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FALMOUTH DOCKS DEVELOPMENT
WATER FRAMEWORK DIRECTIVE ASSESSMENT

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1. INTRODUCTION

1.1 Brief

1.1.1 Ramboll UK Limited (Ramboll) has been appointed by Falmouth Docks and Engineering Company (FDEC) (the 'Applicant') to undertake a Water Framework Directive (WFD) assessment for the proposed redevelopment and upgrade of facilities (the 'proposed development') at Falmouth Docks, Cornwall (the 'site').

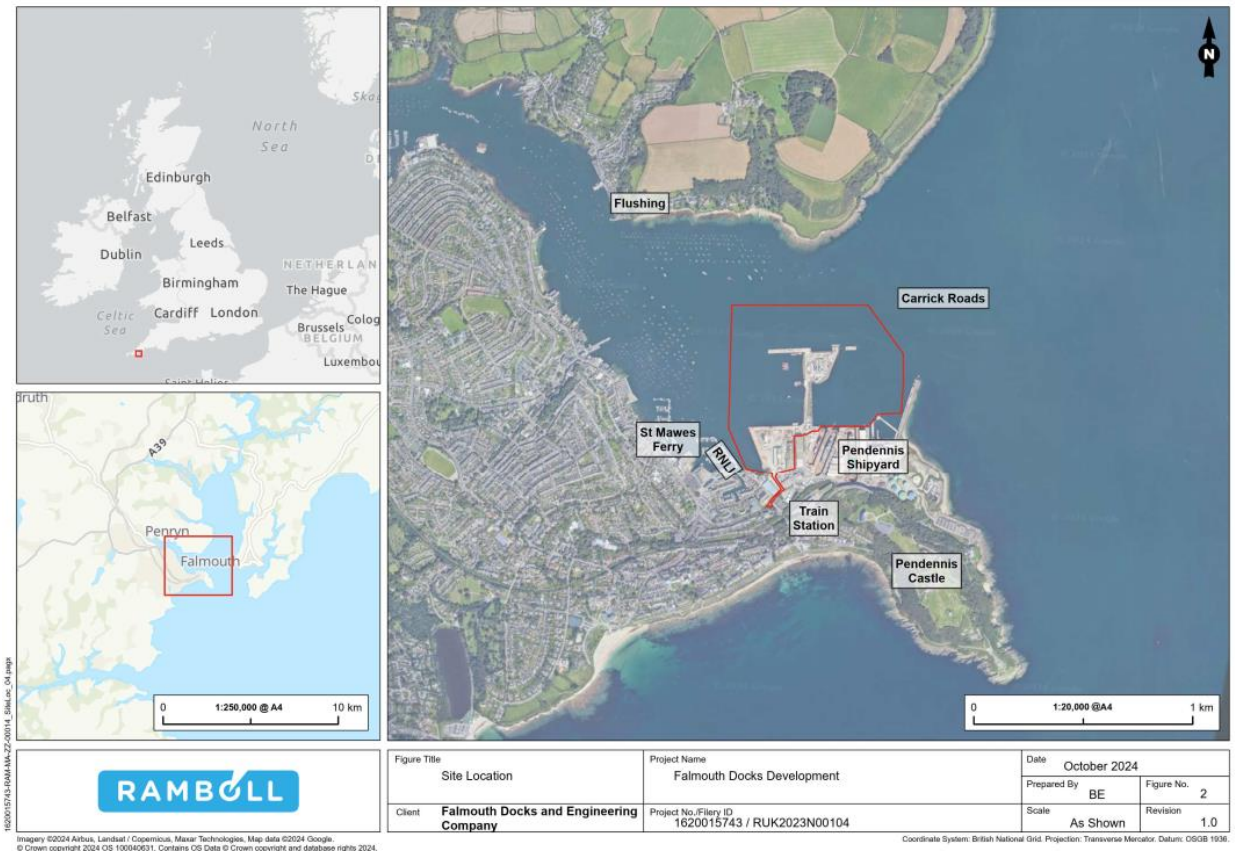


Figure 1: Site Location

1.1.2 As shown in Figure 1, the site is located at Falmouth Docks, Falmouth, Cornwall, TR11 4NR, and is centred at National Grid Reference: SW 81765 32796. The site is owned and operated by FDEC, who are part of the A&P Group. Under the Falmouth Harbour Act and Orders 1870-1991[1], FDEC is the Statutory Harbour Authority (SHA) for the area.

1.1.3 The EIA site boundary is irregularly shaped, covering a total site area of approximately 47.2 hectares (ha). Approximately 7.7 ha of the site currently comprises hardstanding, building structures and wharf structures. Parts of this site infrastructure are considered to be in poor condition and/or unsafe for operational use. The remaining area within the site boundary consists of the Carrick Roads channel. The Carrick Roads channel is the determining factor in vessel movements and vessel size, with a channel depth of 5.4 m Chart Datum (CD) at Mean High Water Spring (MHWS).

1.1.4 Under Section 66 of the Marine and Coastal Access Act 2009, a marine licence is required in order to undertake the proposed works. This WFD assessment has been prepared to support the marine licence application to the Marine Management Organisation (MMO). As such, the WFD assessment is restricted

[1] UK Government Legislation, 2007. Marine Works (Environmental Impact Assessment) Regulations 2007, as amended, online. Available at: https://www.legislation.gov.uk/uksi/2007/1518/contents/made

to the evaluation of potential impacts associated with the proposed marine works only and excludes any assessment of the proposed terrestrial works (the demolition of on-site buildings and re-configuration of Falmouth Docks activities) as these would not interact with the marine environment or waterbodies designated under the WFD. With regards to run-off, suitable measures outlined within the Construction Environmental Management Plan (CEMP) would ensure the appropriate management and secure storage of demolition and construction waste and materials, and during the operational stage, existing drainage assets would be utilised.

1.2 Proposals

1.2.1 The proposed development would redevelop and modernise the existing facilities at Falmouth Docks to reinstate full alongside berth capability and increase berth capacity. 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 renewable floating offshore wind (FLOW) (supporting the offshore wind market).

1.2.2 The proposed development comprises the following redevelopment activities within the marine environment:

- Pocket dredge of berth areas to achieve required underkeel clearance for larger cruise vessels (up to Excellence class) and the FLOW renewable energy device underkeel requirements (considered to be -10.5 m Chart Datum (CD));
- Removal of foul ground within areas of the former Kings and Empire Wharves;
- Surface skim of seabed on eastern side of the site to maintain -5.5 m CD;
- Demolition of the remaining existing Western Wharf timber piles and above surface infrastructure;
- Construction of a new Western Wharf suspended deck structure with a deck level of +8.36 m CD (5.45 m Above Ordnance Datum (AOD));
- Demolition of the Northern Arm concrete structure and substructure to below seabed level and removal of the gang walkway and old timber piles that are located west of this structure;
- Construction of a suspended deck structure (Northern Wharf) in the existing 90 m gap between Queens Wharf and the Northern Arm to create a longer functional wharf length, with a deck level of +8.36 m CD (5.45 m AOD);
- Upgrades to the existing Queens Wharf structure;
- Extension of the Queens Wharf suspended deck structure 50 m westward with a deck level of +8.4 m CD (5.49 m AOD);
- Installation of a 290 m deck (the 'FLOW Deck') to facilitate a FLOW device with a deck level of +8.36 m CD (5.45 m AOD);
- Upgrades to the existing Duchy Wharf structure to facilitate a FLOW device with a deck level of +8.24 m CD (5.33 m AOD); and
- Potential strengthening works to Duchy and County Wharf piles.

1.2.3 The proposed development general arrangement is presented in Figure 2.

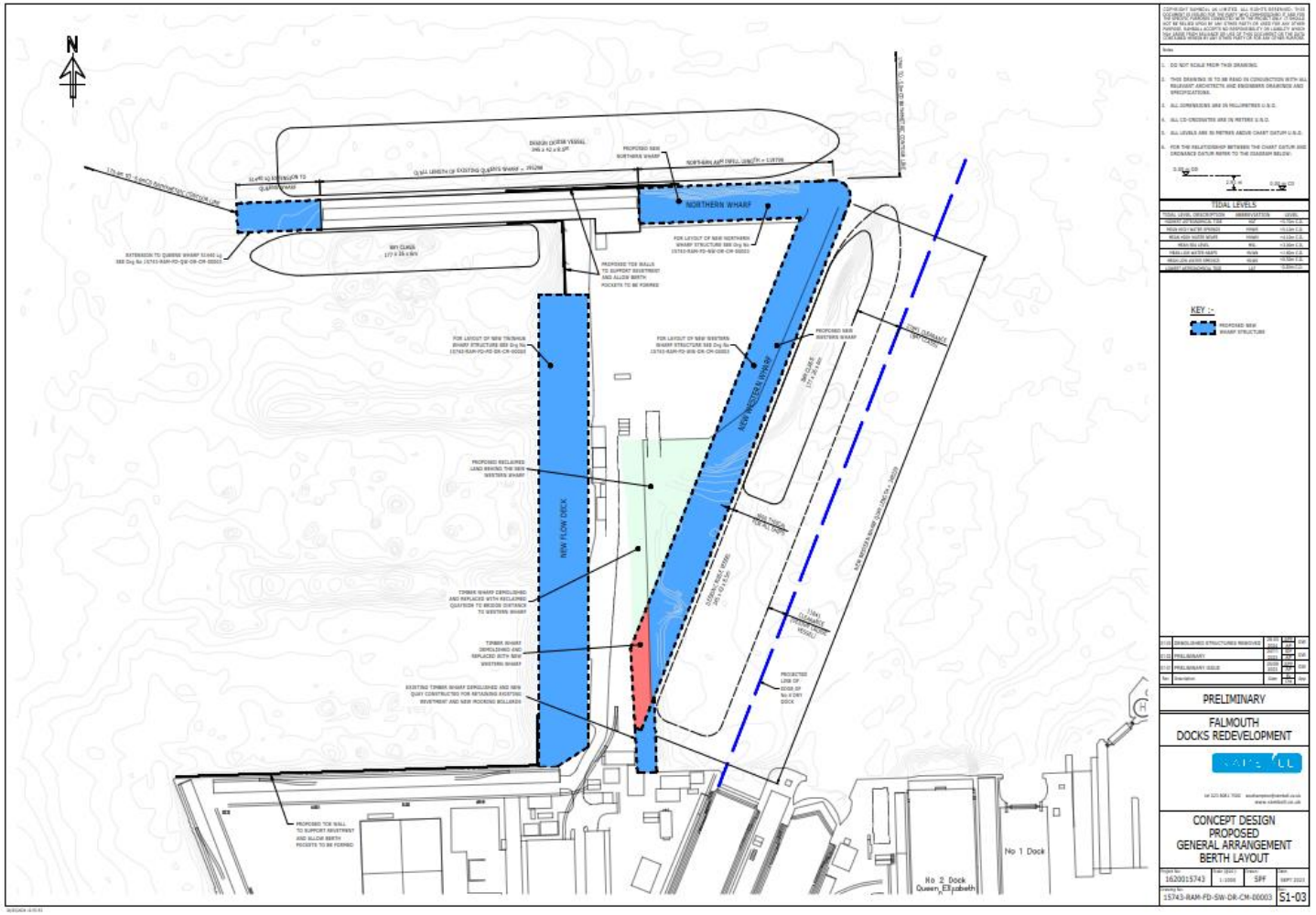


Figure 2: Proposed Development General Arrangement Plan

1.3 Demolition and Construction Activities

1.3.1 It is anticipated that the demolition and construction stage would be delivered through five key activities:

1. Activity 1: Strengthening and Enabling Works;
2. Activity 2: Demolition;
3. Activity 3: Dredging;
4. Activity 4: Construction; and
5. Activity 5: Finishing Works and Upgrades.

1.3.2 A detailed demolition and construction programme has not yet been produced. To enable a worst-case assessment of likely environmental effects, an indicative programme has been developed by the Applicant based on the most efficient and intense use of plant and equipment deemed practicable, whereby the works at each wharf are undertaken in parallel and demolition and construction activities occurring in different areas of the site overlap. As a worst-case, it is also assumed that Falmouth Docks would remain operational whist demolition and construction activities are on-going.

1.3.3 To enable a worst-case assessment of likely environmental effects, based on commencement of works in Q4 2025, the demolition and construction stage is anticipated to be undertaken over an approximately 42-month period, finishing in Q1 2029. The majority of the wharfs, however, will be completed after 27 months (in Q4 2027). The indicative demolition and construction programme is shown in Table 2.1. However, it is possible that due to market conditions and funding, as well as the choice of contractor, the demolition and construction stage could occur over a longer duration, or that the wharfs could be constructed in a different order than that shown in Table 2.1.

Table 2.1: Proposed Indicative Demolition and Construction Programme

Activity	Estimated Duration (weeks)	Estimated Commencement Date	Estimated Completion Date
Western Wharf			
Strengthening and Enabling Works	8	Q4 2025	Q4 2025
Demolition (timber Western Wharf and temporary buildings)	12	Q4 2025	Q1 2026
Dredging	20	Q3 2026	Q4 2026
Construction, including Reclamation	48	Q4 2026	Q4 2027
Finishing Works and Upgrades	28	Q3 2027	Q4 2027
Northern Wharf			
Strengthening and Enabling Works	8	Q4 2025	Q1 2026
Demolition (Northern Arm)	12	Q4 2025	Q1 2026
Dredging	18	Q1 2026	Q2 2026
Construction	22	Q2 2027	Q4 2027
Finishing Works and Upgrades	8	Q4 2027	Q4 2027
Queen's Wharf – Existing and Extension			
Strengthening and Enabling	4	Q1 2026	Q1 2026
Dredging	Included in Northern Wharf dredging		
Construction	11	Q3 2027	Q4 2027
Finishing Works and Upgrades	4	Q4 2027	Q4 2027
FLOW Deck			

Table 2.1: Proposed Indicative Demolition and Construction Programme			
Activity	**Estimated Duration (weeks)**	**Estimated Commencement Date**	**Estimated Completion Date**
Strengthening and Enabling	12	Q1 2026	Q1 2026
Dredging	20	Q4 2026	Q1 2027
Construction	40	Q2 2026	Q3 2028
Finishing Works and Upgrades	24	Q4 2028	Q1 2029
Duchy Wharf and County Wharf			
Strengthening and Enabling	20	Q2 2026	Q3 2026
Finishing Works and Upgrades	8	Q3 2026	Q3 2026

1.3.4 An Outline Construction Environmental Management Plan (ES Volume 2 Technical Appendix 5.1: Outline Construction Environment Management Plan (OCEMP)), and an Outline Site Waste Management Plan (ES Volume 2 TA 5.2: Outline Site Waste Management Plan (OSWMP)) have been produced and accompany the applications for full planning permission and the marine licence. The OCEMP would form the basis of a detailed CEMP to be prepared by the main contractor(s) and implemented during the demolition and construction works, which would be secured by means of appropriately worded planning and marine licence conditions.

1.3.5 The marine demolition and construction activities which require assessment under the Water Framework Directive, due to potential impact on or interaction with the water environment, are described in greater detail in turn below.

Strengthening and Enabling Works

1.3.6 The following strengthening and enabling works are required across the site, to allow dredging and construction activities to occur:

Stabilisation of Existing Causeway

1.3.7 The existing central causeway is required to be stabilised, to enable the demolition and removal of the timber wharf at Western Wharf. Either a cross-tied wall or ground anchored combi-wall is proposed to stabilise the causeway, and would be installed using the following method:

i. Drive steel vibro-driven or impact-driven piles for the wall, with steel sheet piles between to retain fill material or bored and cased concrete piles;
ii. Install cross-ties or ground anchors through boring and grouting;
iii. Construct capping beam over piles;
iv. Backfill with well graded granular material; and
v. Form new revetment and place rock armour.

Excavation of Existing Revetments

1.3.8 Excavation of the existing revetment at Western Wharf is required to allow dredging to be undertaken. This will be undertaken with a long reach excavator, to form a stable slope from bed level to the existing ground level. Excavation of the head of the existing causeway and the existing revetment surrounding Northern Arm is also required prior to the demolition of the Northern Arm, in order to form a stable slope. Temporary rock armour may be required to protect the newly formed slope during the works. Excavation of the existing revetments at the FLOW Deck will also be required.

Toe Walls

1.3.9 Toe walls are required at the toe of revetments across the site. The toe walls would retain the existing revetments and land behind where the proposed dredging will undermine the toe. This is required to accommodate the new proposed dredge depth. Locations requiring toe walls include:

- Along the quay to the south of Western Wharf and west of the dry docks;
- Immediately north of the FLOW Deck;
- Along the southern extent of the FLOW Deck;
- Beneath Duchy Wharf;
- Along the existing Queen's Wharf; and
- At the interface of Queen's Wharf and Northern Wharf.

1.3.10 Two options for the installation of the toe walls have been developed, to allow for highly weathered or competent rock. If the rock is found to be weathered, sheet piles are proposed to be driven to depth. Alternatively, a cased bored secant wall would allow for the toe walls to be installed into competent rock.

1.3.11 For both options, the area would first be surveyed and seabed obstructions removed on the line of the piled wall, including any rocks that may have slipped out of position from the revetment.

1.3.12 The proposed process for installation of driven sheet piles (in the case of weathered rock) is to vibro-drive steel sheets into position to a 'set', and then to impact-drive sheets to the required toe level.

1.3.13 The proposed process for bored secant piles (in the case of competent rock) is to first install unreinforced piles at approximately 0.8 pile diameters apart, and to then install reinforced concrete piles between the unreinforced piles. The installation of each unreinforced pile would be undertaken using the following methodology:

- Bore hole for softer 'slow gain' unreinforced piles. Temporary casings will be required from water level to approximately 1 m below bed level to prevent loss of material into the water and may be required to prevent collapse of softer material into the bored hole;
- Pour slow gain weak mix concrete into the bored hole and extract casings for reuse. The underwater concrete placement is envisaged to be undertaken by tremie placing concrete from the bottom of the bored hole; and
- Compact concrete (or use a self-compacting concrete mix).

1.3.14 The installation of each reinforced pile would then be undertaken to complete the bored secant wall, using the following methodology:

- Bore holes for reinforced concrete piles. These bored holes will overlap the softer unreinforced piles by approximately 0.1 pile diameters each side, to create a suitable interlock. Casings may be required to prevent collapse of softer material into the bored hole;
- Pour structural concrete and extract casings for re-use; and
- Place reinforcement cage into pile.

Demolition

1.3.15 The demolition works associated with the marine infrastructure are shown in red in Figure 3.

Demolition of Western Wharf Timber Jetty

1.3.16 The existing Western Wharf is a timber jetty, formed from timber piles, beams and deck, in addition to a sheet pile wall driven in front of the jetty and tied by timber piles to the Western Wharf. The timber piles and above surface infrastructure require demolition.

1.3.17 The timber wharf in the southern corner of Western Wharf would be demolished following the construction of the causeway stabilising structure, as follows:

- Remove timber decking planks and joists;

- Backfill between cross tied wall or ground anchored combi-wall and the existing quay wall, burying lower sections of the Western Wharf in a new revetment;
- When fill material reaches a suitable height, cut out timber beams and piles above fill material; and
- Backfill to final required level.

1.3.18 The remaining Western Wharf deck would then be demolished using the following method:

- Remove timber decking and joists;
- Place revetment material in front of Western Wharf to form a stable slope to retain existing revetment beneath timber wharf. Temporary rock armour may be required to protect the slope during construction. Revetment is to be placed to a suitable level to provide stability to the existing gravity wall; and
- Remove timber beams and cut out timber piles above the revetment.

Demolition of Northern Arm

1.3.19 The Northern Arm structure consists of precast blocks placed on a rock outcrop as walls, in-situ concrete walls formed over this, and an interior void with lean mix concrete (6:1), in addition to remaining timber structures. The concrete structure and substructure would be demolished to below seabed level and the gang walkway and old timber piles located west of this structure would also be removed.

1.3.20 Demolition of the Northern Arm would comprise the demolition of its upper section (in-situ concrete down to MLWS) followed by demolition of its lower section (precast and lean mix concrete down to the rock head). The demolition method for the upper section is anticipated to be as follows:

- Wire cut the mass concrete walls and capping slab into liftable pieces;
- Use mobile crane or excavator with grab / grapple to remove pieces;
- Remove cut pieces from site; and
- Excavate fill material by excavator and stock-pile for potential re-use as walls are reduced.

1.3.21 The demolition method for the lower section is anticipated to comprise:

- Excavate fill material by wire saw cutting, hydraulic breaker (used up to a total of 1-hour in any 24hrs) and excavator and stock-pile for potential re-use, thereby loosening the blocks from the structure;
- Lift concrete blocks out with excavator and grab/grapple;
- Remove mass concrete blocks from site;
- Excavate rock head to required dredge level; and
- Remove any remaining timber piles or obstructions.

