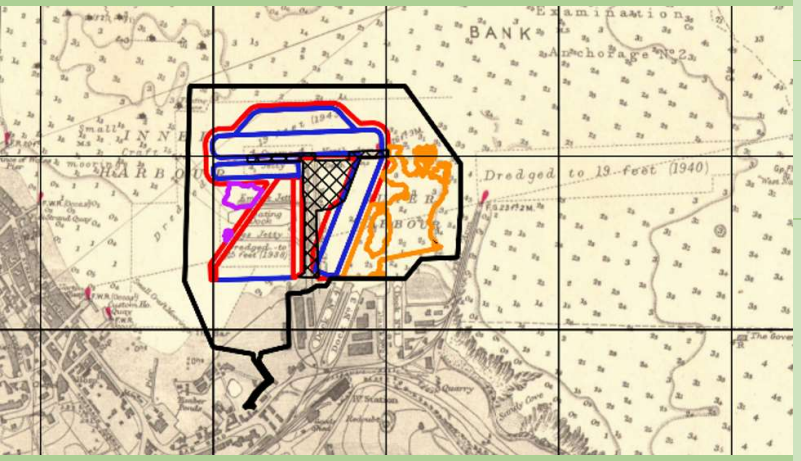
4. Design Alternatives and Evolution

Falmouth Cruise Project 2009 Dredge Extent



Excerpt from Admiralty Chart 32, updated 1953, showing historical dredging with proposed dredge pocket overlaid

Consideration of Alternatives

FDEC and the project team, supported by stakeholders through consultation, studied a range of alternative options before reaching the final design. Environmental considerations were integral to the design development and included:

- Presence of maerl habitat, which is a protected species under Natural Environment and Rural Communities Act 2006, Section 41 and for which the Fal and Helford Special Area of Conservation (SAC) is designated;
- Proximity of the site to Falmouth Bay to St Austell Bay Special Protected Area (SPA), which is designated for over-wintering birds;
- Landscape, seascape and visual amenity, particularly in relation to the Cornwall National Landscape;
- The levels of contamination within seabed sediments, as informed by Ground Investigation (GI) testing;
- Flood risk at the site, including allowances for future climate change;
- Existing small areas of reasonable quality vegetation within the site, including modified grassland, vegetated vacant/derelict land and supralittoral rock (boulders above the high tide line);
- Embedded carbon, and other sustainability measures, which were considered within a Sustainability Workshop held with the applicant and design team in December 2023; and
- Nearby sensitive receptors (such as residential properties and ecological receptors, and particularly in relation to traffic, adverse air quality, noise, underwater noise and sediment mobilisation).
- Safe navigation and access to existing wet docks and dry docks and wider harbour infrastructure.

Alternative considered	Details	Environmental and other considerations	Outcome
Do nothing	The proposed development is not progressed, and the site is left in its current state	In the 'Do-Nothing' scenario the following would occur: • Part of the dock infrastructure would remain unsafe for operational use and access, and other sections would reach the end of their design life; • The dock would remain unable to accommodate modern cruise ships, resulting in a lost opportunity to increase tourism in Falmouth and Cornwall; • The lost opportunity to enhance port infrastructure for e.g., FLOW operations and to contribute to the UK's transition to offshore renewable energy; and • A continued lack of berth and landside space capacity.	Not considered further
Alternative locations	Alternative sites for the proposed development	• The site is owned by the applicant; already has a significant operational dock; and is safeguarded for marine-related employment by CC. The site is also already an existing cruise terminal. • The feasibility of other ports in south-west England were considered but no alternative location was identified that could meet requirements and offer a practical option.	No other locations or sites identified
Alternative designs and layouts	Dock development	• Different layout options were considered, which focused on various improvements to infrastructure around the docks estate. Consideration was made for the demolition of the Northern Arm and part of the remaining Western Wharf, the construction of the new Western Wharf, the joining of Queens Wharf and Northern Wharf, the westward extension of Queens Wharf westward and the potential installation of the FLOW Deck.	Most favourable environmental and commercial option was taken forward
	Dredging	• The 2009 Falmouth Cruise Project sought to dredge an area of seabed in the eastern part of the navigation channel. The revised approach for the proposed development was a considerably reduced dredge area and a pocket dredge of berth areas instead (within previously dredged areas), making use of the high tides to accommodate the deeper underkeel clearance required from vessels entering and leaving the docks via Carrick Roads. Notable consideration was made to the presence of Maerl beds, and ensuring impacts were avoided.	Most favourable environmental option taken forward

3 Alternatives and Design Evolution

3.1 Introduction

3.1.1 This chapter reviews the reasonable alternatives to the proposed development considered by the Applicant, including in relation to its location, size and design development.

