but only insofar as it is necessary to obtain an effective load of sediment lower in the hopper, therefore the sediment plume generated from the dredging operations is kept to a minimum (Refer to Section 5.3 Coastal Processes - bespoke plume modelling results carried out by ABPmer Ltd, UK).

F. Monitoring Surveys: Regular in-dredge bathymetric bed surveys will be undertaken to monitor the progress and accuracy of the work. This will identify "high spots" requiring local removal and low areas where no further dredging is required, thereby limiting over-dredging both in terms of bed level and excavated volumes.

The dredger will be equipped with a GPS navigation system which is interfaced to a dredge computer. This allows the real time position of the vessel to be shown in relation to both the dredging and discharge areas and provides for accurate positioning of the vessel thus mitigating over-excavation, as noted above.

Once loaded the dredger will sail to the Burford Bank Licensed Marine Disposal "Spoil Ground" area in Dublin Bay, approximately 4 nautical miles distant, where the material will be deposited using normal bottom discharge methods. To prevent the formation of significant high spots the dredger will continue sailing at reduced speed whilst dumping, always ensuring the material is deposited within the limits of the disposal area. The use of the Burford Bank for this purpose is acknowledged as being the subject of a Dumping at Sea Licence from the EPA.

A trailer dredger is a sea going vessel and as such will normally generate a noise footprint equivalent to vessels of similar size which currently frequent Dun Laoghaire Harbour.

A relevant consideration is that the harbour carries out a capital dredging within the Harbour walls as lately as 2003 associated with the new Marina Development.

The vast majority of the proposed dredge channel is located away from shallow draught areas. A small, shallow draft vessel, plough, or a barge mounted excavator may be deployed to move material from shallow or otherwise inaccessible areas, into locations where the material can be handled by the suction dredger. Referring to Figure 1 above this will arise mainly in part of the red shaded area (refer also Drawing Nr SA-90-1020). The associated volume is estimated at approximately 14,000 cu m which represents 2% of the total estimated dredge volume. Through good construction management practice by a competent contractor the associated impacts should be extremely limited both in location and volume terms.

An indicative programme is included in Section 3.5.4 below. The dredger, probably procured from the UK or overseas, is anticipated to work 7 days a week, and the shortest programme would be achieved where the dredger operates 24 hours a day, as is normal dredging practice in Ireland. Adherence to good practice will ensure a degree of receptor habituation in the initial weeks. The overall dredging programme will depend on the precise vessel available at the time of construction. Based on the operational routine described above, and recommended summer time working, the programme is likely to be in the range of 14-17 weeks. These measures ensure the dredging can be accomplished within one relatively short season.

3.5.3 Quay Construction

3.5.3.1 Piling

All piling on the project will be in the form of steel tubes filled with reinforced concrete. The main quay structure and access causeway will be supported on a grid of 750mm-1000mm diameter pile. Large diameter monopiles will be used to take mooring and breasting loads away from the main quay area

Piling operations will be undertaken from a heavy duty crane barge, moored using spud legs and anchors if required. A multi-purpose support vessel will also be used to transfer crew and materials to the barge. It is anticipated that the same equipment will be used for all pile diameters irrespective of the pile diameter. All piles will be steel tubes with a reinforced concrete infill.

The steel piles will be manufactured off site and shipped to site. As berthing and storage facilities in Dun Laoghaire Harbour are limited the piles will be delivered on a progressive basis as construction progresses, more than likely being delivered by barge from the sea.

Piling operations will commence with the installation of a piling frame to guide the piles into the correct position. Piles will be installed using a drive – drill - drive method, whereby the initial installation of the casing is by using a vibrating hammer or hydraulic piling hammer. The soil and rock within the steel tube will be removed by rotary drilling, with a final drive of the tube to achieve the required depth. With this method it is anticipated that the piles can be founded at the correct design depth without the need for post installation cutting. On commencement of the piling a 'soft start' method will be adopted with the vibrating hammer being used on minimum power being over the initial 20 minute period. Further information about noise generation and mitigation measures is included in Section 5.6 in the EIS.

Referring to Drawing Nr SA-20-0020, the piles will be constructed from water level say at +4.10mCD MHWS through the soil/ water vertical profile consisting mainly of boulder clay underlain by rock at approximately -30.0mCD – the proportion of shallow bed deposits entrained within a pile will be very small. Arisings flushed from the pile may overtop the steel casing and enter the sea but these are likely to take the form of the courser materials considered in the plume analysis for the dredging (refer Section 5.4 Coastal Processes), which will tend to settle to the bed almost immediately rather than be transported latterly. Hence the

impact of discharge from piles will be considerably less than that considered for the dredge activities - all in terms of volume, intermittent occurrence, and dispersed pile locations.

After completion of the installation of the steel tube, the vibrating hammer and piling frame will be removed. A reinforcement cage will be inserted into the steel tube and the whole pile concreted up to the underside of the quay deck level. Appropriate protection measures will be adopted to ensure that concrete is not spilled into the harbour.

The overall piling programme will be approximately 12 weeks with the contractor using extended working hours together with night-time working for quieter activities and deliveries.

Figure 3.5.3: Typical Piling Arrangements

3.5.3.2 Deck Construction

The deck structure is in two parts:

A. the main quay which will be used for berthing operations and for the embarkation/disembarkation of passengers

B. An access causeway which provides access for passengers and light vehicles from the land to the quay.

Both parts of the structure have been designed to maximise the use of precast concrete elements to provide a permanent shutter and a working platform for the insitu works. This will minimise the risk of concrete spills into the water as a complete and sealed precast concrete platform will be present before the commencement of in-situ concreting work. This approach will also minimise the requirements for temporary works over water.

The main quay structure has been designed as a two way spanning slab supported on a grid of precast beams which span approximately 8m in a longitudinal direction and 6m in a transverse direction. The concrete deck will be 500mm thick, with a solid 200mm precast concrete slab forming a permanent shutter and a 300mm reinforced insitu concrete slab.

The precast beams could either be manufactured in a yard on site, or alternatively manufactured off site and transported by either road or sea, depending on the preferences of the selected contractor. Space for a casting yard exists within the landside site area indicated in Figure 3.5.6 which is conveniently placed to receive via Harbour Road the normal compliment of road deliveries, notably readymixed concrete, formwork and reinforcement steel bars and the like. The beams could be lifted into position using a heavy duty barge mounted crane. The beams will be mechanically fixed to the piles as a temporary measure and then the precast permanent shutters will be lifted into place. The whole of the deck structure, including the joints between the precast beam elements, will then then have a reinforcement cage fixed in position. Embedments for bollards and fenders will also be incorporated at this stage. The final operation will be to pour an insitu concrete slab over the whole of the deck area. Concrete could be delivered using ready mix trucks travelling on the already available previously constructed deck and pumped into the final position using a concrete pump similarly situated. This is normal construction practice involving no new or novel features, is well known to contractors, so the likelihood of large grout escape to the receiving Harbour waters is low assuming the normal preventative measures are taken.

After completion and curing of the reinforced concrete slab the bollards, fenders and other furniture will be lifted into position and bolted to the deck.

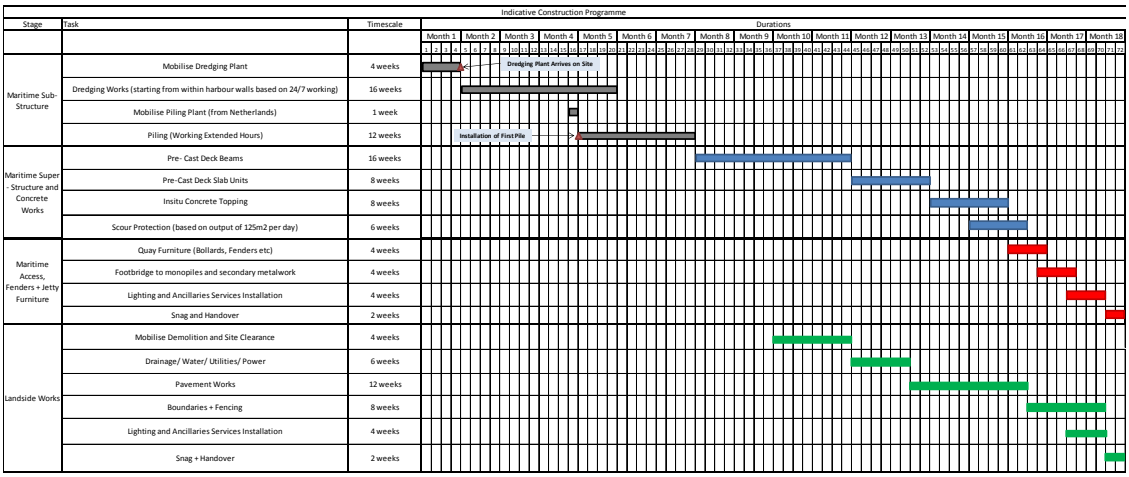


Figure 3.5.4: Indicative Construction Programme (Berth 6)

An indicative programme is included above for the contrution of the proposed new Berth 6. It is anticipated that these elements of the work will take approximately 24 to 32 weeks to complete.