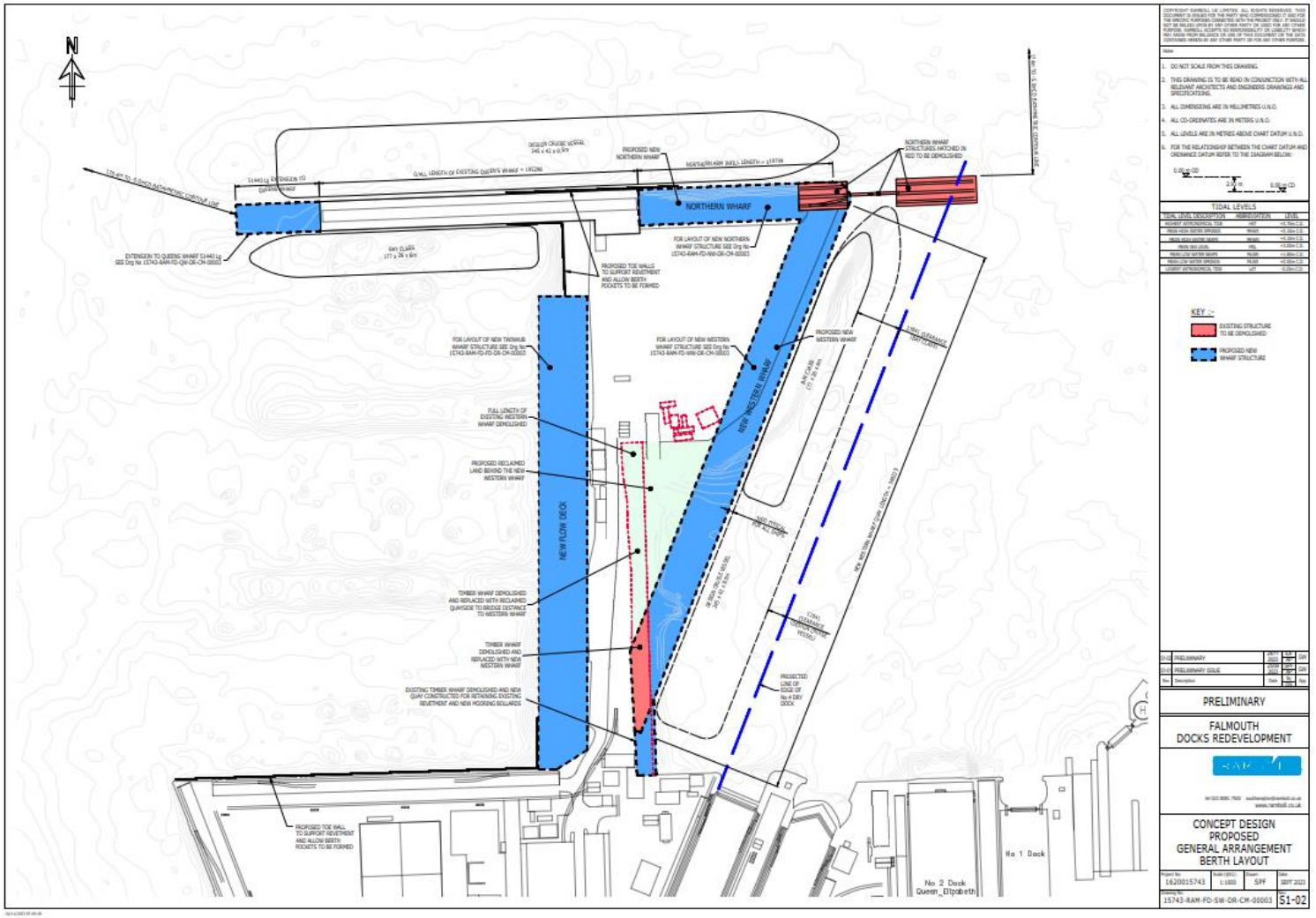


Figure 3: Proposed Development Demolition Plan

Dredging

1.3.22 As presented in Figure 3, it is proposed to dredge pockets along the berths at Western Wharf, north and south of Queen's Wharf and in the western basin adjacent to the proposed FLOW Deck. The berth pockets are proposed to be dredged to -10.5 m CD to achieve the required bed depths and underkeel clearances associated with the FLOW devices and the various vessels that would berth at the site. These dredge depths are to the clear draught of the design vessel with an additional 1 m underkeel clearance at Lowest Astronomical Tide (LAT) and 300 mm siltation allowance. The remaining elements of King's Wharf and Empire Wharf to the west of the causeway would be removed and surface-skimming of the eastern side of the causeway to -5.5 m CD would be undertaken.

1.3.23 The total dredged area would be approximately 232,500 m^2, whilst the total volume of dredged material would be approximately 643,000 m^3. Dredged material would comprise seabed material in addition to rock material that has been identified in the dredge pockets through ground investigation surveys. Stable batter slopes would be formed as part of the dredge process to ensure stability of the existing ground and prevent debris falling into the berth pockets. The sides of the dredge pockets would be graded and, if required, rock scour protection would be placed in the berth pockets. The dredge areas would then be surveyed again, and any missed areas or slipped material from batter slopes would be removed.

1.3.24 The dredge pockets would be formed using a backhoe dredger(s) to minimise sediment mobilisation. In addition, an 'environmental bucket' will be used. This is a lidded bucket which is designed to minimise the release of suspended sediment losses to the water column. The size of the bucket assumed for modelling is a 10 m^3 lidded bucket, which is considered a precautionary approach for modelling purposes. The final choice of plant will be defined by the contractor; however, it will not be larger than the plant simulated.

1.3.25 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.

1.3.26 The production rate for the dredger using a 10 m^3 bucket will be approximately 11,000 m^3 per week. As shown in the indicative demolition and construction programme (Table 2.1), dredging could be undertaken over a 58-week period, which is the quickest timeframe that this could realistically be undertaken. This assumes a 10 m^3 closed bucket is used for all dredge material and that dredging would only be undertaken on a flood tide (amended to 1.75 hours before low water to 1.75 hours before high water).

1.3.27 Using a smaller bucker with a longer programme is predicted to decrease sediment dispersion, and therefore modelling the largest bucket deemed practicable (10 m^3) is deemed the worst-case in terms of sediment dispersion. In practice, the dredge production rate and therefore duration of dredging would depend on the size of the backhoe dredger and bucket deemed most appropriate by the contractor, as well as the rate at which this can be disposed of on land and/or storage options, which may be the limiting factor.

1.3.28 The dredged material suitable for disposal at sea would be loaded directly onto barges and taken to the disposal site, Falmouth Bay (B) Disposal Site (PL075). The contaminated dredge material would be landed and removed from site by Heavy Goods Vehicle (HGV). A proportion of the dredged material is anticipated to be beneficially re-used on site.

1.3.29 Should the rate of dredging exceed the rate at which the contaminated material can be removed from site, temporary stock-piling of contaminated material will be required. The material would either be

stored temporarily on a barge within the site (either at Queen's Wharf or Duchy Wharf), or stockpiled on the dock quayside area within the site (likely to be at Duchy Wharf). Adequate control measures would be put in place and adhered to for any temporary storage of contaminated material in line with Government guidance[2], including appropriate secondary containment.

1.3.30 Falmouth Bay disposal site lies approximately 9.4 km to the south-east of the site, in the English Channel, as shown on Figure 5. Disposal would be undertaken in line with any marine licence conditions to ensure no significant adverse environmental effects.

1.3.31 The sea at this disposal site is not classified under the WFD, due to its location beyond the area to which WFD designation extends. Whilst it is recognised that the disposal of sediment at Falmouth Bay (B) Disposal Site will generate a sediment plume that could lead to increases in water turbidity and deposition of the sediment in proximity to the disposal site (see Environmental Statement (ES) Volume 2, Technical Appendix (TA) 6.3 Sediment Plume Modelling Report which presents worst-case model outputs for sediment plumes due to disposal of arisings at sea), any such impacts will be of low magnitude, temporary and localised, and do not significantly extend into or overlap with any waterbody designated under the WFD. As such, the disposal of sediments at sea is not considered further in this report.

1.3.32 Limited maintenance dredging is proposed. The anticipated volume of maintenance dredging is estimated to be up to approximately 8,000 m^3 every 5 years (or depending on operational requirements, up to approximately 16,000 m^3 every 10 years), as required, mostly within the eastern berth pocket (Western Wharf). For further detail refer to ES Chapter 6: Coastal Processes and Technical Appendix (TA) 6.2: Sediment Transport Modelling. Maintenance dredging would be undertaken in line with the requirements of the marine licence, with proposed disposal at the Falmouth Bay Disposal site.

[2] Pollution prevention for businesses - GOV.UK (Accessed 14 November 2024)

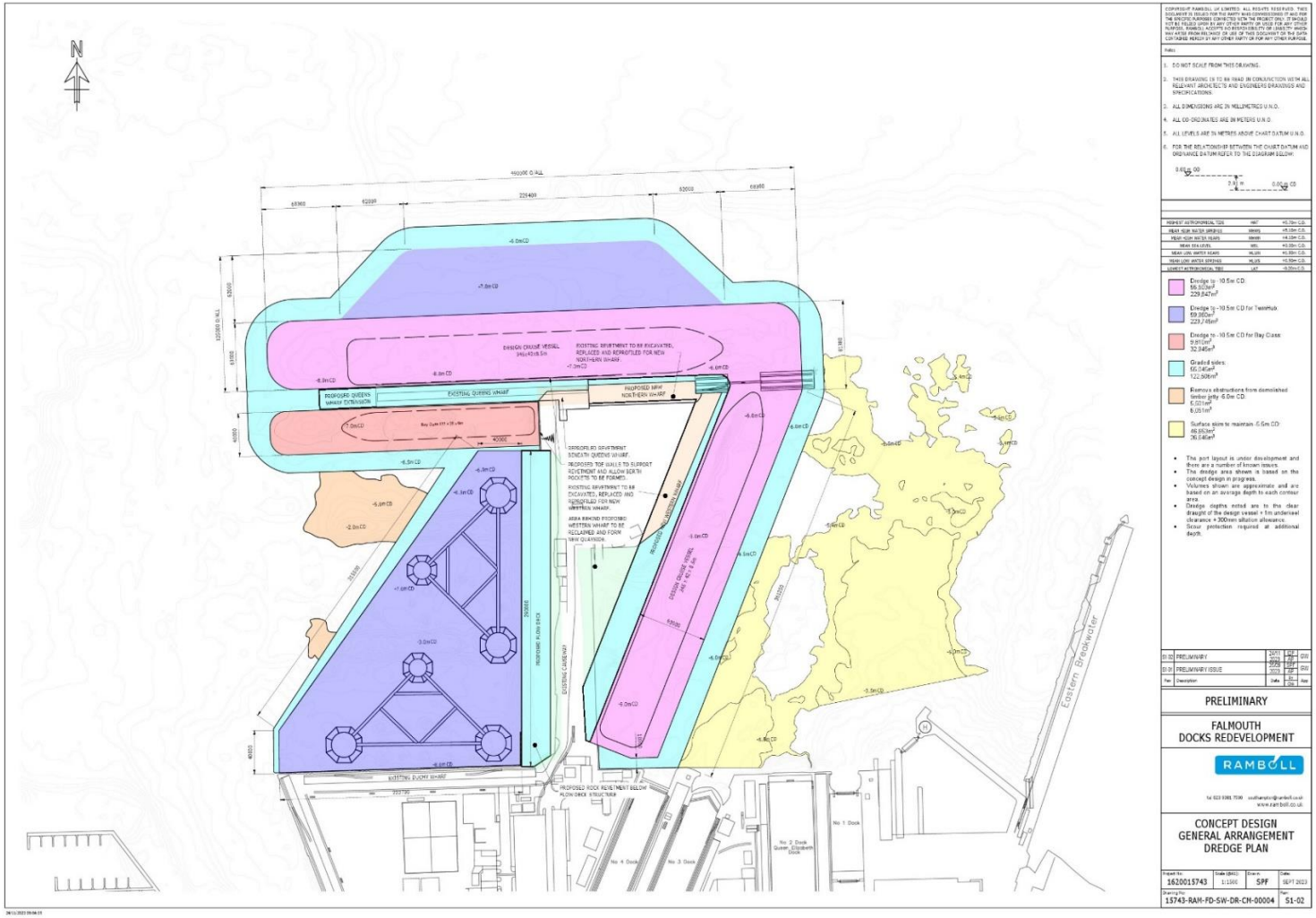


Figure 4: Proposed Development Dredging Plan

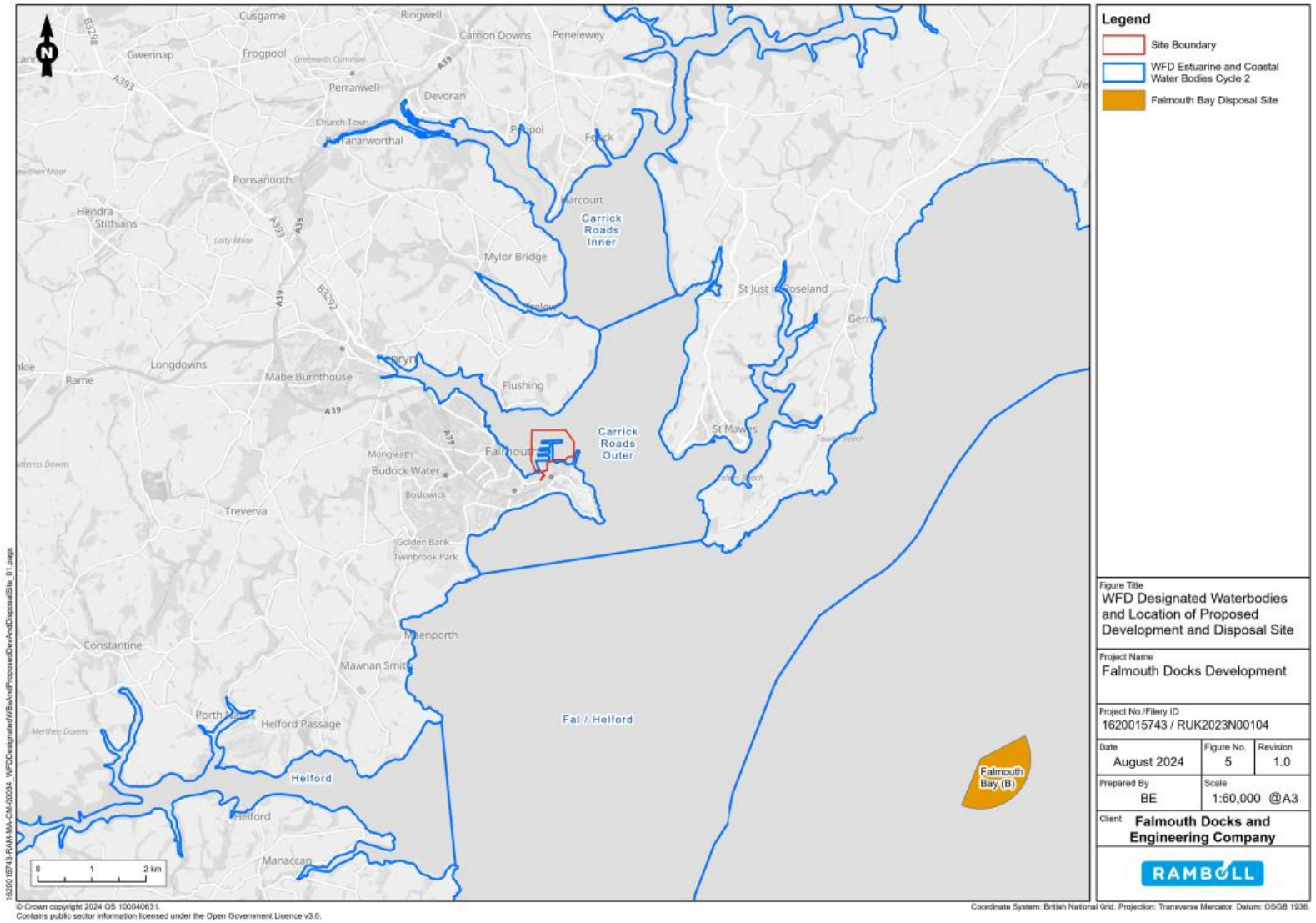


Figure 5: Plan Showing WFD-Designated Waterbodies and Location of Proposed Development and Disposal Site

Construction

1.3.33 The proposed new wharf structures would each be constructed following the same structural form and methodology. The suspended decks would consist of a combination of vertical and raking piles, supporting a series of longitudinal and transverse reinforced concrete beams with a reinforced concrete deck over. With the exception of the Queen's Extension, new revetment would be constructed beneath the decks, as well as transition slabs positioned at the landward edge of the quay, bridging between the reclaimed land behind and the new structures. An area of land reclamation in the zone between the existing causeway and the new Western Wharf would be constructed.

1.3.34 To summarise, the key infrastructure required for each wharf that would be constructed and installed is as follows:

Table 2.2: Main Infrastructure Required at each Wharf

Wharf	Requirements
Western Wharf	• Area of land reclamation in the zone between the existing causeway and the new wharf • New revetment (330 m in length) • A transition slab positioned at the landward edge of the quay, bridging between the reclaimed land behind and the new structure • 164 no. 1,270 mm diameter steel vertical piles • 46 no. reinforced concrete raking piles installed within the existing causeway revetment and area of reclaimed land behind • Suspended deck
Northern Wharf	• New revetment (160 m in length) • A transition slab positioned at the landward edge of the quay, bridging between the reclaimed land behind and the new structure • 80 no. 1,270 mm diameter steel vertical piles • 46 no. reinforced concrete raking piles • Suspended deck
Queen's Wharf	• 28 no. 1,016 mm diameter steel vertical piles • 20 no. 914 mm diameter steel raking piles • Suspended deck
FLOW Deck*	• New revetment (290 m in length) • Transition slab positioned at the landward edge of the quay, bridging between the reclaimed land behind and the new structure • 195 no. 1,321 mm diameter steel vertical piles • 140 no. reinforced concrete raking piles • Suspended deck
*Minimum requirement for FLOW to be operational (i.e. the FLOW Dolphins)	• New revetment (290 m in length) • 40 no. 1,321 mm diameter steel vertical piles • 32 no. reinforced concrete raking piles

Installation of Steel Tubular Vertical Piles

1.3.35 The installation of the steel tubular piles is considered to be similar regardless of the option chosen for providing lateral stability. The construction process will include:

- Rock armour would be removed locally to the proposed pile position and piles driven into the ground, using vibro-driving as far as possible (to minimise noise and impact on the surroundings) and using impact driving if required pile depths are not achieved through vibro-driving.
- Precast concrete troughs would then be placed over the piles, positioned to allow plant to track forward and drive the remaining piles through a similar drive/place/drive approach. Alternatively, a temporary steel working platform may be used. The contractor may prefer to have two teams working simultaneously, one driving piles and one placing concrete to allow the construction process to continue with minimal interruption between processes.

1.3.36 The steel tubular raking piles for Queen's Wharf Extension are envisaged to be installed with a similar method to the steel vertical piles, working out from the existing Queen's Wharf.

1.3.37 A piling rig would be utilised to undertake the percussive piling. It is estimated that approximately 6 hours is required for the installation of each pile, of which approximately 2 hours would comprise percussive piling (up to a total 4 hours of percussive piling on a given day).

Provision of Lateral Stability

1.3.38 To provide lateral stability, two options are being considered, and the most suitable will be selected following a detailed ground investigation.

1.3.39 The first option to provide lateral stability is through the installation of raking piles on land behind the suspended decks and within the reclaimed land behind. The raking piles are proposed to be bored and cased reinforced concrete piles to resist tension and compression.

1.3.40 An alternative to the concrete raking piles (should the bedrock be found to be suitable in the detailed ground investigation) is to bore rock sockets for the vertical piles to a point of fixity which would allow a bending moment to develop at the toe of the piles. This process would be installing the piles through vibro-driving as above, followed by coring of the driven pile into the rock layer below through a process of 'drive-drill-drive'. The toe of the piles would then be grouted to fill any void between the steel piles and rock socket. This would likely have to be completed with marine plant.

Placement of New Revetment

1.3.41 New revetments would be formed by placing fill, filter layer and permanent rock armour and reinstatement of rock armour removed prior to dredging. Some compaction of the fill will be required.

Construction of Suspended Deck

1.3.42 Once the revetments and rock armour are completed, the suspended deck would be constructed by placing the remaining precast concrete trough elements by crane, to form the transverse and longitudinal beams. The deck would then be formed over the beams by placing precast concrete planks as form for the decking slab. The final *in situ* slab forming the load-bearing surface of the wharf would be the final concrete element to be constructed, by placing reinforcement over the precast planks in a combination of lifting pre-made cages into position by crane and fixing loose bars for both beams.

Finishing Works and Upgrades

Strengthening of Duchy and County Wharves

1.3.43 Duchy Wharf would be strengthened through the construction of piled crane platforms and new mooring bollards on the land behind it, to allow mooring and fit out of FLOW devices. The crane platforms would be formed from bored concrete piles with a reinforced concrete deck over, to allow cranes to position at the rear of Duchy Wharf. The mooring bollards would be formed from reinforced concrete pads.

1.3.44 Some strengthening works may be required to Duchy and County Wharf piles. This is dependent upon the recommendations of a condition survey and structural assessment which will be undertaken during the detailed design phase.

Landside Works to Wharves

1.3.45 The final construction processes for each wharf would include the installation of braces to the seaward piles and then the fenders, fender panels and quay furniture (bollards, ladders, grab chains, etc.) to allow the wharf to service vessels. Installation of cathodic protection onto the steel piles is likely to be adopted to increase the service life of the structures.

2. BASELINE ENVIRONMENT

2.1 The Site

2.1.1 As presented in Figure 1, the site is located within Falmouth Docks. The boundaries and immediate surroundings of the site comprise the following:

- The north of the site is surrounded by the Carrick Roads channel, leading to the English Channel. The Flushing headland lies approximately 500 m to the north.
- The A&P dry docks lie immediately to the east of the site, followed by the Pendennis Shipyard. The Eastern Breakwater is located approximately 430 m further east. Pendennis Castle lies approximately 1 km south-east.
- Tinners Walk is located south of the site, beyond which are the Falmouth Docks operational buildings, and further beyond is Falmouth train station.
- Immediately to the south-west of the site lies RNLI Falmouth Lifeboat Station, Cockwells at the Lock House and Port Pendennis Marina, beyond which lies the National Maritime Museum Cornwall. A number of visitor moorings are also present adjacent to the site within the Carrick Roads/Falmouth Bay area. The St Mawes-Falmouth ferry service runs adjacent to the site boundary along a west to north orientation. Falmouth town and residential area lies further west of the site.