3.1.2 This chapter also discusses the ways in which the proposed development has addressed environmental issues raised in relation to a previous project in the area in 2009 (hereafter referred to as the "Falmouth Cruise Project (2009)").

3.1.3 An 'Alternatives Workshop' was held with the Applicant in May 2022 to discuss the business case and need for the proposed development and alternative options, including the 'do nothing' scenario and alternative locations and designs.

3.1.4 The following alternatives were considered:

- The 'Do Nothing' scenario where the proposed development is not progressed;
- Alternative locations for the proposed development; and
- Alternative designs and layouts for the proposed development.

3.2 Legislation and Guidance

3.2.1 The EIA Regulations state that an ES is required to provide:

"A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."

"An outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental effects of those alternatives and the project as proposed."

3.2.2 IEMA provides guidance in terms of the best practice consideration of alternatives with respect to:

- Alternative locations;
- Alternative scales of development;
- Alternative site layouts and access arrangements;
- Different approaches to scheme design; and
- Alternative processes and alternative phasing of construction.

3.3 Development Objectives

3.3.1 The proposed development aims to repair, upgrade and extend the currently poor condition dock infrastructure in order to reinstate and increase full alongside berth capability at Falmouth Docks. The proposed development aims to deepen dredge pockets to accommodate excellence class cruise ships and floating offshore wind (FLOW) devices. To support the growth of offshore floating wind, the site would be an integration site for FLOW (where substructures are stored, assembled and loaded out) and would support operation and maintenance when required.

3.3.2 The development objectives are to:

- Ensure infrastructure is safe for continued operational use and access by dock users;
- Maintain existing business and activities at Falmouth Docks;
- Resolve conflicts between the different site uses and activities and enable more efficient use of the docks; and
- Future-proof the dock with respect to cruise capacity, cargo capacity and FLOW.

3.4 Development Considerations

Policy Requirements

3.4.1 The development considerations for the site are set out in the following planning policy and guidance documents at national, regional and local levels:

- National Planning Policy Framework (NPPF)[1];
- UK Marine Policy Statement (MPS)[2]
- South West Marine Plan[3]; and
- The Cornwall Local Plan[4].

3.4.2 In the Cornwall Site Allocations Development Plan Document[5] (Policy FP-E6), Falmouth Docks has been safeguarded for marine related employment uses. Policy BE 13 of the Falmouth Neighbourhood Development Plan (NDP)[6] also supports redevelopment and/or enhancement of employment uses on existing employment sites, including at Falmouth Docks.

3.4.3 The proposed development's alignment with and consideration of planning policy is discussed in the Planning Statement and Marine Planning and Policy Statement, which accompany the applications for planning permission and a marine licence.

3.5 Site Considerations

3.5.1 A series of site considerations informed the design process, including:

- The geometry, position and condition of the existing dock structures;
- The site's existing use as an operational dock, and associated navigational and safety requirements;
- The Applicant's existing business obligations and contractual agreements; and
- Site allocations under aforementioned planning policies.