3.5.4 Protection of Existing Structures

Eastern Breakwater

The scour protection at the southern end of the berth when installed will help prevent scour and the undermining of the existing structures when the cruise ship is moving on and off the berth. The scour protection will be in the form of one of the following:

1. A hollow mattress using impermeable closed sock features that is positioned by divers and then temporarily fixed to the floor of the berthing pocket using steel pins inserted using hand tools. The whole of the mattress is then injected with grout from the top to form a permanent concrete protection to the soil slope at the end of the berth. The top, bottom and sides of the mattress will be protected with rock armour to prevent undermining of the mattress once installed. Concrete injection methods will be specified to prevent excessive grout release to the Harbour waters.

2. A precast concrete methodology using precasted blocks tied laterally and longitudinally into flexible mats which are then lifted bodily in draped segments by crane and manipulated into position by divers on the Harbour bed. This method further reduces the use of insitu concrete and the attendant (albeit low) risk of leakege to the Harbour waters.
3. Hybrid systems combining elements of 1 and 2 above such as as precast counterweights and insitu mattress of impermeable socks injected with grout.

Roundheads

The specialist input of a conservation architect to advise on historic structures has been presented in EIS Chapter 5.11, and that role could be extended to the monitoring and construction repair aspects of the Roundhead protected structures.

There are no works engineering envisaged in close proximity to the masonry East and West Piers or the associated Roundheads. The proposed dredged channel would have in excess of 50m clearance. The proposed piling for the berth would be well in excess of 220m away across the waterbody. No blasting techniques are envisaged for dredging. Drill-drive-drill techniques for piling are envisaged for piling specifically to help limit noise and vibration. In Chapter 5.5.5.3 the vibration specialists state the view that due to the distance of sensitive locations to the proposed works there is little likelihood of structural damage. Notwithstanding that, it is intended that the contractor for the works would be tasked to include in the construction management plan (a) pre- and post- condition surveys of the most proximate extents of the Roundheads and locally part of each adjacent pier, and (b) monitoring surveys of a series of monitoring stations to help pick up any potential movement or vibration effects. Monitoring could be accompanied by above and below water sonar imaging to confirm aspects not immediately visible.

Where it has been identified that a small number of masonry blocks require to be replaced primarily at the West Roundhead, it is envisaged that this work could be expedited without impacting on the adjacent dredging. The methodology would simply involve use of static crane hoists situated on the Roundhead deck surface, plus workboats operating in conjunction with divers, to lift each replacement block into position one at a time. Reuse of masonry block "debris" from the sea bed would be very appropriate historically for this purpose.

3.5.5 Temporary Maritime Work Zones

The methods of construction of the cruise berth structures and approach channels have been described in EIS sections 3.5.1 to 3.5.4 above, and in summary require the following floating plant items and vessels:

1. Dredger vessel up to 7m draught
2. Barge mounted excavator
3. Barge mounted piling crane pile hammers, drill heads, plus equipment/ small plant
4. Pile delivery barges – working and backup storage
5. Service pontoons for health and safety provisions
6. Work boat/ tug
7. Service launch vessels for routine access from the existing quaysides to work areas over water
8. Support launch vessels for surveys and monitoring staff

Work Area A shown on Figure 3.5.5 is associated with access channel dredging and piling works for the proposed berth. Work Area B will be dominated by access channel dredging vessels primarily. The vessels listed at 6 to 8 above will be common to both work zones.

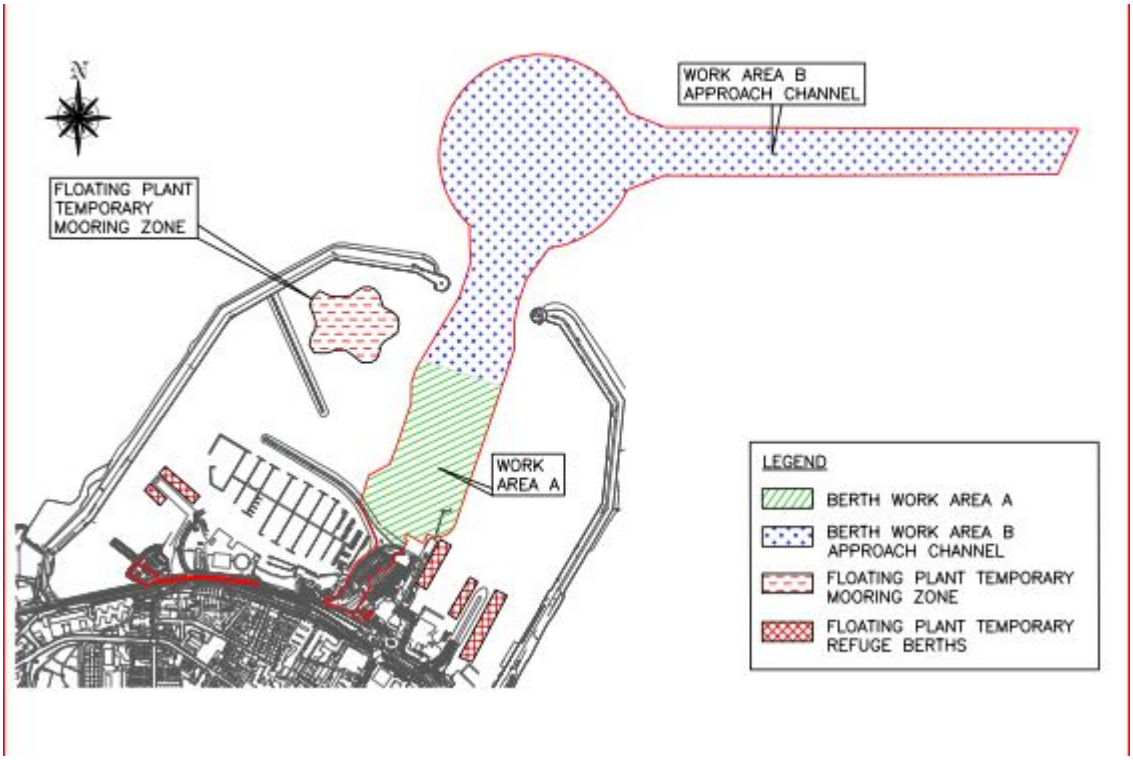


Figure 3.5.5 – Temporary Maritime Work Zones

Barges are normally towed into position using a work boat tug. Once located in position using GPS, barges are anchored. Vessels and floating barges in active performing duty normally require to be anchored or otherwise securely moored, using splayed mooring chains or spud-legs securely anchored to the sea bed. Work boats and service launches normally remain in proximity in readiness in case of emergency on the works barges.

In the event of severe weather conditions during the course of the marine based works, the vessels and barges will stop work and relocate in advance to protected sheltered areas within the Harbour. Figure 3.5.5 shows indicative refuge berths and temporary mooring zones which may be allowed by the Harbour Master depending on vessel draught, berth availability and the quayside connectivity required.

Equipment on barges is loaded in a manner to keep barge stability at a maximum with weight being evenly distributed. Therefore with change of plant items barges normally require to access the quayside temporarily, the indicative locations of which are shown on Figure 3.5.5.

It is normal procedure that each vessel shall be in radio and telephone contact with the Harbour Master. Vessel movements across the work areas are planned, coordinated and monitored colaboratively on a daily rolling programme documented in writen method statements. Notices to Mariners on the Dun Laoghaire Harbour website are used to alert other harbour users in advance, particularly when new maritime conditions or vessels are decided upon.

3.5.6 Introduction (Landside)

This section of the environmental impact statement describes the methods envisaged for construction of the landside works including:

a) The proposed coach park adjacent to the marina

b) The remote overflow coach park adjacent to the Old Quay off Accommodation Road

c) General site access for construction

Further site investigation prior to the detailed design stage will inform the proposed works.

3.5.7 Temporary Site Compounds

The availability of free space within the Harbour properties is extremely limited. To facilitate the maritime works described above here floating marine plant utilising sea access direct to the work site should be maximised. Notwithstanding this, a significant amount of landside construction access is required both for the landside works but also for servicing the maritime works.

The main temporary site compound is envisaged as being the within the footprint of the north-south access route adjacent to the marina illustrated on Figure 3.5.6, with temporary traffic access off Harbour Road.

