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Contaminated Land Desk Study

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FALMOUTH DOCKS DEVELOPMENT CONTAMINATED LAND DESK STUDY

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1. INTRODUCTION

1.1 Background

This report presents the objectives, scope, findings and conclusions of a Contaminated Land Desk Study undertaken at Falmouth Docks (the "site"). The review was undertaken in connection with the proposed redevelopment of the site. The site is shown on Figure 1 in Appendix 1 and includes reference to both terrestrial and marine areas.

This report was prepared by Ramboll UK Limited ("Ramboll") on behalf of Falmouth Docks and Engineering Company (FDEC).

1.2 Objectives

The main objective of this assessment was to assess the potential for significant soil or groundwater contamination, both at and in the immediate vicinity of the site, and the potential effects of the proposed development with respect to any contaminated present.

No sampling or analysis of soils, waters or other materials was undertaken as part of this desk study.

A review of compliance with environmental legislation is outside the scope of this assessment.

Identifying potential land contamination contributes to broader sustainability objectives. By using risk-based approaches to assess potential land contamination, use of natural resources, carbon and social impacts can be minimised. Where relevant, this report identifies where the site may contribute to a number of United Nation Sustainable Development Goals (SDGs).

1.3 Scope of Works

The scope of the Contaminated Land Desk Study has included the following:

- examination of historic, recent and current Ordnance Survey plans to identify activities which might have led to contamination of soil or groundwater (for example, from manufacturing processes, from storage activities or waste disposal practices) both on the site and in the immediate surroundings;
- examination of published records and plans on the shallow and deep geology and hydrogeology of the site to assess the vulnerability and sensitivity of groundwater and surface water resources to contamination, if present, and the possible direction of movement off-site, if mobile;
- search of a proprietary database of environmental permits, records and incidents at the site and in the surrounding area;
- enquiries of the Environmental Health Department to obtain information on environmental conditions, incidents, known contamination risks, and on the Local Authority's Contaminated Land Strategy;
- enquiries of the Petroleum Enforcement Authority to determine if records exist of above ground or below ground licensed (petrol) storage facilities; and
- a site walkover visit of the terrestrial portion of the site.

1.3.1 Scope of Works, Notable Exceptions and Restrictions

Items which do not form part of this assessment are as follows:

- No sampling or analysis of soils, waters or other materials has been carried out as part of the contaminated land desk study;

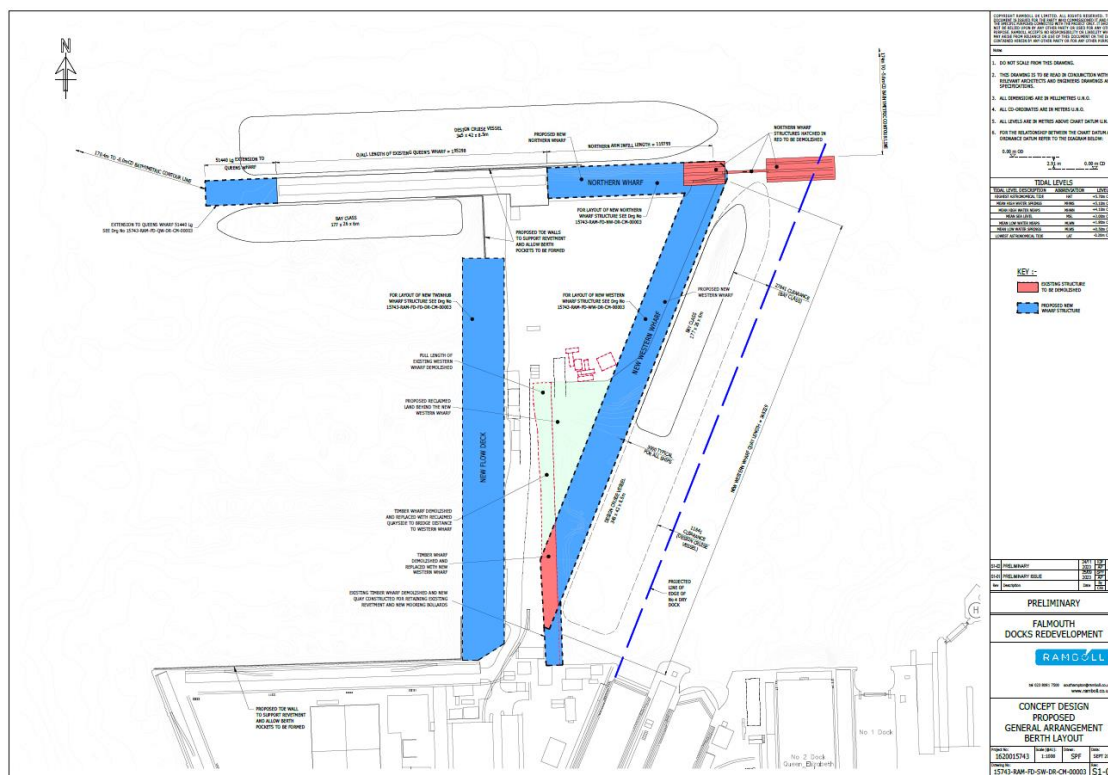
- The desk study did not include an audit of operational environmental compliance issues, environmental compliance requirements associated with close-down of operations, or waste documentation;
- The assessment specifically excluded a detailed assessment as to the presence and condition of asbestos or asbestiform containing materials at the site; and
- Ramboll's site visit was limited to the accessible buildings and external areas on the site, as detailed in Section 2.2.2. The walkover did not include the area of the site comprising the Carrick Roads (estuary) marine portion of the site, or the wider terrestrial site outside of the site boundary.

1.4 The Proposed Development

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 dock infrastructure in order to maintain existing business and future proof the dock with respect to cruise capacity, cargo capacity and renewable Floating Offshore Wind (FLOW) (supporting the offshore wind market).

The planning application and marine licence application (MLA) would comprise the following redevelopment activities (as shown in Drawing 1):

- 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 King's 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;
- Demolition of the Northern Arm concrete structure and sub-structure 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 Queen's Wharf and the Northern Arm to create a longer functional wharf length;
- Upgrades to the existing Queen's Wharf structure;
- Extension of the Queen's Wharf suspended deck structure 50 m westward;
- Installation of a 290 m deck (the 'FLOW Deck') to facilitate a FLOW device;
- Upgrades to the existing Duchy Wharf structure to facilitate a FLOW device;
- Potential strengthening works to Duchy and County Wharf piles; and
- Demolition of on-site buildings and re-configuration of Falmouth dock activities.



Drawing 1 – Proposed Development General Arrangement

1.5 General Limitations and Reliance

This report has been prepared by Ramboll exclusively for the intended use by the Client in accordance with the agreement between Ramboll and the Client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the Client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and / or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third-party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will continue to be used for its current and future proposed purpose as described in Section 1.4.

Ramboll's scope of services for this assignment did not include collecting samples of any environmental media. Ramboll cannot rule out the existence of conditions, including, but not limited to, contamination not identified and defined by the data and information available to and / or obtained by Ramboll. Specifically, this assessment must not be considered as an asbestos

survey (whether in built structures, waste, soils, etc.), even though the subject of Asbestos Containing Materials (ACMs) may have been discussed in the report.

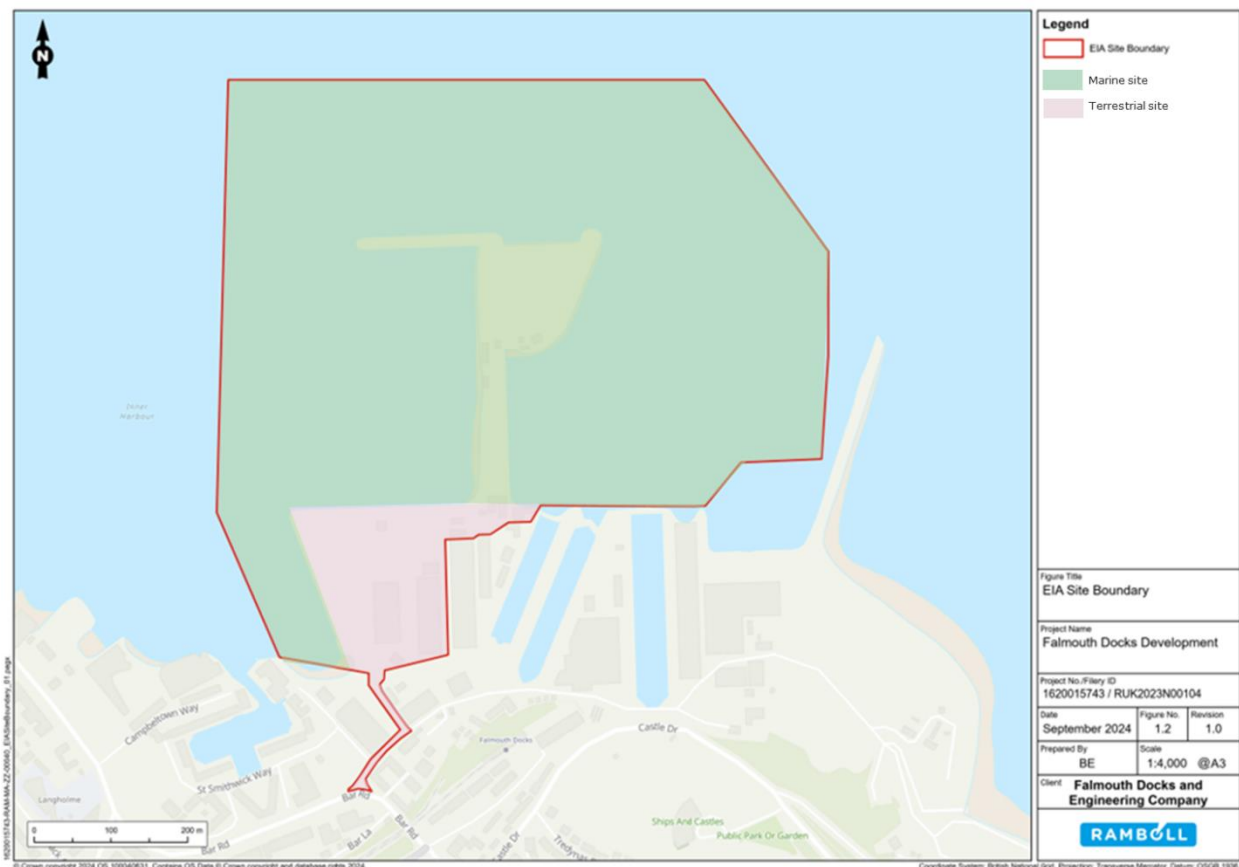
2. SITE VISIT

The following information was derived from a site visit undertaken on 20 March 2024 by Elena Henning of Ramboll. Discussions were held with the Chief Chemist/ Environmental Manager at FDEC. The purpose of the site visit was to assess whether there is potential for contamination from current and recent activities at the site.