2.1.2 The current arrangement of the wharf structures within the site can be summarised as comprising the following principal parts, shown on Figure 6:

- A central causeway from which the docks run, leading from the main dockside to the central part of the site redline boundary, where the hardstanding ends at the operational Queens Wharf and Northern Arm (which is no longer operational due to safety concerns);
- Queens Wharf (190 m, 6.5 m draft) and the Northern Arm area located in the central part of the site, between which lies a section of open revetment;
- A berth to the south of Queens Wharf (135 m, 6 m draft);
- The former Western Wharf situated to the east of the central causeway, which is no longer operational due to safety concerns;
- The Duchy and County Wharfs (202 m, 8.5 m draft and 180 m long, 8.5 m draft, respectively) located to the south-west of the central causeway; and
- Two former wharfs, Empire Wharf and Kings Wharf were removed in 2008, however the footprints of these structures remain as foul ground on the seabed, creating shallow water areas.

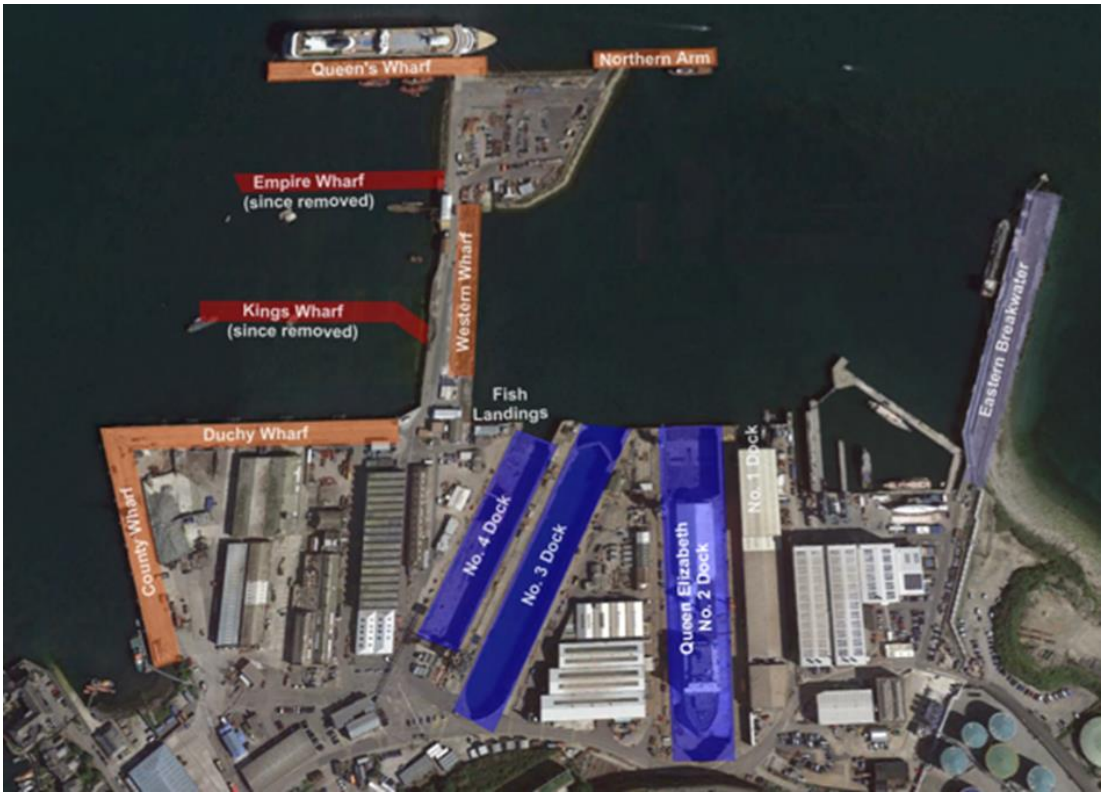


Figure 6: Existing Site Layout

2.1.3 Current uses on site include:

- Cargo - glass recycling, granite, bulk cement, road salt, and other bulk products;
- Cruise - off-boarding and on-boarding of cruise vessels for day visits, including alongside berthing and tender calls from ships berthing in Falmouth Harbour;
- Ship Repair - berthing capacity for ship repair vessels;
- Ministry of Defence (MoD) support - whole life support to vessels; and
- Other - towage services, mobilisation and demobilisation works for jackups etc, hosting of international events.

2.2 Geology and Hydrogeology

2.2.1 According to British Geological Survey (BGS) 1:50,000 mapping[3] of the area, the site is directly underlain by sedimentary bedrock geology of Portscatho Formation – sandstone and argillaceous rocks, interbedded.

2.2.2 Given the location of the site (docks within marine waters), the BGS mapping has not identified any superficial geology at the site. The closest recorded superficial geology is located directly adjacent to the south-western corner of the site boundary. At this location, the superficial geology comprises marine beach deposits – sand and gravel.

2.2.3 A publicly available BGS borehole log[4] (BGS ref. SW83SW5) indicates the geology approximately 30 m south of the site consists of predominantly marine deposits, comprising sand, silt and clay, with occasional deposits of slate gravel. The same borehole log notes the standing level of groundwater to be at 3.4 m and is noted to not be sealed by casing.

2.2.4 A drop-down video (DDV) survey conducted at the site in May 2022 (ES Volume 2, Technical Appendix 9.1. Carcinus Ltd (2022) Drop Down Video (DDV) Survey Report for the Port of Falmouth) recorded seabed conditions at the site consisting predominantly of sublittoral cohesive mud and sandy mud with generally mixed (coarser) sediments occurring further from the existing port structures. A Multidisciplinary Ecological Survey undertaken in May 2023 (ES Volume 2, Technical Appendix 9.3. Carcinus Ltd. (2024) Benthic Ecology Survey Report in support of the Port of Falmouth Development), involving DDV transects, remotely operated vehicle (ROV) inspections and grab samples found that sediments within the western berth pocket were generally sandy mud or muddy sand with a small proportion of gravels within the sediments. Sediments to the north of Queens' Wharf and east of the Docks had a much higher proportion of gravel sediments.

2.2.5 A Ground Investigation (GI) was conducted at the site in March 2024 (ES Volume 2, Technical Appendices 8.1 Factual GI Report and 8.3 GI Interpretive Report). The 2024 GI works comprised a total of 21 environmental vibrocores taken to the maximum depth of 6.0 m below the seabed level. The locations of the vibrocore samples are shown in Figure 7. The locations were approved following consultation with the MMO (approved under reference SAM/2023/00055), to provide information on conditions across the proposed dredging footprint with regards to sediment particle size and the level of sediment contamination present at the site.

2.2.6 The 2024 GI confirmed that the site conditions comprised of marine sediments (typically described as a soft black silty clay or black clayey silt with occasional anthropogenic material, becoming firm to very stiff orangish brown or greenish grey gravelly clay with fine to coarse siltstone and slate gravel with depth), which ranged in thickness between 0.5 m and 1.0 m. This was underlain by the Portscatho Formation, described as soft laminated grey clay, or very soft greenish grey mottled light bluish grey clay with shell fragments, to firm or stiff orangeish brown mottled greenish grey gravelly clay with slate and siltstone gravel. Below this, the formation was generally recorded as a greenish grey clayey mudstone, slate gravel and clay.

2.2.7 Marine sediment samples were taken at surface level, and at every 1 m interval until the required depth (the proposed dredge depth shown on Figure 4) or bedrock was reached. All marine sediment samples were tested for a suite of determinands, and the data was compared against published Cefas Action Levels (ALs)[5] and various additional risk-based assessment criteria (see the Ground Investigation Interpretative Report (GIIR)**Error! Bookmark not defined.** for detailed description of methodology

[3] BGS Geology Viewer. Available online at: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/ [Accessed 14/05/2024]

[4] BGS Borehole Record. SW83W5. Available online at: http://scans.bgs.ac.uk/sobi_scans/boreholes/611338/images/12808112.html [Accessed 14/05/2024]

[5] Marine Management Organisation, 2023. Marine Licensing: sediment analysis and sample plans. https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans Accessed: May 2024.

and criteria employed in line with consultation with Cefas and the MMO). These determinands are also associated with industrial uses and were chosen to target potential contamination that could exist in the sediment on-site. This included heavy metals, total hydrocarbon content, organo-tins (Tributylin (TBT) and Dibutylin (DBT)), pesticides, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile and semi-volatile organic carbons (VOCs and SVOCs), and polybrominated diphenyl ethers (PBDE).

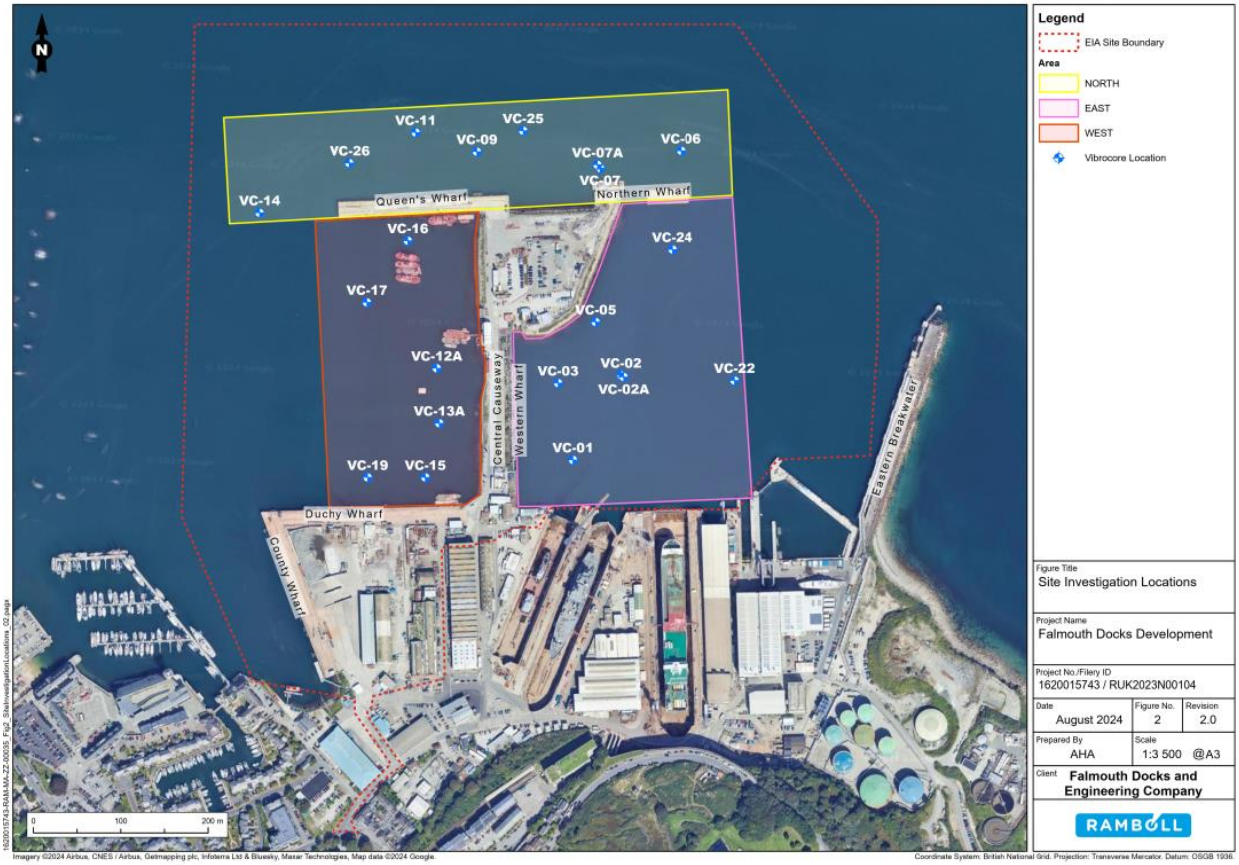


Figure 7: March 2024 Ground Investigation Vibrocore Locations

2.2.8 The Factual Ground Investigation Report (Technical Appendix 8.1) and GIIR (Technical Appendix 8.3) present the GI methodology, field observations and laboratory results fully, the latter of which are briefly summarised here:

- Nickel and perylene levels are consistently elevated above AL1 but are generally marginal and likely to be naturally occurring or related to metal mining legacy through the Fal catchment.
- The northern area shows the lowest contamination levels, with AL1 exceedances for heavy metals, organotins, PAHs, PCBs, and pesticides mainly at shallow depths (up to 0.10 m) across all locations. Sporadic exceedances of copper and the pesticide p,p'-Dichlorodiphenyltrichloroethane (PPDDT) were also noted, but these are considered to be minor. AL2 exceedances were also detected for mercury, TBT, PCBs, and lead, in shallow samples (up to 0.10 m).
- In the eastern area, contamination is more widespread, with AL1 exceedances at all seven locations within the shallow marine sediments (up to 0.10 m), and some localised deeper impacts at 1.0 m and 2.0 m (VC-03). Contaminant levels tend to increase near the wharves, especially in VC-01, VC-03 and VC-05. AL2 exceedances for metals, organotins, and PCBs were found mainly in the top layer, with notable deeper exceedances of mercury and PCBs in VC-03 to 2.0 m -2.10 m.

- The western area has the highest contamination levels, with AL1 exceedances recorded in all locations to depths of between 1.10 m and 2.10 m. Surface sediments show significant contamination from all analysed contaminant groups. This area is also a hotspot for PCBs in shallow and deeper samples, and there were multiple AL2 exceedances for mercury, zinc, copper, and lead, especially near the wharves. There is a general trend of decreasing contamination at greater depths.

2.2.9 A review of all site data was completed to understand the lateral and vertical extent of contamination, using all exploratory hole logs and visual/olfactory evidence of contamination to determine the thickness of the stratum which each sample could be considered to represent. This provided a robust and evidence-based approach for estimating likely thickness (from seabed surface) of sediment considered unsuitable for disposal to sea. It is estimated that 29-34% of the dredge arisings will not be suitable for disposal at sea due to contamination and therefore will require disposal on land (see the GIIR for further detail).

2.2.10 In summary, various contaminants have been encountered in the marine sediment across the site, such as heavy metals, PCBs, Organo-tins, pesticides, PAHs, and BDE. These show clear lateral and vertical patterns across the site: there is a general trend of decreasing contamination at greater depths, and with increasing distance away from the wharfs.

2.3 Surface Water Environment

2.3.1 The terrestrial portion of the site is located within the Fal Operational Catchment, within Cornwall West and the Fal Management Catchment[6]. There are 20 water bodies within this operational catchment, however there are no fresh surface water bodies within or in close proximity to the site (the closest to the site is College Reservoir, located approximately 4.4 km west of the site). As such, the demolition and construction activities would neither interact with nor impact water bodies within the Fal Operational Catchment and therefore no further assessment is required.

2.3.2 The terrestrial portion of the site does not fall within a Drinking Water Safeguard Zone for surface water, nor is the terrestrial portion of the site categorised as a Nitrate Vulnerable Zone (NVZ) by the Environment Agency[7]. Therefore, no further assessment is required.

2.3.3 The marine portion of the site is located within the Carrick Roads Outer Water Body[8], a coastal waterbody within the South West TraC (transitional and coastal) Management Catchment. The water body is neither designated as artificial nor heavily modified.

2.3.4 Tides at Falmouth are semi diurnal with two high and low waters per day. The site has generally low suspended sediment concentration and sedimentation/deposition rates. There is natural variability in turbidity in the Carrick Roads channel, especially during storm events when the sediment loading of the channel increases naturally. Waves at the site are a result of both the propagation of waves from offshore and those generated by the wind flowing over Falmouth Harbour and its approaches. There are relatively low wave heights (generally less than 0.3 m) and tidal currents (generally less than 0.2 m/s) present in the area of the proposed development.

2.3.5 Water at the site is subject to tidal variation and sediment distribution and movement in this dynamic environment are controlled by multiple factors, including the competing currents within the estuary. The Environment Agency monitors water quality within the site, at a sampling point approximately

[6] DEFRA, EA Catchment Data Explorer, Fal Operational Catchment. Available online at: https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3184 [Accessed 14/05/2024]
[7] Environment Agency (online) Drinking Water Safeguard Zone and NVZs. Available at: https://environment.data.gov.uk/farmers/ [Accessed 17/07/2024]
[8] DEFRA, EA Catchment Data Explorer for Carrick Roads Outer Water Body. Available online at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB650806250000 [Accessed 14/05/2024]

100 m to the east of the Northern Arm[9]. Results from 2022 to 2024 indicate a typically low turbidity environment, with high levels of dissolved oxygen, and tributyltin being present in most samples.

2.3.6 Carrick Roads Outer Water Body was classified as having a 'good' ecological status in 2022. In 2022, the water body did 'not require assessment' for chemical status, whilst in 2019 the chemical status was classified as 'fail' due to a change in assessment method whereby inclusion of four groups of global pollutants (ubiquitous, persistent, bioaccumulative and toxic substances (uPBTs)) causes all water bodies to fail chemical status[10]. The Carrick Roads Outer Water Body's chemical status is classified as 'good' when uPBTs are excluded[11].

2.3.7 The main activities noted as reasons for not achieving good status include[8]:

- Dissolved inorganic nitrogen relating to poor livestock management and poor nutrient management;
- Dissolved inorganic nitrogen relating to sewage discharge (continuous);
- Tributyltin compounds relating to contaminated water body bed sediments; and
- PBDE and mercury and its compounds.

2.3.8 During the 2024 GI works, surface water samples were taken from approximately 0.20 m water depth at 11 locations (VC-01, VC-05, VC-06, VC-12, VC-14 to VC-16, VC-22 and VC-24 to VC-26). All surface water samples were tested for a suite of determinands commonly associated with historical industrial use and brownfield land; including total petroleum hydrocarbons, BTEX compounds (benzene, Toluene, Ethylbenzene, m/p-Xylene, and o-Xylene), heavy metals, phenols, PAHs, volatile and semi-volatile organic compounds VOCs and SVOCs), and organotins.

2.3.9 Samples were tested for a range of potential contaminants and compared to Environmental Quality Standards (EQS) protective of marine receptors. The laboratory results of the surface water sampling are briefly described here and shown on Figure 8. Refer to the Factual Ground Investigation Report and GIIR for further detail.

- Phenols, BTEX compounds, PAHs, SVOCs, VOCs and organotins were all recorded below the laboratory detection limit across all surface water samples.
- Exceedances of EQSs for heavy metals, cyanide and ammoniacal nitrogen were present in the surface water samples collected from across the site.
- The EQS for zinc and lead were exceeded in every sample across the site. Concentrations were all within an order of magnitude and there was no pattern of concentrations across the site, suggesting these compounds are ubiquitous within the surface water environment.
- Two cyanide exceedances were noted in the north of the site.
- Three ammoniacal nitrogen exceedances were present in the east.
- Localised heavy metal exceedances (namely copper, hexavalent chromium, mercury and nickel) were present in the east.
- It is likely that these discrete areas of contamination present in the surface water are due to the migratory routes of contaminants from specific off-site works, or discharges into the surface water. For example, a sewage outflow in the east of the site is a potential source of the ammoniacal nitrogen concentrations, and a historic gas works to the west of the site has the potential to be an off-site source of cyanide in the north and north-west of the site.

[9] DEFRA, 2022. Environment Agency, Water Quality Archive, Falmouth Docks Northern Wharf, online. Available at: https://environment.data.gov.uk/water-quality/view/sampling-point/SW-H1910125 [Accessed July 2024]

[10] Defra/Environment Agency (online) How to use Catchment Data Explorer, Chemical Status. Available at: https://environment.data.gov.uk/catchment-planning/help/usage#chemical-status [Accessed 17/07/2024]

[11] Defra/Environment Agency (online) Draft river basin management plan: maps, chemical status: surface water, Available at: https://environment.maps.arcgis.com/apps/MapSeries/index.html?appid=14f7bcac038a4898866aa461b48e305d&entry=2 [Accessed 17/07/2024]

Figure 8: March 2024 Ground Investigation Summary of Surface Water Exceedances Across the Site

2.4 Groundwater Environment

2.4.1 The site is underlain by the Portscatho Formation, which is classified as a Secondary A bedrock aquifer[12]; its hydrogeological significance characterised by permeable formations with potential to support localised abstractions. The site is not underlain by a superficial aquifer, and is not located within a Source Protection Zone (SPZ)[12] and is not within a Drinking Water Safeguard Zone for groundwater[7].

2.4.2 Under the WFD, the aquifer within the Portscatho Formation is designated as being part of the South Cornwall Water Body[13]. This groundwater waterbody had an overall 'poor' classification in 2019, with a 'good' quantitative status and a 'poor' chemical status. The main activities noted as contributing to the classification elements in this waterbody include an abandoned mine, poor pesticide management, poor nutrient management, and poor livestock management. These activities are classified as diffuse sources.

2.4.3 The site is within a high-risk area for groundwater vulnerability[12]. This risk refers to the vulnerability of the groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre.

[12] DEFRA, Magic Map. Available online at: https://magic.defra.gov.uk/MagicMap.aspx [Accessed 14/05/2024]
[13] DEFRA, EA Catchment Data Explorer for South Cornwall Water Body. Available online at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB40802G800200 [Accessed 14/05/2024]

3. WATER FRAMEWORK DIRECTIVE

3.0 Background

3.0.1 The WFD (2000/60/EC) was published in December 2000 and transposed into English law in December 2003 through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, later being updated through The Water Environment (WFD) (England and Wales) (Amendment) Regulation 2015 and most recently The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Water Framework Directive (WFD) 2006/60/EC, has been retained in UK law following the UK's exit from the EU.

3.0.2 The intention of the Directive is to provide a more holistic approach to protection of the water environment than had previously been in place, addressing a wide range of aspects of the water environment, including physico-chemical, chemical, hydromorphological and ecological aspects.

3.0.3 The environmental objectives of the WFD are to:

i. Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
ii. Aim to achieve at least 'good' status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve 'good' status by 2021 or 2027;
iii. Meet the requirements of WFD protected areas;
iv. Promote sustainable use of water as a natural resource;
v. Conserve habitats and species that depend directly on water;
vi. Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
vii. Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
viii. Contribute to mitigating the effects of floods and droughts.