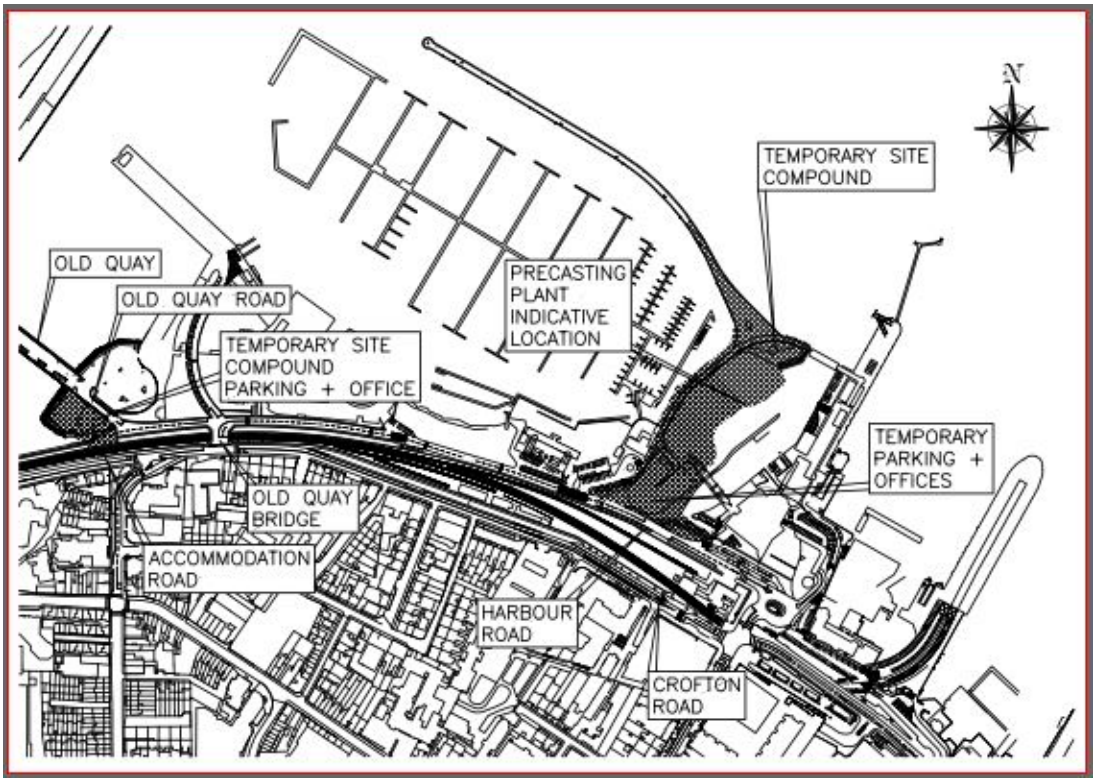


Figure 3.5.6 – Temporary Site Compounds

Although continued access for service vehicles to the marina eastern breakwater will be maintained, it is envisaged that public pedestrian access will be temporarily suspended and reinstated within the shared surface and boardwalk permanent works on completion.

A second temporary site compound will be necessary at the Old Quay to facilitate remodelling of the road junction Accommodation Road / Old Quay Rd. This can be located within the existing car park at that location as depicted in Figure 3.5.6, with temporary traffic access off Accommodation Road.

Temporary construction traffic has been estimated later in this section of the EIS, and effects together with anticipated background traffic has been included in Section 5.9 of the EIS (Material Assets Transportation).

An indicative construction programme is included in 3.5.4 above with landside activites estimated to take approximately 32 weeks straddling and overlapping with construction of the marine side quay and causeway during which the temporary compounds will be in operation (i.e. 72 weeks overall estimated).

3.5.8 Marina Eastern Breakwater

Local modifications to the marina eastern breakwater are required where it adjoins the proposed new quay structure, although no significant change in quay level is envisaged. Removal of the breakwater surfacing locally at this juncture would be followed by the installation of bespoke piling from ground level through the breakwater earthen structure. This can be achieved by an appropriate mobile tracked piling rig gaining access from the adjacent temporary site compound. The other equipment envisaged would be the normally associated mobile excavators, rock breakers and dumper trucks. Deliveries of materials and concrete

supply would be achieved using the normally associated trucks and hopper delivery wagons accessing via the Harbour Road entrance to the temporary compound.

3.5.9 Proposed Access Route and Boardwalk

Once the buried concrete boundary wall foundation has been removed a new road foundation would be constructed to occupy the void created. This will comprise of imported granular material delivered by road compacted in layers. The new concrete pavement would be achieved using either onsite mixed or ready-mixed concrete with all materials being delivered by road via Harbour Road.

The proposed access route running north-south adjacent to the marina requires no special construction activities. Buried utilities and services will be installed in shallow trenches backfilled with imported material, all delivered by road.

The proposed suspended boardwalk will be constructed over water utilising a small floating access barge with materials delivered by road placed in position by a medium sized crane. Small sections of the existing rock armour would be removed temporarily to allow access for local steel pile foundations inserted using a mobile piling rig standing on the existing ground – following such pile insertion the rock armour would be replaced. The boardwalk would then be completed using relatively short steel members with a timber walkway surface and metal railing.

Erection of a new screen wall along the new perimeter would utilise a metal framed structure clad in an appropriate timber constructed using small plant.

3.5.10 Demolitions

The demolition of the existing reinforced concrete boundary wall would be achieved using large diameter circular saws and percussive mobile rock breakers to obtain more easily transportable segments. This should help to mitigate the duration of associated noise generated. The cut segments will be transported by dumper to an external disposal location. For further details of this please refer to the EIS Section 5.9 (Material Assets – Waste) for details of the cruise facility waste strategy.

Removal of the porte cochere skeletal steel structure would be that of reverse construction starting with controlled un-stressing of the stressed skin canopy and guy wires, followed by fabric removal. A large mobile crane would be used to support the steel structure temporarily whilst the members are cut sequentially using oxy-acetylene equipment, with the dissected members removed from site using suitable truck transport to the disposal site. Removal of the pad foundation members would be achieved using normally associated excavators to unearth to formation level, followed by the use of rock breakers and/ or circular saws to render transportable segments.

3.5.11 Accommodation Road Wall Remodelling

Demolition and realignment of a short section of existing masonry wall here adjacent to the Old Quay car park would require no special construction equipment and can be achieved using normal mobile rock breakers, excavators and dumper trucks for disposal off-site. Access would be achieved through the existing Old Quay car park put into temporary use as a site compound. Live road traffic and pedestrians would be separated from the workplace by temporary hoarding for the period of demolition and reconstruction of the remodelled boundary wall and associated pavement drainage.

3.5.12 Operational Activities

Maintenance

The proposed works have been designed to require minimal maintenance.

No additional large cranes are required on the berth for cruise activities.

Accidental fenders damage will require to be replaced and would be expedited using surface mounted winches and the use of offsite fabricated fender elements.

Any maintenance dredging of the new dredged channel areas will be carried out as part of the Harbour's maintenance dredging programme. Environmental testing indicates the bed deposits are suitable for dumping at sea. The bed material therefore would be disposed of at sea at a licensed disposal site subject to obtaining a dumping at sea licence.

Pollution Control

The landside trafficked areas and associated drainage works have been designed to collect water in a system of drainage channels and gullies which, as per existing, will discharge to sea via interceptors/ separators.

The maritime quay areas will be trafficked by electric train sets moving cruise passengers and occasional service vehicles which will transport ship waste in sealed containers. The risk of pollution of the harbour waters is low, and requires no specific measures.

Discharges from vessels to the harbour waters will not be permitted.

Dun Laoghaire Harbour operates an Environmental Management Plan which includes procedures for the disposal of waste from berthed vessels. All waste will be handled by a licenced waste contractor. Waste awaiting disposal will be held temporarily on the quay side and collected for disposal on a daily basis, and as necessary.

3.5.13 Construction Road Traffic

Construction materials will be delivered to site by road and sea.

Most of the heavier large diameter steel monopile tubes will probably arrive on site via barge by sea, and can be constructed directly into position using floating plant.

Likewise large dredging equipment will be sea going vessels disposing of excavated dredge material direct to the disposal site by sea operating 24 hours each day so as to reduce the overall programme duration. This is equivalent to an average of 6 vessel journeys per day through the Harbour mouth.

The remainder of the construction materials for the quay, causeway and landside have conservatively been assumed to arrive to site by road.

The total tonnage of materials assumed to be delivered by road has been included in the table below. Using estimated programme durations as shown in Figure 3.5.4 and assumed tonnage per load, the average number of trucks per day is calculated.