Ramboll's visit was limited to the units that were accessible at the time of the visit; namely, buildings 419, 54, 55, and 68 (see Drawing 3).

Figures showing the location of the site, site boundary and key features on-site are presented in Appendix 1. Photographs taken during the site visit are referenced throughout this document and presented in Appendix 2.

For the purpose of this report, the site has been split into two parts: the terrestrial area and the marine area. Details of these areas are as listed below shown in Drawing 2.



Drawing 2 - Terrestrial and Marine Site Areas

- **The Marine Site:** the northern area of the site, including the Central Causeway, Queen's Wharf, the Northern Arm, and Western Wharf, and the rest of the site which falls within the Carrick Roads channel; and
- **The Terrestrial Site:** the southern area of the site to the south-west of the Central Causeway, formed of Falmouth Docks and Duchy and County Wharves.

2.1 Site Setting

The site has a total area of approximately 47.2 hectares (Ha) including terrestrial and marine areas, and is located at the existing Falmouth Docks in Falmouth, Cornwall, TR11 4NR. The site

includes part of the Carrick Roads. The site is centred at the approximate National Grid Reference SW 81765 32796.

The terrestrial portion of the site is located within an area of commercial and industrial land use.

The wider surrounding areas are characterised by 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;
- Tinnars 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 the Royal National Lifeboat Institution (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 areas lie further west of the site.

2.2 Site Layout and Activities

2.2.1 Marine

The marine portion of the site consists of the Central Causeway from which the wharves extend; with the Western Wharf (which is currently not in operation) running parallel to the eastern side of the Central Causeway. The Western Wharf is noted to be overgrown and stockpiles of wood / timber have been noted along the length of the wharf (Photo 1). The southernmost part of the Central Causeway consists of a storage area for Falfish wholesale seafood supplier (Photo 2).

Queen's Wharf (Photo 3) and Northern Wharf (Photo 4) are located at the most northern point of the Central Causeway, and beyond this lies the Carrick Roads estuary. To the north-east of the Central Causeway and south of Northern Wharf, exists an infilled area of reclaimed land which is covered in gravel and concrete hardstanding (Photo 5). It is currently used as a parking area (Photo 6); with welfare units, office facilities, equipment storage and shipping containers of unknown contents (Photos 5, 6 and 7).

An electricity sub-station (Building 506 on Drawing 3) is located on the Central Causeway.

The Northern Arm is no longer operational due to safety concerns, however, Queen's Wharf, to the north-west of the Central Causeway, is active.

The remainder of the marine portion of the site is formed of the Carrick Roads which is used as an operational harbour.

2.2.2 Terrestrial

The terrestrial portion of the site is located to the south-west of the Central Causeway and consists of a variety of commercial and industrial uses. To the north-east of the terrestrial portion, bordering the Central Causeway, exists Falfish fish landings and associated buildings.

To the west and south-west of this lies the rest of the terrestrial portion of the site, occupied by FDEC, consisting of various warehouses with uses such as storage rooms, a mechanical garage, a cleaning room, and an electrical sub-station.

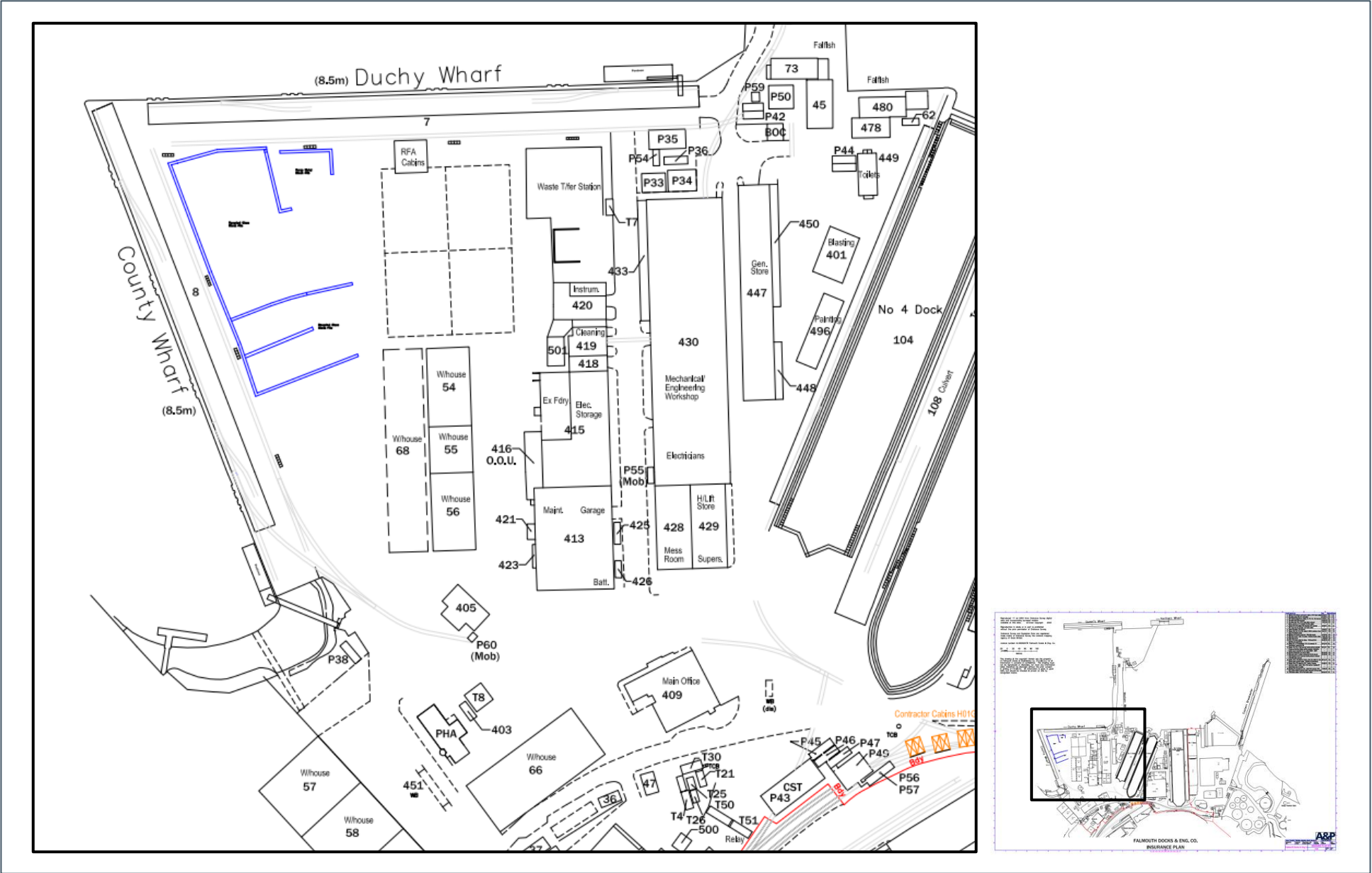
In the central section of the site lies a waste handling area (Photo 8), operated by FDEC and discussed in Section 3.4, and in the north-west, a recycled glass cullet storage area is present (Photo 9). Various heavy goods vehicles, machinery and storage containers with unknown contents were present at the time of the site walkover. Duchy and County Wharves form the boundary of the terrestrial portion of the site.

Some standing water was present across the site during the site walkover. The hardstanding covering the terrestrial portion was in various conditions of integrity.

The following buildings (corresponding to numbers presented in Drawing 3) were accessible during the site walkover:

- Building 68 is a lean-to located outside of warehouses 54, 55 and 56. It is a storage area consisting of paint drums, a stockpile of grit blast, sandbags, waste skips, and machinery (Photos 10, 11 and 12).
- Building 55 is a warehouse containing various equipment, machinery, and chemicals (Photos 13 and 14) (to be demolished as a part of the main planning application).
- Building 54 is a warehouse containing machinery, paints and chemicals (Photo 15).
- Building 419 is a cleaning room, used to clean machinery and equipment. Machinery and various substances are stored in this room, and three tanks containing corrosive material were recorded during the site walkover (Photos 16 and 17).

Drawing 4 presents the buildings proposed to be demolished as part of the proposed development, shown in red. Buildings shown as grey are due to be demolished as part of the dock operations under permitted development rights by the Applicant.





Drawing 4 – Buildings Proposed for Demolition

2.3 Bulk Storage of Chemicals and Hazardous Substances

2.3.1 Underground Storage Tanks (USTs)

Site personnel were not aware of the current or former presence of USTs at the site and no visual evidence of USTs, such as fill points, pumps, gauges, or signage, markings or concrete scarring indicative of such potential uses was identified during the visit.

2.3.2 Above Ground Storage Tanks (ASTs)

ASTs present at the site are summarised in Table 2.1.

Table 2.1: Summary of Above Ground Storage Tanks On-site

Tank Number	Contents and Capacity	Location	Construction and Containment
1	Kerosene Unknown capacity	To the west of building 428	An integrally bundled plastic tank, observed to be in good condition, located on a concrete slab. No signs of heavy staining observed (Photo 18).
2	Diesel 4394 L	To the west of building 428	A metal tank, observed to be in good condition, located on concrete hardstanding. The tank is attached to a pump and an above ground hose located above a concrete bund. Impact protection surrounded the tank. No signs of heavy staining observed, and no hydrocarbon sheen noted in the standing water in the bund (Photo 19).
3	Hydraulic Oil 1000 L	To the west of building 428	An integrally bundled plastic tank, observed to be in good condition, located above a concrete bund. No signs of heavy staining observed, and no hydrocarbon sheen noted in the standing water in the bund (Photo 20).
4	Waste Oil 2000 L	To the west of building 428	A metal tank, located in a concrete bund. Used to store waste oil from vehicle and plant maintenance. No signs of heavy staining

Tank Number	Contents and Capacity	Location	Construction and Containment
			observed, and no hydrocarbon sheen noted in the standing water in the bund (Photo 21).
5	2 x Waste Oil 25,000 L each	To the west of building 428	Two integrally bunded tanks, used for the temporary storage of waste oils and oily water from vessels. These are used to store oil for disposal off-site when the normal procedure of tankering straight into World Fuels for disposal cannot occur. These are both located on hardstanding. No heavy staining was observed (Photo 22).
6	Kerosene 2000 L	On the external eastern wall of Building 419	An integrally bunded plastic tank, observed to be in good condition, located in a concrete bund. No signs of heavy staining observed, and no hydrocarbon sheen noted in the bund (Photo 23).
7	Caustic cleaner 6500 L	Building 419	An uncovered metal tank, located within a bund in Building 419. Used for cleaning of machinery (Photo 24).
8	Degreaser 8900 L	Building 419	A metal tank, covered in sheeting and located within a bund in Building 419. Used for cleaning of machinery (Photo 25).
9	Hydrochloric acid 700 L	Building 419	A metal tank with a metal lid, covered in sheeting and located on hardstanding in Building 419. Used for cleaning of machinery. Evidence of acid spills on the floor have been noted (Photo 26). Hardstanding in relatively good condition. Wastewater from the cleaning room is caught in a below ground pit and pumped into IBCs for off-site disposal.
10	Diesel (Falfish) 1200 L	To the west of Building 45	An integrally bunded plastic tank with level gauge, observed to be in good condition, located on concrete hardstanding. No signs of heavy staining observed (Photo 27).

