



Preliminary Investigation Report

at
**Mawgan Porth Beachfront Regeneration,
Newquay, Cornwall TR8 4BJ**

for
C Jones Enterprise Ltd

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Prepared by

Oliver Scott BSc (Hons), MSc, ACSM, MIMMM, FGS



First check by

L.V. Quick BSc (Hons) ACSM AIEMA MCorIE MIEEnvSc



Second check by

Eur Ing R B Higginson BSc, PGDip, CEng, MICE, FGS.



This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

Soils Limited was commissioned by C Jones Enterprise Ltd to undertake a Preliminary Investigation on Mawgan Porth Beachfront Regeneration, Newquay, Cornwall, TR8 4BJ. The scope of the investigation was outlined in the Soils Limited quotation reference Q22663 dated 15th December 2020.

Caveat

Whilst reasonable skill and care has been taken to determine the site history and the environmental setting within the time constraints applied by the project, it should be appreciated that uncertainties may occur owing to the natural variability of soil material within a defined area or as a result of unknowns that are associated with contaminated land assessment in general. The site conditions may be different from that indicated by this Preliminary Investigation, particularly on a site with a history of past development. No responsibility can be accepted should such conditions alter the recommendations made in this report.

This Preliminary Investigation does not include a detailed UXO risk assessment, it does however contain a basic assessment in accordance with CIRIA C681 and C785. In preparing a Preliminary Investigation reference is made to historical maps and web based sources to assess the risk of the site potentially having been impacted by bombing during the World Wars. The data readily available is not necessarily definitive. Certain areas were bombed heavily such as centres of industrial manufacture, airfields, shipyards, docklands, railways sidings and junctions. The assessment is based on the likely area risk, bomb patterns (i.e. lines of recorded bomb impacts with gaps where an impact would be anticipated) and the age of structures on and in close proximity to the site.

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Section I Introduction

1.1 Objective

The Preliminary Investigation Report was undertaken to advise the client on the risk pertaining to the site, with special reference to historic and current potential contaminative activities and processes. This also included the assessment of their impact on current and future sensitive receptors such as human health, controlled waters, ecological features, building structures and services.

1.2 Legislation and Liability

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. The legislation provides powers in relation to the identification, remediation and apportionment of liability for contaminated land. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

Under Part IIA of the Environment Act 1995, Local Authorities are required to identify contaminated land and serve on every person who is an appropriate person a remediation notice setting out what is to be done by way of remediation and the period within which it must be done.

If the person who caused, or knowingly permitted, the contaminating substance cannot be found, the owner and/or, occupier for the time being, of the property can be the appropriate person.

Under the legislation, Contaminated Land is defined as: -

“Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused.”

Where the Act defines harm as:

“harm to the health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property.”

and pollution of controlled waters is defined as: -

“the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter.”

In addition, The Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 introduced the supplementary definition of harm to include: lasting exposure to any person resulting from the after-effects of a radiological emergency, past practice or past work activity.

With regard to contaminated waters, the Environment Act 1995 amends the Water Resources Act 1991 and provides the Environment Agency with the power to force clean-up of historical contamination by issuing a Works Notice, with remediation paid for by the responsible parties.

The Groundwater Regulations (1998) stated that entry of List 1 substances into groundwater must be prevented, and List II substances must be controlled.

1.3 Limitations and Disclaimers

This Preliminary Investigation Report relates to the site located at Mawgan Porth Beachfront Regeneration, Newquay, Cornwall, TR8 4BJ and was prepared for the sole benefit of C Jones Enterprise LTD (The "Client") for the brief described in the Commission of this report.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the

time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

There may be other sources of information not included in those listed that hold data relevant to the Preliminary Investigation Report undertaken at the site that could materially affect the conclusions made in this report.

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. "Contaminated Land" is defined in Section 57 of the Environment Act 1995.

Where a contaminative use is identified in the Preliminary Investigation Report this does not determine whether contamination has actually occurred, or if it has the degree to which it may have taken place. An intrusive investigation(s) and analysis is required to establish the nature and degree of any contamination present.

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1.4 Site Location

The site was located at Mawgan Porth Beachfront Regeneration, Newquay, Cornwall TR8 4BJ and had an O.S Land Ranger Grid Reference of SW 84987 67172.

The site location map is presented in Figure 1 and the full Site Walkover is discussed in Section 2.1 of this report.

1.5 Proposed Development

The proposed development comprises a mixture of retail and residential property. The new development will comprise two three-storey buildings joined by a single storey building. The buildings will comprise retail units on the ground floor and residential units on floors one and two. The proposed buildings will be clad with metal and local stone.

In compiling this report reliance was placed on drawings PL-11 to PL-20 dated November 2020 and prepared by Superstrukt. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

The proposed development plans have been provided in Appendix A.