Table 3.5.1: Construction Road Traffic

Description	Tonnage by Road	Average Trucks per Day
Rock Armouring	4,983	15
Concrete	20,321	15
Metalwork	1,481	5
Earthworks	2,156	5
Total		40

The average number of loads/ heavy trucks required per hour based on the table above is deemed to be approximately 6 vehicles per hour by road. The actual number however would be based on what activities are actually proceeding in tandem. The average delivery rates in the range 10-25 trucks per day would be typical for the remainder of the construction period. Normally restricted working hours would limit or set to zero rates in off peak periods, at night, at weekends and on holidays.

3.6 Main Alternatives Considered

This section of the EIS considers and summarises the existing berth availability at Dun Laoghaire Harbour, the operational needs for berthing large cruise vessels, the sensitivities of waterfront locations at the Harbour, alternative positions and orientation of a cruise berth, the likely effects of deep dredging on key heritage structures, the likely visual effects of alternative berth locations, continuity of harbour operations post construction, and the likely construction impacts of alternatives. These are first considered individually to highlight the berth selection rationale, followed by an overall assessment to suggest an optimum balanced solution.

3.6.1 Project Summary

Dun Laoghaire Harbour Company (DLHC) produced a Masterplan in 2011 which identified proposals for future developments within the Harbour over the next 15 to 20 years. These future developments included a provision for a new cruise berth facility, the need for which is reinforced by the fact that cruise vessel traffic arriving at Dun Laoghaire has been on the increase over the last 5 years.

DLHC now wish to advance a dedicated cruise berth previously highlighted in the Masterplan, composed mainly of the infrastructure works illustrated in Figure 3.6.1:

1) Deepening of the fairway and approach to DLH to increase the available water depth to -10.5mChart Datum (CD) to accommodate the cruise vessel dimensions stated in Figure 3.6.2
2) Works at the proposed berth location and access channel including construction of a new quay and access causeway, new mooring dolphins, capital dredging eastward from the Harbour mouth, and scour protection of an existing breakwater illustrated in Figure 3.6.3

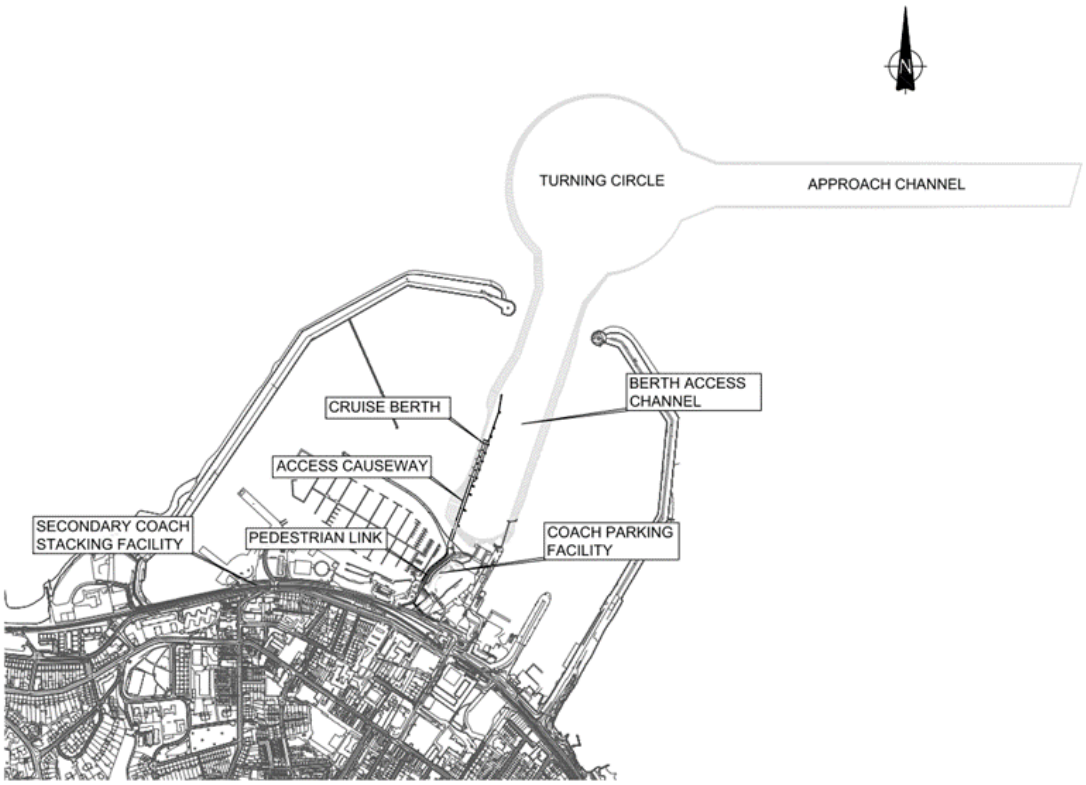


Figure 3.6.1: Proposed Project Berth Layout

It is important to note that channel dredging in a northerly direction from the Harbour mouth was considered but this would have involved a substantially longer channel, a higher dredge volume, had less favourable impacts, was not beneficial in direction for cruise ship navigation, and so not developed with regard to berth selection.

It is also important to note that the position of the turning circle and approach channel outside the Harbour walls do not significantly influence decisions regarding the location of the cruise berth within the Harbour.

The engineering characteristics of the proposed berthing and mooring structures have been illustrated on plan in Figure 3.6.2. These have been the subject of specialist maritime navigational studies. It can be seen that the new structures would represent a substantial addition to the existing harbour infrastructure, and so require careful consideration to ensure optimum rapid sea access for cruise vessels; measures have been included to avoid disruption to harbour operations at adjacent berths.

"Independence of the Seas"

- Length Overall - 339m
- Beam (width) - 38.6m
- Draft - 8.8m
- Passenger Decks - 14
- Passenger Capacity - 3,634
- Crew - 1,365

Figure 3.6.2: Large Cruise Ship Characteristics

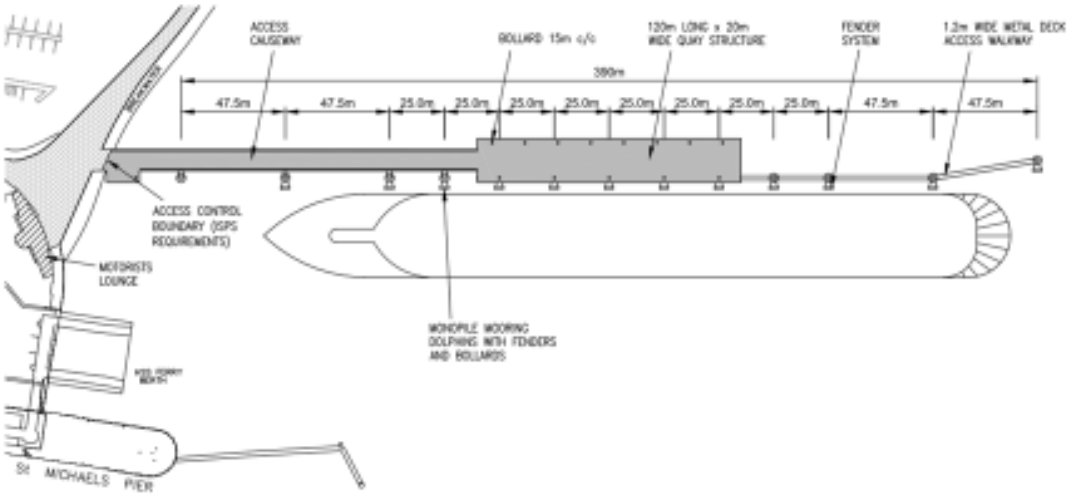


Figure 3.6.3: Engineering Dimensions on Plan of the Proposed Berth

3.6.2 Existing Harbour Waterfronts

The Masterplan document refers to two distinct waterfront types summarised in Figure 3.6.4 broadly divided into 4 overlapping zones:

A. Old Harbour Heritage Waterfront located at the west side of the Harbour. This area is effectively blocked to access by large vessels by its existing harbour infrastructure; usage for cruise purposes is limited to transferring passengers by small vessels via the existing tender berth at the Old Harbour.

B. Marina Waterfront located to the west of the Harbour – this area is also blocked to access by large vessels by virtue of existing Marina infrastructure;

C. The Carlisle Pier Heritage Waterfront at the east side of the Harbour is intended for leisure and tourism activities. This area is earmarked for the addition of new leisure moorings but also addition of a new Urban Beach Floating Pool located at the East Pier which in 2015 has received a planning decision for approval from DLRCC; The Carlisle Pier has been identified in the Masterplan as the ultimate location of the proposed new International Diaspora Centre and is envisaged as a major visitor attraction. Notwithstanding that, at present smaller cruise vessels up to approx. 150m and of relatively shallow draught utilise the berths at the Carlisle Pier.

D. The Ferry/ Cruise Waterfront is located in the environs of St Michael's Pier and is intended for commercial marine infrastructure uses and is generally located centrally within the Harbour free waterbody. At present the smaller cruise vessels do not berth in this area.