There exists the potential for other tanks to be present in areas that were inaccessible at the time of the site walkover.

2.3.3 Other Bulk Chemical Storage

There was a large amount of bulk chemical storage on site, the most pertinent of these are summarised in Table 2.2.

Table 2.2: Summary of Other Bulk Storage On-site

Item	Location	Containment and other comments
Hydraulic Oil	Building 55	A 1000-litre IBC stored on hardstanding within the building. No evidence of staining (Photo 28). A 208-litre drum stored on wooden pallet. No evidence of staining.
Engine Oil / Greases / Paints	Building 55	Approximately 10 containers of a variety of sizes, stored directly on surfacing within the building. No evidence of staining (Photo 14).

Ad-blue	Building 55	A 20-litre container stored directly on hard surfacing. No evidence of staining.
Paint drums	Building 68	More than 20 drums of waste paint awaiting collection for disposal stored on wooden pallets with no secondary containment. No evidence of staining (Photo 29). More than 30 smaller containers of paints of various sizes stored on drip trays. No evidence of staining was observed.
Paints / De-ruster / hydraulic oil	Building 54	Eight containers located in a metal cage with a base. Slight staining to metal. A sheen was present in the surface water inside the building (photo 30).
Paints	Building 54	More than 50 containers of paints in various sizes located on wooden pallets, cages and directly on hardstanding. Some paint staining was observed on floor surfacing (Photo 31).
Hydraulic Oil	Building 54	A 20-litre container stored directly on hardstanding. Some evidence of staining observed on the floor (Photo 32).
Wastewater (in an IBC labelled CLP Gear Oil)	Building 419	A 100-litre IBC, used for wastewater from the cleaning room which is caught in a belowground pit and pumped into the IBC for off-site disposal. Located directly on hardstanding. No evidence of staining was observed (Photo 33).
Hydrochloric acid / AdBlue / Fleetsafe	Building 419	Many containers of different sizes, located on wooden pallets, worksurfaces, and directly on hardstanding. Floor in Building 419 had evidence of spills such as green standing water.
Lubricant oil / hydraulic oil /	To the east of building 55	More than 20 containers located in a locked cage outside on drip trays. Some evidence of staining in drip trays.

In addition to the storage of chemicals and fuels listed above, other containers were present across the site, and there is the potential for the bulk storage of chemicals in the buildings that were not accessible at the time of the site walkover. This includes storage containers with unknown contents that were present in the Central Causeway and wharves.

Compressed gas containers were also present across the site; with acetylene and propane stored in Building 55, and an oxygen tank located outside of Building P33. There is likely to be more compressed gas located on-site that was not visible during the site walkover.

Note that good management of hazardous chemicals reduces the risk of uncontrolled release into the environment and contributes to good health and wellbeing (SDG 6¹).

2.4 Water, Wastewater and Drainage

The site is reported to be provided with mains drainage that connects to the municipal foul sewer system.

A saltwater main is present on-site that runs throughout the whole site; however, the abstraction point is located off-site (the exact location of which is unknown – there are two inlet pipes, one into the main pump room and one to number 4 pump room).

The site has various drainage channels and drains, both in the external areas of the site and within the buildings, however some areas of standing water were present at the time of the walkover.

¹ Sustainable Development Goal 6: Clean Water and Sanitation

Two oil-water interceptors were reported to be present on-site; one located in the waste compound, and the other located in the vehicle washdown area. Wastewater from the cleaning room (Building 419) is caught in a below ground pit and pumped into IBCs for off-site disposal.

The appropriate management of water, wastewater and drainage contribute to supply of clean drinking water and protection of water resources from pollution.

2.5 Waste Storage

A recycled glass cullet storage area is present in the west of the terrestrial site (Photo 9). The glass is collected from the wider county of Cornwall and is stored in open bulk cargo bays before it is loaded into cargo vessels on County Wharf.

Waste paint drums stored on wooden pallets, empty paint containers located in a skip, and a grit blast waste stockpile stored directly on hardstanding were present in Building 68 (Photos 10, 11, and 12).

A Waste handling area is also present to the north of the terrestrial portion of the site for general waste (Photo 8). Waste is stored directly on hardstanding which appeared to be in good condition. According to the site contact, the Waste Transfer notes are checked daily.

No visual evidence of staining or leaching from waste storage areas onto unsurfaced ground was noted.

A review of waste documentation was outside the scope of this review.

2.6 Deleterious Materials

2.6.1 Asbestos Containing Materials (ACM)

Asbestos surveys carried out on-site were made available to Ramboll for review. Table 2.3 details the areas that were found to contain or suspected to contain asbestos.

Table 2.3 Summary of Asbestos in Buildings On-site

Location	Asbestos present	Date of survey	Comments
Building 54	Yes	14-Oct-03	Roof and cladding sheets.
Building 55	Yes	14-Oct-03	Roof and cladding sheets.
Building 56	Yes	14-Oct-03	Roof and cladding sheets.
Building 501	Possible	21-Oct-03	Flash guard, switchgear.
Western Wharf	Yes	24-Nov-05	Probable pipe insulation in poor condition – inaccessible.
Northern arm	Possible	13-May-05	No access to pipes in culverts - no insulation visible from outside.
Duchy wharf	Yes	26-Sept-07	Accessible pipework insulation encapsulated, and metal clad, inaccessible and in poor condition.

Although potential risks associated with the presence of asbestos within soils at the site have been included in the risk assessment, an asbestos survey has not been undertaken by Ramboll as it is outside the scope of this assessment.

2.6.2 Polychlorinated Biphenyls (PCB)

Two electricity sub-stations are located on-site; one located on the Central Causeway, and one within Building 501. There was no access to the sub-station buildings at the time of the walkover; however, there was no evidence of staining visible surrounding the sub-stations.

Due to the age of the development, there is the potential for PCB-containing equipment to be present or to have been present on the site. However, according to the Chief Chemist and Environmental Manager of FDEC, testing was undertaken on the oils in the substations and the levels of PCBs encountered were below the relevant threshold.

2.7 Other Issues

A large fire was reported to have occurred circa 2000 which destroyed the Queens Wharf.

No significant spills likely to have resulted in lasting effects were reported.

Various environmental ground investigations have taken place on-site, the findings of these are summarised in Section 3.6.

2.8 Potential for Ground Contamination from Current Uses

2.8.1 Potential On-site Contamination Sources

There are several potential sources of contamination present from the current activities on-site, and these are as summarised below:

- Fuel tanks, alkali / acid tanks and waste chemicals / paints are present across the site (terrestrial and marine). There is potential for leakages / spillages to have previously occurred on-site;
- Asbestos is known to be present in some buildings which will be demolished as part of site redevelopment in the terrestrial part of the site, however, due to the infilling activities in the marine area of the site (as per Drawing 2 in Section 2), asbestos cannot be discounted from this part of the site as well;
- There is potential for other impacts from the presence of Made Ground (reclaimed land) beneath the marine area of the site;
- Hydraulics, degreasants and greases used for machinery in relation to the docks have been recorded across the site;
- Chemicals which may have been used to manage the fire which destroyed Queen's Wharf c.2000;
- Storage of antifouling and marine paints and treatments in the terrestrial area of the site;
- Two electrical sub-stations are present both in the terrestrial and marine areas; and
- Two oil-water interceptors are located in the terrestrial area of the site.

There is potential for the contaminants of concern to be present from localised impacts of the abovementioned site uses. These include petroleum hydrocarbons (TPHs), Semi-Volatile Organic Compounds (SVOCs), Volatile Organic Compounds (VOCs), asbestos and ACMs (principally from demolition of some buildings as part of the proposed development), heavy metals, ground gases (namely increased carbon dioxide and methane concentrations and depleted oxygen levels), Polyfluoroalkyl Substances (PFAS) and Perfluorooctanoic Acid (PFOA) compounds; PCBs; Tributyl-Tin (TBT); and Polybrominated Diphenyl Ethers (PBDEs).

2.8.2 Potential Off-site Contamination Sources

The industrial uses of the surrounding area have the potential for sources of contamination, such as the A&P dry docks and the Pendennis Shipyard to the east of the site. Due to access constraints, it was not possible to carry out a site walkover of the off-site areas. However, there is potential for various potentially contaminative activities to have occurred given their industrial nature, for example, the storage of fuels and chemicals in tanks and leakages / spillages arising of various other substances. Considering the site uses adjacent to the terrestrial area, the abovementioned contaminants of concern are also relevant to the off-site uses.

3. HISTORICAL AND REGULATORY INFORMATION

Ramboll has undertaken a review of historical mapping and aerial imagery (where available) obtained from a proprietary environmental database which is summarised below. Selected historical maps are presented in Appendix 3. The earliest maps available that have been reviewed date from the late 19th century.

3.1 Map History

3.1.1 The Site

Marine

The earliest maps dating to the late 19th century, show that the Western Breakwater (now Western Wharf) was present in its current location, with railway tracks running up its length from the terrestrial area. Shingle is illustrated on the western side of the Breakwater. Northern Breakwater (later Northern Wharf) is illustrated in the north-east of the area. By 1907, two rectangular buildings had been developed along the Western Breakwater, with railway tracks terminating at the buildings.

Empire Jetty and the Northern Breakwater were developed by 1933, with traveling cranes running up the Western and Northern Breakwater and Empire Jetty, and bollards were present along the structures. The two rectangular buildings are no longer present.

By 1968, Queen's Wharf, Northern Wharf and Western Wharf were labelled and King's Wharf has been developed south of the Empire Wharf. Queen's Wharf in the north-west has been extended, with travelling cranes now noted along the structure. Four buildings are present along the west side of the Western Wharf.

By 1994, a bund has been developed on the north-eastern part of the site, connecting the Western Wharf with the Northern Wharf, which is shown to be infilled in the 1999 aerial photography.

From historic maps, the Empire and King's Wharves are shown to have been removed in 2007/8 with structures removed to seabed level.

The bund area appears to have been used for car parking and storage purposes to date and the Northern Wharf appears to have been partially removed in the north-eastern most part of the site.

Terrestrial

The earliest maps dating to the late 19th century show the terrestrial portion of the site to have been generally occupied by shingle, labelled as 'The Bar', and a 'Bar Point' has been labelled in the north-west of the terrestrial area. Railway tracks are present in the north-eastern part of the site, extending from the off-site buildings south of the Western Wharf.