3.6 Environmental Considerations

Environmental Considerations

3.6.1 A number of environmental considerations informed the design process, including:

- Presence of maerl habitat in the Fal Estuary, which is a protected species under Natural Environment and Rural Communities Act 2006, Section 41 and for which the Fal and Helford Special Area of Conservation (SAC) is designated;
- Proximity of the site to Falmouth Bay to St Austell Bay Special Protected Area (SPA), which is designated for over-wintering birds;

[1] Department for Levelling Up, Housing and Communities, 2024. The National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] HM Government, 2011. UK Marine Policy Statement, online. Available at: https://www.gov.uk/government/publications/uk-marine-policy-statement [Accessed 09/01/2024]
[3] Marine Management Organisation, 2021. South West Marine Plans. Available at: https://www.gov.uk/government/collections/south-west-marine-plan
[4] Cornwall Local Plan Strategic Policies 2010-2030, 2016 [online] Available from: https://www.cornwall.gov.uk/media/ozhj5k0z/adopted-local-plan-strategic-policies-2016.pdf
[5] Cornwall Council, 2019. Cornwall Site Allocations Development Plan Document. Available at: https://www.cornwall.gov.uk/planning-and-building-control/planning-policy/adopted-plans/cornwall-site-allocations-development-plan-document/
[6] Falmouth Town Council. Falmouth Neighbourhood Development Plan 2021-2030. Post examination version. Available at: https://www.cornwall.gov.uk/planning-and-building-control/neighbourhood-planning/neighbourhood-planning-in-cornwall/

- Landscape, seascape and visual amenity, particularly in relation to the Cornwall National Landscape;
- The composition of and the levels of contamination within seabed sediments, as informed by Ground Investigation (GI) works;
- Flood risk at the site, including allowances for future climate change;
- Existing small areas of reasonable quality vegetation within the site, including modified grassland, vegetated vacant/derelict land and supralittoral rock (boulders above the high tide line);
- Embedded carbon, and other sustainability measures, which were considered within a Sustainability Workshop held with the Applicant and design team in December 2023; and
- Nearby sensitive receptors (such as residential properties and ecological receptors, and particularly in relation to traffic, adverse air quality, noise, underwater noise and sediment mobilisation).

Socioeconomic Opportunities

3.6.2 A number of Socioeconomic opportunities and benefits also informed the design process, including:

- Opportunity to increase the efficiency, safety, and long-term viability of operations at the site, including navigational improvements;
- Opportunity to increase tourist footfall in Falmouth by increasing the site's cruise ship capacity - generating local and regional economic growth and employment whilst reducing pressures on local accommodation, healthcare, waste services, energy and road networks (as these services are all managed and maintained on board cruise ships);
- Opportunity to increase the volume of trade moving through the dock by increasing the docks cargo capacity; and
- Opportunity to be an integration port for FLOW assembly and maintenance, contributing to the UK's transition to offshore renewable energy and the mitigation of climate change, alongside supporting employment.

3.6.3 The Economic Impact Assessment, which accompanies the applications outlines the potential local and regional economic impact of the proposed development and the market outlook for the above-mentioned industries.

Consultation

3.6.4 Extensive stakeholder engagement has been undertaken throughout the design process and has contributed to the design evolution. Engagement has comprised individual stakeholder meetings and design workshops with numerous stakeholders.

3.6.5 A stakeholder design workshop was held in November 2022 with the Environment Agency, Natural England and MMO in attendance. The proposed wharf upgrades and orientation and the proposed approach to dredging, which avoided harming mearl habitat was presented, to which stakeholders were supportive.

3.6.6 The following additional meetings have been undertaken with statutory consultees, and supplemented through follow up e-mails and phone discussions:

- Natural England:
  - July 2021;
  - May 2022;
  - October 2023;
  - January 2024;
  - February 2024;
  - March 2024;
  - May 2024;
  - June 2024;
  - July 2024;
- Cornwall Council:
  - April 2024;
  - June 2024;
- Historic England:
  - July 2024; and
- CEFAS:
  - July 2024.

3.7 Alternatives

Do Nothing

3.7.1 The 'Do Nothing' scenario is a hypothetical alternative conventionally considered in EIA as a basis for comparing the development proposal under consideration. In this scenario, the proposed development would not come forward, and the site would remain in its current underutilised and unsafe state.