3.0.4 The WFD Regulations require that the Environment Agency (EA) define River Basin Districts and for each of these develop a River Basin Management Plan (RBMP). As part of this process all inland (above or below ground) and coastal waters have been allocated status categories in order to help inform where water bodies are at risk and/or protective/management measures need to be put in place.

3.1 Assessment Process

3.1.1 In December 2016 the EA produced updated guidance[14] as to how to assess the impact of activities in estuarine (transitional) and coastal waters with respect to the requirements of the WFD. The aim of such WFD assessments is to assist the regulator, in this case the MMO, in assessing:

i. The impact an activity may have on the immediate water body and any linked water bodies; and
ii. Whether the activity complies with the relevant RBMP.

3.1.2 The EA guidance adopts a three-stage process as follows:

i. Screening – This excludes any activities that don't need to go through the scoping or impact assessment stages;
ii. Scoping – Identifies the receptors that are potentially at risk from the activity and need impact assessment; and

[14] EA Guidance Water Framework Directive assessment: estuarine and coastal waters. Available online at: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters [Accessed 14/05/2024]

iii. Impact assessment – Considers the potential impacts of the activity, identifies ways to avoid or minimise impacts, and shows if the activity may cause deterioration or jeopardise the water body achieving good status.

3.1.3 The assessment presented in this report, follows the above protocol and utilises the resources and templates provided by the EA for this purpose.

4. ASSESSMENT

4.1 Screening

4.1.1 Activities that need a marine licence include construction (including laying of cables, maintenance, alteration or improvement of existing structures and assets), dredging, deposit of any substance or object or removal of any substance or object.

4.1.2 The nature of the project is therefore such that a full marine licence is required. As part of this process the MMO requires the completion of a WFD assessment and the MMO's licensing pages refer applicants to the EA's guidance described in Section 3.1.1 in order to undertake such work. The EA is the competent authority for the WFD and support the MMO in their decision making and thus the EA's three-stage process has been adopted.

4.2 Scoping

4.2.1 The EA protocol provides a scoping template to complete in order to identify the potential risks to receptors associated with a project or activities and thus inform the scope of any required detailed impact assessment. The completed scoping template is presented below in Table 4-1.

Table 4-1a: Water Framework Directive Assessment Scoping – Baseline

Activity	Description Notes or More Information
Applicant name	A&P Group
Application reference number (where applicable)	N/A
Name of activity	Falmouth Docks Development. The proposed development would redevelop, extend and modernise the existing facilities and currently poor condition infrastructure at Falmouth Docks to reinstate full alongside berth capability, increase berth capacity and future-proof the Docks. See detailed description of proposals in Section 1.2 of this report.
Brief description of activity	Demolition and Construction Activities: See detailed description of marine demolition and construction activities in Section 1.3 of this report, briefly summarised as: *Strengthening and Enabling Works:* • Stabilisation of the existing causeway, involving piles, backfill and formation of new revetment/placement of rock armour. • Excavation of existing revetments with long reach excavator. • Installation of toe walls at the toe of the revetments, either bored secant or sheet piles. *Demolition:* • Demolition of the existing Western Wharf timber jetty, involving cutting and removal of timber elements, backfill and formation of new revetment and potential placement of temporary rock armour. • Demolition of the Northern Arm, involving wire saw cutting, use of hydraulic breaker, use of mobile crane and/or excavator to remove cut pieces and concrete blocks, excavation of fill material and rock head, and removal of any remaining timber piles or obstructions. *Dredging:* • Dredging of berth pockets up to -10.5 m CD using backhoe dredger, including creation of stable batter slopes, graded sides, and potential placement of rock scour protection if required. • Removal of remainders of King's Wharf and Empire Wharf and surface-skimming of the eastern side of the causeway to -5.5 m CD. *Construction (of suspended deck wharves and area of reclaimed land):* • Installation of steel tubular vertical piles, involving the removal of rock armour local to pile position, followed by installation of piles (using vibro-driving as far as possible with percussive piling to achieve required depths), facilitated by either placement of precast concrete troughs to allow plant to track forward or by a temporary steel working platform. • Provision of lateral stability, involving either the installation of raking piles on land behind the suspended decks and within the reclaimed land behind or creation of bore rock sockets for the vertical piles. • Placement of new revetments by placing fill, filter layer and permanent rock armour and reinstatement of rock armour removed prior to dredging. • Construction of suspended decks by placing precast concrete trough elements, precast concrete planks and reinforcement.

Activity	Description Notes or More Information
	• Positioning of transition slabs at the landward edge of the quay, bridging between the reclaimed land behind and the new structures, and construction of an area of land reclamation in the zone between the existing causeway and the new Western Wharf. *Finishing Works and Upgrades:* • Strengthening of Duchy Wharf through the construction of piled crane platforms and new mooring bollards. • Potential strengthening works to Duchy and County Wharf piles (dependent upon recommendations of a condition survey). • Installation of braces, fenders, fender panels, quay furniture and cathodic protection. <u>Operational Stage:</u> • In operation, the site would continue to accommodate existing activities and industries as well as those introduced through the proposed development, including vessel movements and activities associated with cruise, cargo, freight, commercial fisheries, MoD vessels, ships for repair, and FLOW. • The proposed development would provide capacity for assembly and maintenance of up to two FLOW devices (at Duchy Wharf and the FLOW Deck), which would be brought to and taken from the site using tugboats. • The operational development would accommodate approximately 24 no. freight vessels a year, an increase of 12 freight vessels from the existing operations. • It is assumed that approximately 11 additional no. Excellence Class (up to 345 m in length) cruise vessels would be accommodated annually at the site, reducing the number of tender calls. • General port operation and maintenance activities would continue, including regular maintenance requirements, cathode protection replacement (once every 10 years) and fender replacement (once every 10-20 years). • No increased emissions to sewers are expected from the development; management of foul water from and potable water supplied to berthing vessels will continue as per existing operations. • No additional outfalls or discharges are proposed as part of the proposed development, existing drainage systems would be utilised[15]. • Limited maintenance dredging is proposed, anticipated to be up to approximately 8,000 m^3 every 5 years (or depending on operational requirements, up to approximately 16,000 m^3 every 10 years), as required, mostly within the eastern berth pocket.
Location of activity (central point XY coordinates or National Grid reference)	Falmouth Docks, Falmouth, Cornwall, TR11 4NR (centred at NGR SW 81765 32796). The location of specific demolition and construction activities within the site boundary is illustrated in Figures 2-4 and described fully in Section 1.3, in addition to being summarised above.
Footprint of activity (ha)	The site boundary, as shown in Figure 1, covers a total area of approximately 47.2 ha. Approximately 7.7 ha of the site currently comprises hardstanding, building structures and wharf structures, whilst the remaining portion of the site comprises the marine

[15] Ramboll (2024). Falmouth Docks Development – Flood Risk Assessment (FRA). 15743-RAM-FD-SW-RP-EV-00015.

Activity	Description Notes or More Information
	environment (39.5 ha). The proposed development would provide a total 26,133 m^2 of deck area (increased from 11,644 m^2) and a total 810 m additional length of quayside. Dredging would be undertaken over a total area of approximately 232,500 m^2.
Timings of activity (including start and finish dates)	As described above, based on commencement of works in Q4 2025, the demolition and construction stage is anticipated to be undertaken over an approximately 42-month period, finishing in Q1 2029. The majority of the wharfs, however, will be completed after 27 months (in Q4 2027). It is, however, possible that the demolition and construction stage could occur over a longer duration due to market conditions and funding, as well as the choice of contractor. The port currently operates 24 hours per day, 7 days per week, and it is anticipated that the majority of construction works will also be undertaken on this basis (with the exception of demolition works, piling works and compaction works, which would not be undertaken at nighttime). The indicative demolition and construction programme is shown in Table 2.1, which provides the estimated durations of specific activities in different areas at each wharf.

Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	The size, scale, frequency and durations of the marine activities are fully presented in Figures 2-4, Tables 2.1 and 2.2 and Section 1.3 of this report, with key details summarised briefly here:
	Excavation and Demolition:
	• Demolition of the existing Western Wharf timber jetty will generate 684 m^3 of timber.
	• Demolition of the Northern Arm will generate 21,220 m^3 of concrete. A hydraulic breaker would be used up to a total of 1-hour in any 24 hours.
	• 36,840 m^3 of fill material will be excavated from the central causeway.
	Dredging:
	• Dredging could be undertaken non-continuously over a 58-week period (the quickest timeframe that this could realistically be undertaken, assuming a 10 m^3 closed bucket is used for all dredge material and that dredging would only be undertaken on an adjusted flood tide (1.75 hours before low water to 1.75 hours before high water)). The total area of the dredging would be approximately 232,500 m^2, whilst the total volume of dredged material arising would be approximately 643,000 m^3.
	Construction:
	• As described in Table 2.2:
	  • The proposed 348 m long Western Wharf requires a 330 m length of revetment, 164 no. 1,270 mm diameter steel vertical piles and 46 no. reinforced concrete raking piles.
	  • The proposed 130 m long Northern Wharf requires 160 m length of revetment, 80 no. 1,270 mm diameter steel vertical piles and 46 no. reinforced concrete raking piles.
	  • The proposed 51.4 m long and 18 m wide Queen's Wharf Extension requires 28 no. 1,016 mm diameter steel vertical piles and 20 no. 914 mm diameter steel raking piles.
	  • The proposed 290 m long and 30 m wide FLOW Deck requires 290 m length of new revetment, 195 no. 1,321 mm diameter steel vertical piles and 140 no. reinforced concrete raking piles.
	• It is estimated that approximately 6 hours is required for the installation of each pile, of which approximately 2 hours would comprise percussive piling. A total of 4 hours of percussive piling would occur on a given day.

Activity	**Description Notes or More Information**		
Use or release of chemicals (state which ones)	N/A – no chemicals to be used or released.		
WFD water body name	**South Cornwall Water Body**	**Carrick Roads Outer Water Body**	
Water body ID	GB40802G800200	GB650806250000	
Operational catchment name	Cornwall South Operational Catchment	Carrick Roads Operational Catchment	
Water body type	Groundwater Body	Coastal Water	
Water body total area (ha)	88589.951	1475.28	
Overall water body status	Poor (2019)	Moderate	
Ecological status	N/A	Good (2022)	
Chemical status	Poor (2019)	Does not require assessment (2022)	
Quantitative status	Good (2019)	N/A	
Target water body status and deadline	N/A	Moderate (2015)	
Hydromorphology status of water body	N/A	Supports Good (2022)	
Heavily modified water body (HWMB) and for what use	N/A	Neither designated artificial nor HMWB	
Higher sensitivity habitats present for **Carrick Roads Outer Water Body** (low resistance to, and recovery rate, from human pressures) *(not relevant to groundwater bodies)*	**Habitat (within 2 km of site)**	**Distance from Site at closest point (according to Magic Maps, see Figures 9 and 10)**	**Area (ha) (total, within entire Carrick Roads Outer Water Body)**
	Maerl	Mapped within site boundary (in the east)	228.87
	Subtidal kelp beds	Mapped within site boundary (in the east)	207.52
	Subtidal seagrass	Approximately 160 m north of site boundary	23.54
Lower sensitivity habitats present for **Carrick Roads Outer Water Body** (medium to high	Cobbles, gravel, and shingle	Mapped within site boundary (in north-eastern corner)	4.10

Activity	Description Notes or More Information		
resistance to, and recovery rate from, human pressures) *(not relevant to groundwater bodies)*	Intertidal soft sediments like sand and mud	Approximately 300 m west and 300 m north of site boundary	151.03
	Rocky shore	Approximately 50 m east of the site boundary	63.23
	Subtidal rocky reef	Mapped within site boundary (in the north and north-east)	159.34
	Subtidal soft sediments like sand and mud	Mapped within site boundary (in the east and south-east)	389.12
Carrick Roads Outer Water Body Phytoplankton status *(not relevant to groundwater bodies)*	High		
Carrick Roads Outer Water Body History of harmful algae *(not relevant to groundwater bodies)*	No		
WFD Protected Areas within 2 km	Figure 11 shows the WFD Protected Areas located within 2 km of the site: • The site is located within Fal and Helford SAC (Reference: UK0013112); • The site is located immediately adjacent to Falmouth Bay to St Austell Bay SPA (Reference: UK9020323); • The site straddles two Designated Shellfish Waters - Carrick Roads E Shellfish Waters (Reference: 74) cover the eastern portion of the site, whilst the Penryn Shellfish Waters (Reference: 75) cover the western portion of the site; • The site is within a Coastal Sensitive Area (Eutrophic, Sensitive to Nitrate), Truro Tresillian and Fal Estuary; and • The site is within 2 km of two Designated Bathing Waters – Gyllyngvase (Reference: UK28600, classified Excellent) is located approximately 1 km south-west whilst Swanpool (Reference: UK28700, classified Excellent) is approximately 1.7 km south-west.		

4.2.2 Within each topic presented below, the conclusions as to whether further impact assessment is required or not, is indicated in bold text, with the reasoning for that decision in the 'risk issues' column to the right (Table 4-2).

Table 4-2b: Water Framework Directive Assessment Scoping – Specific Risk Information

HYDROMORPHOLOGY			
Assess Further if Activity:	**Yes**	**No**	**Hydromorphology Risk Issue(s)**
Could impact on the hydromorphology (e.g. morphology or tidal patterns) of a water body at high status	Requires impact assessment	**Impact assessment not required**	No. Carrick Roads Outer Water Body is of Moderate status overall.

Could significantly impact the hydromorphology of any water body	**Requires impact assessment**	Impact assessment not required	Yes. Dredging to create berth pockets to up to -10.5 mCD has the potential to influence the hydromorphology of the Carrick Roads Outer Water Body due to the change in seabed morphology and bathymetry. Furthermore, the installation of additional revetment and piles and change to the form of the quay line could influence hydrodynamics through introduction of new physical structures to the Carrick Roads Outer Water Body. The proposed development may therefore impact tidal currents, wave conditions and sediment transport patterns.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	**Impact assessment not required**	No. The Carrick Roads Outer Water Body is not designated artificial and is not a heavily modified water body.
BIOLOGY - HABITATS			
Assess further if the Footprint[A] of Activity is:	**Yes**	**No**	**Biology Habitats Risk Issue(s)**
0.5 km^2 or larger	**Yes to one or more – requires impact assessment**	No to all – impact assessment not required	Yes. The total site boundary is 47.2 ha (0.472 km^2), 39.5 ha (0.395 km^2) of which comprises the marine portion of the site. The proposed dredge area is approximately 232,500 m^2 (0.2325 km^2), 0.349 km^2 when multiplied by 1.5 as per guidance[14]. However, a sediment plume would be generated by the capital dredging works, which would extend beyond the marine site boundary and could lead to a total activity footprint of greater than 0.5 km^2.
1% or more of the water body's area			Yes. The area of the marine environment within the site boundary is 39.5 ha, whilst the total surface area of the Carrick Roads Outer Water Body is 1475.28 ha. Therefore, the footprint of the Falmouth Docks Development site boundary within the marine environment is 2.68% of the water body's area.
Within 500 m of any higher sensitivity habitat			Yes. Maerl beds, subtidal kelp beds and subtidal seagrass beds are shown to be located within 500 m of the proposed development on Magic Maps (see Figure 9).
1% or more of any lower sensitivity habitat			Yes. The site lies within and in proximity to multiple areas of lower sensitivity habitat shown on Magic Maps (see Figure 10). The proposed development has the potential to affect more than 1% of the area of these habitats within the Carrick Roads Outer Water Body.

FISH			
Assess Further if Activity:	**Yes**	**No**	**Biology Fish Risk Issue(s)**
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	**Continue with questions**	Go to next section	The Carrick Roads Outer Water Body is not assessed for the status of fish populations as it is a coastal waterbody. However, the upstream Carrick Roads Inner Water Body is classed as 'good' status for fish populations[16]. The Fal estuary is home to a wide range of fish species and commercially important shellfish such as mussels, oysters, variegated (queen scallops), crabs, and lobsters. The seabed habitats, including mudflats, seagrass and maerl beds, provide juvenile fish feeding and nursery areas, but there is no indication of the presence of any important nursery grounds within the estuary. The most common species recorded in EA TraC data, including just upstream of the proposed development, were sand smelt, pilchards, gobies and sprat, together accounting for over 90% of fish sampled. Fish species making up the remaining 10% include flatfish and low numbers of other pelagic species such as herring, cod and whiting. Data indicate that the estuary is not important for shad. Cartilaginous species such as basking shark and thornback ray have been reported but records indicate only very occasional presence in the estuary. Diadromous fish, reliant on migratory routes for their lifecycle, recorded in the estuary are trout (*Salmo trutta*) and the European eel (*Anguilla anguilla*), although both have been recorded only in low abundance. Both are listed as species of principal importance in Section 41 of the NERC Act 2006, however, within the study area they are not protected as part of a designated site. Both have the potential to be present but the Fal is not a particularly important river for either species. There is limited data to suggest other diadromous species are present, including species of shad and salmon, for which only rare and old records (>10 years) of these species exist.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	**Requires impact assessment**	Impact assessment not required	Yes. Demolition and construction activities, particularly piling, demolition and dredging works would occur as part of the proposed development. As such, there could be impacts on fish behaviour, specifically on migration due to underwater noise given the anticipated duration of the works (although there would be natural downtime during piling and demolition works as these would not occur overnight and natural downtime during dredging as this would be undertaken at certain tides only).

[16] Environment Agency (online). Carrick Roads Inner Water Body. Available at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB520804814400 [Accessed 19/07/2024]

			However, in operation, the use of the site will continue to be port-related with continued frequent passage and berthing of vessels. The small projected increase in vessels moving to and from Falmouth Docks once the proposed development is operational would not represent a significant increase in comparison to the baseline vessel traffic, and so no new or enhanced significant impact on fish behaviour is predicted.
Could cause entrainment or impingement of fish	Requires impact assessment	**Impact assessment not required**	No. The proposed development should not present a new or enhanced significant risk of entrainment or impingement of fish within the Fal Estuary. Whilst new structures (such as piles and revetment) would be introduced to the marine environment, these would not extend further northwards into the Carrick Roads channel than existing structures and are of similar structure and geometry to the existing infrastructure at the site. No change to current velocities or hydrodynamics of the scale or magnitude to lead to entrainment or impingement of fish is predicted.
WATER QUALITY			
Assess Further if Activity:	**Yes**	**No**	**Water Quality Risk Issue(s)**
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns ***continuously for longer than a spring neap tidal cycle*** (about 14 days)	**Requires impact assessment**	Impact assessment not required	Yes. The indicative demolition and construction programme (Table 2.1) indicates possible overlapping activities, therefore the overall works could be continuous during the indicative 42-month demolition and construction stage, although the individual demolition and construction activities would not be continuous due to down-time. Down-time is expected during many of the demolition and construction activities (for example, natural down-time between the installation of each pile whilst the piling rig is re-positioned, and natural down-time between tides during which no dredging would occur). Also, no demolition, piling or compaction works would occur overnight. Therefore, effects on water clarity have the potential to be longer than a spring neap tidal cycle throughout this period. The proposed development activities are not expected to impact temperature, salinity or oxygen levels and no inputs relating to nutrients and microbial patterns are anticipated as a result of the proposed development.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	**Impact assessment not required**	No. Phytoplankton status for Carrick Roads Outer Water Body is High (2022).
Is in a water body with a history of harmful algae	Requires impact assessment	**Impact assessment not required**	No. No history of harmful algae.
Assess Further if Activity Uses or Releases Chemicals (e.g. Through Sediment Disturbance or Building Works)	**Yes**	**No**	**Water Quality Risk Issue(s)**

The chemicals are on the Environmental Quality Standards Directive (EQSD) list	**Requires impact assessment**	Impact assessment not required	Yes. Chemicals on the EQSD list for WFD assessments[17] and sediments containing contaminants above AL1 and AL2 were recorded within samples obtained during the 2024 GI, including but not limited to: • AL2 exceedances - copper, mercury, lead, zinc, organotins, PCBs • AL1 exceedances - arsenic, cadmium, chromium, copper, mercury, nickel, lead, zinc, organotins, PAHs, PCBs, and PPDDT Whilst the use of a 10 m^3 (or smaller) lidded backhoe dredger(s) for dredging and vibro-piling (where possible) are methods that minimise sediment mobilisation and losses in comparison to alternative plant/methodologies, the proposed works have the potential to disturb contaminated seabed sediments. No other chemicals would be used or released during demolition, construction or operation.
It disturbs sediment with contaminants above Cefas Action Level 1	**Requires impact assessment**	Impact assessment not required	
If Activity has a Mixing Zone (such as Discharge Pipeline or Outfall) Assess further if:	**Yes**	**No**	**Water Quality Risk Issue(s)**
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	**Impact assessment not required**	No. There are no point discharges or outfalls associated with the proposed development.
PROTECTED AREAS[B]			
Assess Further if Activity is:	**Yes**	**No**	**Protected Areas Risk Issue(s)**
Within 2 km of any WFD Protected Area[C]	**Requires impact assessment**	Impact assessment not required	Yes. The following WFD Protected Areas are located within 2 km of the site: • Fal and Helford SAC; • Falmouth Bay to St Austell Bay SPA; • Carrick Roads E Shellfish Waters; • Penryn Shellfish Waters; • Truro Tresillian and Fal Estuary Coastal Sensitive Area; • Gyllyngvase Designated Bathing Waters; and • Swanpool Designated Bathing Waters.
INVASIVE NON-NATIVE SPECIES (INNS)			
Assess Further if Activity Could:	**Yes**	**No**	**INNS Risk Issue(s)**

[17] Environment Agency (2016). Guidance. Environmental Quality Standards Directive (EQSD) list for WFD assessments. Available at: https://www.gov.uk/government/publications/list-of-chemicals-for-water-framework-directive-assessments/environmental-quality-standards-directive-eqsd-list-for-wfd-assessments [Accessed 19/07/2024]