Section 2 Site Conditions

2.1 Site Walkover

A site walkover was undertaken in February 2021 by Soils Limited. During the site walkover observations were made in relation to current activities, evidence of historical activities, sources of potential contamination such as fuel storage tanks, oil drums and chemical storage and evidence of contamination. The walkover also looked for evidence of soil contamination in the form of staining odours and stressed or discoloured vegetation.

The notes of the site walkover are presented in Table 2.1 and Table 2.2.

Table 2.1 Site Walkover Record (On-site)

Use of site	At the time of the site walkover, the site comprised a mixture of commercial and residential properties with vehicle parking and storage areas.
Structures	The structures comprised one and two storey buildings with a combination of pitched and flat roofs. Several wooden sheds and storage containers were also present on the site at the time of the walkover survey.
Site topography	The site was flat and level with no change in elevation.
Site covering	The majority of the site was covered by buildings surrounded by concrete, brick pavers, and macadam hard standing.
Vegetation	Small areas of grass were located around the perimeter of the property.
Potential Contamination Sources	<ul style="list-style-type: none"> • Made Ground – associated with the previous development. • Vehicle Parking – potential for fuel/oil spillages • Demolition waste stockpiled on site. • Air conditioning units were observed.
Odour	None noted.
Drainage and Services	<ul style="list-style-type: none"> • Surface drains were observed across the site. • Unidentified service covers were observed near the road in the north of the site. • Telecoms service covers were observed on the site. • Overhead electricity cables were observed on site.

Table 2.2 Site Walkover Record (Off-site)

Use of Land	The site was bound by roads to the north and west. The River Menalhyl follows the southern boundary of the site. A carpark and tennis courts were located to the east of the site.
Area topography	The site was located at the bottom of a valley. The valley rises to the north, south and east of the site, and falls away to the northwest at an approximate gradient of 2°.
Vegetation	A number of mature trees, semi-mature trees, and bushes are present in the nearby area. Areas of open grass land were located to the northeast of the site.
Potential Contamination Sources	None noted.

2.2 Site Drainage

Via surface drainage, which are anticipated to be connected to the mains system.

2.3 Site Photographs

The site photographs have been included within Appendix F.

Section 3 Geology, Hydrogeology, Hydrology and Radon

3.1 Anticipated Geology

The 1:50,000 BGS Geology map showed the site to be situated on the Bovisand Formation bedrock, with overlying superficial deposits of Alluvium.

3.1.1 Alluvium

Alluvial deposits are indicated to be present across the site and typically comprise unconsolidated detrital material deposited by a waterbody as a semi-sorted sediment. The material is generally recovered as clay, silt, sand and gravel. The sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

3.1.2 Bovisand Formation

The Bovisand Formation is described as a slaty mudstone, medium to dark grey, with thin sandstone beds and sporadic thin limestone beds. The sedimentary bedrock formed between 410.8 and 393.3 million years ago during the Devonian period.

The Bovisand Formation typically shows a gradational weathering profile, being generally more cohesive near surface but becoming increasingly competent and granular with depth (less weathered).

3.2 Hydrogeology

To assess the vulnerability of groundwater to contamination, consideration must be given to the leaching characteristics of the overlying soils and the characteristics of the strata in the unsaturated zone. Information on the geological strata such as lithological type and permeability characteristics has been combined with the physical properties of the soil to produce varying degrees of vulnerability.

Table 3.1 presents the hydrological data that is relevant to the site.

Table 3.1 Hydrogeological Assessment

Hydrogeological Data		Comment
On-site Aquifers	Superficial	Secondary A Aquifer ¹
	Bedrock	Secondary A Aquifer ¹
Groundwater Vulnerability		<ul style="list-style-type: none"> • Superficial Aquifer – High vulnerability² • Bedrock Aquifer – Classed as high vulnerability due to the well-connected fractures.
Source Protection Zones (SPZ)		None.
Abstraction	Potable	None.
	Non-potable	Three surface water abstractions located 44m to 50m south of the site and relate to abstraction from the River Menalhyl for spray irrigation of a caravan site and a pitch and putt golf course.
Sensitive land uses		None within 500m of the site.

Hydrogeological Data	Comment
Surface Water Features	The river Menalhyl is located 6m south of the site. The ordinary high tide mark for the Celtic Sea is located 135m northwest of the site.
Flood Risk from Rivers or Seas	Risk of flooding and extreme flooding from the rivers or seas located on site.
Flood Risk from Surface Water	<ul style="list-style-type: none"> • Low risk (1000-year return) of flooding from surface water – Onsite • Medium risk (100-year return) of flooding from surface water – Onsite • High risk (30-year return) of flooding from surface water – Onsite
Flood Risk from Groundwater	<ul style="list-style-type: none"> • Potential for flooding to occur at surface – Onsite • Limited Potential for groundwater flooding to occur – 71m northeast • Potential for groundwater flooding of property situated below ground level – 1m southwest

Notes: ¹Secondary A are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. ² Soils of high leaching potential.