3.7.2 In the 'Do Nothing' scenario, the following would occur:

- Part of the infrastructure at Falmouth Docks would remain unsafe (particularly the Western Wharf area) for operational use and access and the central causeway would be at risk of failure, and other sections would reach the end of their design life;
- The Northern Arm structure would continue to act as a navigational obstruction for vessels accessing the port;
- The lack of berth capacity and availability would continue to cause conflicts between the various activities and vessels;
- The docks would be unable to accommodate larger cruise ships, as these require deeper water and longer berths than those which currently exist at the site, resulting in a lost opportunity to increase tourism in Falmouth and Cornwall more widely;
- The limited landside space, loading capacity and degraded condition of existing structures would continue to prevent the servicing of larger vessels to allow the docks to meet the growth of imports and exports and the increasing size of cruise ships; and
- The opportunity to provide docks infrastructure necessary for FLOW operation and maintenance, in a strategic location in the proximity of the Celtic sea, and contribute to the UK's transition to offshore renewable energy would be lost.

3.7.3 The 'Do Nothing' scenario is therefore considered to represent an alternative where the economic and employment potential of Falmouth Dock is compromised, with a decline in the Dock's operational capacity and the activities it supports over time. Falmouth Dock would not be future-proofed with respect to cruise capacity, cargo capacity and FLOW. Therefore, the 'Do-Nothing' scenario is not considered to be a viable or reasonable alternative and the Applicant has not considered this further.

Alternative Sites

3.7.4 No alternative sites have been taken forward by the Applicant, for the following reasons:

- The site is owned by the Applicant and therefore the Applicant did not consider alternative sites which are the property of a third-party;
- The site is already a substantial operational docks that supports established activities and industries; and
- The site is safeguarded for marine-related employment in the Cornwall Site Allocations Development Plan Document.

3.7.5 The site is an existing cruise terminal and there is demand for cruise tourism in Falmouth and Cornwall more widely. Falmouth has been identified by the FLOW Taskforce as having the potential to be an integration port for FLOW, due to its water depth, land area and its potential for capacity and expansion[7]. Therefore, the site meets the criteria and requirements for both cruise ships and to be an integration port for FLOW, as it:

- is located in proximity to the WaveHub site off the coast of Hayle, Cornwall (which is to install FLOW technology in the Celtic Sea), within the 72-hour weather forecasting window and towing distances required for FLOW;
- is located in a sufficiently sheltered area for FLOW, with the access required for the tow-in and tow-out of FLOW devices;
- meets the space and infrastructure requirements for FLOW storage and assembly;
- is an existing cruise terminal and located in an area where there is an existing demand for tourism;
- is a suitable cruise destination to allow shore excursions to attractions in west Cornwall (such as Lands End); and
- has the potential to accommodate Excellence Class cruise vessels once the proposed development is operational, both in terms of navigation and berthing requirements.

3.7.6 Various port locations in south-west England were assessed against the above criteria, in order to ascertain whether they represent a feasible alternative location to the site (see Table 3.1). Alternative locations outside of the south-west of England were not considered, as the proposed development aims to support the supply chain for FLOW in the Celtic Sea, and aims to serve tourism demand in Falmouth and Cornwall more widely.

Table 3.1: Assessment of Possible Alternative Locations Against FLOW and Cruise Requirements

Possible Location	Assessment
Plymouth	Plymouth is not able to accommodate Excellence Class cruise vessels at an alongside berth. Plymouth is also located too far east, both in terms of potential shore excursions to tourist attractions in west Cornwall, and in terms of the towing distance from the Celtic Sea to optimise use of weather windows. Plymouth has heavy Naval traffic and international ferry services and there is limited space for significant alongside expansion which would likely conflict with the growth in the cruise and for FLOW sectors.
Fowey	Fowey is not able to accommodate Excellence Class cruise vessels due to the lack of an alongside berth and limitations to navigational access. Fowey is also located too far east, and is less well-served by the highway network in terms of potential shore excursions to tourist attractions in west Cornwall. The River Fowey channel is used by leisure vessels and local ferry services, which would likely conflict or lead to collision risk with any cruise vessels or tugboats for FLOW.
Newlyn	Whilst Newlyn is located in west Cornwall and therefore within the 72-hour towing distance for the Celtic Sea, the foreshore at Newlyn is considered to be too exposed to accommodate FLOW devices, and there is limited existing quayside infrastructure.
Portland	Portland is not located within the towing distance from the Celtic Sea to optimise use of weather windows. However, due to its water depth, land area and existing quay length, Portland has been identified by the FLOW Taskforce as a potential location for manufacturing and assembly of FLOW[7]. However, the proposed development aims to provide an integration port for FLOW, rather than a manufacturing port. Furthermore, with regards to cruise tourism, Portland is located too far east for potential shore excursions to the numerous tourist attractions in west Cornwall.