Introduce or spread INNS	Requires impact assessment	**Impact assessment not required**	No. The location of the proposed works is considered to be vulnerable to INNS due to the high frequency of international vessel movements into the area. The Multidisciplinary Ecological Survey undertaken in May 2023 identified the barnacle *Austrominius modestus* and the red ripple bryozoan *Watersipora subatra* in the grab samples, and two invasive species of marine alga, *Bonnemaisonia hamifera* and *Asparagopsis armata*. However, the proposed development is not considered to have the potential to introduce new INNS or contribute to the spread of INNS due to embedded controls. In particular, during demolition and construction, standard measures would be implemented to ensure that vessels and equipment are biosecure, alongside adherence to any measures in place through FDEC at the site. Measures would be incorporated into the CEMP (anticipated to be secured by an appropriately worded marine licence condition) and contractor method statements to reduce the risk of introduction or spread of INNS, including the use of the smallest vessels possible to undertake the works, frequent vessel checks and appropriate ballast water management, and following port and harbour protocols. During operation, similar activities would occur at the site as in the current setting, with the exception of Excellence Class cruise ships and tugboats and devices for FLOW. The proposed development is therefore not anticipated to introduce a new or enhanced significant risk regarding INNS, particularly as existing controls and measures currently in place to manage and prevent the introduction and spread of INNS at the site would be maintained.
GROUNDWATER (relevant to South Cornwall Water Body)			
Assess Further if Activity Could:	**Yes**	**No**	**Groundwater Risk Issue(s)**
Result in a substantial increase in conductivity levels in a groundwater body or the introduction of groundwater of substantially different chemical composition	Requires impact assessment	**Impact assessment not required**	No to all. The site is not located within a SPZ and is not within a Drinking Water Safeguard Zone for groundwater. Under the WFD, the South Cornwall Water Body had an overall 'poor' classification in 2019, with a 'good' quantitative status and a 'poor' chemical status. The site is within a high-risk area for groundwater vulnerability. This risk refers to the vulnerability of the groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. A risk to the groundwater body underlying the site was identified from migration via routes created by piles during preliminary risk assessments. However, the site data has identified that the uppermost sediments in the marine area are the most contaminated. The proposed development works involve dredging and removal of much of the top layers of marine sediment at the site,
Cause a surface water body to fail to meet WFD requirements through the presence of pollutants at concentrations in excess of their respective Environmental Quality Standards	Requires impact assessment	**Impact assessment not required**	
Impact a Groundwater Dependent Terrestrial Ecosystem (GWDTE)	Requires impact assessment	**Impact assessment not required**	

through changes in groundwater quality or flow			therefore the dredging process would lead to the removal of the most impacted sediment with the remaining material being significantly less impacted. The risk to the groundwater aquifer beneath the site is therefore significantly reduced as the majority of the contamination will be removed before the piling works begin. Risks to groundwater resources are therefore considered low. It is also expected that soft sediments would rapidly form a seal around driven piles, further reducing the risk to the groundwater aquifer during the piling works.
Impact the quality of a groundwater body designated as a Drinking Water Protected Area (DrWPA) such that new or additional treatment of water treatment is required	Requires impact assessment	**Impact assessment not required**	
Cause a groundwater body to fail to meet WFD requirements through the presence of pollutants at concentrations in excess of their respective Environmental Quality Standards	Requires impact assessment	**Impact assessment not required**	
Impact on the water balance of a groundwater body in a non-sustainable manner	Requires impact assessment	**Impact assessment not required**	

[A] Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area[14].
[B] Protected Areas include Special Areas of Conservation (SAC), Special Protection Areas (SPA), shellfish waters, bathing waters and nutrient sensitive areas.
[C] A regulator can extend the 2 km boundary if an activity has an especially high environmental risk.

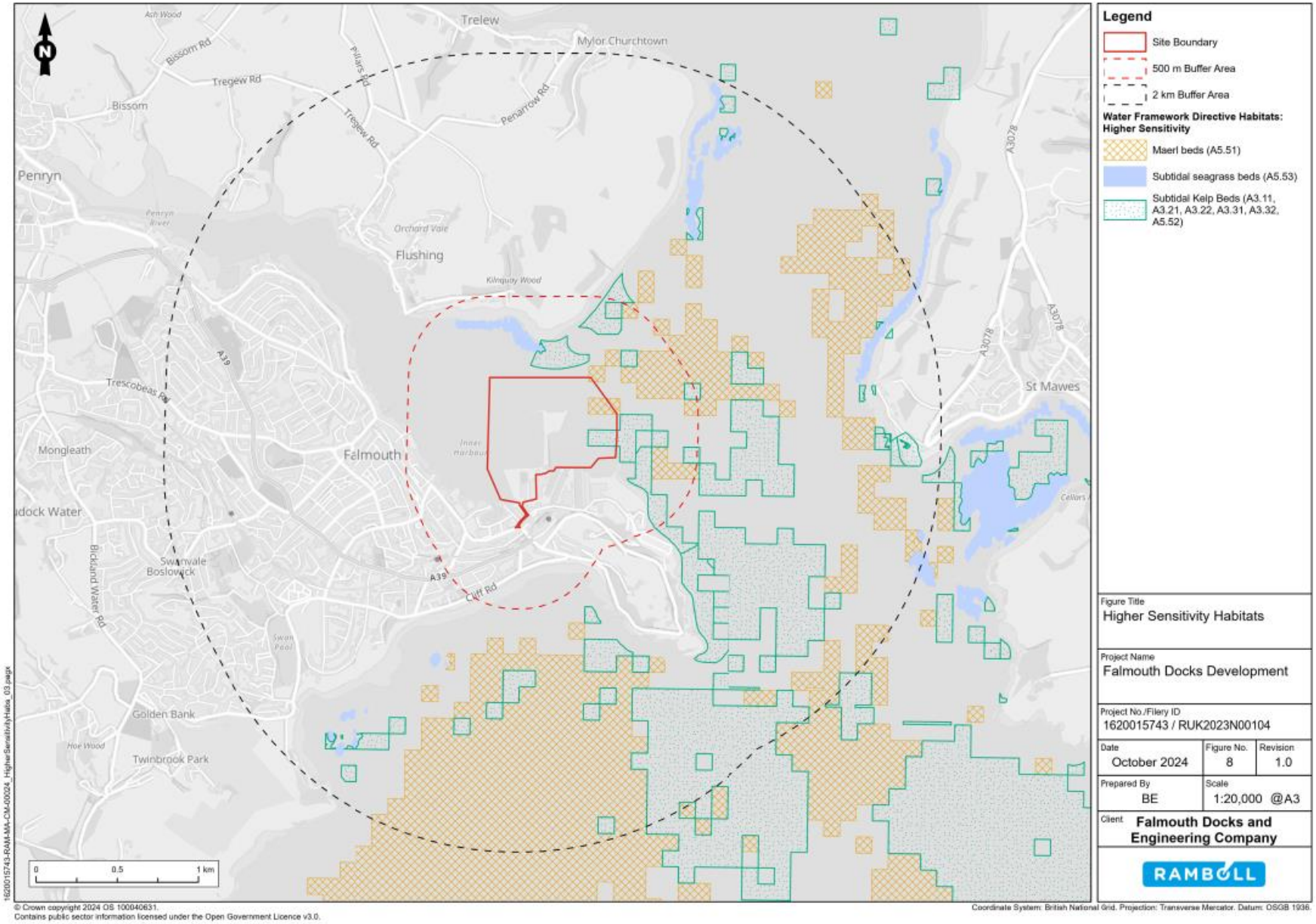


Figure 9: Location of Higher Sensitivity WFD Habitats within 2 km and 500 m of the site boundary

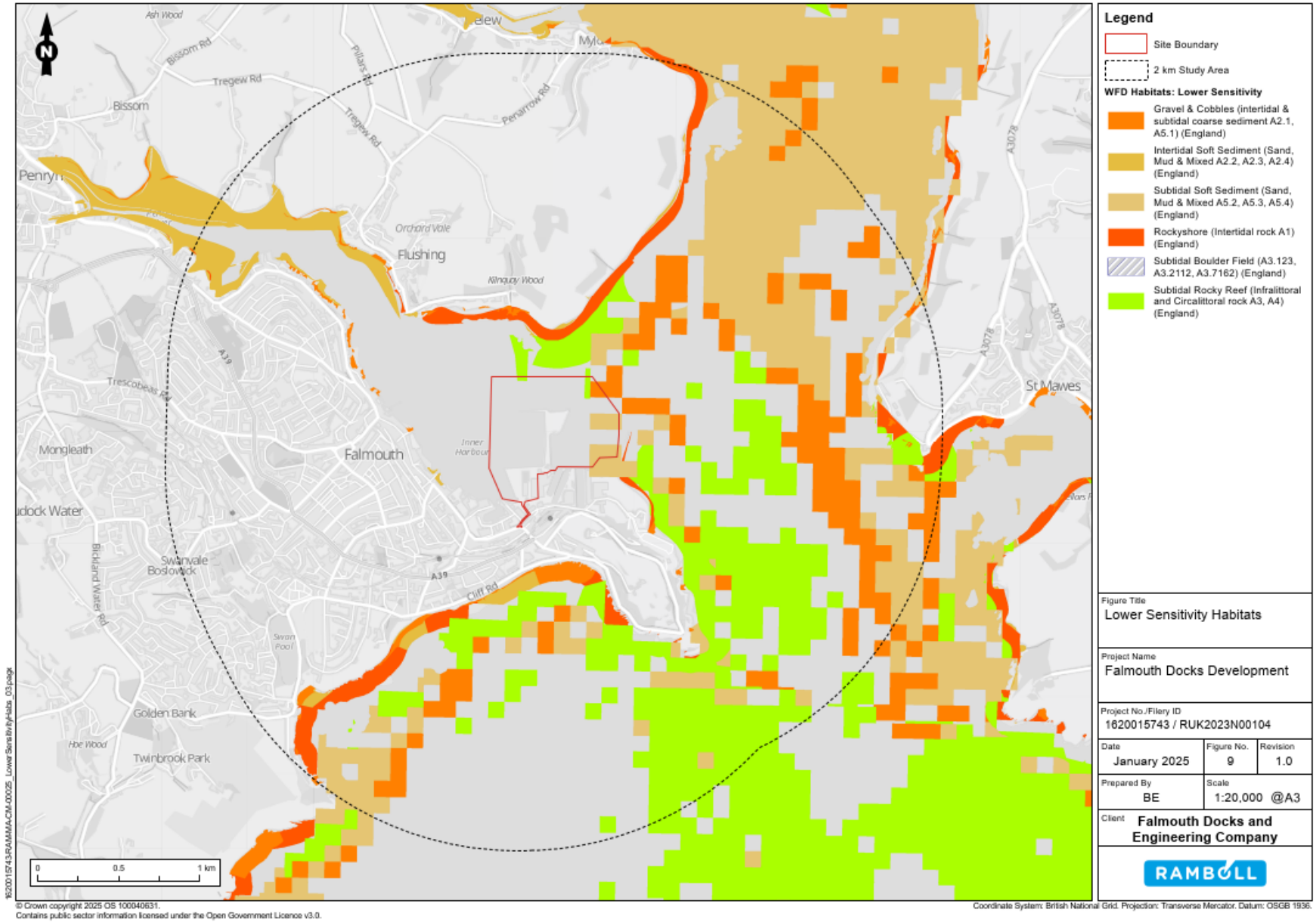


Figure 10: Location of Lower Sensitivity WFD Habitats within 2 km of the site boundary

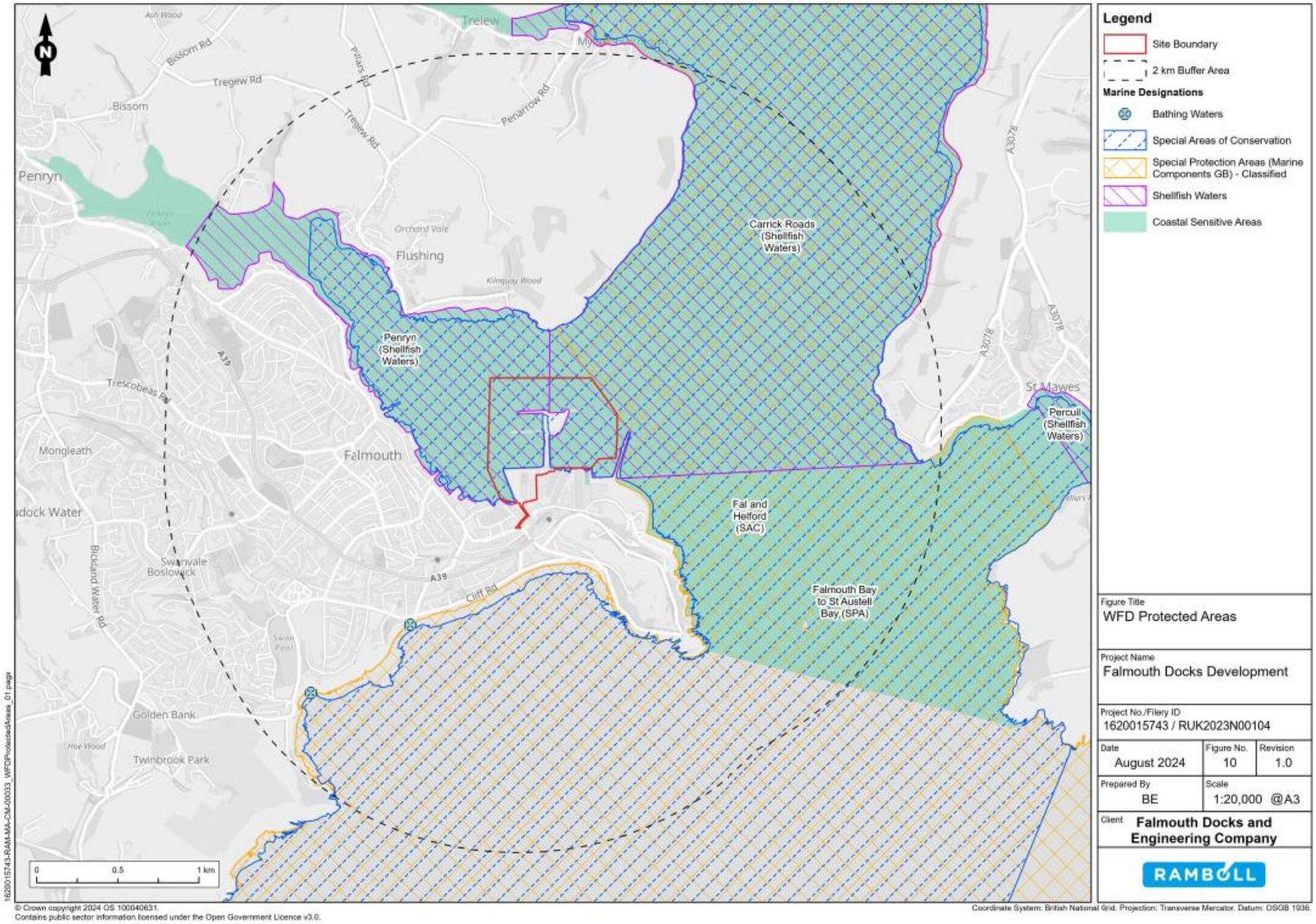


Figure 11: Location of WFD Protected Areas Habitats within 2 km of the site boundary

4.2.3 Where no risk to potential receptors is identified at scoping stage, impact assessment does not need to be completed. Where the scoping exercise has identified potential risks to receptors, these are taken forward for detailed impact assessment. Table 4-3 summarises the outcome of the scoping stage.

Table 4-3: Potential Risks to be Assessed

Receptor	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Hydromorphology	**Yes**	The proposed development has the potential to influence the hydromorphology of the Carrick Roads Outer Water Body.
Biology: Habitats	**Yes**	The site comprises 1% or more of the Carrick Roads Outer Water Body area and has a footprint greater than 0.5 km^2 (when the predicted peak sediment plume is also included). The site is located within 500 m of areas of higher sensitivity habitat and has the potential to affect more than 1% of the area of the lower sensitivity habitats within the Carrick Roads Outer Water Body.
Biology: Fish	**Yes**	The proposed development has the potential to impact normal fish behaviour (migration) during the demolition and construction stage (due to underwater noise).
Water Quality	**Yes**	The proposed development could affect water clarity continuously for longer than a spring neap tidal cycle (about 14 days). Activities would displace EQSD chemicals and contaminants above AL1 and AL2, as these are present in the sediment proposed to be dredged.
Protected Areas	**Yes**	The site overlaps with WFD Protected Areas and is within 2 km of WFD Protected Areas.
Invasive Non-Native Species	No	The proposed development is not considered to introduce new INNS or contribute to the spread of INNS during demolition and construction or during operation. Measures will be in place to ensure that working vessels and equipment are biosecure.
Groundwater	No	The dredging and removal of much of the top layers of marine sediment at the site will result in the removal of the most impacted sediment prior to piling works, with the remaining material being significantly less impacted. It is also expected that soft sediments would rapidly form a seal around driven piles, further reducing the risk to the groundwater aquifer during the piling works.

4.3 Impact Assessment

Mitigation Measures

4.3.1 The impact assessment below is written in the context of the following mitigation measures being included within the proposed development works:

i. Completion of construction works under a suitable CEMP (based on the OCEMP submitted to support the marine licence application), for example, all construction and operational vessels will follow the requirements of both MARPOL[18] and the EA's guidance on works in, near or over watercourses[19] and carry appropriate spill kits should accidental spillage occur, to minimise the damage caused by such an event. The CEMP will also include specific measures to minimise the introduction or spread of invasive non-native species;
ii. Appropriate timing and programming of works to ensure minimisation of overlap of noisy activities. Piling and demolition would not occur simultaneously and would not occur overnight. Only one piling rig would be used on site, with no more than 4 hours of percussive piling in any given day. Only 1 hour of demolition with a hydraulic breaker would occur in any given day;
iii. Use of vibro-piling where reasonably practicable and possible to achieve pile depths.
iv. Implementation of soft-start procedures for percussive piling;
v. Use of back-hoe dredger(s) with a 10 m^3 (or smaller) lidded bucket for dredging, to minimise sediment mobilisation and release;
vi. Dredging non-continuously and according to tides: specifically, from 1.75 hours before low water to 1.75 hours before high water to minimise total deposition in sensitive areas to the east of the site; and
vii. Minimisation of the extent of dredging and the number of piles as far as practicable as part of the design, whilst ensuring structural integrity and achievement of development objectives.

Hydromorphology

4.3.2 The proposed development has the potential to lead to changes in the hydromorphology of the Carrick Roads Outer Water Body, principally through:

- The creation of dredge pockets (up to -10.5 mCD), changing seabed morphology and bathymetry;
- The installation of additional revetment and piles in the marine environment and on the seabed could lead to hydromorphological changes, by altering hydrodynamics, sediment regime and patterns of erosion and deposition; and
- The change to the form of the quay line could impact tidal propagation, currents, wave conditions and sediment regime.

4.3.3 ES Volume 1 Chapter 6: Coastal Processes and Sediment Regime reports on the predicted change as a result of the proposed development on factors such as water levels, current speed and magnitude, wave height and period, sediment deposition and erosion and sedimentation. The accompanying Technical Appendices present the outputs of wave (ES Volume 2, TA 6.1 Wave Modelling Report), sediment transport (ES Volume 2, TA 6.2 Sediment Transport Modelling Report) and tidal flow (ES Volume 2, TA 6.4 Tidal Flow Modelling Report) modelling undertaken for the proposed development. These should be referred to for greater detail regarding baseline conditions, model methodology and full model results, however the impacts of the proposed development on hydromorphology during the operational stage of the proposed development are summarised below.