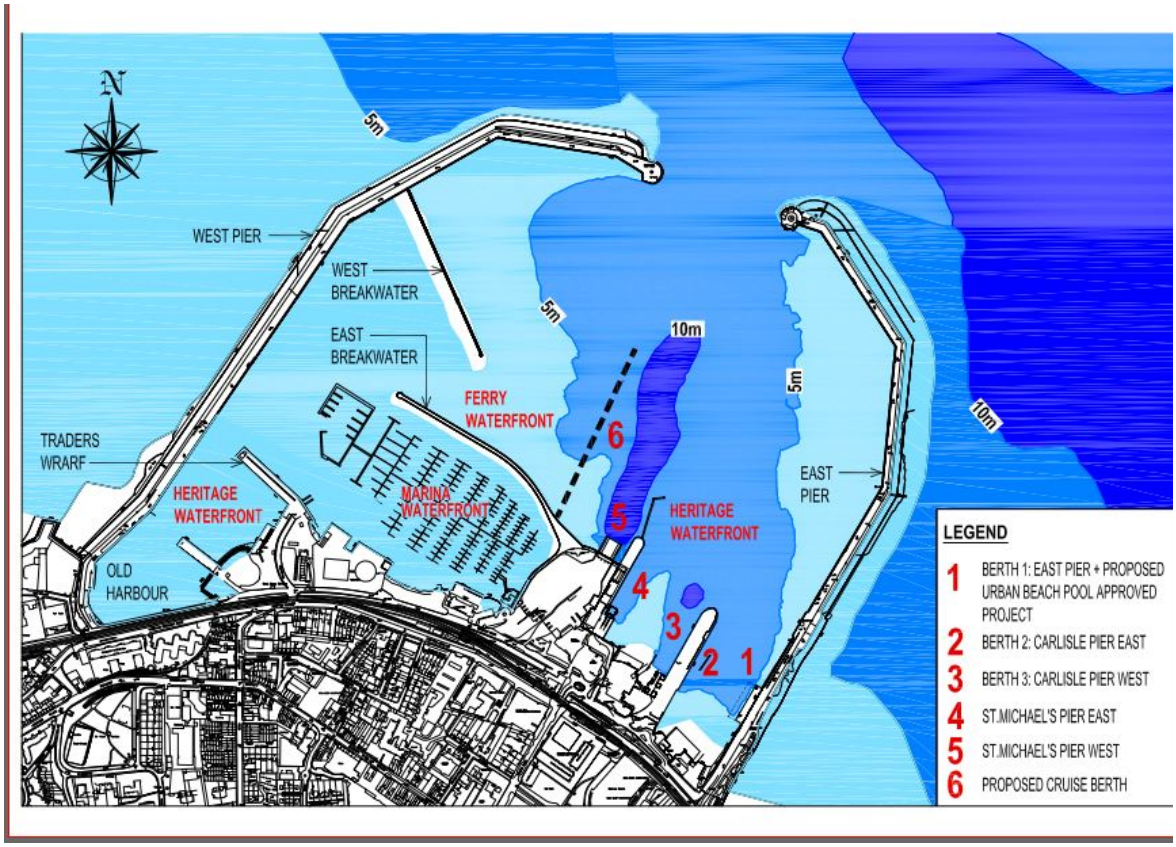


Figure 3.6.4: Existing Berths and Waterfront Zones

There are important planning considerations and restrictions associated with both heritage waterfronts A and C, which appear at variance with the addition of the scale outlined in Figure 3.6.3 above.

Effectively, navigation access to the Old Harbour A and Marina Waterfront B zones are not feasible for cruise ships.

The East Pier is very attractive for walkers and hosts a range of temporary cultural activities throughout the year. Navigation access to the East Pier heritage waterfront A (Berth 1 and

effectively Berth 2) will be heavily constrained by the addition of the approved Urban Beach Floating Pool.

The consideration of alternative berth locations has therefore focused on the following shown on Figure 3.6.4:

I. East Pier: North of Berth 1

II. Carlisle Pier East and West: Berth 2 and 3 Extension

III. St Michael's Pier East: Berth 4 Extension

IV. St Michael's Pier West: Berth 5 Extension (Previously the HSS Stena berth)

V. Proposed New Berth 6 emerging from the east breakwater within the ferry/ cruise waterfront designated zone D (from the DLHC Masterplan document)

An assessment of the relative impacts of these feasible berth locations being used for cruise purposes would have on the Masterplan objectives for each waterfront is provided in Table 3.6.1.

Table 3.6.1: Relative Waterfront Impact versus Masterplan Objectives

Cruise Berth ID	**1**	**2**	**3**	**4**	**5**	**6**
Masterplan Conflict	Highest	High	High	Medium	Medium	Low
Part of Proposed Development	No	No	No	No	No	Yes

3.6.3 Main Alternative Berths Considered

The consideration of alternative berth locations, as noted above, has focused on the following shown on plan in Figure 3.6.5 (1 to 8):

I. East Pier: North of Berth 1

II. Carlisle Pier East and West: Berth 2 and 3 Extension

III. St Michael's Pier East: Berth 4 Extension

IV. St Michael's Pier West: Berth 5 Extension (Previously the HSS Stena berth)

V. Proposed New Berth 6 emerging from the east breakwater

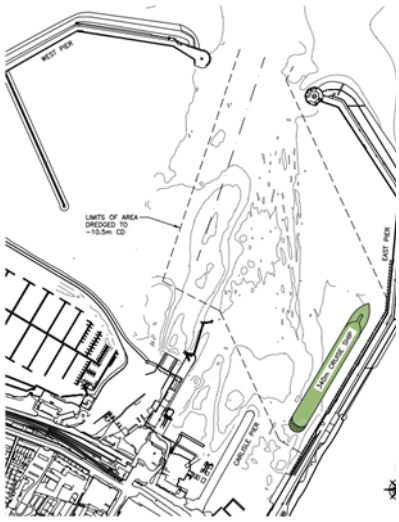


Figure 3.6.5.1
I: East Pier: North of Berth 1

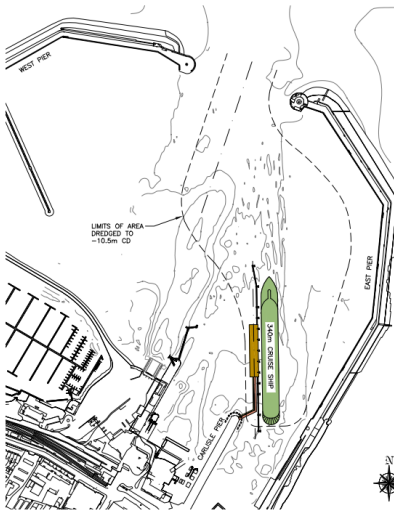


Figure 3.6.5.2
IIA: Carlisle Pier East and West:
Berth 2 / 3 Extension
*** Harbour Mouth Orientation**

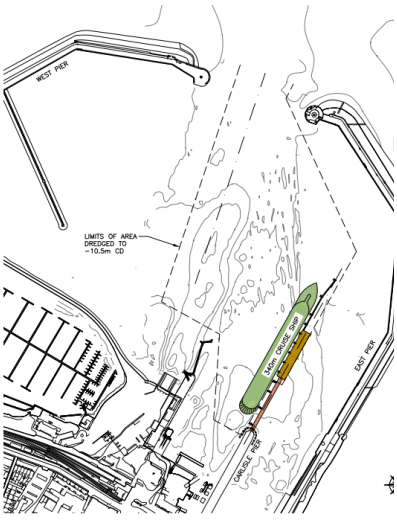


Figure 3.6.5.3
IIB: Carlisle Pier East and West:
Berth 2 / 3 Extension

Figure 3.6.5.4
IIIA: St Michael's Pier East
Berth 4 Extension

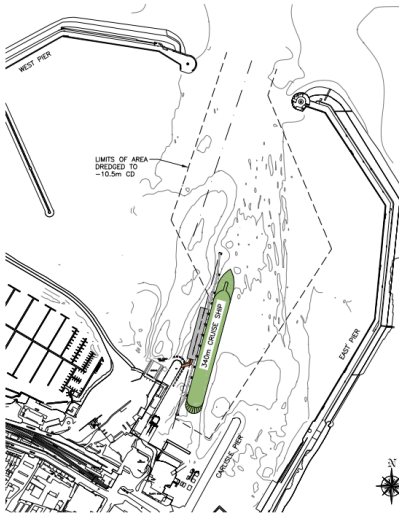


Figure 3.6.5.5
IIIB: St Michael's Pier East
Berth 4 Extension
*** Harbour Mouth Orientation**