3.7.7 Overall, no alternative location has been identified that meets the requirements for the cruise and FLOW industries, and which could offer a practical option.

Alternative Land Uses

3.7.8 The existing site functions as an operational dock, supporting numerous established activities and industries, and is safeguarded for marine-related employment. The proposed development aims to ensure the continued viability of such operations and maintain Falmouth Dock's significance over time by modernising and future-proofing the site. For these reasons, no alternative land uses were considered outside of the proposed development.

Alternative Layouts, Design and Design Evolution

3.7.9 The following sub-sections of this chapter describe the design evolution process undertaken by the applicant's design team.

3.7.10 The proposed development, as presented in Chapter 4: Proposed Development Description, is the result of an iterative process of analysis, design, dialogue, refinement and consultation, as described below.

Key Design Concepts

3.7.11 A key design concept has been to safeguard and modernise the existing Falmouth Dock facility and re-use, repair and upgrade the existing structures as far as practicable. The options for the general layout of the site have therefore been limited to the existing dock area and wharfs. Furthermore, with regards to the construction of new structures and the extension of existing structures, the proposed development has been designed to match the geometries and elevation of the existing structures.

3.7.12 The proposed development consists of an operational dock, serving a variety of activities and vessel types. A key design requirement has therefore been to provide flexibility on the berths and the quayside, to allow the site to accommodate various industries and vessels, achieve operational efficiency and realise the economic potential of Falmouth Dock.

3.7.13 Environmental considerations have been at the heart of the design and driven key design decisions. The Falmouth Cruise Project 2009 did not proceed, primarily due to harm to maerl habitat. A key consideration of the design development has therefore been to avoid impacts on maerl beds and minimise dredging within the Fal and Helford Special Area of Conservation (SAC), in particular avoiding dredging in the channel.

Operational Requirements

3.7.14 Meeting operational requirements of the docks was a fundamental requirement of the design. The proposed development includes the FLOW Deck to facilitate the assembly and maintenance of FLOW. The key environmental driver for this change is to support the transition to renewable energy and mitigation of climate change, alongside supporting employment.

3.7.15 The proposed development meets the design objective of improving the safety of the site for users, including navigational safety. The proposed development comprises upgrades to the Western, Northern, Queens and Duchy wharves and demolition of the Northern Arm.

3.7.16 A key consideration in the design to enable the dredge area to be reduced, is the operational use of the tides to bring vessels into the docks. This has enabled dredging in the channel to be avoided altogether, with only dredge pockets being proposed in the vicinity of the wharfs.

Environmental Design Response

3.7.17 Due to the sensitivity of the site's location, environmental considerations have been at the core of the proposed development design.

[7] Royal HaskoningDHV, 2023. Floating Offshore Wind Taskforce: Industry Roadmap 2040. Building UK Port Infrastructure to Unlock the Floating Wind Opportunity. Available at: https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/docs/flow_tf_-_inegrated_report_f.pdf

Ecology

3.7.18 A key driver for the proposed development was to avoid any damage to or loss of live maerl habitats located in the vicinity of the site. Numerous ecological surveys were undertaken to understand and categorise the benthic ecology. These comprised an initial drop-down video survey in May 2022, the findings of which were used to conduct further targeted surveys, undertaken in May 2023. The surveys provided an understanding of areas containing live and dead maerl and other species of note.

3.7.19 The results of the surveys confirmed that the dredge pockets of the proposed development avoid direct impact to live maerl habitats.

3.7.20 The design of the proposed development has sought to achieve the highest possible biodiversity net gain (BNG) whilst avoiding impacts to existing operations and accommodating expanding cruise and cargo operations. Areas of terrestrial and intertidal habitat have been retained were possible. Approximately 20 small trees will be planted in pots and installed on the site, allowing easy movement to accommodate changing operation requirements and provide biodiversity value. In addition, offsite biodiversity units are being investigated in consultation with Cornwall Council to provide the statutory biodiversity net gain required.