By 1907, the eastern part of The Bar had been reclaimed and an off-site Iron Foundry is noted to extend onto the site. Buildings are present on the eastern boundary, likely to be of commercial and industrial use; and by 1933 the Iron Foundry is labelled on-site, with five Railway Tracks extending onto the southern half of the area.

By 1968, The Bar no longer exists, and the area of reclaimed land on the terrestrial portion of the site is now the same as the current configuration. This area is now labelled Falmouth Docks. Works are present in the east of the terrestrial site. County Wharf and Duchy Wharf have been developed on the western and northern shorelines, respectively, with travelling cranes present

along both wharves. The Railway Tracks have been repositioned to serve the wharves and the marine part of the site.

By the 1990s, development has occurred in the centre of the terrestrial site area, with buildings occupying the centre and the eastern parts of the site and the tracks present only along the southern, western and northern perimeters of the area.

The 1999 aerial photography shows the tracks to no longer be present in the south, and between 2020 and 2021, the building in the centre north of the area has been demolished.

3.1.2 The Surrounding Area

The earliest mapping in the late 19th century shows the surrounding area was largely developed with various land uses. Land to the immediate east was developed as an Iron Foundry and a Lifeboat House is also noted. Two docks (No. 1 Dock and No. 2 Dock), a Smithy and an Engine House were present within 250 m east of the site, and a Quarry was located further east approximately 350 m from the site. Tanks were present approximately 75 m south-east of the site, and a Train Station with Railway Tracks were located from approximately 200 metres to the south-east. A Timber Yard and two Timber Ponds were present approximately 100 m to the south-west, and a Gas Works was noted approximately 500 m west of the site.

By 1907, the Timber Ponds were no longer depicted on the map, with the area illustrated to be of marsh surfacing with small structures connected to railway tracks noted. The Lifeboat House is no longer marked adjacent to the east of the site and has been constructed approximately 110 m to the east of the site. The aforementioned tanks are no longer present.

By the 1930s, two additional docks have been constructed (No. 3 Dock and No. 4 Dock) to the east of the site, and the Iron Foundry, the Engine House, the Smithy and the Quarry are no longer depicted on the map. Tanks are recorded approximately 30 m east of the site. The Timber Yard area to the south-west was no longer present, and by 1933 this area contained a Hotel, 'Stones', and Tracks running through it towards the docks, and it was no longer depicted as marshland. The Gas Works to the west was no longer present by 1933 and Allotment Gardens are noted beyond the Station, approximately 220 m to the south-east.

By 1963, Oil Storage Tanks were located approximately 380 m to the south-east of the site (in the location of Falmouth Petroleum today), and by 1972, unspecified Works were located between Docks No.2 and No.3. Tanks were also present approximately 300 m to the south-east. The Tanks 30 m east of the site were no longer marked. Allotment Gardens are no longer labelled and the greater area in the south-east is generally redeveloped with residential housing (with gardens). An Electrical Sub-station is marked approximately 100 m to the south of the site.

By 1990s, there is more development to the south-west and south of the site, with generally commercial and residential developments taking place. A Garage is now noted approximately 130 m south of the site, and a Marina has been constructed 100 m to the south-west. The station is now labelled as Falmouth Docks Station and No. 2 Dock is renamed to Queen Elizabeth Dock.

By 2000, a Tip (disused) is noted approximately 400 m east of the site, which is no longer present by 2024 mapping, and the Marina is noted to have been extended between 2000 and 2015. The Garage has been demolished sometime between 2001 and 2005. The unspecified Works between Docks No. 2 and No. 3 (150 m east of the site) is no longer marked, although the structure remains unchanged to this day.

3.2 Anecdotal Evidence

According to Falmouth Harbour² and Tibbald's Planning and Urban Design (2011)³, Falmouth has a long history of being an active harbour, dating back to the 15th century. Industrialisation in the Victorian era resulted in Falmouth Docks being developed in the current location, with the first docks being dated to 1860.

King's Wharf and Empire Wharf were built in the 1930s, and the Northern Arm was extended in 1938. In 1942, the Northern Arm was rebuilt, and Queen's Wharf was completed; and in 1958, County Wharf and Duchy Wharf were completed.

In 2003, Queen's Wharf was rebuilt after it was burnt down in a fire, and between 2006 and 2008, Empire Wharf and King's Wharf were demolished.

The Quarry which was present approximately 350 m to the east of the site (as discussed in Section 3.1), was reportedly used as a landfill site for the waste generated by the docks. An oil sludge soakaway was present here, and the landfill site received materials such as paint tins, TBT contaminated materials and asbestos⁴.

3.3 Environmental Database Records

The following information has been obtained from a search of a publicly available third-party environmental database⁵ (dated 15th April 2024) and information provided by the client:

- There is one contaminated land register entry / notice within a 1 km radius of the site. This is located 550 m west of the site at Church Street Car Park and dated 27 October 2011. The entry relates to the Environmental Protection Act (1990) Section 78E (1) Remediation Notice.
- There is one historical landfill site recorded within a 250 m radius of the site (i.e., the "planning consultation zone"), located on site. This is in the north-east of the site (the marine area of the site), with no information relating to the dates of operation. The specified waste is noted to be waste including unknown material. As discussed in Section 3.6, this is likely to comprise Made Ground material described as slightly sandy clayey crushed shale and gravel and sandstone cobbles.
- There is an additional historical landfill located approximately 370 m east of the site at its nearest point; this is the Falmouth Docks Landfill site and operated by FDEC. This is the Quarry noted in section 3.1.2. According to information contained within the database, the landfill was authorised to receive deposited waste including industrial, commercial, household, and special waste, and liquid sludge. The first input date was recorded to be December 1911 and the last input date December 1987.
- The environmental database records that there are three current Environmental Permits for waste management activities (excluding Part A(1) and Part B permitted waste installations) within 1 km of the site. The environmental database states that the closest of these is located on-site and it is held by FDEC for a household, commercial and industrial transfer station. The Applicant has advised that there is a registered exemption for the recycled glass cullet storage area but no permitted waste transfer station.
- There are two current Environmental Permits to operate Part A(1) Installations issued under the Industrial Emissions Directive⁶ within 1 km of the site. According to the environmental

² Falmouth Harbour (2024) Important Dates in Falmouth's History. Available at: <https://www.falmouthharbour.co.uk/about-falmouth-harbour/history/> (accessed June 2024)

³ Tibbalds Planning and Urban Design (2011) Port of Falmouth Masterplan.

⁴ Bailey Investments Limited (2007) A & P Ship Repair and Conversion Facilities, Falmouth, Cornwall Interim Site Investigation Report (ref. 9380/HP/07)

⁵ Landmark (2024) Envirocheck Report, Falmouth Dock and Engineering Co, Falmouth Docks, (ref. 342801869_1_1)

⁶ Formerly referred to as Integrated Pollution Prevention and Control (IPPC) Authorisations, or Pollution Prevention and Control (PPC) Authorisations.

database, the closest is located approximately 50 m east of the site and held by Falmouth Petroleum Limited, however according to the Applicant this is located a greater distance from the site. The permit allows for the temporary storage of hazardous waste with a capacity of over 50 tonnes; disposal of more than 50 tonnes of non-hazardous waste involving physico-chemical treatment; and the disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment.

- There is one Environmental Permit to operate a Part A(2) Installation issued under the Industrial Emissions Directive⁷, within 1 km of the site. This is located approximately 50 m south of the site and held by A&P Falmouth. The Applicant has advised, this is for the solvent emissions from painting ships and covers areas within the site as well as the adjacent dry docks.
- There are three Environmental Permits to operate Part B Installations issued under the Industrial Emissions Directive⁸ within 1 km of the site:
 - The closest is located approximately 50 m south of the site and held by Falmouth Cargo Handlers for PG3/5: coal, coke and coal product processes. The Applicant has advised that this was surrendered several years ago.
 - The second closest permit relates to PG3/1 blending, packing, loading and use of bulk cement. The Applicant has advised this is located on site.
 - The Applicant has advised there is a permit located on site, relating to the storage of animal feed which is held by FDEC but is not currently active, covering the wharfs within the site.
- There are no Radioactive Consents registered within 1 km of the site. *NB Due to public security restrictions, certain information on closed or mobile radioactive substance authorisations has been removed from the public register and is not available to Ramboll.*
- There are four Control of Major Accident Hazard (COMAH) sites within 1 km of the site. The closest of these is located 30 m south of the site for Bunn Fertiliser Limited. The Applicant has advised that Bunn Fertiliser Limited has not operated on site for 10 years.
- There are two explosive sites within 1 km of the site. The closest of these is located approximately 10 m south of the site and is operated by FDEC.
- There are four potential Planning Hazardous Substance Consents within 1 km of the site, with two of these having an unknown status. The nearest is located on-site and it is held by FDEC for ammonium nitrate based fertilisers and composite fertilisers containing phosphate and / or potash. The Applicant has advised this has not been in use for 10 years.
- There has been one prosecution relating to controlled waters within 1 km of the site. This was recorded approximately 110 m to the south-east of the site for allowing oil to escape into foreshore. Hearing date is recorded to have been 1 October 2009.
- Similarly, there has been one prosecution relating to authorised processes within 1 km of the site. This was recorded approximately 190 m south of the site for dumping construction waste on land without a waste management consent. Hearing date is recorded to have been 21 March 2003.
- There are five Environmental Permits held with the Environment Agency for water discharge activities (formerly referred to as Discharge Consents) within a 500 m radius of the site. The nearest is located approximately 10 m to the north-east and it is held by Maxamillion Properties Ltd for treated effluent discharge into saline estuary (assumed to be Carrick Roads).

⁷ Formerly referred to as Local Authority IPPC Authorisations.

⁸ Formerly referred to as Local Air Pollution Prevention and Control Authorisations

- There have been 44 pollution incidents to controlled waters within 1 km of the site. Two of these were recorded on-site, and both related to the release of oil from boats / ships into Tidal Waters within the Helford, Lizard & Carrick Roads catchments. These incidents occurred in March and August 1992, and were classified by the Environment Agency as a Category 3 - Minor Incident.
- There are no active fuel stations within a 1 km radius of the site.
- There are six ecologically sensitive sites within a 1 km radius of the subject site. This includes the Fal and Helford Special Area of Conservation (SAC) located on-site, and the Falmouth Bay to Saint Austell Bay Special Protection Area (SPA).

According to the environmental database, the site lies in a "Radon Affected Area" as defined by Public Health England. The site is recorded as being located in an area where between 10 % and 30 % of residential properties are projected to contain radon above the residential action threshold.

Under Health and Safety legislation, employers have a duty to manage workplace risks including the potential for radon exposure. Health and Safety Executive guidance recommends radon monitoring for workplaces located in radon Affected Areas. If the workplace radon threshold is exceeded, the Ionising Radiations Regulations 1999 require employers to take action to reduce risks.