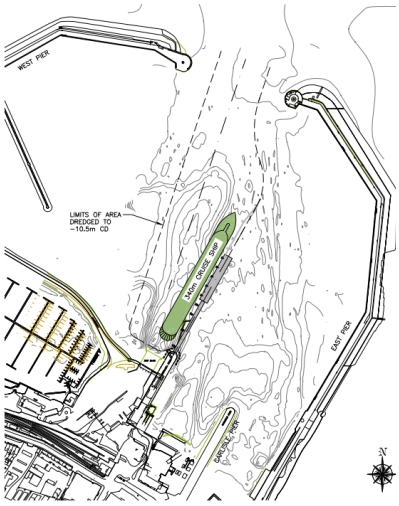


Figure 3.6.5.6
IVA: St Michael's Pier West
Berth 5 Extension

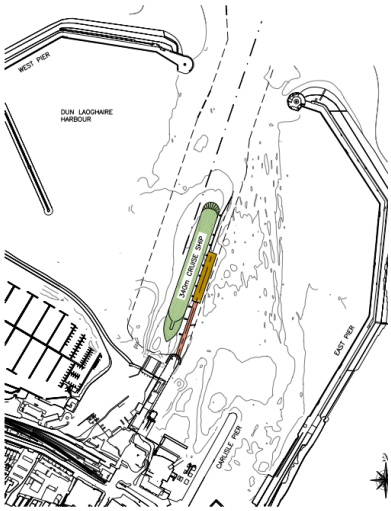


Figure 3.6.5.7
IVB: St Michael's Pier West
Berth 5 Extension
***Harbour Mouth Orientation**

Figure 3.6.5.8
V: Proposed New Berth
***Harbour Mouth Orientation**

Figure 3.6.5: Berth Locations Assessed (Berth ID 1 to 8)

Each potential new berth location is presented in this diagram taking account of:

a) Accommodating the required ship and berth dimensions illustrated in Figures 3.6.2 & 3.6.3 above

b) Protecting existing structures by maintaining a clearance distance on plan between each and the cruise vessel at berth

c) The required dredge channel outline on plan necessary for cruise vessels to navigate safely and as rapidly as practicable to each location (dredge level -10.5mCD)

d) The dredge channel outline on plan necessary to ensure continued access by other vessels to adjacent berths. In some cases this has led to greater dredge outlines with greater capital and operational dredging needs than might otherwise have been the case

e) Harbour mouth orientation of berth on plan, where favourable

f) Inability of the existing pier structures to sustain berthing forces of a 350m LOA cruise vessel (comparison with HSS vessel would be a factor up to 10)

3.6.4 Dredging Constraints

The alternative dredge channel extents are shown indicatively on plan Figure 3.6.5 above, catering for continued use of existing berths and the proposed cruise vessel / berth dimensions.

The proposed cruise berth essentially involves the addition of a deep water jetty within and beside port infrastructure constructed between the early Victorian period and the 2000's. Engineering works proposed in the project are beside berths that are currently in use, which makes the project implementation challenging and would inevitably require costly mitigation to achieve a successful resolution.

Current draught is the depth to which a berth can be dredged without undermining it and without requiring additional protection works as mitigation.

Table 3.6.2 illustrates the existing berth locations and summarises the available navigation draughts at each. The table indicates the significant depths of bed sediment requiring to be removed if Berths 1 to 4 were to be selected for cruise purposes (with dredge level of -10.5mCD).

The table itemises berths where heritage pier structures are particularly sensitive to new engineering works, namely Berths 1, 2 and 3. That is not to say that Berths 4 and 5 are not sensitive to dredging - albeit for additional reasons other than heritage conservation.

Table 3.6.2: Summary of Navigation Depths at Dun Laoghaire Main Berths

Berth ID	Part of Proposed Development	Location	Current Navigation Draught	Proposed Navigation Draught	Ultimate Navigation Draught	Historic Structure	Comment
1	No	East Pier	5.0m	N/A	N/A	Yes	The Urban Beach project has been approved by ABP
2	No	Carlisle Pier East	5.0m	N/A	N/A	Yes	None of the Existing berth structures has been designed for deep navigation draught and would require strengthening to upgrade for large cruise vessels.
3	No	Carlisle Pier West	7.5m	N/A	N/A	Yes	
4	No	St Michael's Pier East	6.0m	N/A	N/A	-	
5	No	St Michael's Pier HSS	<10.0m	N/A	N/A	-	
6	Yes	Proposed Cruise berth	<9.0m	10.5m	10.5m	None	A new berth will be configured that minimises dredge volumes

It can be seen from Table 3.6.2 that although a new dedicated cruise Berth 6 located in the Ferry/Cruise waterfront zone would require significant removal of bed sediment (so as to achieve the required dredge level of -10.5mCD), its volume would be significantly less compared to deep dredging at Berths 1 to 5 where existing bed levels are less favourable. The associated temporary construction impacts at the Berth 6 alternative therefore would be less than with all other alternatives.

None of the existing berth structures at Berths 1 to 5 has been designed for extensibility for deep navigation draught and would require significant strengthening to upgrade for large cruise vessels. Strengthening would be in the form of both underwater secant bored piled walls to stabilise against scour from ship propellers, but also internal strengthening of the Victorian pier structures so as to ensure future integrity against deformation.

Operation phase maintenance dredging will be required for all options, probably carried out annually initially, and thereafter perhaps in 5 year cycles based on the results of sonar bathymetric surveys to help define new sediment accretion rates. Accretion rates are normally low in areas where less depth of material is removed initially. Therefore as suggested by Table 3.6.2, Berth 6 requiring lesser bed depth removal compared to other locations also yields a less onerous maintenance dredging regime.

An assessment of the comparative impacts that deep dredging would have at these otherwise technically feasible berth locations, if selected for cruise purposes, is provided in Table 3.6.3.

Table 3.6.3: Compartive Impacts on Harbour Bed and on Historic Structures of Dredging

Cruise Berth ID	**1**	**2**	**3**	**4**	**5**	**6**
Dredging Impact	Highest	High	High	High	Medium	Lowest
Conflict with Historic Structures	High	High	High	Medium	Medium	Lowest
Part of Proposed Development	No	No	No	No	No	Yes

3.6.5 Cruise Navigation

Cruise ship operators who are conversant with large cruise vessel navigation have been consulted, and an independent specialist navigation study undertaken prior to preparing the environmental impact statement. These sources have provided planning stage validation of the proposed dredge channel layout at Berth 6 from a navigational standpoint. Those findings were extrapolated by the designers to ascertain likely cruise ship manoeuvres necessary if cruise vessels were to access Berths 1 to 5 alternative locations illustrated in Figure 3.6.5 above.

The key ship operational constraints are:

1) Availability of straight transit paths to/ from a berth which do not require complicated breasting or turning manoeuvres.
2) Capability to enter and leave the Harbour mouth without tug assistance in normal weather.
3) Capability to manoeuvre within the Harbour with wind acting on the high sided cruise vessels.

Oblique entry to the Harbour mouth limits the lateral clearance to the existing Roundheads and is not a sensible navigation strategy. The ship transit paths to Berths 1 to 4 are therefore more difficult and consequently much slower.

The transit lengths arising in order to gain ship access at Berths 1 to 4 are significantly longer compared to Berths 5 and proposed Berth 6.

The transit paths emerging in order to gain ship access to Berths 1 to 4 appear to be highly complicated probably beyond the ability for some cruise vessels to manoeuvre safely under transverse wind action. The extent of the required turning basin needed to maintain clearances is much more extensive than with Berth 5 and proposed Berth 6.

Where it has been feasible to adjust the plan orientation of the proposed berth structures to better align with the Harbour mouth this yields somewhat more favourable transit paths (refer to Berths 2, 3 and 4 as indicated in Figure 3.6.5 above). However these paths are still more difficult and slower for cruise vessels compared to Berths 5 and proposed Berth 6, particularly so when other than slack winds are in play.

An assessment of the relative quality of cruise ship navigation to each berth location, if selected for cruise purposes, is provided in Table 3.6.4.

Table 3.6.4: Comparative East of Navigation

Cruise Berth ID	1	2	3	4	5	6
Ease of Cruise Navigation	Poorest	Poor	Poor	Medium	Good	Best
Part of Proposed Development	No	No	No	No	No	Yes

3.6.6 Visual Impact

The proposed berth structures can be summarised as follows:

- Quay 120m long alongside quay face, with mooring/fending dolphins to provide 340m + 25m at bow and stern (i.e. total 390m between outermost dolphins) – Refer Figure 3.6.3 above
- Quay deck width – 20m minimum – located 180m along the proposed dredge channel to facilitate access and egress for cruise passengers from the docked vessel
- An access causeway 180m long used to gain access to the quay structure to/from landside
- The causeway and quay deck levels are at +6.90mCD (+4.49mODM) which places them roughly at existing quay level and at 2.8m height above the mean high water spring tide level

These elements have been illustrated on side elevation in Figure 3.6.6.