Any works or development which has the potential to have an impact on surface water, aquifer or groundwater quality must be approved by the Environment Agency prior to implementation.

3.3 Hydrology

The approximate elevation of the site was ~6m Above Ordnance Datum (AOD). The anticipated groundwater flow direction is given in Table 3.2.

Table 3.2 Hydrological Assessment

Type	Direction	Notes
Surface water	Northwest	Surface water is anticipated to flow down towards the northwest, in line with the wider topography. Surface drains were noted onsite. Here, surface water is anticipated to flow into the mains water drainage system.
Groundwater	Northwest	Groundwater is anticipated to flow towards the northwest, predominately through the Alluvium and well-connected fractures within the Bovisand Formation, in line with the wider topography.

3.4 Radon Gas

The British Geological Survey, in conjunction with the Radiation Protection Division of the Health Protection Agency, indicates the site to lie within an area where there is a probability of 10-30% of present or future homes being above the action level of 200Bq/m³. As such, the site is classified as a Radon Affected Area.

Therefore, the guidance recommends that full radon protective measures should be installed in the proposed development in line with the Building Research Establishment Report BR211.

Section 4 Site History

4.1 Historic Map Study

The object of this study was to report on the evidence of site history and redevelopment of the site and its environs from available County Series and Ordnance Survey Maps dating from the mid to late 19th Century to the present day as downloaded from Landmark Environmental.

The published maps only represent a “snap shot” of the site and its environs at the date of the survey. The detail of the information recorded can vary between epochs, map scale and county areas. It should be noted that changes in land uses, processes or activities may have occurred outside of published epochs and these may not have been recorded on subsequent epochs. Also note that as methods of projection, production and recording have changed over time, this can result in geo-reference errors that may indicate the established site boundary is off-centre from its true location on older historical maps. Where this is potentially significant it will be noted.

Any distances quoted for features remote from the site have been scaled from the maps and are only approximate. Where dates have been noted in brackets, these are the actual dates applicable to the map editions and may not reflect the date of the original survey it is based on. The information reported might not represent all pertinent information that could be obtained. The interpretation of the maps and/or other data commented on in this report is subjective.

As part of the review of the historical plans, only features considered to have or to have had a potential contaminative impact on the site and usually within a notional 250m radius are discussed. The north point and approximate extent of the site are indicated on each figure. The historic maps referred to are appended to this report (Appendix B).

Table 4.1 Historic Development of the Site

Site History	Date Range	
	From	To
The site is first shown to comprise an area of rough pasture with a track around the northern boundary and a stream to the west-southwest. No structures are shown on the site.	1880-1881 ¹	1963 ²
The map shows three structures on the site.	1963	1966
The 1966-1972 plan indicates three larger buildings and three/four smaller buildings on the site. The buildings are shown to comprise a garage, public convenience, and a property called Bridge House.	1966	1994
The map shows an additional structure in the north of the site.	1994	1995
The buildings on site are no longer listed as a commercial garage. No further significant changes have been observed until the most recently published map dated 2021 ² .	1995	2021 ³

Notes: ¹First available map. ²No detailed maps available between 1907-1966 ³Time of reporting February 2021.

Table 4.2 Historic Off-site Development

Off-site Development	Date Range	
	From	To
The surrounding area is predominantly agricultural land with St. Mawgan beach to the northwest of the site. The highest point to which ordinary tides flow is located 130m northwest. A coastguard station is located 125m northwest of the site. Porth Farm is located 460m east of the site. The hamlet of 830m to 980m south of the site and contains a public house and a smithy. Three quarries are located within a 1000m radius of the site. The 1908 map shows a pumping house is located 630m north of the site.	1880-1881 ¹	1963 ²
Residential development has taken place to the north and east of the site. A hotel is now located 450m north of the site.	1963	1966-1972
Residential development continues to take place in the surrounding area. A swimming pool and tennis courts are now at the previously mentioned hotel located 450m north of the site. A tank is located 650m north of the site. A caravan park and a holiday park are located 130m and 370m east respectively. Four hotels are now located 20m to 375m south of the site. A car park is located to the east of the site.	1966-1972	2000
A dairy is located 950m south of the site. No further significant changes have been observed until the most recently published map.	2000	2021 ³

Notes: ¹First available map. ²No large scale maps available between 1908-1963 ³Time of reporting February 2021.

Table 4.3 Potential Sources of Pollution Indicated from Historic Maps

Source	Direction	Distance (m)	Date Range	
			From	To
Historic Development – garage / Made Ground	Onsite	-	1963	1995

4.2 Bomb damage and the potential for Unexploded Ordnance

In accordance with guidance presented in C681 'Unexploded Ordnance (UXO) A guide for the Construction Industry' a review has been undertaken of the historic maps and the Zetica UXO risk maps which has indicated that the site is not in an area that is likely to have been subject to bombing, shelling or has had a military use.