According to BRE Report BR211 (2015) Radon: Protective Measures for New Buildings, radon protection measures are required under building regulations for new buildings at this location.

The LinesearchbeforeUdig⁹ database indicates that there are potential services underground within the site boundary.

3.4 Regulatory Authority Enquiries

3.4.1 Local Authority Environmental Health Department

Ramboll has received information from the Environmental Health Department of the Local Authority, details of this are listed below.

- The north-east corner of the site has been prioritised for further inspection under the Council's Part IIA strategy but the score achieved under the review process means that it is currently a Low Priority Site, due to its commercial nature. Neither the site nor adjoining land have been designated as Contaminated Land under Part IIA of the Environmental Protection Act.
- The site has a long commercial history and may have issues related to spillages, asbestos, landfill and other issues associated with docks. The Council has two recorded pollution incidents in the area:
 - In 2011 located 177 m west of the site; Air; No impact Land; No impact, Water significant impact, relating to the discharge of paint blated of the hull off a vessel in No. 2 Dock.
 - In 2009 located 395 m west of the site; Air No impact; Land Minor impact; Water Significant impact.
 - The Council does not have any further detail regarding the nature of the incidents and were likely reported to them from the Environment Agency.
- The Council holds records for two landfill sites:

⁹ LinesearchbeforeUdig (2024) Available at: <https://lsbud.co.uk/> (accessed June 2024)

- Located on the north-east part of the site, known as 'Falmouth Basin' (GR: 181800 32900). The Council does not have any detailed information on the Falmouth Basin site.
- Located approximately 395 m east of the site known as 'Falmouth Docks' (GR:182300 32400). Falmouth Docks landfill site operated between 1911 and 1987 and accepted industrial and household waste. This is noted in Section 3.3 and Section 3.1.2.
- The Council does not have any records of gas monitoring being undertaken at either site or the volumes of waste deposited.
- The Council does not hold any records relating to radon at this premises.
- The Council's records do not show any Private Water Supplies within 2 km of the site.
- Cornwall Council has records of two Permits registered to the docks:
 - Falmouth Cargo Handlers – Animal and Vegetable Treatment processes
 - A&P Falmouth Ltd – Coating Processes

3.4.2 Local Authority Planning Department

Ramboll has obtained a planning history of the site from the Cornwall Planning Department via the planning portal¹⁰ of the Local Authority. Relevant applications are summarised as follows:

- Planning Application Reference: PA23/06550 in relation to the EIA Scoping Opinion request for proposed development which aims to restore and upgrade the existing facilities at Falmouth Docks. Applicant: A&P Group. Advice given on proposed planning conditions on 6 October 2023. Proposed conditions relating to contaminated land are as summarised below:
 - Condition 3: No development, other than demolition of any buildings or structures, shall commence until an assessment of the risks posed by any contamination shall have been submitted to and approved in writing by the local planning authority.
 - Condition 4: No development shall take place where (following the risk assessment) land affected by contamination is found which poses risks identified as unacceptable in the risk assessment, until a detailed remediation scheme shall have been submitted to and approved in writing by the local planning authority.
 - Condition 5: The approved remediation scheme in condition (4) shall be carried out and upon completion a verification report that demonstrates the effectiveness of the remediation shall be submitted to and approved in writing by the local planning authority before the development [or relevant phase of development] is occupied.
 - Condition 6: Any contamination that is found during construction of the approved development that was not previously identified shall be reported in writing immediately to the local planning authority. Development on the part of the site affected shall be suspended and a risk assessment carried out and submitted to and approved in writing by the local planning authority.
- Planning Application Reference: C1/PA02/1365/07/M, for the construction of yacht marina within dock area and associated changing / welfare facilities / office, car park & safe routes. Applicant: A & P Ports & Properties. Approved with conditions on the 30 October 2007. Conditions relating to contaminated land are as summarised below:
 - Condition 2: No development hereby permitted shall commence until an Environmental Management Plan outlining the proposed methods of construction

¹⁰Cornwall Council Online Planning Register. Available at: <https://planning.cornwall.gov.uk/online-applications/> (accessed: May 2024).

mitigation and monitoring and details of the Seaflex anchor blocks shall be submitted to and approved in writing by the Local Planning Authority.

- Condition 3: No development hereby permitted shall commence until details of post construction monitoring of the benthic ecology to determine the actual effects of the proposed engineering works comprising the settlement of the anchor blocks within the soft silty sediment shall be submitted to and agreed in writing by the Local Planning Authority
- Planning Application Reference: C1/HD02/1044/92 in relation to claim for deemed consent for storage / blending and distribution of ammonium nitrate fertilizer. Applicant: Falmouth Docks and Engineering Co. Approved with conditions on 20 September 1992.

No discharge of the contaminated land planning conditions in reference to the abovementioned applications have been obtained from the planning portal.

3.4.3 Petroleum Enforcement Authority

An enquiry has been submitted to the Petroleum Officer at Cornwall Council in order to establish if the site is currently or has previously been licensed for the bulk storage of petroleum products. This information is awaited.

3.5 Historical Potential for Ground Contamination

3.5.1 The Site

The following potentially contaminative activities have been identified as having taken place on-site:

- Historic use of the site for various industrial and commercial purposes (Iron Foundry, unspecified Works, industrial activities associated with the active dockland such as railway tracks and cranes). Potential for heavy metals, hydrocarbons, asbestos, PAHs, organo-tin compounds, PFAS, SVOCs and VOCs including chlorinated solvents to have impacted soil, vapour and groundwater.
- Fuel storage including above ground tanks across the terrestrial portion of the site. Potential for hydrocarbons in soil, vapour and groundwater.
- Made Ground (including reclaimed land and potential landfill which is likely to comprise Made Ground as per Section 3.6). Potential for heavy metals, hydrocarbons, asbestos, PAHs in soils and groundwater, as well as potential for generation of ground gases.

3.5.2 The Surrounding Area

The following potentially contaminative activities have been identified as having taken place in the surrounding 250 m radius of the area:

- Iron foundry, smithy, engine house and docks within 250 m east of the site, most of which has been redeveloped by 1930s (apart from the docks);
- Train station and railway line network from the earliest mapping to today;
- Tanks approximately 30 m to the east and allotment gardens approximately 220 m to the south-east of the site which were present between 1930s and 1960s;
- An electrical sub-station was constructed circa 1960s, approximately 100 m south of the site, which is present to this day;
- An unspecified works present approximately 150 m to the east of the site from 1960s and no longer labelled by 2000, however, the building remains largely unchanged;

- Timber yard and timber ponds located 100 m to the south-west of the site, which have been presumably infilled through time for the subsequent construction of railway lines and hotel, and more redevelopment in the area by the 1990s of commercial and residential nature; and
- A garage (between 1990s to early 2000s) approximately 130 m south of the site.

Contaminative land uses beyond the 250 m radius of the site included gas works, quarry, tip, a landfill and oil storage tanks, which have generally been redeveloped and are considered to be too distant to pose a risk to the subject site.

All of these land uses have the potential for the presence of elevated concentrations of heavy metals, hydrocarbons, asbestos, PAHs, and SVOCs.

The above activities represent potential off-site sources of contamination that (if present) could potentially migrate beneath the site.

The potential for off-site contamination (if present) to migrate beneath the site would be dependent on the underlying geological conditions, which are discussed in Section 4.

3.6 Previous Site Investigations

Previous intrusive investigations have been carried out at the site. Site investigations on the marine portion of the site were reported by Soil Mechanics Limited¹¹, George Wimpey & Co Limited¹², Sub Marine Services Limited¹³, and Geotechnical Engineering Limited¹⁴ in their respective Factual Reports. Site investigations on the terrestrial portion of the site were reported on in an interim Site Investigation report by Bailey Investments Limited⁶.

A full review of previous investigation data is beyond the scope of this report, however, pertinent information obtained from these investigations include the following:

- Black organic material was present in the marine boreholes at Empire Wharf and Queen's Wharf;
- Shallow perched water tables were encountered;
- Groundwater was encountered at various depths, thought to be due to the tidal influence;
- Presence of elevated concentrations of heavy metals, TPHs and some PAHs in soils, with potential risks to human health and controlled waters being identified;
- Elevated gas concentration of ammonia in some locations across the site;
- Ash has been encountered across the site in the Made Ground. Deposits of coal, organic material, iron staining and decomposed timber has been recorded in some locations within the Made Ground;
- Hydrocarbon odour encountered to the east of the site (off-site) in the Made Ground;
- The area of reclaimed land south of Northern Wharf (marine) which is classed as 'landfill' by the Environment Agency consists of Made Ground material described as slightly sandy clayey crushed shale and gravel and sandstone cobbles, with rare instances of sandy ash and occasional coal, and occasional concrete, brick, clay pipe, granite and mudstone gravel;

¹¹ Soil Mechanics Limited (1952) Site Investigation at Empire Wharf, Falmouth Harbour (ref. 1120/1)

¹² George Wimpey & Co Limited for The Falmouth Docks and Engineering Company (1961) Report on Site Investigation for Proposed Development of Falmouth Harbour (ref. S/2948)

¹³ Sub Marine Services Limited (2007) Falmouth Docks Borehole Site Investigation (ref. 695)

¹⁴ GEL (2022) Falmouth Causeway Factual Ground Investigation Report (ref. 36988)

- Presence of fragments of plastic, organic material, clinker, and glass in the Made Ground on the Central Causeway; and
- Presence of low levels of PAHs, TPHs, and some heavy metals, none exceeding the threshold for commercial / industrial land use in the Made Ground on the Central Causeway.

4. ENVIRONMENTAL SETTING

Desk-based research of the local geology, hydrogeology and hydrology was carried out in order to establish the potential for migration of contamination onto or away from the site, and to assess the sensitivity and vulnerability of the site's setting with respect to surface water, groundwater and ecological resources.

Information was obtained from a number of sources, including:

- examination of published geological maps produced by the British Geological Survey (BGS);
- review of publicly available BGS borehole logs for the site or near vicinity;
- a proprietary environmental database procured by Ramboll; and
- Regulatory Authority websites including the Environment Agency (EA).

4.1 Geology and Hydrogeology

The local geology has been assessed from review of 1:50,000 scale geological mapping information obtained from the British Geological Survey (BGS) website¹⁵, the BGS geological map for the area (Geological Sheet 352)¹⁶, and borehole logs from a historic ground investigation located on the existing Central Causeway running through the marine portion of the site¹⁸.

Information from the historic investigations at the site indicates that the typical ground conditions of the site comprise Made Ground underlain by the Portscatho Formation (Sandstone and Argillaceous Rocks, Interbedded). No superficial deposits are indicated to be present at the site.

The general geological profile of the site is summarised in Table 4.1.