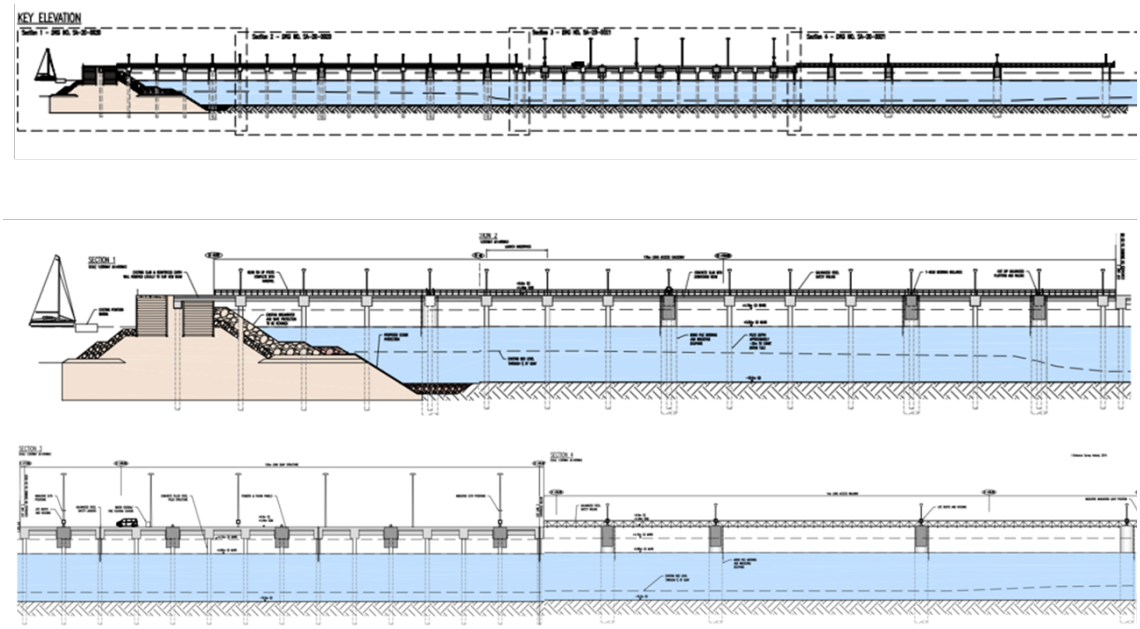


Figure 3.6.6: Elevation

The overall length of structures is 435m from the land end, which would cover approximately 2/3rds the water distance from St Michael's Pier to the Roundheads. Various means of visually integrating the proposed berth structures in the Harbour have been illustrated in Figure 3.6.4

above, both in terms of position within the harbour and of plan orientation towards the Harbour mouth.

In this process, generally where slight reduction below the 435m of the overall structure length was achievable it was always at the expense of placing the permanent structures in closer proximity (i.e. closer viewing distances) to key vantage points.

For example, the viewing distance across the Harbour for walkers midway on the East Pier to most berth locations shown in Figure 3.6.4 is half that compared to proposed Berth 6; Berth locations 1 to 4 are all in extremely close oblique proximity to the Carlisle Pier Heritage Waterfront.

By comparison the viewing distances to the proposed Berth 6 for walkers on the East and West Piers is approximately equal, exceeding 400m viewing distance.

By virtue of masking by St Michael's Pier, the proposed Berth 6 location is not directly inter-visible from the Carlisle Heritage Waterfront.

Views of the proposed Berth 6 from the Ferry/ Cruise Waterfront are generally along the proposed quay length and perhaps less intrusive from that vantage point.

Mitigation of the overall structure shape is limited by the operational design needs of berthing and mooring large cruise vessels 340m in length. In collaboration with the project Architect, measures have been incorporated to mitigate the quay deck elevational treatment by reducing its apparent depth. Further details can be seen on Drawing SA-0025.

An assessment of the relative visual impacts of cruise berth structures at each berth location, if selected for cruise purposes, is provided in Table 3.6.5.

Table 3.6.5: Comparative Visual Impact

Cruise Berth ID	**1**	**2**	**3**	**4**	**5**	**6**
Visual Impact	Poor	Worst	Poor	Poor	Medium	Better
Part of Proposed Development	No	No	No	No	No	Yes

3.6.7 Continuity of Operation

The present economic model of Dun Laoghaire Harbour is based on the ongoing availability of all Berths 1 to 5 - refer to Figures 3.6.4 above either for berthing or other uses. The berths currently in use at Dun Laoghaire Harbour are:

I. East Pier: Berth 1 (now allocated as location of floating pool)

II. Carlisle Pier East and West: Berth 2 and 3

III. St Michael's Pier East: Berth 4

IV. St Michael's Pier West: Berth 5 (previously the HSS Stena berth)

The impact of legislation like the Harbour Acts requires the Dun Laoghaire Harbour Company to target a positive financial return.

The addition of another berth in the Harbour, at locations exemplified by Figure 3.6.5, will have knock-on effects on the existing usage and if incorrectly situated could profoundly alter the Harbour Company's economic model, perhaps negatively. The reasons range from:

- physical obstruction of existing berths by the cruise berth structures (and vessel when at berth), to
- the need to provide a more extensive dredged basin for smaller vessels to navigate around the proposed cruise berth to existing berths

- adoption of a cruise berth enforcing slow transit or difficult access

Greater navigation transit times have an economic impact, but often also may actually discourage usage where berthing options in other Harbours exist.

Locating the proposed cruise berth at any of I to IV above will lead to loss of flexibility which can be summarised as follows:

a. Cruise Vessel at East Pier: access to Berth 1 would be limited
b. Cruise Vessel at Berth 2/3: access to Berth 1 and 2 would be limited except for low draft vessels shorter vessels
c. Cruise Vessel at Berth 4: access to Berth 4 restricted
d. Cruise vessel at Berth 5: use by other vessels of Berth 5 itself restricted, but also the navigation routes to Berths 1 to 4 restricted by the central location of the cruise structures

The addition of a cruise facility at Berth 6 allows all current Berths 1 to 5 to continue unrestricted in use. Unlike other berths, the proposed Berth 6 provides economic opportunities for future berth development arising from potential cruise business growth at Dublin Bay (potential future design).

An assessment of the relative retention of berth flexibility after cruise berth installation, is provided in Table 3.6.6.

Table 3.6.6: Retention of Berth Flexibility

Cruise Berth ID	**1**	**2**	**3**	**4**	**5**	**6**
Continuity of Operation	Medium	Worst	Poor	Poor	Medium	Best
Part of Proposed Development	No	No	No	No	No	Yes

3.6.8 Construction Impacts

The likely direct temporary impacts associated with cruise berth installation can be summarised:

i. Presence of dredging vessels required to excavate the dredge channel traversing the inner harbour

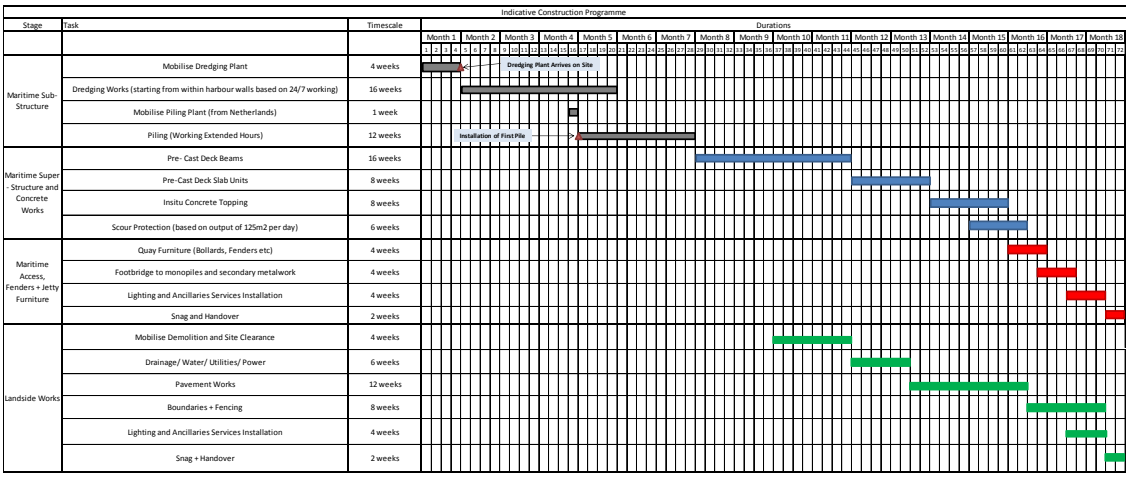
ii. Presence of piling equipment and associated service barges and service vessel boat traffic

iii. Need to maintain a temporary navigation exclusion zone around work areas, i.e. restricting leisure and vessel navigation with the existing landside facilities

iv. Time required to construct enabling works to protect the existing structures (refer Table 3.6.2 above)

The cumulative impacts during construction dis-improve with longer time required to complete the works. An indicative programme has been devised for the proposed Berth 6, presented in Table 3.6.7.