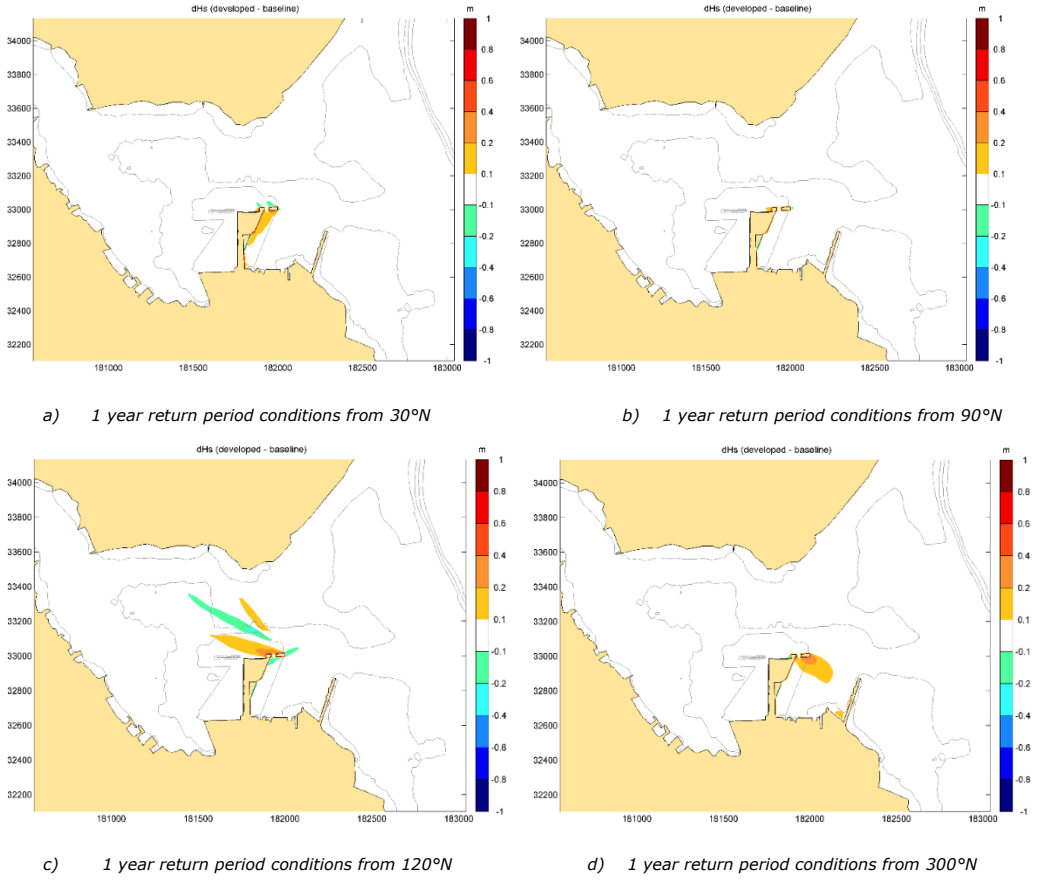
Wave Conditions

[18] The name for the International Convention for the Prevention of Pollution from Ships

[19] Pollution Prevention Guidance No 5: Works in, Near or Over Watercourses (note guidance no longer supported by the EA, but continues to be utilised as good practice within the UK)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/485199/pmho1107bnkg-e-e.pdf

4.3.4 Key aspects of the predicted effects of the proposed development on wave conditions for the 1 year present day conditions are shown in Figures 12a-d and summarised as follows:

- Differences in significant wave heights between the baseline and proposed development are localised in the area immediately around the proposed development;
- Predicted conditions from 300°N will cause an increase in significant wave height of up to 0.3 m along the Northern Wharf for the 1 year conditions;
- Predicted conditions from 120°N will cause an increase in significant wave height of up to 0.35 m along the Northern Wharf for the 1 year conditions;
- Predicted conditions from 30°N will lead to an increase in significant wave height of up to 0.3 m along the new Western Wharf and in the corner of the existing Western Wharf; and
- No change in wave height greater than 0.1 m is seen along the coastline or over intertidal areas for the 1 year conditions.



a) 1 year return period conditions from 30°N

b) 1 year return period conditions from 90°N

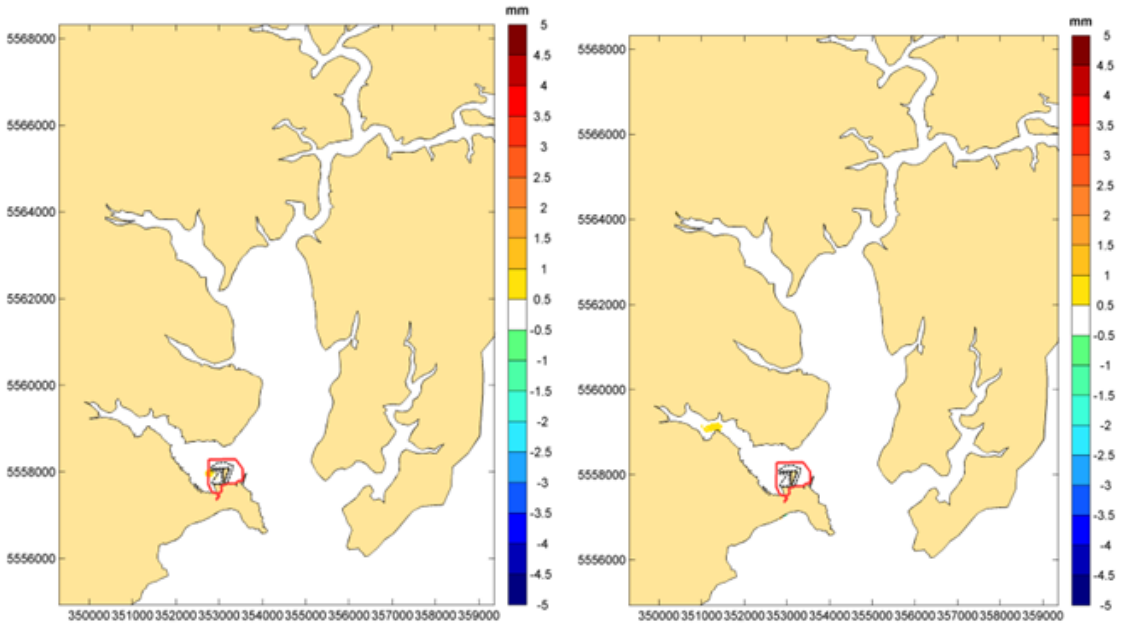
c) 1 year return period conditions from 120°N

d) 1 year return period conditions from 300°N

Figures 12a-d: Predicted effect of proposed development on 1 year return period significant wave height at MHWS (difference in significant wave height (Hs) between the baseline and proposed development layout)

Tidal Levels

4.3.5 With regard to predicted effects of the proposed development tidal levels, Figures 13a-b present the differences in maximum and minimum water levels between the baseline and proposed development. No effect on maximum or minimum water level is predicted to be greater than 1 mm, showing that the proposed development has a very minor and limited impact on tidal propagation. This indicates no effect on habitat function, intertidal exposure or flood risk linked to the effect of the proposed development on tidal water levels.

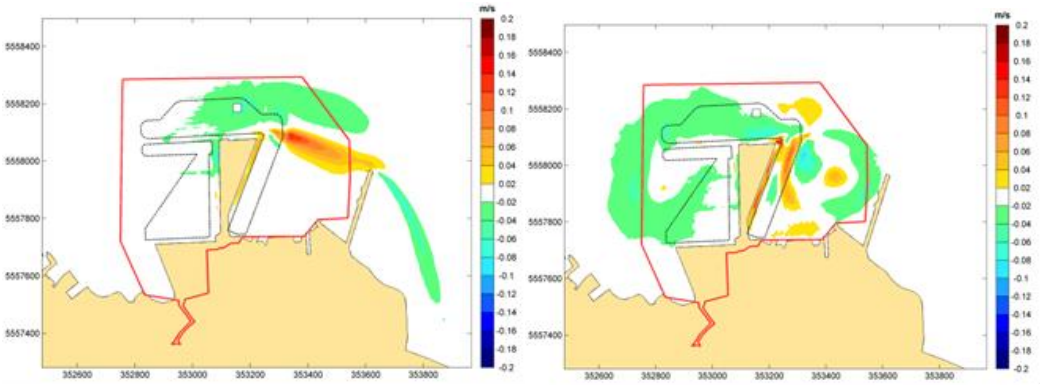


a) Effect on maximum water level *b) Effect on minimum water level*

Figures 13a-b: Predicted effect of the proposed development on maximum and minimum water levels (simulated for the full spring neap cycle)

Tidal Currents

4.3.6 With regard to predicted effects of the proposed development on tidal currents, Figures 14a-b present the difference in peak current speed and pattern between the baseline and proposed development, at times of peak ebb and peak flood tides. The main changes predicted are localised areas of reduction in current speed, which are associated with the increased cross-sectional area of the harbour due to the dredging to the north of the proposed development. The change to the shape and dredged depths in the Western Wharf area alters the slow-moving circulation within the wharf area; this change to the recirculation pattern results in some small and transient current speed increases for the flow passing the Western Wharf on both the ebb and flood tide.

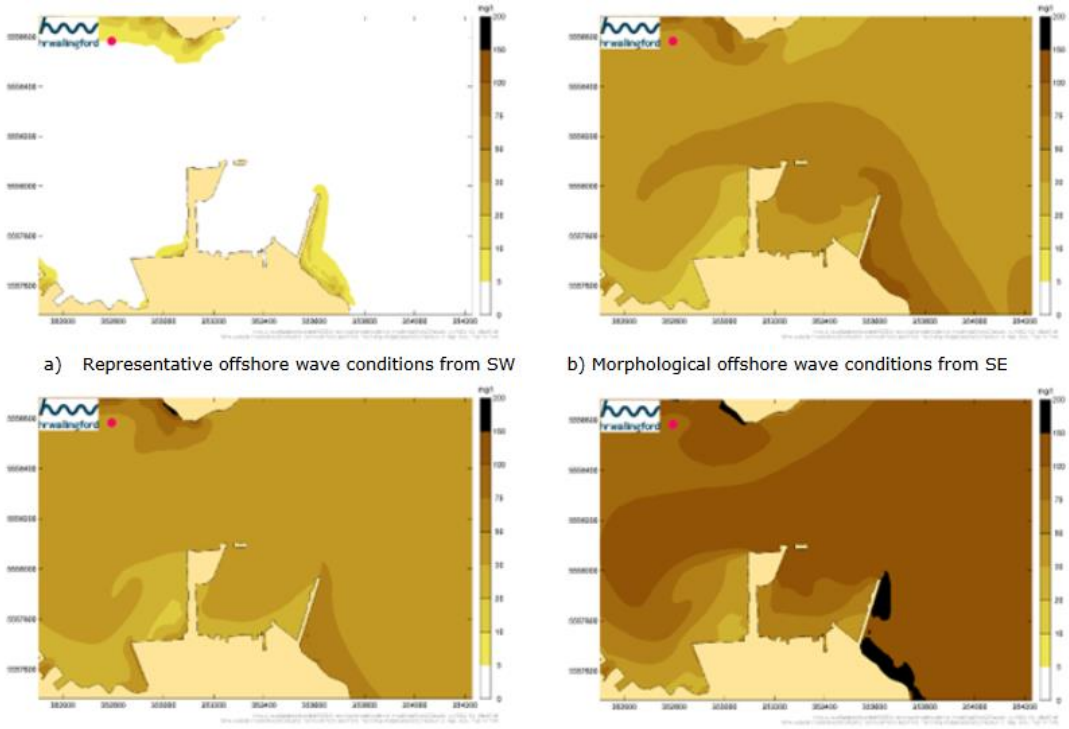


a) Peak ebb *b) Peak flood*

Figures 14a-b: Predicted effect of the proposed development on current speed at time of peak ebb and peak flood

Suspended Sediment Concentrations

4.3.7 Fine sediment transport modelling has also been undertaken to predict any potential changes to naturally occurring levels of suspended sediment and infill rates (the sediment regime) as a result of the proposed development.



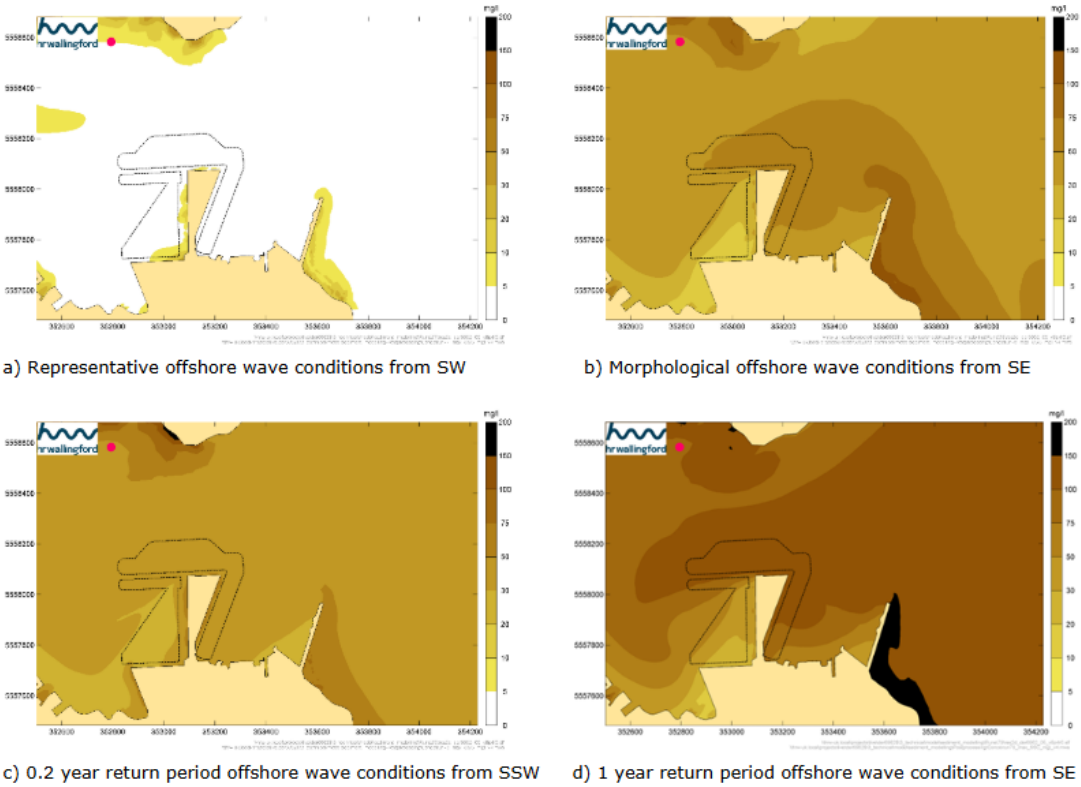
a) Representative offshore wave conditions from SW

b) Morphological offshore wave conditions from SE

c) 0.2 year return period offshore wave conditions from SSW

d) 1 year return period offshore wave conditions from SE

Figures 15a-d: Modelled maximum suspended sediment concentration for a range of offshore wave conditions with the baseline site layout



a) Representative offshore wave conditions from SW

b) Morphological offshore wave conditions from SE

c) 0.2 year return period offshore wave conditions from SSW

d) 1 year return period offshore wave conditions from SE

Figures 16a-d: Predicted maximum suspended sediment concentration for a range of offshore wave conditions with the proposed development in place

4.3.8 Figures 15a-d and 16a-d show the maximum suspended sediment concentration (SSC) experienced during four wave conditions modelled for the existing site layout (Figures 15a-d) and for the proposed development layout (Figures 16a-d) respectively. For both the baseline and proposed layouts, during typical wave conditions (representative offshore wave conditions from SW), the concentrations of suspended sediment are generally very low. The highest maximum SSC is predicted during more extreme storm conditions (1 year Return Period (RP) offshore wave condition from 130°N). Comparison of Figures 15a-d and 16a-d shows that there is negligible difference in maximum SSC levels in the water column during the operational stage of the proposed development in comparison to the baseline environment, for all four modelled wave conditions. Some small changes in concentration contours are seen, however as the figures represent peak values, such effects are short-lived. The overall effect of the proposed development on suspended sediment concentrations is small as might be expected considering the small effects of the proposed development on the driving forces for sediment transport (tidal currents and waves).

Deposition and Infill of Fine Sediment

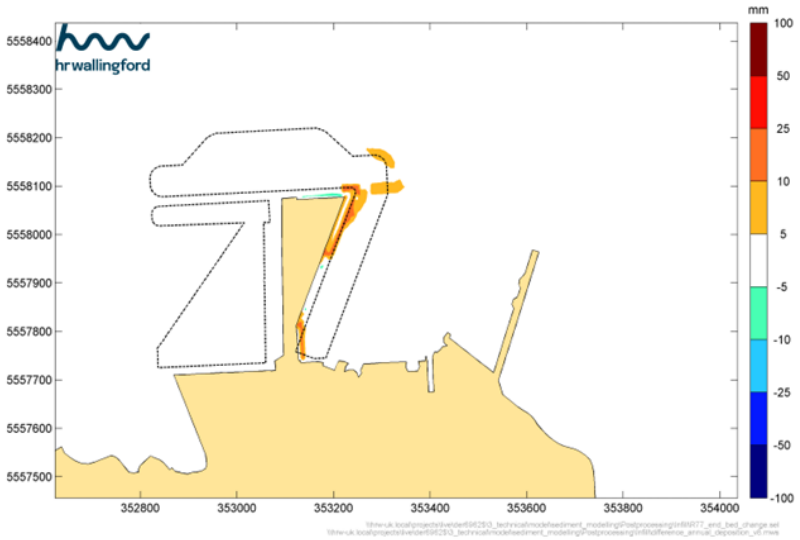


Figure 17: Predicted change to annual deposition depth of fine sediment with the proposed development in place (comparison to baseline)

4.3.9 Figure 17 presents the difference in the pattern of predicted annual deposition of fine sediment between the baseline and the proposed development. Yellow to red contours indicate increases in annual fine sediment deposition whilst green to blue contours indicate decreases in annual fine sediment deposition as a result of the proposed development, in comparison to the baseline. Changes are negligible (generally less than ±0.5 cm annually). Some small areas of increased infill of up to 2 cm/year are predicted to occur adjacent to the Northern Wharf and Western Wharf (due to localised changes in the coastline where the Northern Arm and existing timber Western Wharf will have been removed).

4.3.10 Accordingly, the predicted change in infill volume for the overall port operational area is very small, and largely within the dredged areas, specifically along the Western Wharf on the revetment. This infill could be remobilised or redistributed by vessel propeller wash or by currents generated during emptying of the dry docks and could require infrequent, low-volume, minor maintenance dredging. Annual maintenance dredging is unlikely to be required, rather, maintenance dredging of up to approximately 8,000 m^3 every 5 years (or depending on operational requirements, up to approximately 16,000 m^3 every 10 years), may be required, mostly within the eastern berth pocket (Western Wharf).

Deposition and Infill of Larger Grain-Size Sediment

4.3.11 The effect of the proposed development is generally to reduce current speeds within the dredged areas (see Figures 14a-b), potentially leading to a very minor increase in deposition of sand, gravel or other larger grain-size sediment at these locations. However, the general sediment fluxes are low at the site

and hydrodynamic processes that may mobilise and transport sand and similar materials are generally weak at the site, so any changes will be minimal and small in magnitude.

4.3.12 The proposed development is not predicted to increase the transport of sediment to the site (within the red line boundary) nor is it predicted to affect the wider sand transport regime within the estuary.

Hydromorphology - Summary

4.3.13 Overall, it is concluded that the impact of the proposed development on the hydromorphology of the Carrick Roads Outer Water Body is not significant. This is evidenced by the extensive modelling undertaken, which shows that any effects arising would be minor and highly localised:

- Figures 12a-d show the limited effect of the proposed development on significant wave heights for the 1-year present day conditions;
- Figures 13a-d show the limited effect of the proposed development on maximum or minimum water level, not predicted to be greater than 1 mm;
- Figures 14a-b show that all changes to tidal currents are small, localised and transient;
- Figures 15a-d and 16a-d indicate that the proposed development is not predicted to significantly impact peak suspended sediment concentrations for a range of wave conditions; and
- Figure 17 shows the predicted negligible and highly localised changes to annual fine sediment deposition and infill, which would not affect the wider sediment regime within the estuary.

4.3.14 Impacts to hydromorphology have been minimised as far as possible through the design evolution of the proposed development. For example, the extent and volume of dredging has been minimised as far as possible whilst allowing for the berth pocket lengths and underkeel requirements of FLOW devices and Excellence Class ships to be accommodated. The stable batter slopes, graded sides and potential placement of rock scour protection, if required, would ensure stability of the proposed dredge pockets.

4.3.15 The number and diameters of piles have also been minimised as far as practicable whilst ensuring structural integrity, and the structural form and geometry of the existing structures have been replicated across the new wharf lengths. The extent and scale of the design has been minimised as far as practicable, for example the design has aimed to extend, stabilise and strengthen the already-existing structures, suspended decks and rock revetments, rather than introduce entirely new structures to the water body.

Biology: Habitats

4.3.16 The scoping exercise has identified that habitats should be included within the impact assessment as the footprint of the proposed development is:

- 0.5 km² or larger (including sediment plume);
- More than 1% of the Carrick Roads Outer Water Body's total area;
- Within 500 m of higher sensitivity habitats; and
- 1% or more of lower sensitivity habitats within the Carrick Roads Outer Water Body.

4.3.17 These considerations are discussed below to assess the impact of the proposed development on the habitats within the Carrick Roads Outer Water Body.

Proposed Development Scale and Footprint Within Carrick Roads Outer Water Body

4.3.18 Whilst the marine portion of the site area comprises more than 1% of the Carrick Roads Outer Water Body area and the proposed activity footprint could exceed 0.5 km^2 when the extent of the sediment plume generated by the capital dredge is included, the scale of the proposed development, dredging and sediment plume has been minimised as far as reasonably practicable through the design evolution

and choice of dredge plant and methodology (including the use of tidal water movements to minimise sediment dispersion).

4.3.19 A key design concept for the proposed development has been to modernise, re-use, repair and upgrade the existing infrastructure at the site as far as practicable. The proposed development would not extend further northwards into the Carrick Roads channel than the existing infrastructure and the area of reclaimed land behind Western Wharf has also been minimised. Although the proposed development comprises the installation of additional infrastructure in the water body, with an associated loss of benthic and water column habitat, a portion of this is suspended deck infrastructure which the Carrick Roads Outer Water Body would continue to underly. An area of open channel within the Carrick Roads Outer Water Body would be reinstated due to the demolition of the Northern Arm.

4.3.20 The dredge requirements for the proposed development (see Figure 4) are considered to be the minimum possible extent and volume of dredging, whilst allowing the design objectives and necessary underkeel requirements to be achieved. Dredging has been avoided where possible, for example dredging is not proposed in the approach channel to Falmouth Docks (in areas where higher quality live maerl habitat has been identified). Rather, large vessels would make best use of the tides to access and egress the dock infrastructure.

4.3.21 During dredging, fine sediment on the seabed would be mobilised into the water column (resulting in elevated SSC levels) and dispersed away from the site, before being re-deposited in a different location. The scale of the sediment plume generated by the capital dredge operations and the subsequent footprint of fine sediment deposition has been minimised through the selection of plant and the dredge methodology as follows:

- Dredging using a backhoe dredger(s) with a 10 m^3 (or smaller) lidded bucket; and
- Dredging according to tides, specifically from 1.75 hours before low water to 1.75 hours before high water only.

4.3.22 The proposed plant and dredge timings are considered to be effective mitigation to minimise the rate of release of fine sediment into the water column. Use of a 10 m^3 (or smaller) lidded backhoe dredger allows for increased accuracy in areas of contamination, reduced production rate and reduced sediment disturbance and release rate in comparison to dredging using other plant. Dredging solely on specific tides leads to an elongated dredge programme (assuming use of a single dredger with a 10 m^3 bucket and relatively high rates of productivity, the quickest possible duration being a total of 58 weeks) in comparison to dredging continuously (24 hours per day), thereby reducing the rate of sediment suspension and resultant SSC elevation. The chosen timing of the dredging also reduces the fine sediment deposition total to the east and south-east of the proposed development. As such, the spatial extent of the sediment plume and the subsequent footprint of deposition have been minimised.