4.3 Historical Mining Search

A historical mining search has been undertaken on behalf of the client by Westcountry Mines and Property Surveys (report reference 67040 and dated 10th February 2021) and upon which full reliance has been assumed. The report is presented in Appendix E.

The site lies within a historic mining area with sporadic underground and surface activity. Newquay was once an important silver producing district during the 16th Century to produce silver for improving the coinage of the realm. The most important period of activity was during the early 19th Century when copper, lead, silver and zinc ore was produced from intermittent workings. The property lies well to the north of this former activity.

There is little information and no mine plans of the very early underground workings in the Mawgan Porth area. However, the survey has identified some known, indicated and suspected mining and geological features within this locality:

- It is indicated from an early mining map that a lode structure lies approximately 410 metres to the north of the property's northern boundary. The exact location of the lode is unknown, it is also possible that this feature is a hypothetical representation or is barren of mineralisation and unworked in the immediate vicinity. Although significant and extensive workings would not be expected, very often these features may indicate the presence of early and unrecorded trial or exploratory workings. If shallow workings should underlie or encroach within the property, there could be a risk to ground stability.
- A second lode structure, recorded as an iron lode, is indicated to lie 800 metres to the south of the property.
- The geological plans show an area of alluvium beneath the property; certain alluvial tracts were extensively worked for tin. However, there is no evidence that this type of activity was undertaken in the vicinity of the property.
- The geological maps show a fault passing through the central section of the property, but it is believed that this feature is barren of mineralization in this local area.
- There is no evidence of deep underground metalliferous mine workings in the local area and the presence of early shallow workings are unlikely.

It is indicated that the property is clear of known significant metalliferous mining activity. While mining features would not be expected, as in any mineralised area, there is always a possibility of future metalliferous mining related settlement, however in this instance it is considered an acceptable development risk.

If the property were to be developed further it would be recommended, that if any soft spots or anomalies be encountered during the excavation of the foundation and service trenches then a mining consultant be asked to carry out a precautionary inspection.

Section 5 Environmental Records and Consultation

5.1 Dataset Information

The Landmark Envirocheck Report was obtained by Soils Limited and includes site specific information. The extent of the search has initially been limited to a radius of 250m as it is considered that sources of contamination beyond 250m are unlikely to impact on the site. This search radius may however, be increased if a significant source of contamination or sensitive receptor is identified within 1000m of the site. A copy of the report is appended to this report in Appendix C and summarised in Table 5.1-Table 5.3.

Table 5.1 Environmental Significance of Data

Source	Direction	Distance (m)	Detail
Contaminated Land Register Entries and Notices	None	None	
Discharge Consents	SW	71	Southwest water pumping station – final/treated sewage effluent discharge into a tributary of the Menalhyl River.
Integrated Pollution Prevention and Control	None	None	
Local Authority Pollution Prevention and Controls	Onsite	0	Mawgan Porth Garage – local authority air pollution control relating to the previous petrol filling station.
Local Authority Pollution Prevention and Control Enforcements	None	None	
Nearest Surface Water Feature	South	6	Relates to the River Menalhyl
Pollution Incidents to Controlled Waters	Onsite	0	Water company crude sewage outfall due to inadequate design/capacity. Occurred on the 17 th August 1992 and listed as a Category 3 – Minor Incident.
Prosecutions Relating to Authorized Processes	None	None	
Registered Radioactive Substances	None	None	
Substantiated Pollution Incident Register	None	None	
Nearest Potable Abstraction Point	None	None	
Nearest Non-Potable Abstraction Point	South	44m	Surface water abstraction from the River Menalhyl for spray irrigation use.
Water Industry Act Referrals	None	None	
Source Protection Zones	None	None	
Extreme Flooding from Rivers or Sea Without Defences	Onsite	0	
Flooding from Rivers or Sea Without Defences	Onsite	0	
Areas Benefiting from Flood Defences	Southeast	52	
Flood Water Storage Areas	None	None	
Flood Defences	Onsite	0	Envirocheck indicates flood defences to be present on the site.