Flood Risk

3.7.21 The proposed development design considered flood resilience and resistance, including through minimising volume and extent of dredging and through the design of the structures. The design allows for future sea level rise, assuming construction in approximately 2026, this predicts a sea level rise of approximately 0.4 m over 50 years for the 50th percentile and approximately 0.6 m for the 95th percentile. A sea level rise value of 0.6 m is allowed for in the design.

Design Evolution

3.7.22 Table 3.2 presents a summary of the main design evolution for the proposed development, including a description of the different marine infrastructure and dredging options explored. Table 3.2 focuses on the key design differences between the Falmouth Cruise Project 2009 and the proposed development.

Table 3.2: Design Evolution Summary

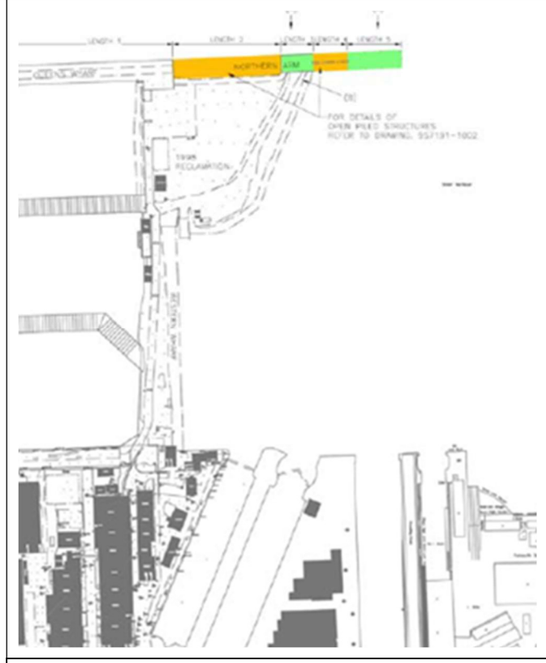
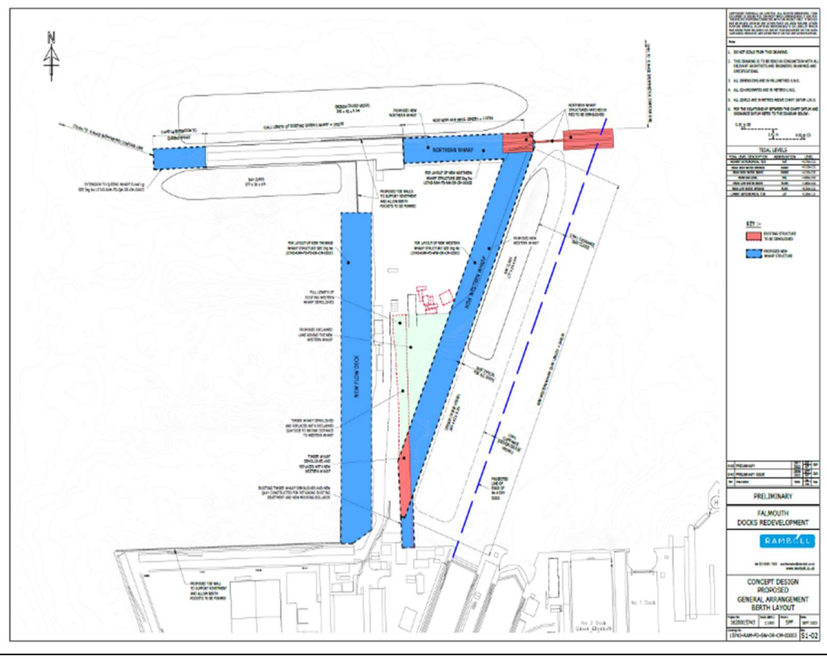
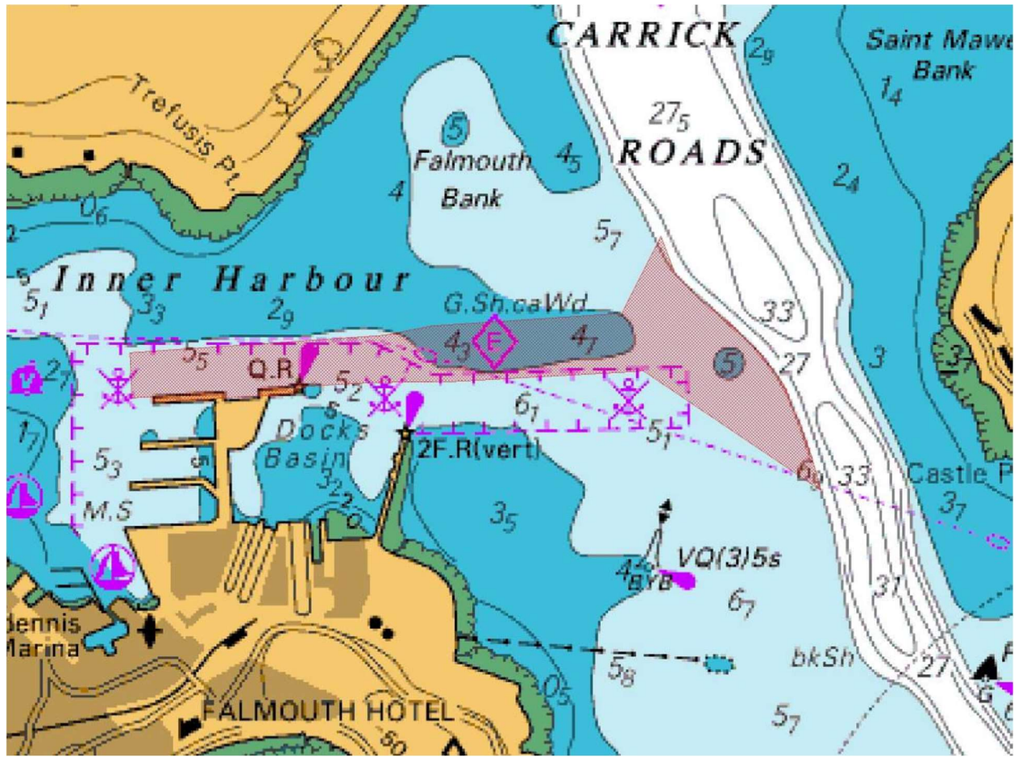
Design Evolution Component	Falmouth Cruise Project (2009)	Proposed Development (2024)
General Arrangement and Infrastructure		
	Proposals for the Falmouth Cruise Project (2009) comprised combining the Queens and Northern Wharfs to create a longer cruise quay, constructing a new cruise terminal building on the reclaimed land near the Queens and Northern Wharfs, and various improvements to infrastructure around the docks estate. The Western and Duchy Wharfs were to remain in the existing orientation, with no upgrades.	The proposed development includes the demolition of the degraded Northern Arm, removing the navigational hazard and enabling safer access to the Western Wharf. The proposed development was updated to comprise demolition of part of the remaining Western Wharf and construction of the new Western Wharf to