4.3.23 Overall, the proposed development is considered to be the design solution which minimises the required new infrastructure and footprint and impact of dredging within the Carrick Roads Outer Water Body, whilst ensuring that the proposed development objectives are met and the FLOW devices and Excellence Class vessels can be safely accommodated in terms of structural integrity and alongside berth and underkeel requirements.

Lower and Higher Sensitivity Habitats

4.3.24 The lower sensitivity habitats present within the Carrick Roads Water Body and within a 2 km buffer of site (as identified on Magic Maps and shown in Figure 10) are:

- Gravel and cobbles
- Intertidal soft sediment
- Subtidal soft sediment
- Rocky shore
- Subtidal rocky reef

4.3.25 The higher sensitivity habitats within 500 m of the site (as identified on Magic Maps and shown in Figure 9) are:

- Subtidal seagrass meadows
- Maerl
- Subtidal kelp beds

4.3.26 Surveys were undertaken in 2022 and 2023 (ES Volume 2 Technical Appendices 9.1 and 9.3) in order to determine the presence, distribution, structure and condition of benthic habitats within and in proximity to the proposed development footprint. The survey findings ground-truth and therefore are considered to supersede the mapping of lower and higher sensitivity habitats provided on Magic Maps (Figures 9 and 10), for the area within the benthic ecology survey study area. Outside of the benthic ecology survey study area, the locations/distributions of lower and higher sensitivity habitats shown on Figures 9 and 10 are utilised.

4.3.27 The survey findings are summarised briefly below, in order to establish relevant baseline considerations for the lower and higher sensitivity habitats. The 2022 and 2023 ecological survey reports (Technical Appendices 9.3 and 9.5) and Chapter 9: Marine Ecology can be referred to for full detail of survey methodology and results.

Baseline Considerations: Lower Sensitivity Habitats

4.3.28 The 2022 survey recorded seabed conditions at the site consisting predominantly of sublittoral cohesive mud and sandy mud with generally mixed (coarser) sediments occurring further from the existing port structures. The 2023 survey found that sediments were generally sandy mud or muddy sand with varying proportions of gravel. As such, it is considered that 'cobbles and gravels' and 'subtidal soft sediment' are present within the site boundary, as well as the locations shown on Figure 10.

4.3.29 No 'intertidal soft sediment' was present within the site boundary, although it does occur approximately 300 m to the west and 300 m to the north, at Flushing headland (Figure 10). No 'rockyshore' is present within the site boundary, although it is located approximately 50 m east and north of the site, along Flushing headland (Figure 10). Although 'subtidal rocky reef' is shown to be located within the site boundary (Figure 10), the survey findings indicate that there is no subtidal rocky reef within the site boundary.

Baseline Considerations: Higher Sensitivity Habitats

4.3.30 With regards to seagrass meadows, no subtidal seagrass was identified within the survey areas. The nearest seagrass is located approximately 160 m to the north of the site boundary, on the south side of the Flushing headland (Figure 9).

4.3.31 Kelp beds were identified as present on the basis of habitat mapping on Magic Maps. However, the project specific DDV surveys identified kelp plants to be present (Figure 18) but only sparsely, along with a higher coverage of red seaweed, which would not be considered to be a kelp bed habitat. Therefore, there were no kelp beds identified within the project site boundary.

4.3.32 With regards to maerl habitat, "areas of maerl in sediment" and "living maerl overlying dead maerl" were identified in the survey area, as presented in Figure 18. A Technical Note produced for the proposed development (ES Volume 2 Technical Appendix 9.5: Technical Note – Maerl) provides a detailed description of the baseline environment with regard to maerl in the survey area (including surface coverage, thalli size and structure) and can be referred to for further detail. Within the site boundary maerl is generally present in small, mostly dead, fragments on sediment, with no 3D structure or complexity that is typical of the maerl beds that are a designating feature of the Fal and Helford SAC.

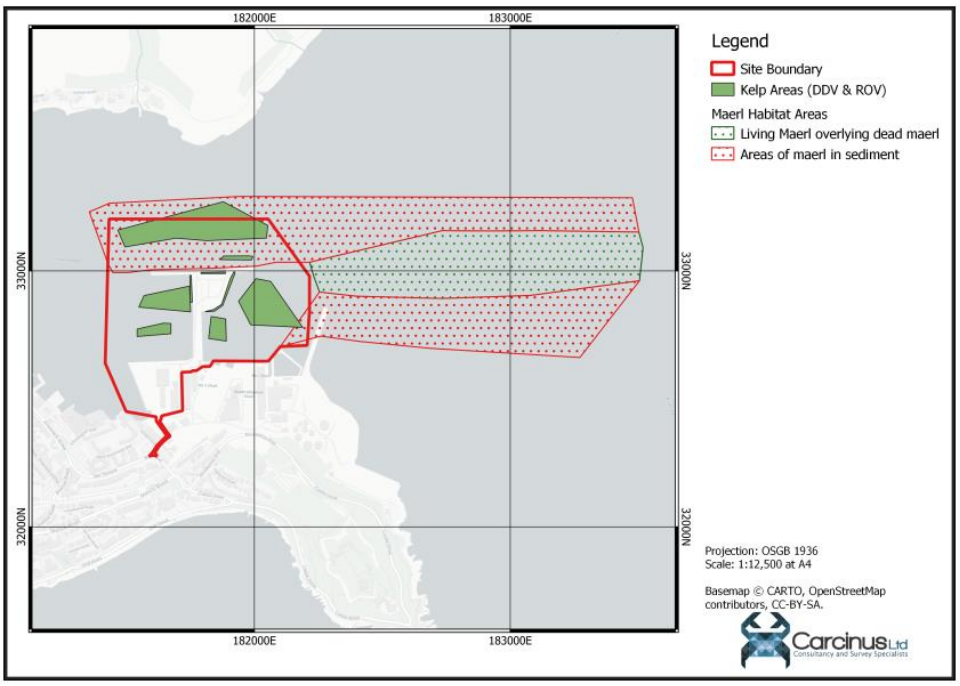


Figure 18: Distribution of Higher Sensitivity habitats (kelp and maerl) within the Site Boundary and Benthic Ecology Survey Study Area

Habitats: Impact Assessment

4.3.33 Table 4-4 below provides an assessment of the impacts of the demolition and construction stage on the lower and higher sensitivity habitats in proximity to the proposed development within the Carrick Roads Outer Water Body.

4.3.34 The following potential impact pathways were identified (see Chapter 9: Marine Ecology, Technical Appendix 9.5 Maerl Technical Note and Technical Appendix 2.12 Habitats Regulations Assessment):

- Habitat removal and disturbance;
- Overshadowing;
- Elevated suspended sediment concentrations (SSC);
- Suspended sediment deposition;
- Contaminated sediment mobilisation and deposition; and
- Introduction and/or spread of invasive non-native species (INNS).

4.3.35 Impacts on the lower and higher sensitivity habitats' supporting processes, structure and function are considered in Table 4-4. As previously mentioned, it is considered that the risk of introduction or spread of INNS will be suitably managed via measures in the CEMP, therefore this impact pathway is not considered again below. For sediment impact pathways, plume modelling has been undertaken and informs the impact assessment within Table 4-4. ES Volume 2 Technical Appendix 6.3: Sediment Plume Modelling can be referred to for further detail of modelling methodology and outputs.

Table 4-4: Impact Assessment for Lower and Higher Sensitivity Habitats in Carrick Roads Outer Water Body

Habitat Types		Habitat removal and disturbance	Overshadowing	Increased SSC	Suspended sediment deposition	Contaminated sediment mobilisation and deposition
Lower Sensitivity	**Gravel and cobbles**	The capital dredging would remove the muddy sand, sandy mud and gravels in the dredge pockets. However, these sediments are contaminated, not particularly notable and only a small proportion of the Fal Estuary. The removal of these marginal habitats within the dredge pocket is therefore not considered to be significant.	These lower sensitivity habitats are not directly impacted by overshadowing, as they are not photosynthetic. Therefore, no further assessment is undertaken herein; refer to Chapter 9: Marine Ecology.	These lower sensitivity habitats are not directly impacted by increased turbidity, as they are not photosynthetic. Therefore, no further assessment is undertaken herein; refer to Chapter 9: Marine Ecology.	The deposition of mobilised sediment over areas of subtidal soft sediment would not lead to any effect, as the deposited sediments would comprise fines of a similar nature to the existing composition of the subtidal soft sediment. Any deposition of fines occurring over areas of gravel and cobbles would be highly localised in the context of the Water Body and not significant.	The contamination within sediments mobilised over areas of subtidal soft sediment are typical of the sediment contamination within these habitat types and so is not expected to increase current levels. Sediment dispersion and deposition are largely retained with the site boundary and the extent of effect is very limited.
	Subtidal soft sediment					
	Intertidal soft sediment	These habitat types are not located within the site boundary, therefore no impact pathway is possible, and no further assessment is required.			These habitat types are not located within the predicted fine sediment deposition footprint for the capital dredge and as such no impact pathway is possible and no further assessment is required.	These habitat types are not located within the predicted fine sediment deposition footprint for the capital dredge, as such no impact pathway is possible and no further assessment is required.
	Rocky shore					
	Subtidal rocky reef					
Higher Sensitivity	**Subtidal seagrass meadows**		Subtidal seagrass is not located within the site boundary, therefore no impact pathway is possible, and no further assessment is required.	The modelled sediment plume would not reach any known seagrass bed, including those closest to the site located at Flushing headland, therefore no impact pathway is possible.		
	Maerl	No areas of living maerl overlying dead maerl would be removed during the dredging. Whilst areas of maerl in sediment would be removed during dredging north of Queen's Wharf, the areas of maerl in sediment lack 3D structure with thalli not longer than 1 cm, and in the majority of areas is only a surface veneer of dead maerl gravel with low percentage cover. As the maerl in the dredge pocket is	Temporary reductions in underwater illumination due to construction workboats would be insignificant, and once the operational development is in place, additional overshadowing from the new wharf lengths and from the presence of additional berthed vessels would be highly localised and not lead to significant effects.	On average, SSC increases would be highly localised (largely confined to the site boundary and affecting areas of maerl in sediment only). Whilst the maximum SSC plume may reach areas of live maerl habitat to the east of the site, such peaks would be transient, particularly as dredging would occur non-continuously according to tides. SSC increases would be very short-lived (returning to baseline levels shortly	Sediment deposition would largely be within and immediately adjacent to the site boundary, declining to less than 1 mm at distances of 370 m to the west of the site and 300 m to the east, not reaching areas of pristine live maerl (e.g. off St Mawes) or dense aggregations of dead maerl found in the wider Falmouth Bay. Deposition occurs on areas of maerl in sediment (not removed by dredging) with a	Sediment deposition outside the site boundary occurs on a small, localised area of 'maerl in sediment' to the east of the Eastern Breakwater. The level of deposition is low, and in areas of dead maerl such that no significant impact from contamination in sediments is likely.

		not structurally or functionally characteristic of a maerl bed, the removal of areas of maerl in sediment due to dredging is not considered to be significant.		after the completion of dredging) and, outside of the site boundary would be within the natural variation of the system (whereby naturally occurring weather events such as storms lead to increased SSC, see Figure 15d), and therefore not significant.	2D structure and is considered unlikely to change the function of the habitat as the maerl fragments present are too small to give the habitat a 3D structure. In many areas, deposition of dredged material is unlikely to significantly exceed natural variability.	
	Subtidal kelp beds	Kelp is widely found within the Fal Estuary. Kelp plants are present within the dredge pockets, however, presence of these macroalgae in the site boundary is very sparse and not considered to be kelp beds. Accordingly, the removal of sparse subtidal kelp plants due to dredging is not considered to be significant.	Temporary reductions in underwater illumination due to construction workboats would be insignificant, and once the operational development is in place, additional overshadowing from the new wharf lengths and from the presence of additional berthed vessels would be highly localised and not lead to significant effects.	Subtidal kelp within the dredge pockets would not be impacted by elevated SSC as the plants will have been dredged. On average, SSC increases would be highly localised (largely confined to the site boundary). Whilst the maximum SSC plume may reach other subtidal kelp areas (Figure 9), such peaks would be transient, particularly as dredging would occur non-continuously according to tides. SSC increases would be very short-lived (returning to baseline levels shortly after the completion of dredging) and, outside the site boundary would be within the natural variation of the system (whereby naturally occurring weather events such as storms lead to increased SSC, see Figure 15d), and therefore not significant.	Subtidal kelp within the dredge pockets would not be impacted by deposition as the plants will have been dredged. Deposition would largely be within and immediately adjacent to the site boundary, declining to less than 1 mm at distances of 370 m to the west of the site and 300 m to the east of the site. Negligible depth of sediment deposition (<1mm) is predicted over mapped areas of subtidal kelp to the east of the site boundary (Figure 9), particularly considering the nature of the habitat and as the predicted deposition in this location is within the range of natural variability.	Sediment deposition outside the site boundary is negligible such that no significant impact from contamination in sediments is likely.

4.3.36 As described within Table 4-4, during the demolition and construction stage, the proposed development would lead to non-significant temporary and localised effects on some of the Carrick Roads Outer Water Body lower and higher sensitivity habitats. As previously mentioned, the scale of the proposed development and the magnitude of impacts have been minimised as far as possible, both through the design evolution (avoidance of dredging in the approach channel, minimisation of dredging extents and re-development of existing infrastructure as far as possible) and through the proposed dredging plant and methodology (use of a lidded bucket dredger and dredging from 1.75 hours before low water to 1.75 hours before high water only).

4.3.37 In the long-term, during the operational stage, no significant impacts are predicted, as the operational setting would be similar to the baseline with regard to the activities and vessel movements at the Docks. The small projected increase in vessel movements would not lead to any significant impacts on habitats (e.g. relating to propellor wake/wash or overshadowing/shading). Furthermore, the capital dredge would remove contaminated sediment underlying the Carrick Roads Outer Water Body, which is considered to be a beneficial impact by reducing the potential for transport and re-mobilisation of contaminants in the future (for example, during naturally occurring storm events or maintenance dredge campaigns). Any maintenance dredging that may be required at the site would be of a significantly smaller scale than the capital dredge occurring as part of the demolition and construction stage (approximately 8,000 m^3 every 5 years or up to approximately 16,000 m^3 every 10 years), comprising low-frequency, short-duration campaigns and leading to localised and not-significant impacts on habitats only.

Habitats – Summary

4.3.38 Overall, with the above design and mitigation measures, it is concluded that the proposed development will not have any significant impact on the Carrick Roads Outer Water Body's lower and higher sensitivity habitats. The existing conditions and supporting processes within Carrick Roads Outer Water Body would persist (e.g. sediment regime) and no new activities that could have significant adverse impacts would be introduced to the Docks. The distribution, condition, function and structure of the lower and higher sensitivity habitats within the Carrick Roads Outer Water Body are therefore not expected to be significantly impacted during demolition and construction or operation, and the Carrick Roads Outer Water Body's ability to support such habitats would not be compromised.

Biology: Fish

4.3.39 The Carrick Roads Outer Waterbody is not assessed for the status of fish populations as it is a coastal waterbody. However, the Carrick Roads Inner Waterbody, which is approximately 2.5 km upstream from the site, is assessed in relation to fish and had a good status classification in 2022. As identified in Table 4-2b and described fully within ES Chapter 9: Marine Ecology, there are records of the migratory species trout and European eel present in the Fal.

4.3.40 Accordingly, as there are fish that could be migrating through the Fal estuary to the Carrick Roads Inner Waterbody, there is potential for impacts on the diadromous species trout and eel. However, the number of records of both species is low and the lack of any upstream sites designated for diadromous species indicates that the Fal is not an important migratory river for either species. Nevertheless, these species do have the potential to be present.

4.3.41 Migratory fish may be sensitive to some demolition and construction stage activities, such as impact piling and the operation of a hydraulic hammer, which could create a barrier to movement because of the propagation of underwater sound. No other proposed development activities could pose a barrier to movement. With regards to turbidity, increases in SSC resulting from dredging would not extend far from the site boundary, due to the dredging approach adopted to minimise sediment mobilisation into the Fal (dredging on an adjusted flood tide, using a backhoe dredger(s) with a 10

m^3 (or smaller) lidded bucket). However, consideration of effects on water quality (namely due to the release of contaminants into the water column during the capital dredge) is provided in the 'Water Quality' section below. This would not lead to any significant impact on fish. As described within 'Hydromorphology' above, no significant change to currents and flow within the water body are predicted, and so this would not lead to any significant impact on fish.

4.3.42 Of all the demolition and construction stage activities, impact piling represents the worst-case scenario in relation to underwater sound impacts on fish and is considered in this WFD assessment. An appraisal of the impact of all proposed development activities for all fish receptors can be found in ES Chapter 9: Marine Ecology.

4.3.43 Underwater noise can cause mortality or potential mortal injury, permanent (non-lethal) or temporary injury to fish, or behavioural responses. Temporary impairment in sound detection capabilities, known as a temporary threshold shift (TTS) is also possible.

4.3.44 Underwater noise modelling has been undertaken in order to predict change in underwater noise as a result of the proposed development and the distances over which ecological receptors may be impacted. The worst-case locations were chosen (e.g. modelling from the north-eastern-most point of the Western Wharf). The use of vibro-piling (where reasonably practicable and where possible to achieve required depths) and the implementation of a soft-start procedure would also minimise the risk of adverse effects from underwater noise and vibration to fish. As part of the design, the number and diameters of piles have been minimised as far as practicable whilst ensuring structural integrity. The detailed modelling outputs can be found in ES Chapter 7: Underwater Noise and TA 7.1 Underwater Noise Modelling Report.

4.3.45 The migratory fish species known to be present, albeit in low numbers, trout and European eel are medium sensitivity hearing (Category 2) fish as they have a swim bladder, which is not specifically involved in hearing. Data indicate that the Fal does not support any habitats important to, or populations of, the most sound sensitive (Category 3) fish, which are predominantly *Clupidae* species such as herring and shad, and so these species are not considered further.

4.3.46 Modelling was undertaken for stationary and fleeing fish. Whilst it can not always be assumed that a fish will move away in response to an underwater sound source (e.g. see Natural England comment[20]), for these migratory species that are by their nature mobile, a fleeing response whereby the mobile fish species move away from the sound source is considered applicable and has been modelled. Evidence indicates that salmonids, such as sea trout, demonstrate a startle response to sound and will change their direction of swimming to avoid areas of higher sound intensity[21].

4.3.47 For the moving fish scenario, the potential for mortality and injury in Category 2 fish species is limited to close to the proposed development (behind the existing wharf structures, and limited to the east due to the presence of the Eastern Breakwater), whilst TTS does not extend into the main channel of Carrick Roads. Fleeing fish would therefore be able to vacate the area. Whilst percussive piling from some locations would cause a barrier to access to the Penryn, it is unlikely that fish are present in this area as it is not a migratory river. Should there be fish in this area, there would be natural periods of down-time during which percussive piling would stop as the rig manoeuvres to the next pile, with only four hours of percussive piling per day. The soft-start that will take place prior to full power percussive piling will result in the sound intensity of the piling to be slowly increased over time. This will allow mobile migratory fish species to exhibit a behavioural response

[20] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010117/EN010117-001588-EN010117%20467675%20-%20Appendix%20E4%20-%20Natural%20England%E2%80%99s%20Advice%20on%20Fish%20and%20Shellfish.pdf

[21] Oppedal, F., Barrett, L.T., Fraser, T.W., Vågseth, T., Zhang, G., Andersen, O.G., Jacson, L., Dieng, M.A. and Vindas, M.A., 2025. The behavioral and neurobiological response to sound stress in salmon. Brain Behavior and Evolution, 100(1), pp.11-28.

prior to any TTS, injury, or mortality occurring. On this basis, it is considered unlikely that the underwater sound will present a barrier to upstream movement of migratory fish in the Fal.

4.3.48 However, to take a precautionary approach, the effect on stationary fish has also been considered. For stationary Category 2 fish (i.e. worst-case modelling assumption), high sound exposure levels were predicted to accumulate during impact piling, with the SEL_{cum} TTS threshold being exceeded up to a mean distance of 1,700 m and a maximum of 4,100 m from the noise source. This distance extends across the Fal and has the potential to represent a barrier to movement. Percussive piling would occur for a maximum of 4 hours per day, in daylight hours only, with down-time between piles whilst the piling rig manoeuvres between piles. Therefore, effects on fish behaviour due to percussive piling would be temporary and non-continuous. Migratory fish would be able to complete their migration during the periods of down-time which will be the majority of the time.

4.3.49 Considering all noise generating activities, the programming of works ensures the minimisation of overlap of noisy activities (i.e. piling and demolition would not occur simultaneously), and the appropriate timing (no demolition or piling overnight) and short-term duration of activities (no more than 4 hours of percussive piling in any given day and no more than 1 hour of demolition with a hydraulic breaker in any given day) would also ensure appropriate down-time from key noise-generating activities.

4.3.50 Thus, considering the use of a soft-start procedure for percussive piling, the short duration of proposed development activities generating underwater sound, with longer quiet periods during each day, there is considered to be limited potential for demolition and construction stage activities to create a barrier to migration for the low numbers of migratory fish present. Whilst there may be some behavioural responses such as moving away from the sound source, or altering position in the water column, no significant impacts on migratory fish are predicted.

Fish - Summary

4.3.51 Overall, and with the implementation of the above-mentioned design and mitigation measures, it is concluded that the impact of the proposed development on fish is not significant during both the demolition and construction and the operational stages. Chapter 9: Marine Ecology concludes that there are no significant effects on fish and can be referred to for further detail.