Table 4.1: Summary of Geology and Hydrogeology

Formation	Description	Thickness	EA Aquifer Designation	Hydrogeological Significance
Made Ground (present at terrestrial site and reclaimed areas of marine site)	Fill used for land reclamation.	~ 6 m	Unclassified	N/A
Portscatho Formation	Interbedded sandstone beds (up to 2 m) and slaty mudstone.	Up to 5.4 km thick	Secondary A	Permeable formations with potential to support localised abstractions.

The EA currently classifies groundwater at the site (the South Cornwall Water Body) as being of 'Poor' chemical quality and of 'Good' quantitative status under the Water Framework Directive classification scheme.

According to EA information provided by a commercial environmental regulatory database provider, there are two licensed groundwater abstractions within a 2 km radius of the terrestrial site, as detailed in Table 4.2.

¹⁵ British Geological Survey (BGS) (2024). GeoIndex Terrestrial. Available at: <https://www.bgs.ac.uk/> Accessed: May 2024.

¹⁶ British Geological Survey (2024). Geology of the country around Falmouth. Memoir for 1:50 000 geological sheet 352 (England and Wales). Available at: <https://webapps.bgs.ac.uk/Memoirs/docs/B01739.html> (accessed: May 2024)

Table 4.2: Licensed Groundwater Abstractions within 2km of the Site

Licence Holder	Distance from Site	Abstraction source	Purpose of Abstraction
Mr N J Trefusis	890 m N	Groundwater	General Farming and Domestic
Mylor Yacht Harbour Limited	1.75 km N	Groundwater	Commercial Private Water Undertaking: Drinking, Cooking, Sanitary, Washing

The site is not situated within an EA designated groundwater Source Protection Zone.

The Environmental Health Department of the Local Planning Authority do not hold any records of private (unlicensed) water supplies within 2 km of the site.

4.2 Hydrology

The nearest identified surface water body is the Carrick Roads, a tidal waterbody which falls within the marine portion of the site to the north. It is designated under the Water Framework Directive (WFD) as the Carrick Roads Outer waterbody. This is classified as a coastal waterbody, most recently (2019) being recorded as being of 'good' ecological quality, 'fail' chemical quality¹⁷.

According to an independent, third party environmental database, there are no licensed surface water abstractions within a 2 km radius of the site.

4.3 Water Quality

The surface waterbody is designated as a Special Area of Conservation and Shellfish Waters. It is not classified as a heavily modified or artificial waterbody.

The EA WFD classification records show that there are elevated concentrations of mercury compounds, tributyltin compounds and PBDE. The latter compounds are associated with widely used fire retardants and are potentially sourced from urban run-off into the estuary. Mercury and tributyltin are generally associated with industrial and commercial activities in the coastal urban environment, with tributyltin having been widely used as an additive in marine paints used on shipping. The waterbody is recorded as being well oxygenated and supporting good hydromorphological characteristics. The ecological quality elements that support the ecological element of the classification show good quality populations of invertebrates and phytoplankton levels that equate to high quality.

Downstream of the Carrick Roads Outer waterbody lies the Fal / Helford coastal waterbody, which currently has a classification of 'good' ecological quality' and 'fail' chemical quality, with very similar characteristics as the Carrick Roads Outer waterbody. It also fails with respect to mercury compounds and PBDE. The Environment Agency monitor water quality within the site, at a sampling point approximately 100 m to the east of the Northern Wharf¹⁸. Results from 2020 to 2023 indicate a low turbidity environment with high levels of dissolved oxygen and tributyltin being present in most samples.

The nearest designated bathing water to the site is at Gyllyngvase beach, located approximately 1 km to the south-west of the site, on the far side of Pendennis Point. Swanpool beach lies further along the same stretch of coast, approximately 2 km from the site, and also on the far

¹⁷ Department for Environment Food & Rural Affairs and the Environment Agency (2024). Catchment Data Explorer. Available at: <https://environment.data.gov.uk/catchment-planning/WaterBody/GB650806250000> (accessed June 2024)

¹⁸ Department for Environment Food & Rural Affairs and the Environment Agency (2024). Water Quality Archive. Available at: <https://environment.data.gov.uk/water-quality/view/download/new> (accessed June 2024)

side of Pendennis Point. Both beaches are classified as having excellent water quality¹⁹, the water quality being classified in terms of *Intestinal Enterococci* and *Escherichia Coli*.

The site straddles the boundary between two designated shellfish water protected areas (Penryn and Carrick Roads), each of which contains multiple individual shellfish beds for varieties of bivalve molluscs. Additionally, the Percuil shellfish water protected areas lies approximately 3.5 km to the east of the site on the far side of the Fal estuary.

4.4 Sediment

The site is located in an area of seabed consisting of a mix of rocky substrate / reefs, gravel and cobbles, as well as subtidal soft sediments of sand to clay grainsize²⁰.

The site is located within a geologically mineral-rich area, and as such any sediment located within the site boundary may contain contaminants derived from metal mining operations upstream of the site. An Environmental Impact Assessment (EIA) completed in 2009 for a previous scheme at the site²¹ discussed investigations at and within the vicinity of the site, which confirmed the presence of elevated concentrations of a range of contaminants including tributyltin and dibutyltin; metals such as arsenic, nickel, copper, mercury, lead and zinc; as well as PAHs and PCBs within the sediments.

4.4.1 Impacts of Historic Mining on Sediment in the Falmouth Estuary

As reported within a scientific paper 'Impacts of Historic Mining on Sediment Associated Trace Metals of the Fal Estuary'²², the tin and copper mines of Cornwall were of great international significance from as early as the Bronze Age.

The River Carnon drains one of the most heavily mined river catchments in Britain. The catchment extends from the historical copper and tin mining districts of Chacewater, St Day, Carharrack, Gwennap and Baldhu to the east of Redruth, past Twelveheads and Bissoe, down to Devoran, at the head of the estuary Restronguet Creek which makes up part of the extensive Fal Estuary system.

In the 18th century, Cornwall was the largest producer of copper globally. Copper mines in the St Day area produced large tonnages of copper ore, as did the nearby Poldice mine.

The Great County Adit began construction in 1748, comprising of a system of interconnected adits that helped drain water from the Poldice mine from 1760s, initially, into the River Carnon.

By 1880, the adit consisted of a network of drainage channels 40 miles long, serving more than 60 mines at an average of 80 to 100 metres in depth. At its peak, the Great County Adit discharged more than 65 million litres per day into the River Carnon, and thence into Restronguet Creek (a tidal arm of the Carrick Roads upstream from Falmouth).

Recent data suggest County Adit contributes to approximately 70 - 80 % of downstream loadings of cadmium, nickel, copper and zinc, and effectively 100 % of arsenic and iron. Although all the mines served by the Great County Adit have now closed, it still drains many of their underground workings today.

¹⁹Department for Environment Food & Rural Affairs and the Environment Agency. Bathing Water Quality. Available at: <https://environment.data.gov.uk/bwq/profiles/> (accessed June 2024)

²⁰ European Commission (2024) EMODnet Map Viewer. Available at: <https://emodnet.ec.europa.eu/geoviewer/#/> (accessed June 2024)

²¹ Royal Haskoning (2009), Falmouth Cruise Project: Environmental Statement (Ref. 9S4181)

²² John, S (2015). Impacts of Historic Mining on Sediment Associated Trace Metals of the Fal Estuary.

Extraction of arsenic increased in the Carnon Valley during the 19th century with a former tin smelting house near Perranarworthal in the Carnon Valley being adapted to produce commercial quantities of arsenic; and in the 1830s a second arsenic works was established at nearby Bissoe.

Wheal Jane was a metalliferous mine halfway between Redruth and Truro in the Gwennap mining area of Cornwall, England. During its lifespan it produced over 100,000 tons of copper ore, and 27,000 tons of arsenic. In January 1992 there was an accidental release of approximately 50 million litres of acidic metal laden water, where iron hydroxides were carried in suspension and water was highly contaminated with metals in solution including more than 600 parts per billion of cadmium, flowing out via Restronguet Creek into Carrick Roads.

Due to this extensive mining history around the site, there is likely to be elevated heavy metals in the marine sediment.

4.5 Designated Ecological Sites

The following sites have been designated as being environmentally sensitive and are potential receptors of contamination arising at the site:

- Fal and Helford Special Area of Conservation, located on-site;
- Falmouth Bay to St Austell Bay Special Protection Area, located to the east of the site;
- Penryn Shellfish waters, located to the north-west of the site; and
- Bathing waters located at Gyllyngvase Beach and Swanpool Beach, both categorised as excellent, located approximately 1 km and 1.7 km to the south-west, respectively.

4.6 Environmental Sensitivity and Vulnerability

There are two licensed groundwater abstractions within 2 km of the site, the closest of which is located approximately 890 m north for general farming and domestic use. The EA classified the groundwater quantitative quality as 'Good' under the Water Framework Directive but the chemical status was 'Fail'.

The site is considered to be situated in an area of **low to moderate** sensitivity with respect to groundwater resources due to the underlying Secondary A Aquifer in relation to the Portscatho Formation.

However, as the Carrick Roads estuary is in proximity to the terrestrial portion of the site, it is likely that any risks to the groundwater will also impact the surface water receptor. The Carrick Roads estuary therefore represents the most sensitive water receptor.

The sensitivity of the surface water receptor in terms of ecological value can be considered as **high** as part of the site boundary extends into Carrick Roads with ecological designations in and around the site.

5. QUALITATIVE RISK ASSESSMENT

5.1 Legislative Framework

There is no specific guidance on the assessment, at desk study stage, of risks associated with contamination in the marine environment. Therefore, for the purposes of this appraisal, the same process for assessment of risks associated with contaminated land has been utilised for both the terrestrial and marine portions of the site. This is considered to be appropriate as the marine site is located immediately adjacent to land and the characteristics of sediments at the marine site are likely to be influenced by current and historic land-based activities.

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently revoked with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380) (as amended), which came into force in August 2006, and consolidated the previous regulations and amendments. Revised statutory guidance ("the Guidance") for local authorities on how to implement the regime, including the decision-making process on whether land is contaminated land in the legal sense, has been published by the Department for Environment, Food and Rural Affairs (Defra) and entered into force in April 2012.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears... to be in such a condition, by reason of substances in, on or under the land, that:

- a) significant harm is being caused or there is a significant possibility of such harm being caused²³; or
- b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused".

The pollution of controlled waters is defined in Section 78A(9) of the Act as "the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter".

5.2 Sustainability

Identifying potential land contamination contributes to broader sustainability objectives. By using risk-based approaches to assess potential land contamination, use of natural resources, carbon and social impacts can be minimised.

The assessments in this report may contribute to a number of United Nation Sustainable Development Goals (SDGs) including SDG 3: Good Health and Wellbeing, SDG 11: Sustainable Cities and Communities, and SDG 6: Clean Water and Sanitation.