Source	Direction	Distance (m)	Detail
BGS Recorded Landfill Sites	None	None	
Historical Landfill Sites	None	None	
Licensed Waste Management Facilities	None	None	
Local Authority Recorded Landfill Sites	None	None	
Potentially Infilled Land (Non-Water)	None	None	
Potentially Infilled Land (Water)	None	None	
Registered Landfill Sites	None	None	
Registered Waste Transfer Sites	None	None	
Registered Waste Treatment or Disposal Sites	None	None	
Control of Major Accident Hazards Sites (COMAH)	None	None	
Notification of Installations Handling Hazardous Substances	None	None	
Planning Hazardous Substance Consents	None	None	

Table 5.2 Contemporary Trade Directory

Contemporary Trade Directory within 250m	Direction	Distance (m)	Status	Viable Source
Disco Beads – Jewellery manufacturers and repairers	Onsite	-	Inactive	No
Mawgan Porth Garage – Fuel filling station	Onsite	-	Inactive	Yes

Table 5.3 Geological Hazards

Source	Nearest Distance from Site/Type
Coal Mining Affected Areas	In an area not affected by coal mining
Mining Instability ¹	Very low
Natural and Mining Cavities	No hazard
Potential for Collapsible Ground Stability Hazards	Very low risk – Onsite
Potential for Compressible Ground Stability Hazards	Moderate risk - Onsite
Potential for Ground Dissolution Stability Hazards	No hazard
Potential for Landslide Ground Stability Hazards	Low risk – Onsite
Potential for Running Sand Ground Stability Hazards	Low risk – Onsite
Potential for Shrinking or Swelling Ground Stability Hazards	Very low risk - Onsite

Notes: ¹A detailed historical mining search has been undertaken by Westcountry Mines and Properties Ltd and is presented in Appendix E.

5.2 Site Sensitivity Maps

No other significant potential sources of contamination were shown on the Landmark Envirocheck Site Sensitivity Maps, which have not been listed in Table 5.1, Table 5.2 and Table 5.3, and copies of which are appended to this report (Appendix C).

5.3 Soil Geochemistry

The BGS data indicates the following concentrations of naturally occurring metals to be representative of background levels in natural soil underlying the site. The levels are based on those present in rural soils and are not necessarily representative of levels within Made Ground which may be encountered on site.

The results of this survey are contoured on the Landmark Environmental check report (Appendix C).

The results of the local soil chemistry are presented in Table 5.4.

Table 5.4 Soil Geochemistry

Determinant	Indicated Soil Geochemistry (mg kg⁻¹)
Arsenic	35-45
Cadmium	<1.8
Chromium	60-90
Lead	<100
Nickel	15-30

Section 6 Data Collection Summary

6.1 General

The findings of the data collection are summarised in Table 6.1 below, which includes the site Environs, which include geology, hydrogeology, the risk from radon and potential risk from flooding.

Table 6.1 Site Environs

Environs	Summary
Geology	Superficial deposits of the Alluvium overlying the Bovisand Formation bedrock.
Hydrogeology	Superficial alluvium deposits are classed as a Secondary A aquifer and could support shallow groundwater. The Bovisand Formation bedrock is classed as a Secondary A Aquifer and is likely to support groundwater movement through well connected fractures.
Source Protection Zone (SPZ)	None
Surface Water Flow	Anticipated to be into drainage on site and then into the mains system.
Groundwater Flow	Anticipated to be west in line with the topography.
Radon	The site lies within an area where there is a probability of 10-30% of present or future homes being above the action level of 200Bq/m ³ . As such, full radon protective measures should be installed in the proposed development.
Flooding	<ul style="list-style-type: none"> • Risk of flooding and extreme flooding from rivers or seas - Onsite • Low risk (1000-year return) of flooding from surface water – Onsite • Medium risk (100-year return) of flooding from surface water – Onsite • High risk (30-year return) of flooding from surface water – Onsite
Geological Hazard	<ul style="list-style-type: none"> • No risk of ground dissolution. • Very low risk of collapsible ground and shrinking/swelling material. • Low risk of landslides and running sand. • Moderate risk of compressible ground.
Soil Chemistry	Elevated levels of heavy metals have been identified as a potential hazard

Table 6.2 provides a summary of potential on-site and off-site contamination sources identified during the study of the historic maps, the Landmark Envirocheck Dataset Report and the Site Walkover.

Table 6.2 Summary of Potential Contamination Sources

Contaminative Sources/Environmental Impact	Direction¹	Distance (m)	Date Range		Data Source
			From	To	
On-Site					
Historic Development – garage (fuel filling station)	Onsite	0	1963	1995	HM / SW
Other Development – Made Ground, Air conditioning units	Onsite	0	1963	Present	HM / SW
Pollution incident to controlled waters	Onsite	0	1992	-	DS
Elevated Heavy Metals	Onsite	0	-	-	GC
Radon	Onsite	0	-	-	DS

Notes: SW – Site walkover, HM – Historic Maps, DS – Datasheet, GC – Geochemistry

Section 7 Preliminary Conceptual Site Model

7.1 General

Environment Agency guidance provided in CLR11 indicates that the Conceptual Site Model should identify those contaminants, pathways and receptors which are 'likely' to represent an 'unacceptable' risk either to human health or the surrounding environment. The following sections present potential contaminants, pathways and receptors based on the information collected during the desktop study. Pathways have been established based on scientific knowledge of the behaviour of the contaminants in the ground.