increase capacity for excellence class cruise vessels. Queens Wharf and Northern Wharf are joined and Queens Wharf extended westward by 50 m to create one functional wharf in replace of the two underutilised and degraded wharfs. Installation of the FLOW Deck, responding to market demands for offshore wind facilitation sites within the 72 hr radius of the Celtic sea.

Table 3.2: Design Evolution Summary

Design Evolution Component	Falmouth Cruise Project (2009)	Proposed Development (2024)
Dredging Extent		
	The dredging proposals for the Falmouth Cruise Project (2009) comprised dredging a deep (-8.3 m Chart Datum (CD)) and straighter navigation channel (from Carrick Roads/The Narrows to the Queens and Northern Wharfs and dredging a -9.5 m CD berthing pocket along the Queens and Northern Wharfs. An area of seabed in the eastern part of the navigation channel was proposed to be dredged and filled with maerl substrate for seabed habitat compensation.	The proposed development dredging plan comprises only the pocket dredge of berth areas to achieve required underkeel clearance for Excellence Class cruise vessels and the FLOW underkeel requirements (-10.5 m CD), the removal of foul ground within areas of the former Kings and Empire Wharfs, and the surface skim of seabed on the eastern side of the site to maintain -5.5 m CD. The dredging extent is **limited to the areas directly surrounding the wharfs** and no dredging is proposed in the channel, where live maerl habitat is present. This design has considered the operation of the docks, and makes use of the tides: Vessels requiring deeper underkeel clearance can enter and leave the docks via Carrick Roads on high tide, therefore avoiding the need for dredging in the channel, and requiring pocket dredges alongside the wharfs only.