5.3 Risk Assessment Framework

"Significant harm" or "significant pollution of controlled waters" is defined in the Guidance on risk-based criteria and must be the result of one or more relevant 'contaminant linkages' relating to the land.

The presence of a contaminant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source - a substance that is capable of causing pollution or harm;
- A receptor - something which could be adversely affected by the contaminant; and

²³ Water Act 2003 (Commencement No. 11) Order 2012

- A pathway - a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 5.1: Classification of Risk (after NHBC / EA 2008)

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high	High	Moderate	Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/ Low	Low	Very low
	Unlikely	Moderate/ Low	Low	Very low	Very low

It has been assumed that the site will continue to operate as a working docks post development.

5.4 Preliminary Risk Assessment

Two preliminary conceptual site models have been developed, with separate qualitative risk assessments undertaken, to identify and assess the potential risks associated with environmental conditions at and in the vicinity of the site based on the available information. One was prepared for the terrestrial portion of the site and the other for the marine portion of the site. These are presented in Tables 5.2 and 5.3.

The terrestrial works are limited, comprising the demolition of some of the existing buildings with limited interaction with the ground. The terrestrial site is proposed to be covered by hardstanding, however the extent of groundworks is not yet finalised. Drawing 4 shows the buildings proposed to be demolished as a part of the works.

The marine conceptual site model has been developed with the assumptions that piling and dredging works in the Carrick Roads are to be carried out for the redevelopment and reconfiguration of the wharves and associated marine infrastructure.

Table 5.2 Terrestrial Conceptual Site Model

Source	Pathway	Receptor	Severity of Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
Current use of site as working docks and associated processes, storage of various contents, and fuel storage. Presence of made ground on site, including reclaimed land, Potential sources of contamination relating to historical uses including: • Made Ground used to bring up the levels for the docks circa early 1900s; • Railway tracks which served off-site land uses; • Iron Foundry which was partially located on-site with realigned railway tracks that have since been removed; • Unspecified Works and other potentially contaminative activities associated with this; and	Leaching to Groundwater & Groundwater Flow. Hydraulic connectivity with surface water receptor	Groundwater in the Secondary A Aquifer. Carrick Roads surface water receptor and ecologically sensitive sites.	Mild	Low	Low. The proposed terrestrial activities involve limited interaction with the ground as currently only the demolition of buildings and associated replacement of hardstanding is proposed. With limited interaction with the ground and suitable drainage, mobilisation of contaminated sediments and water into the groundwater is unlikely to occur. However, the extent of groundworks has not yet been defined. Interaction with the ground and removal of hardstanding will increase infiltration and thus increase the mobilisation of contaminants. Therefore, the risk may be increased if further works are proposed.
	Surface water run-off.	Surface water as controlled water.	Mild	Low	Low. Some standing water was noted across the site during the site walkover, therefore there exists the potential for surface water run-off to occur. However, the appropriate management of surface water run-off is required to prevent materials or pollutants washing from the site during rainfall events and entering the harbour waters. The development will be designed in accordance with best practice guidance, and good construction practices managed through the implementation of a Construction and Environment Management Plan (CEMP). These will be sufficient to ensure that materials are stored securely, and construction run-off is managed correctly.

Source	Pathway	Receptor	Severity of Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
The historic use of the site as an active dockland.	Dermal contact / ingestion of soil / soil dust, inhalation of soil dust and vapours, build-up of ground gases	Future site users and neighbours.	Mild	Low	Low. The site is currently, and in the future proposed to be, covered with hardstanding, therefore no interaction with potential contaminated soils or groundwater is likely. The majority of the buildings on site are large open warehouses. Based on this plus the presence of hardstanding covering the site, the risk from vapours and ground gases is anticipated to be low. If development design alters to include any new structures or confined spaces, there is the potential for the risk to be increased.

Source	Pathway	Receptor	Severity of Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
		Construction and future maintenance workers and neighbours.	Medium	Unlikely	Low. Proposed terrestrial activities involve limited interaction with the ground, however the extent of groundworks is not yet finalised. Wherever excavation and groundwork are required, there will be a potential risk to construction workers through potential for direct contact with impacted soils, exposure to any potential asbestos impact in soils. If any new buildings or confined spaces are proposed there may be a risk from ground gases which will require further investigation prior to commencement of works. This can be managed with use of suitable health and safety measures. A full risk assessment during the works is required to be undertaken by the Contractor in accordance with the Health and Safety at Work Act (1974). Existing buildings on-site are known to contain asbestos; however, this would require removal prior to demolition works being completed. Proximate sites are also commercial or industrial properties rather than residential and therefore considered to be of reduced sensitivity. Site development will be completed in accordance with both best practice and a suitable CEMP to address risks to construction workers.

Source	Pathway	Receptor	Severity of Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
Potential current and historical off-site contamination sources in the vicinity of the site include: • Iron foundry, smithy, engine house, docks and tanks to the east; • Train station and railway line network serving in vicinity of the site historically; • Timber yard and timber ponds to the south-west; • An electrical sub-station and allotment gardens approximately 100 m south and 220 m to the south-east, respectively; • An unspecified works present approximately 150 m to the east; and • A garage approximately 130 m south of the site.	Migration of contaminants in groundwater from offsite sources to the site. Direct contact with groundwater. Volatilisation and inhalation.	Construction and future maintenance workers.	Medium	Unlikely	Low. Many of the historical land uses have since ceased and the sites have been redeveloped. Residual contamination from historical activities has been identified through previous site investigations and remedial works were recommended but it is not known to what extent they have been completed. Potential residual risks via vapour inhalation are present but would be mitigated through good construction practice. A full risk assessment during the works is required to be undertaken by the Contractor in accordance with the Health and Safety at Work Act (1974).

Table 5.3 Marine Conceptual Site Model

Source	Pathway	Receptor	Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
Potential sources of contamination in marine sediments relating to current / historic use of the site as well as nearby land. Including fuel spills from boats, machinery and industry operating in the water as well as run-off of water / sediment from terrestrial activities, potential contamination in the reclaimed land on the wharves and Central Causeway, potential landfill on-site, and potential metal loading in sediments from upstream mine discharges.	Migration via routes created by piles.	Groundwater in underlying aquifer.	Medium	Low	Moderate / Low. The piles proposed in the marine portion of the site could create a pollutant linkage between discrete horizons of permeable strata within the bedrock. A piling risk assessment would be required to assess suitability of various piling techniques. However, it is expected that soft sediments would rapidly form a seal around driven square or circular piles.
	Mobilisation and redistribution of potentially contaminated sediments/soils in the riverbed during capital dredging and construction works (including demolition /removal of some of the existing marine structures).	Surface water as controlled water and ecologically sensitive marine sites	Medium	Likely	Moderate. Sediment disturbance will occur during the marine construction works. This would be of a short duration. The resulting sediment erosion may bring sediments from depth into the water column. Although sediment mobilisation is already likely to occur during the usual operation of the site for the berthing of ships and through natural coastal processes, it is likely to be necessary to employ measures to control sediment mobilisation during the construction works.

Source	Pathway	Receptor	Potential Consequence	Probability of Risk	Risk of Contaminant Linkage
	Dermal contact and ingestion of suspended sediment / surface water. Dermal contact and ingestion of soil / soil dust, inhalation of soil dust for works to wharves and reclaimed area of the marine site.	Construction workers, port operatives and amenity users.	Mild	Low.	Low. It is anticipated that there will be no effect to the designated bathing water areas located 1 km to the south-west of the site. Any incidental contact of amenity site users and port operatives are likely to be infrequent and for a short duration. Once the marine works are completed the risk will be lower than the baseline as the contamination source will be removed from the site. Risks from site contamination for construction workers during works are generally addressed through the use of appropriate working procedures and the use of personal protective equipment.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary and Conclusions

This assessment uses historical and regulatory information to determine the site conditions, along with the findings of a site walkover conducted by Ramboll to establish potential contamination at the site and its risks to the identified receptors in light of the proposed redevelopment of the site.

The site is split into two sections: the terrestrial portion of the site which is made up of the southern area of the site to the south-west of the Central Causeway, formed of Falmouth Docks and Duchy and County Wharves; and the marine site, consisting of the Central Causeway, Queen's Wharf, the Northern Arm, and Western Wharf, and Carrick Roads estuary.

The ground conditions on the terrestrial part of the site are anticipated to be of Made Ground, as well as along the causeway and infilled area south of the Northern Arm in the marine area, directly underlain by the bedrock deposits of the Portscatho Formation. The rest of the marine area is anticipated to consist of the Portscatho Formation at the ground surface. The site lies within an SAC, and designated shellfish water ecological sites.

The current uses of the site are an active docks with its associated processes and storage uses. There is the potential for contamination to be present associated with the current industrial uses; with tanks, industry, and the storage of various hazardous substances noted during the site walkover. Historically, the site and surrounding areas have also had potentially contaminative industrial uses including various industrial works, railway lines, depots, landfill sites and timber works and ponds.

Pertinent findings from the desk study assessment include the following:

- A review of historical information indicates that there are numerous historical and current potentially contaminative activities on and near the site which may have caused contamination of soil, sediment and groundwater at the site.
- Previous investigations have identified presence of contaminants at elevated concentrations at the site that will require suitable health and safety precautions to be adopted during construction in order to mitigate risks relating to vapour / gas inhalation in confined spaces, contact with soils/water and to mitigate release of dust during construction works.
- The terrestrial Qualitative Risk Assessment found a low risk to receptors, with the assumption that limited interaction with the ground will be required and no new buildings or confined spaces are proposed. These risks are to be managed by best practice guidance, the Health and Safety at Work Act (1974), and a CEMP.
- The marine Qualitative Risk Assessment found a Moderate / Low risk to groundwater via piling, to be managed using a Piling Risk Assessment. A Moderate risk was found in relation to the surface water body due to potential mobilisation of sediment during the works, and a low risk to site users and construction workers was found.

6.2 Recommendations

Marine Development Considerations

- It is considered likely that the disturbance of potentially contaminated sediments in the Carrick Roads during construction works, particularly dredging, may affect the surface water quality and local ecological receptors. Measures to mitigate release of sediments into the waterbody will be required.

- Piling is proposed and there is a potential risk of creating pathways for contaminant migration. The proposed development design and construction methods will need to ensure that such pathways are not created where potential contaminants are present, or appropriate mitigation is put in place.
- Additional intrusive ground investigation is necessary to fill in the data gaps. This has been undertaken and reported on in ES Chapter 7: Marine Water and Sediment Quality (Ramboll 2024) and associated Technical Appendices.