7.2 Sources and Pathways of Contamination

The Landmark Site Specific Envirocheck Report and Site Walkover have been used to identify potential contaminative sources. These sources have been presented in Table 6.2. An assessment of the likely pathways and the likelihood of each contaminative source that was considered a risk has been presented in Sections 7.2.1 to 7.2.5.

7.2.1 Potential Pathways

A review of the potential pathways on and off the site has been undertaken based on the site, ground conditions, hydrology and scientific knowledge of the behaviour of the contaminants in the ground. The pathways applicable to the site and the proposed development have been marked in Table 7.1.

Table 7.1 Applicable Pathways

Pathway	Present	Comment
Inhalation of dust	✓	Possible during and following development.
Inhalation of vapour/gases	✓	Possible during and following development.
Ingestion and absorption via direct contact	✓	Possible during and following development.
Migration via surface runoff	✓	Possible during and following development.
Migration in solution via groundwater	✓	Possible during and following development.
Migration of gases via permeable soils	✓	Possible during and following development.
Direct contact with construction material	✓	Possible during and following development.
Services and Utilities	✓	Possible during and following development.

7.2.2 Potential Sources of On-site Contamination.

A study of Landmark Envirocheck Report and Site Walkover has identified the following potential on-site sources of contamination which may present a risk to future uses of the proposed development. The sources have presented in Table 7.2.

Table 7.2 On-site Potential Contamination Sources

Source	Likely	Reasoning
Historic Development – garage (fuel filling station)	✓	The fuel filling station is no longer be active however the underground fuel storage tanks may still be present.

Source	Likely	Reasoning
Other Development – Made Ground, Air conditioning units	✓	During the walkover survey made ground and air conditioning units observed on site. As such the potential risk cannot be ruled out.
Pollution Incident to controlled waters		The incident is listed as being minor and occurred in 1992. As such, it is no longer considered to pose a risk to the site.
Elevated Heavy Metals	✓	Elevated levels of heavy metals above the relevant guideline value are indicated to be present, which may pose a risk to the development.
Radon	✓	Site is situated in a higher probability (10-30% of homes are estimated to be at or above the action level) radon area, where full radon protection measures are required within the proposed development.

7.2.3 Potential Off-site Sources of Contamination

A study of Landmark Envirocheck Report and Site Walkover has not identified any significant potential off-site sources of contamination which may present a risk to future uses of the proposed development.

7.3 Potential Contaminants

To ascertain the chemicals associated with identified potential onsite and offsite sources, the Department of the Environment Industry Profiles have been reviewed. In cases where the DOE profiles have no, or limited information other sources have been reviewed detailing the processes involved in the activity carried out on-site.

Table 7.3 presents the range of possible contaminants associated with the onsite and off-site activities and sources identified following a review of historical maps and datasets.

Table 7.3 Potential Contaminants

Potential Contaminative Sources	Contaminants / Chemical Properties
Historic Development – garage (fuel filling station)	PAHs, TPHs, BTEX, MTBE, pH
Other Development – Made Ground, Air conditioning units	Metals, Semi-metals and non-metals, PAHs, TPHs, BTEX, MTBE, Cyanide, Asbestos, pH, Organic Matter
Elevated Heavy Metals	Metals, Semi-metals, non-metals
Radon	Radon

7.4 Potential Exposure Receptors

The receptors to any potential contamination have been evaluated from our understanding of the current and planned land use of the site, an assessment of surrounding land uses and currently available information pertaining to the site.

The assessment for potential receptors is presented in 7.4.

Table 7.4 Potential Receptors

Potential Receptor		Present
Human Health	Future users of the site	✓
	Construction workers on-site	✓
	Service and maintenance workers	✓
	Site neighbours and wider public	✓
Groundwater/Controlled Waters	Surface Water	✓
	Groundwater/Future Potable Water Supply	✓
Buildings & Materials	Buildings and confined spaces	✓
	Construction materials	✓
	Services and Utilities (e.g drinking water pipes)	✓
Ecosystems	Flora and fauna	✓

7.5 Preliminary Conceptual Site Model and Risk Assessment

A preliminary risk assessment has been undertaken based on the proposed development. The assessment has been based on the likelihood of the presence of a pollutant linkage.

A pollutant linkage is the relationship between a contaminant source, a pathway and a receptor. Unless all three elements of a pollutant linkage are present, a risk is not considered to exist. Each of the three elements has been considered within Table 7.1 to Table 7.4. The preliminary conceptual site model and risk assessment is presented in Table 7.5. The classification tables on which the level of risk has been determined have been modified from 'Contaminated land risk assessment: A guide to good practice, 2001, CIRIA C552' and are presented in Appendix G.