Water Quality

4.3.52 The CEMP (based on the OCEMP and to be secured by means of appropriately worded planning and marine licence conditions) will include measures to be adhered to in order to avoid and minimise adverse effects on water quality during the demolition and construction stage, including measures for surface water protection, for the appropriate handling and management of any hazardous or contaminated materials, for vessels to carry appropriate spill kits (to minimise the damage caused by such an event) and for following the standard requirements of both MARPOL and the EA's guidance on works in, near or over watercourses. Furthermore, fuels and potentially hazardous construction or waste materials which may create pollution hazards would be stored securely.

4.3.53 However, the scoping assessment has identified that the proposed development could affect water clarity continuously for longer than a spring neap tidal cycle (about 14 days) due to the intensive nature of the overlapping activities throughout the demolition and construction stage (see Table 2.1). The capital dredging operation is considered to be the worst-case activity with regard to interaction with the seabed substrate and substratum, and as such would have the highest potential to mobilise sediments. Therefore, the capital dredging operation in particular would cause the mobilisation and dispersion of contaminants, displacing EQSD chemicals and contaminants above

AL1 and AL2 present in the sediment proposed to be dredged (as summarised in Section 2.2 of this report).

Demolition and Construction Stage

4.3.54 Approximately 643,000m^3 of sediment would be dredged and removed from the site, of which a proportion (between approximately 184,000m^3 (29%) and 221,000m^3 (34%)) is contaminated and unsuitable for disposal at sea, as fully detailed within the GIIR. Through the design process, the extent and volume of dredging has been minimised as far as possible whilst allowing for the berth pocket lengths and underkeel requirements of FLOW devices and Excellence Class ships to be accommodated and proposed development objectives to be achieved.

4.3.55 However, the proposed development would affect water quality and clarity within the Carrick Roads Outer Water Body due to the mobilisation of contaminated sediment (particularly during the capital dredge), with the following impact pathways identified:

- Mobilisation of (contaminated) sediment, leading to elevated suspended sediment concentrations at the site and surrounds; and
- Mobilisation of contaminated sediment, potentially leading to dissolved aqueous contaminant plumes with water quality effects at the site and surrounds, as sediment-bound contaminants desorb from the disturbed sediment and become dissolved in the water column.

4.3.56 The implication of the above impact pathways on the Carrick Roads Outer Water Body's turbidity and water quality is assessed below. Assessment of the effects of deposition of contaminated sediment on sediment quality is provided within Chapter 8: Marine Water and Sediment Quality. Assessment of the effects of deposition of contaminated sediment on benthic habitats is considered in 'Biology: Habitats' above, Chapter 9: Marine Ecology and the HRA. The assessment below considers effects to the Carrick Roads Outer Water Body water column only. Aqueous plume and sediment plume modelling has been undertaken, as described fully within ES Volume 2 TA 6.3: Sediment Plume Modelling which can be referred to for further detail.

4.3.57 The proposed mitigation in the form of dredging plant and methodology (dredging using a backhoe dredger(s) with a 10 m^3 (or smaller) lidded bucket and dredging from 1.75 hours before low water to 1.75 hours before high water only, non-continuously over 58 weeks (the quickest timeframe that this could realistically be undertaken)) would minimise the potential for adverse effects on water quality (in terms of EQS exceedances) and clarity (in terms of SSC). Use of a 10 m^3 (or smaller) lidded backhoe dredger allows for increased accuracy in areas of contamination, reduced production rate and reduced sediment disturbance and release rate in comparison to dredging using other plant. Dredging solely on specific tides leads to an elongated dredge programme (the quickest possible duration being a total of 58 weeks), thereby reducing the rate of sediment suspension and resultant SSC elevation. The timing of the dredging (on an adjusted flood tide) would reduce the dispersion distance of sediment and aqueous contaminant plumes and allow for periods of down-time during which no dredging would occur and suspended sediment and dissolved contaminants would be dispersed (particularly given the dynamic tidal environment).

4.3.58 Sediment plume model outputs are provided in Technical Appendix 6.3 Sediment Plume Modelling. Increases in SSC are, on average, largely confined to the area within the site boundary (red line) and the peak increases (in the order of 100s mg/l above background) are largely predicted to be within the site boundary and within the water column in the immediate vicinity of the dredged berth pocket areas (black dashed lines).

4.3.59 TA 6.3: Sediment Plume Modelling also shows modelled EQS threshold exceedances (either the Maximum Allowed Concentration (MAC) or Annual Average (AA) threshold) in the water column. EQS exceedances for the various contaminants modelled are largely limited to within or

immediately adjacent to the site boundary with the exception of exceedances of AA thresholds for TBT which are predicted to extend from the site to the east and south-east. Dredging from 1.75 hours before low water to 1.75 hours before high water only means that the quantity of contaminants released (on each tide) and average concentrations of contaminants within the water column is approximately halved in comparison to dredging 24 hours per day (results of which are shown in the modelling outputs for EQS exceedances). Some exceedances of EQS would nonetheless still be expected outside of the site boundary for TBT. TA 6.3: Sediment Plume Modelling should be referred to for further detail. Such dissolved contamination levels are not expected to give rise to any large-scale or prolonged water quality effects.

4.3.60 Overall, it is considered that water quality and turbidity effects during the capital dredge operations would be of limited spatial extent in comparison to the overall scale of the Carrick Roads Outer Water Body. Effects would also be temporary, non-continuous and of short-duration due to the natural downtime between the tides during which dredging would stop. Increases in SSC are predicted to be short-lived, returning to baseline levels shortly after the completion of dredging operations.

4.3.61 It is also highly likely that the temporary increase in SSC during capital dredging would be within the natural variation of the system, whereby naturally occurring weather events such as storms leads to increased SSC concentrations (see Figures 15a-d for modelled maximum SSC for a range of offshore wave conditions in the baseline environment; Figure 15d specifically presents more extreme storm conditions during which SSC of 130 mg/l and up to 150mg/l are modelled to occur in the vicinity of the Docks and to the east of the Docks respectively). In August 2023, for example, Storm Antoni caused unseasonably strong winds, gusting up to 70 mph and coincided with a temporary ten-fold increase in turbidity levels within the site boundary. A summary of existing surface water quality at the site is provided within Section 2.3 of this report - during surface water sampling in March 2024, EQS exceedances of heavy metals were identified in the baseline environment.

4.3.62 As previously mentioned, the capital dredge described and assessed above would be the worst-case activity with regard to sediment and contaminant disturbance and dispersion. Any water quality and turbidity effects arising from other demolition and construction stage activities (e.g. strengthening and enabling works and construction activities) are predicted to be non-continuous, short-duration, and highly localised (limited to the water column within the site boundary) due to the highly localised nature of the other proposed works (i.e. stabilising, strengthening and extending the existing infrastructure at the site) and due to down-time during activities such as percussive piling. Construction activities occurring after the capital dredge are unlikely to mobilise contaminants, as these would have in majority been removed from the site during the capital dredge.

4.3.63 Overall, the demolition and construction stage of the proposed development is not predicted to give rise to a significant impact on water quality and clarity of the Carrick Roads Outer Water Body. Whilst the overall demolition and construction stage would occur over 42 months (or longer), the effect of individual activities (e.g. capital dredging) would be short-lived, non-continuous, limited in spatial extent and in areas outside the site boundary largely within the natural variability of the system. The OCEMP and carefully designed dredging method, using a lidded dredge bucket and dredging periods windows restricted to specific tidal conditions, significantly reduce and minimise the potential for sediment dispersion outside the immediate site boundary.

Operational Stage

4.3.64 During the operational stage, the proposed development is not expected to introduce either new point source pollution (as no new outfalls or discharges are proposed) or diffuse pollution (as suitable management of surface water run-off and operational waste would occur, as per existing

port operations). Therefore, no additional input of pollutants or nutrients into the marine environment is expected. Comparison of Figures 15a-d and 16a-d shows that no long-term change to water turbidity in terms of maximum SSC is expected for a range of wave conditions. Any low-frequency, short-duration maintenance dredging campaigns that may be required at the site would be of significantly smaller scale than the capital dredge occurring as a part of the demolition and construction works. Furthermore, much of the existing shallow sediments identified to be most impacted by contaminants would have been removed from the site during the capital dredge, decreasing the contamination loading present in the site and leaving the new seabed level a higher quality and less of a risk to the marine environment and Carrick Roads Outer Water Body by reducing the potential for transport and re-mobilisation of contaminants in the future (during any maintenance dredging or naturally occurring storm events). This is considered to be a beneficial long-term impact for the Carrick Roads Outer Water Body.

4.3.65 The use of the site will continue to be port-related with continued frequent passage and berthing of vessels during the operational stage. The small projected increase in vessels to and from Falmouth Docks once the proposed development is operational is not considered to give rise to any significant change to water quality within the Carrick Roads Outer Water Body. The port would continue to operate under existing management procedures and regulatory requirements relating to the handling of potentially hazardous materials, spill response and ballast water management. Such measures are considered to be standard practice and suitable to minimise and manage risk to surface water quality during the operational stage.

Water Quality - Summary

4.3.66 Overall, and with the implementation of the above-mentioned mitigation measures, it is concluded that the impact of the proposed development on the water quality of the Carrick Roads Outer Water Body is not significant. Chapter 8: Marine Water and Sediment Quality can be referred to for further detail and concludes that there are no significant effects relating to water quality and the Carrick Roads Outer Water Body.

Protected Areas

4.3.67 The site overlaps four WFD Protected Areas and is within 2 km of a further three WFD Protected Areas. These are shown on Figure 11 and assessed in turn below:

- The site is located within Fal and Helford SAC;
- The site is located immediately adjacent to Falmouth Bay to St Austell Bay SPA;
- The site straddles two Designated Shellfish Waters - Carrick Roads E Shellfish Waters and the Penryn Shellfish Waters;
- The site is within a Coastal Sensitive Area (Eutrophic, Sensitive to Nitrate), Truro Tresillian and Fal Estuary; and
- The site is within 2 km of two Designated Bathing Waters, Gyllyngvase and Swanpool, both classified as having excellent water quality[22] (based on *Intestinal Enterococci* and *Escherichia coli*).

Fal and Helford SAC

4.3.68 The HRA undertaken for the proposed development considers the potential for the proposed development to give rise to likely significant effects on Fal and Helford SAC and its qualifying features and sub-features, during both the demolition and construction stage and the operational

[22] DEFRA, 2022. Environment Agency, Bathing Water Quality, online. Available at: https://environment.data.gov.uk/bwq/profiles/ Accessed: July 2024.

stage. The HRA Stage 1 Screening assesses the potential for likely significant effects as a result of the following potential impact pathways:

- Habitat removal and disturbance;
- Overshadowing;
- Increased suspended sediment concentrations (SSC);
- Suspended sediment deposition;
- Contaminated sediment mobilisation and deposition; and
- Introduction and/or spread of invasive non-native species (INNS).

4.3.69 The potential scale or magnitude of effects during the operational stage is not predicted likely to be significant. During the demolition and construction stage, no likely significant effect is predicted relating to overshadowing or INNS. However, a likely significant effect was identified relating to the other impact pathways. The identified likely significant effects are further discussed within the Stage 2 Appropriate Assessment of the HRA, and any additional mitigation measures are described. It is considered that the proposed development would not result in an adverse effect on the integrity of the SAC.

Falmouth Bay to St Austell Bay SPA

4.3.70 The HRA undertaken for the proposed development considers the potential for the proposed development to give rise to likely significant effects on Falmouth Bay to St Austell Bay SPA and its qualifying ornithological features (non-breeding Black-throated diver *Gavia arctica*, Great northern diver *Gavia immer*, and Slavonian grebe *Podiceps auritus*) and their supporting habitat, during both the demolition and construction stage and the operational stage. The Stage 1 Screening assesses the potential for likely significant effects as a result of the following potential impact pathways:

- Disturbance (noise and vibration, including underwater noise);
- Collision risk with static or moving objects not naturally found in marine environment;
- Introduction of light and visual disturbance;
- Contamination and surface water quality;
- Changes to foraging habitat (including hydrodynamic changes to intertidal habitat); and
- INNS.

4.3.71 The HRA Stage 1 Screening, which has been informed by wintering bird surveys, identifies that no significant effects are likely, and therefore no Stage 2 Appropriate Assessment was undertaken. This is concluded on the basis of the temporary nature and the scale of the works (localised in the context of the SPA) and the ability of mobile bird species to continue to move and forage across the total SPA area and beyond throughout the demolition and construction stage. Activities during the operational stage are not considered to be of the nature, scale and frequency to give rise to likely significant effects.

Designated Shellfish Waters - Carrick Roads E Shellfish Waters and the Penryn Shellfish Waters

4.3.72 There are no Classification Zones classified for shellfish harvesting under assimilated EU Law Regulation (EU) 2019/627[23] within the site boundary or immediately surrounding waters; the closest Classification Zone to the site is located approximately 750 m north-west (see Figure 19). These Classification Zones are classified for the harvest of Queen scallop *Mimachlamys varia*, native oysters *Ostrea edulis* and mussels *Mytilus* spp. The Fal Estuary is also home to a number of culturally and commercially important local shellfishery operations, including *O. edulis* and potting and trapping of lobsters and crabs.

[23] Assimilated EU Law Regulation (EU) 2019/627. Available at: https://www.legislation.gov.uk/eur/2019/627/contents.

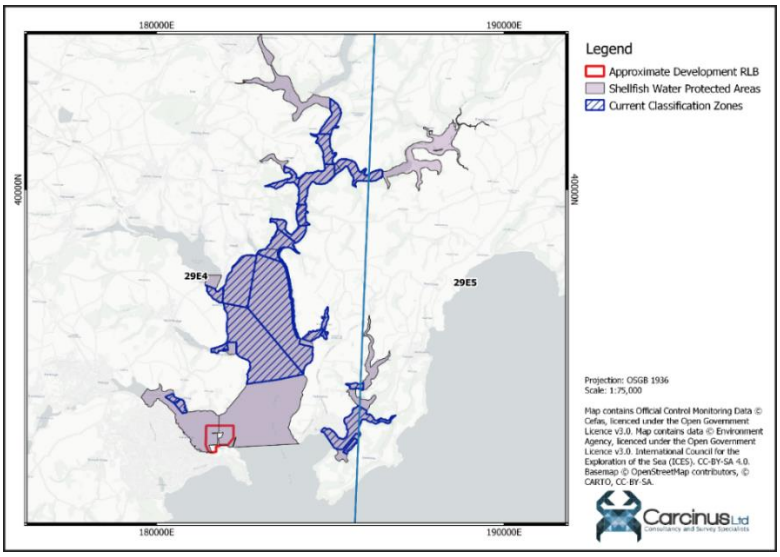


Figure 19: Designated Shellfish Waters and Classification Zones within the Fal Estuary

4.3.73 ES Chapter 10: Commercial Fisheries and Shellfisheries reports on the proposed development's impacts and effects on commercial fisheries and shellfisheries, including effects on stocks of commercial species and/or fishing effort/activities. ES Chapter 9: Marine Ecology considers the fish and shellfish communities (including both commercial and non-commercial species) themselves. These chapters can be referred to for further information and conclude that no significant effects on receptors are predicted.

4.3.74 Water quality impacts on the Designated Shellfish Waters (which are designated to protect or develop economically significant shellfish production) that overlap with and surround the site to its north, east and west are considered below.

4.3.75 As described previously, with the implementation of mitigation measures during the capital dredging operations (dredging with a lidded backhoe dredger and from 1.75 hours before low water to 1.75 hours before high water), the proposed development is not predicted to give rise to any significant effects on water quality within the Carrick Roads Outer Water Body. Elevated SSC levels and the modelled deposition footprint are largely confined to the area within and adjacent to the site boundary, which are unlikely to constitute important shellfish habitat (particularly as they are subject to shading and propellor wake/wash from frequent vessel movements). SSC effects would be non-continuous and within natural variability within the system. Depths of fine sediment deposition from capital dredging decline to negligible depths of less than 1 mm at distances of 370 m to the west of the site and 300 m to the east of the site.

4.3.76 The demolition and construction stage will be subject to a CEMP, secured via appropriately worded planning and marine licence conditions and based on the OCEMP, which will include measures to protect surface water quality. No microbial or nutrient inputs into the marine environment are expected that could affect shellfish populations or production.

4.3.77 During the operational stage, the proposed development would not lead to any additional discharge or run-off of pollutants or nutrients into the water environment as no additional overnight accommodation, no change to land-use and no new outfalls are proposed. Existing maritime and industrial activities at the site would continue, and the small projected increase in cruise and freight vessel movements and activities associated with FLOW integration would not represent a significant change to the baseline setting.

4.3.78 As detailed within 'Hydromorphology' above, the proposed development is not predicted to lead to any significant change to wave conditions, tidal flow (water levels and currents) or sediment regime that could affect the suitability of the Designated Shellfish Waters for shellfish production.

4.3.79 Lastly, much of the sediment identified to contain contaminants within the site (and therefore, within the Designated Shellfish Waters) would be removed during the capital dredge. This would decrease the contamination loading present in the Designated Shellfish Waters, reducing the potential for transport and re-mobilisation of contaminants in the future (for example, during any maintenance dredge campaign or during storm events).

Coastal Sensitive Area (Eutrophic, Sensitive to Nitrate), Truro Tresillian and Fal Estuary

4.3.80 The Truro Tresillian and Fal Estuary is defined as a Coastal Sensitive Area under the Nitrates Directive and is shown on Figure 11. During surface water sampling undertaken in March 2024, ammoniacal nitrogen marginally exceeded the EQS at three surface water sample locations in the east of the site (Figure 8), potentially due to a sewage outflow in the east of the site.

4.3.81 Whilst there could be some short-term release of ammoniacal nitrogen due to disturbance of very shallow organic rich materials during capital dredging, this is considered to have a negligible, and therefore not significant effect, particularly as it is likely to be quickly dispersed in the dynamic tidal environment.

4.3.82 The proposed development would not lead to any additional discharge or run-off of nitrates into the water environment as no additional overnight accommodation, no change to land-use and no new outfalls are proposed. Existing maritime and industrial activities at the site would continue, and the small projected increase in cruise and freight vessel movements and activities associated with FLOW integration would not represent a significant change to the baseline setting. As such, the proposed development will not give rise to eutrophication in the Carrick Roads Outer Water Body.

Designated Bathing Waters – Gyllyngvase and Swanpool

4.3.83 The distance of the site from the two Designated Bathing Waters (Figure 11) is considered sufficient to prevent any potential impact relating to bathing water quality during either demolition and construction or operation, particularly as the Designated Bathing Waters are located on the south side of Pendennis Point whilst the site is located on the north side.

4.3.84 The presence of Pendennis Point will direct currents (and thus sediment or contaminants) away from the beaches, therefore no impact on the Designated Bathing Water areas is anticipated. Dredging using a backhoe dredger(s) with a 10 m^3 (or smaller) lidded bucket for all sediment and dredging from 1.75 hours before low water to 1.75 hours before high water only would minimise the extent of sediment and aqueous plumes, as described fully within TA 6.3 Sediment Plume Modelling Report and in 'Water Quality' above. No AA or MAC EQS exceedances or SSC increases would reach the Designated Bathing Waters.

4.3.85 Existing maritime and industrial activities at the site would continue, and the small projected increase in cruise and freight vessel movements and activities associated with FLOW integration would not represent a significant change to the baseline setting in the Carrick Roads Outer Water Body.

4.3.86 There is no potential for the proposed development to contribute to or give rise to changes (during either demolition and construction or operation) to the Designated Bathing Waters' excellent water

quality as it would neither affect levels of nor lead to inputs of *Intestinal Enterococci* and *E. coli* in the Carrick Roads Outer Water Body.

WFD Protected Areas - Summary

4.3.87 Overall, it is concluded that the proposed development will not lead to any significant adverse impacts on the WFD Protected Areas.

4.4 Mitigation Measures Assessment

4.4.1 The Carrick Roads Outer Water Body is not a heavily modified water body and the EA have not identified any details of mitigation measures in place to protect it, therefore a mitigation measures assessment is not required.

4.5 Deterioration and Risk to Good Status Assessment

4.5.1 The Carrick Roads Outer Water Body has a 'good' (2022) ecological classification, and a 'does not require assessment' (2022) chemical classification. Whilst the proposed development comprises capital dredging, demolition and piling, the potential risks to the water body associated with these activities are considered to have been avoided and minimised as far as reasonably practicable through the design process and proposed methodology of works, and through the implementation of suitably effective mitigation measures. In operation, the proposed development is not considered to comprise a significant change to the baseline setting. The impacts identified in Section 4.1 of this report are therefore limited in temporal and spatial scale, not significant and not predicted to lead to deterioration of the Carrick Roads Outer Water Body's status.

4.5.2 As of 2019, the South Cornwall Groundwater Water Body had a 'good' quantitative classification and 'poor' chemical classification. The proposed development is not considered to lead to deterioration to the water body, as the dredging and removal of much of the top layers of marine sediment at the site prior to the piling works will result in the removal of the most impacted sediment. The remaining material will be significantly less impacted following the dredging works. It is also expected that soft sediments would rapidly form a seal around driven piles, further reducing the risk to the groundwater aquifer during the piling works.

4.5.3 As such no deterioration in water body classification is anticipated to occur, and the proposed works will:

i. Not result in reduction of WFD classification in any water bodies;
ii. Not put at risk the good status/potential of any water body; and
iii. Not inhibit any water body from progressing towards good status/potential.

5. CONCLUSIONS

5.0.1 It is concluded from the above assessment that, with implementation of the mitigation measures (listed in Section 4.3.1), the proposed development will not result in deterioration of the Carrick Roads Outer Coastal Water Body, or the South Cornwall Ground Water Body, nor will it result in deterioration of the fish element of the upstream Carrick Roads Inner Water Body. It is thus in compliance with the requirements of the WFD and supports the South West River Basin Management Plan (RBMP).