Terrestrial Development Considerations

- A number of fuel storage tanks are known to have been present. Tanks should be maintained in accordance with current best practice to ensure that there is no significant impact via leakages / spillages.
- Some buildings on site are known to contain asbestos. During demolition, asbestos will require removal by an appropriately qualified specialist. Suitable health and safety precautions are required to manage the risk associated with asbestos and to mitigate contact with asbestos and the release of dust during construction works.
- The extent of groundworks is not yet finalised. Wherever excavation and groundwork is required there will be a potential risk to construction workers through potential for direct contact with impacted soils, exposure to any potential asbestos impact in soils. Ground works may increase the risk of contaminant mobilisation, therefore an updated risk assessment will be required if the development details change.
- Additional intrusive ground investigation may be required to confirm ground conditions and risks to workers and to inform waste classification for disposal of material.

On the basis of this, the following recommendations are made:

Marine

- The design of an intrusive ground investigation to infill data gaps and target pertinent areas of potential contamination. This should bring the level of investigation of the site to a standard of a 'main' investigation in accordance with BS1017524 guidance. This would include the sampling of marine sediments and surface water. This has been undertaken and reported on in ES Chapter 7: Marine Water and Sediment Quality (Ramboll 2024) and associated Technical Appendices.
- Interpretation of ground investigation data and development of a quantitative risk assessment to refine the marine Conceptual Site Model (CSM) presented herein. Assessment of suitability of sediments for reuse and preliminary waste classification to inform options for disposal of surplus materials. This has been undertaken and reported on in ES Chapter 7: Marine Water and Sediment Quality and ES Chapter 17: Material Resource and Waste (Ramboll, 2024).
- If necessary, development of a remediation options appraisal, foundation works risk assessment and remedial strategy, designed to bring the site to a condition suitable for the proposed use.

Terrestrial

- Once the extent of groundworks are finalised, localised ground investigation works may be required to understand construction health and safety. Subsequent interpretation of

²⁴ British Standards Institution (2017). BS 10175:2011+A2:2017, Investigation of potentially contaminated sites. Available at: <https://knowledge.bsigroup.com/products/investigation-of-potentially-contaminated-sites-code-of-practice-code-of-practice?version=standard> (accessed June 2024)

ground investigation data and development of a quantitative risk assessment may then be required to refine the terrestrial CSM presented herein.

- Any materials to be removed from site will require waste classification which will also require sampling and analysis.
- If works associated with the terrestrial portion significantly change, the terrestrial elements included in this assessment will require a revised risk assessment when the design has been finalised and the extent of works has been confirmed.
- If necessary, development of a remediation options appraisal and remedial strategy, designed to bring the site to a condition suitable for the proposed use.

APPENDIX 1

FIGURES

Figure 1: Site Location

Figure 2: Site Boundary and Layout

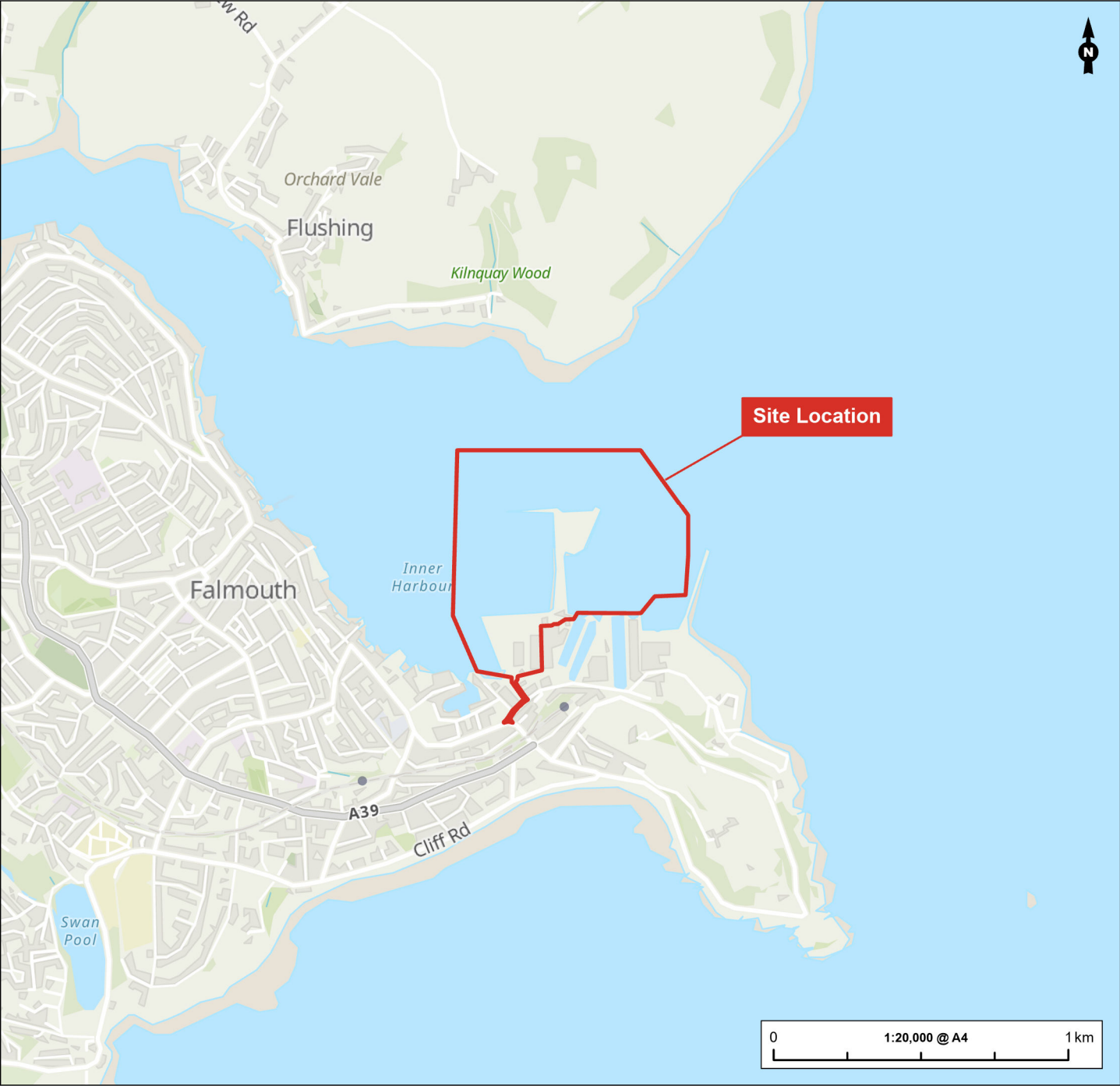


	Figure Title Site Location	Project Name Falmouth Docks Development	Date August 2024	
	Client Falmouth Docks & Engineering Company	Project No./Filery ID 1620015743 / RUK2023N00104	Prepared By BE	Figure No. 1
			Scale As Shown	Revision 1.0



Legend

EIA Site Boundary

Figure Title
EIA Site Boundary

Project Name
Falmouth Docks Development

Project No./Filery ID
1620015743 / RUK2023N00104

Date	Figure No.	Revision
September 2024	1.2	1.0

Prepared By	Scale
BE	1:4,000 @A3

Client **Falmouth Docks and Engineering Company**



APPENDIX 2

PHOTOGRAPHIC LOG



Photo 1.

View of Central Causeway looking north, with the disused Western Wharf on the east.



Photo 2.

The Falfish storage area located on the southern-most section of the Central Causeway, looking east.



Photo 3.

View of Queen's Wharf, looking north-west.



Photo 4.

View of Northern Wharf (and the Northern Arm), looking north-east.



Photo 5.

View of the infilled area to the south of the Northern Wharf, looking north.



Photo 6.

View of the infilled area to the south of the Northern Wharf, looking east.



Photo 7.

Storage containers with unknown contents located on the infilled area to the south of the Northern Wharf.



Photo 8.

View of Waste handling area and containers with unknown contents.



Photo 9.

Recycled glass cullet storage area located to the north-west of the terrestrial site.



Photo 10.

Storage of various materials in Building 68.



Photo 11.

Storage of various materials in Building 68.



Photo 12.

Storage of various materials in Building 68.



Photo 13.

View of Building 55.



Photo 14.

Storage of chemicals in Building 55.



Photo 15.

View of Building 54.



Photo 16.

View of Building 419.



Photo 17. View of Building 419.



Photo 18. Kerosene tank located to the west of Building 428.



Photo 19.

Diesel tank located to the west of Building 428.



Photo 20.

Hydraulic Oil tank located to the west of Building 428.

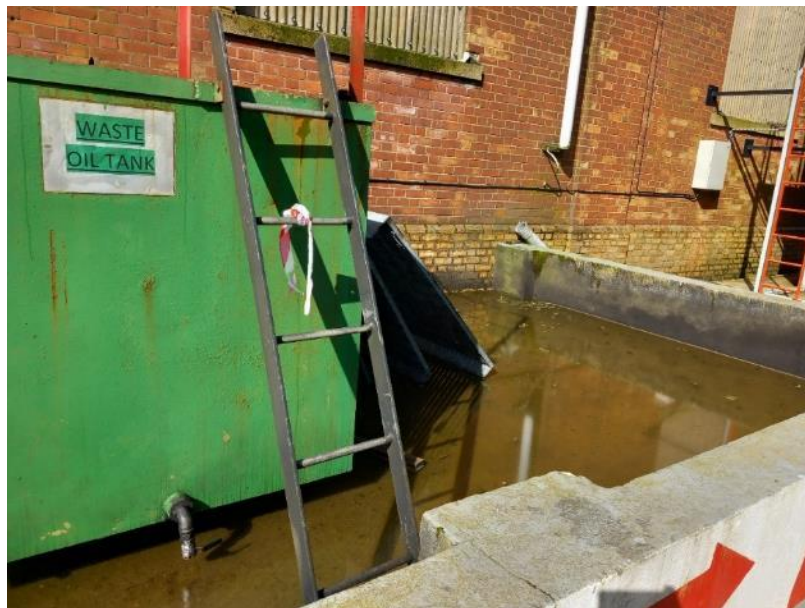


Photo 21

Waste oil tank located to the west of Building 428.



Photo 22.

Two waste oil tanks located to the west of Building 428.



Photo 23.

Kerosene tank on the external eastern wall of Building 419.



Photo 24.

Caustic cleaner tank in Building 419.



Photo 25.

Tank of degreaser in Building 419.



Photo 26.

Hydrochloric acid tank in Building 419.



Photo 27. Diesel tank to the west of Building 45.



Photo 28. Intermediate Bulk Container (IBC) of hydraulic oil located in Building 55.



Photo 29. Paint drums located in Building 68.



Photo 30. Sheen visible in standing water in Building 54.



Photo 31

Paint containers in Building 54.



Photo 32

Evidence of hydraulic oil on floor in Building 54.



Photo 33.

IBC containing wastewater outside of Building 419.

APPENDIX 3

ENVIROCHECK REPORT

Report can be provided upon request.