Table 7.5 Preliminary Conceptual Site Model and Risk Assessment Methodology

Source (See Table 7.2)	Potential Contaminant (See Table 7.3)	Exposure Pathway (See Table 7.1)	Receptor (See Table 7.4)	Initial Assessment from Preliminary Investigation Report Information			Comments	Proposed Investigation		
				Severity	Probability	Risk				
Previous and Existing Development (Fuel Filling Station / Made Ground) On-site historic and current site usage.	Metals, Semi-metals and non-metals, PAHs, TPHs, BTEX, MTBE, Cyanide, Asbestos, pH, Organic Matter	Inhalation of dust	Site Workers/Site Maintenance	Medium	Likely	Moderate	Proposed development does not include significant proportions of soft landscaping as such the main pathway is to site workers or maintenance during construction.	Phase II ground investigation to confirm the ground conditions present and chemical testing prior to undertaking a generic quantitative risk assessment.		
			End Users	Medium	Unlikely	Low				
			Off-site Users	Mild	Unlikely	Very low				
	PAHs, TPHs, BTEX, MTBE	Inhalation of Vapour	Site Workers/Site Maintenance	Medium	Likely	Moderate			Potential for volatile compounds to be present	Phase II ground investigation to confirm the ground conditions present and chemical testing prior to undertaking a generic quantitative risk assessment.
			End Users	Medium	Low	Moderate / Low				
			Off-site Users	Minor	Unlikely	Very low				
	Metals, Semi-metals and non-metals, PAHs, TPHs, BTEX, MTBE, Cyanide,	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Medium	Unlikely	Low			Elevated levels of heavy metals are likely to be present as background concentrations in the underlying geology and water bodies. The site is underlain by a Secondary A Aquifer, and is not located within a Groundwater Source Protection Zone.	
			End Users	Medium	Low	Moderate / Low				
		Migration via surface runoff	Surface Water	Minor	Low	Low				
			Migration in solution via groundwater	Surface Water	Medium	Low				
		Shallow Aquifer	Medium	Low	Moderate / Low					
			Deep Aquifer	Minor	Low	Low				
Direct contact with construction material	Buried structures	Medium	Low	Low						
	Buried Services	Medium	Low	Low						
Elevated Heavy Metals Naturally Occurring geochemistry	Metals, Semi-metals and non-metals	Inhalation of dust	Site Workers/Site Maintenance	Medium	Unlikely	Low	Proposed development does not include significant proportions of soft landscaping as such the main pathway is to site workers or maintenance during construction.	Phase II ground investigation to confirm the ground conditions present and chemical testing prior to undertaking a generic quantitative risk assessment.		
			End Users	Mild	Unlikely	Very Low				
			Off-site Users							
	Metals, Semi-metals and non-metals,	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Medium	Likely	Moderate				
			End Users	Medium	Low	Moderate / Low				
			Direct contact with construction material	Buried structures	Medium	Unlikely			Low	
Site Workers	Medium	Unlikely	Low							
Radon Underlying Geology	Inhalation of Radon	Site Workers/Site Maintenance	Medium	Low	Moderate / Low	The site is within an area where between 10-30% of homes are above the action level.	Full Radon protection must be used in the proposed development.			
		End Users	Medium	Likely	Moderate					
		Off-site Users	Minor	Unlikely	Very low / None					

Section 8 Recommendations

8.1 General

Based on the information obtained during the compilation of this Preliminary Investigation and the preliminary conceptual site model, a potential for a **moderate to high** risk of contamination has been identified, an intrusive investigation is therefore considered to be necessary to further quantify the risks identified. Any subsequent intrusive investigation may reveal additional on-site sources of contamination that were not identified in the Preliminary Investigation and Site Walkover. Any additional sources of contamination or unexpected ground conditions that may promote the migration of contamination will be included and assessed in terms of significance within an updated Conceptual Site Model.

8.2 Proposed Further Site Works

An intrusive investigation is considered necessary to quantify the potential risks and remaining uncertainties that have been identified within the preliminary CSM. The preliminary CSM identifies the test parameters relevant to the sources that have a pathway to a receptor. Dependant on the findings of an intrusive investigation the test parameters may be modified. The intrusive investigation will be designed to investigate and assess the pollutant linkages identified in the preliminary Conceptual Site Model.

The general requirements for further environmental investigation are presented in Table 8.1.

Table 8.1 Proposed Further Environmental Investigation

Proposed Works	General Purpose	Required
Investigatory Holes	To collect sufficient samples for a robust assessment	✓
Laboratory Testing	To quantify the risks identified in the Conceptual Site Model	✓
Risk Assessment	Assess pollutant linkages based on current contaminated land guidance and screening criteria's	✓
Borehole well installation	To allow for continued groundwater and/or gas monitoring	✓
Remediation	If the site-specific risk assessment reveals that the site was contaminated	
Validation & Verification	To validate and verify the remedial objectives based on the site-specific risk assessment	

Notes: Remediation / validation & verification may be required subject to the findings of the intrusive works

8.3 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

Care should be taken during excavation works especially to investigate any soils which appear by eye (e.g. such as fibrous materials, large amounts of ash and unusual

discolouration), odour (e.g. fuel, oil and chemical type odours or unusual odours such as sweet odours or fishy odours) or wellbeing (e.g. light headedness and/or nausea, burning of nasal passages and blistering or reddening of skin due to contact with soil) to be contaminated or of unusual and/or different character to standard soils or those analysed.