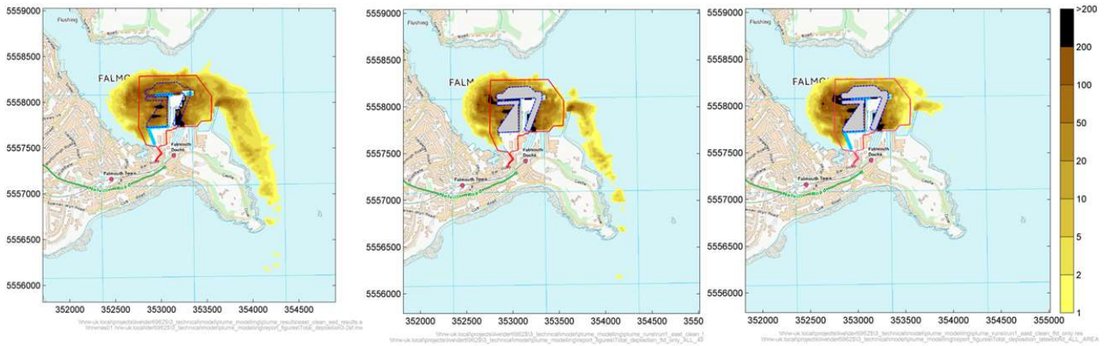
Alternative Construction Methods

3.7.25 Alternative construction methods, particularly with respect to dredging, have been explored to reduce environmental effects and these are summarised below and discussed within ES Chapter 5: Demolition and Construction and Appendix 5.1: Outline Construction Environmental Management Plan.

3.7.26 Alternatives with respect to disposal options for dredge arisings have been specifically considered within Technical Appendix 5.3: BPEO Assessment for Dredging.

3.7.27 The proposed dredge pockets would be formed using a backhoe dredger(s) to minimise sediment mobilisation. In addition, an 'environmental bucket' will be used for all materials. This is a lidded bucket which is designed to minimise the release of suspended sediment losses to the water column.

3.7.28 Dredging will be limited to occur during the flood tide. Following investigation of the sensitivity of released sediment deposition in the area, the timing of the period of dredging was amended to be from 1.75 hours before low water to 1.75 hours before high water, which further minimises fine sediment deposition in the more sensitive areas. Figures 3.1 illustrates the modelled improvement in total sediment deposition when the dredging is undertaken on the flood tide, and further improvements with amending this to 1.75 hours before low to 1.75 hours before high water.



All tide dredging Flood tide only dredging Late ebb/early flood tide dredging

Figure 3.1 – Illustration of Improvements in Modelled Total Sediment Deposition (all tide versus flood tide dredging)

3.8 Conclusion

3.8.1 The objectives of the proposed development are to repair and update the currently poor condition port infrastructure in order to maintain existing business and future proof the port with respect to cruise capacity, cargo capacity and FLOW.

3.8.2 Given the objective to repair and re-use existing infrastructure as far as practicable, the options for the layout of the site have been limited. Due to the nature of the site as an operational dock, the design of the proposed development has ensured flexibility on the berths and the quayside.

3.8.3 The proposed development has sought to address the environmental issues raised by the Falmouth Cruise Project (2009), with particular regard to avoiding and minimising impacts on maerl beds located in the access channel. The design evolution process has been iterative, with design refinement responding to the numerous opportunities and constraints on-site and in the surrounding area, principally those relating to seascape, landscape and visual amenity, hydrodynamics, seabed contamination, flood risk, ecology. The final design solution is presented in detail in Chapter 4: Proposed Development Description and Chapter 5: Demolition and Construction.