Table 3.6.7: Indicative Programme (Proposed Berth 6)



The construction periods for other cruise berth options would be influenced as follows:

A. Berth 1: Additional time required approximately 6 months. Reason: greatly enhanced dredge volumes and enabling works impacts compared to the proposed Berth 6.

B. Berths 2, 3 or 4: Additional time required approximately 6 months. Reason: greatly enhanced dredge volumes and enabling works impacts compared to the proposed Berth 6. These works are located in Harbour waters used to access the Carlisle Heritage Waterfront facilities, so potential conflicts with leisure navigation would be greater.

C. Berth 5: Additional time required approximately 4 months. Reason: more dredging and enabling works compared to the proposed Berth 6.

Operation phase maintenance dredging will be required for all options, probably carried out annually initially, and thereafter perhaps in 5 year cycles based on the results of sonar bathymetric surveys to help define new sediment accretion rates. Dredging has been assessed in Section 3.6.4 above, however the associated lifelong impact associated with disruption of leisure craft by the periodic presence of maintenance dredgers has been considered here.

Inevitably, the extended construction times indicated above involve more environmental impacts, most notably where extra dredging and extra enabling works are required.

The proposed new Berth 6 has been sited and designed to minimise dredging volumes and avoid extra enabling works; concentrates temporary navigation restrictions to the Ferry/Cruise Waterfront area; foreshortens the overall construction period; and consequently involves less construction disturbance.

An assessment of the relative construction impacts associated with each cruise berth location, is provided in Table 3.6.8.

Table 3.6.8: Relative Construction Impacts

Cruise Berth ID	**1**	**2**	**3**	**4**	**5**	**6**
Relative Construction/ Operation Impacts	Highest	High	High	High	High	Lowest
Part of Proposed Development	No	No	No	No	No	Yes

3.6.9 Overall Comparative Assessment

The preceding contents of this section of the EIS has focussed on the anticipated individual impacts material to berth selection associated with individual considerations.

An overall assessment of the issues in combination has been approached by numerically rating the issues, as follows:

- A rating of up to 10 signifying a relatively high/poor impact range
- A rating of 5 signifying a relatively medium impact
- A rating down to 1 signifying a relatively low/ best impact range

These have been assessed together in Table 3.6.9 to highlight the cruise berth location which on balance provides a better berth location satisfying apparently conflicting needs and disparate demands.

Table 3.6.9: Overall Assessment of Cruiser Berth Location Impacts

Cruise Berth ID (Refer Figure 3.6.3)	**1**	**2**	**3**	**4**	**5**	**6**
Masterplan Conflict	Highest	High	High	Medium	Medium	Low
Dredging Impact	Highest	High	High	High	Medium	Lowest
Conflict with Historic Structures	High	High	High	Medium	Medium	Lowest
Ease of Cruise Navigation	Poorest	Poor	Poor	Medium	Good	Best
Visual Impact	Poor	Worst	Poor	Poor	Medium	Better
Continuity of Operation	Medium	Worst	Poor	Poor	Medium	Best
Relative Construction/ Operation Impacts	Highest	High	High	High	High	Lowest
Overall Impact Rating	**64**	**62**	**59**	**48**	**36**	**14**
Part of Proposed Development	No	No	No	No	No	Yes

It is appearant that the cumulative impact trending in Table 3.6.9 in an overall context favours the proposed Berth 6. The proposed Berth 6 location indicated in Figures 3.6.7(a) and (b) is therefore selected and brought forward for detailed assessment within the remainder of this EIS.

Berth location has been selected to provide optimum solution to attract large cruise ship calls to Dun Laoghaire Harbour and to have the overall minimum impact on the harbour, its environment, and its users.

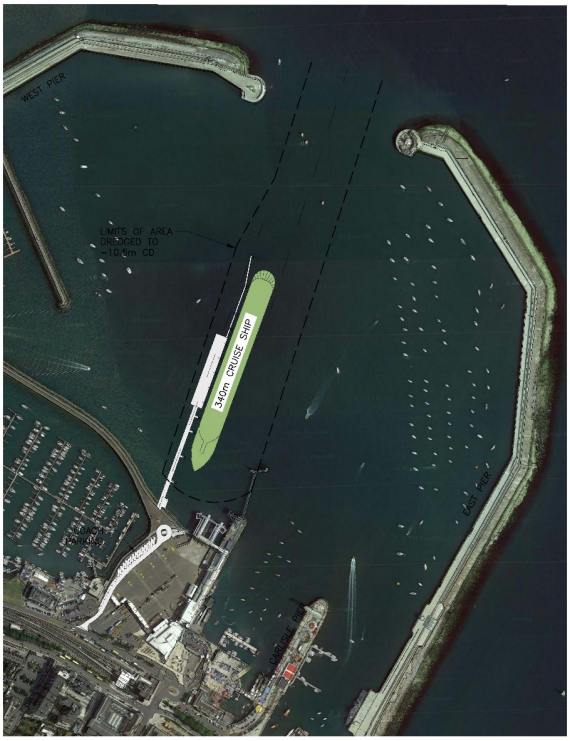


Figure 3.6.7(a): Preferred New Berth 6 Location

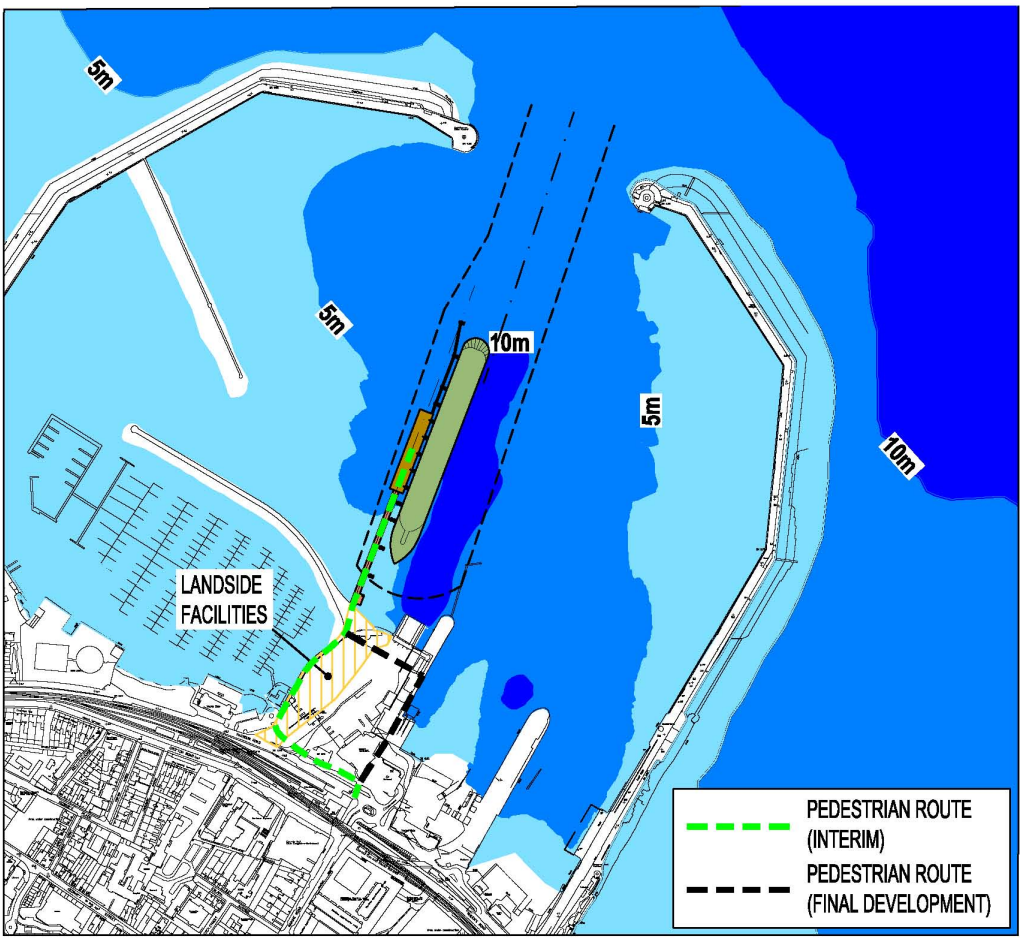


Figure 3.6.7(b): Preferred New Berth 6 Location