In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded, and the Local Authority and a competent and appropriate third-party Engineer/Environmental consultant notified immediately. An approval from the Local Authority must be sought prior to implementing any proposed mitigation action.

The discovery strategy must remain on-site at all times and must demonstrate a clear allocation of responsibility for reporting and dealing with contamination. A copy of the strategy must be placed on the health and safety notice board and /or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy

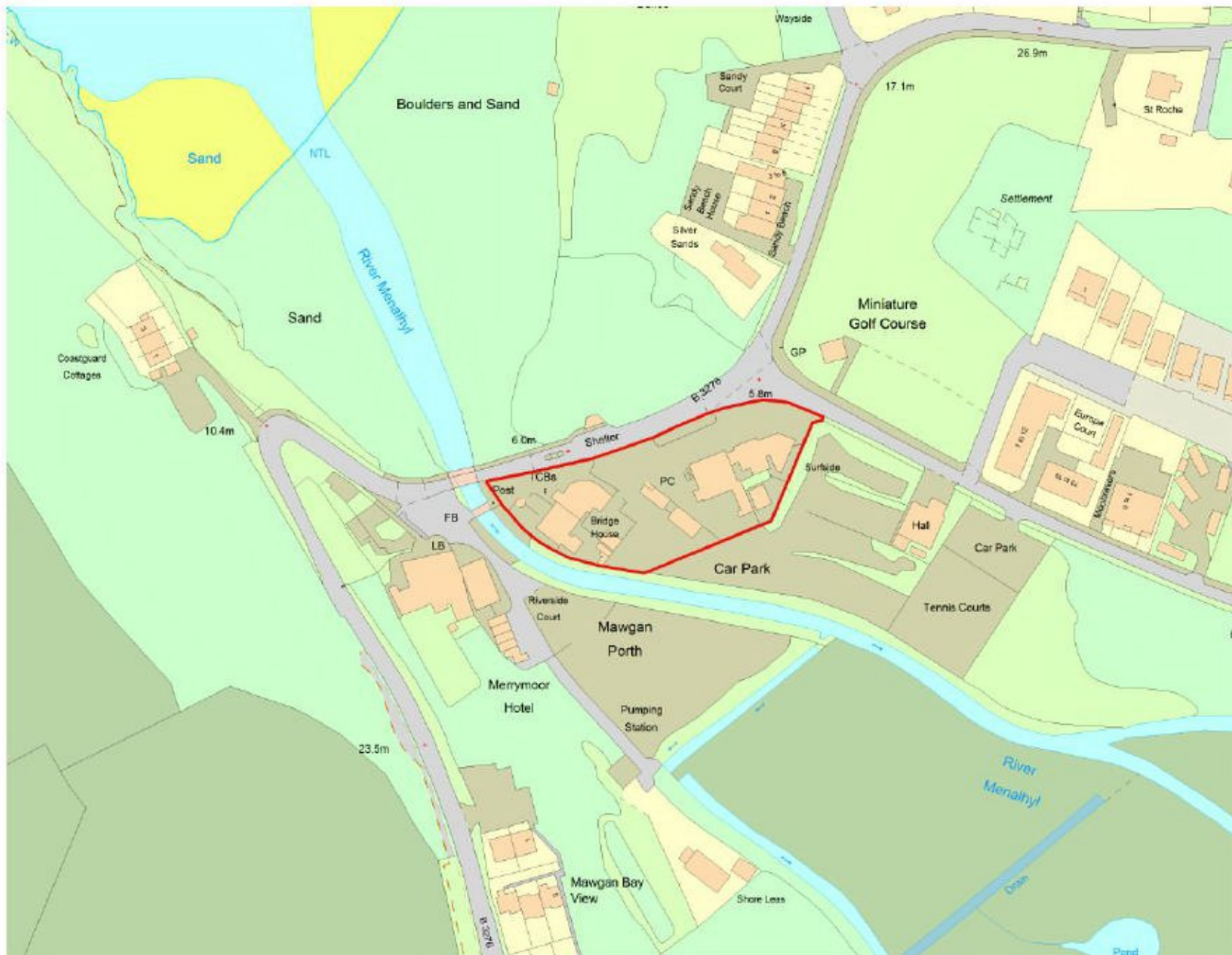


Figure I – Site Location Map

Job Number
19013

Project
Mawgan Porth Beachfront Regeneration

Client
C Jones Enterprise Limited

Date
February 2021

Appendix A Proposed Development Plans