

Preliminary Site Investigation Study for the Proposed Restaurant and Ice-Cream Parlour Development on Swansea Foreshore

Introduction

This report presents a preliminary desktop study and feasibility-stage assessment for the proposed development of a new restaurant and ice-cream parlour located on Swansea Foreshore between County Hall and the Swansea Marriott Hotel. The proposed building will include a restaurant, café bar, ice-cream parlour and commercial kitchen facilities at ground floor level, together with meeting rooms, staff welfare facilities and a manager's apartment above. The proposed gross internal floor area is approximately 2,000 square metres.

The purpose of this report is to examine the historical development of the site and surrounding area, identify potential ground-related risks and provide recommendations for a detailed site investigation to be undertaken by a specialist geotechnical contractor. The report also considers relevant legislation, standards and foundation solutions appropriate to the development.

As the site is located within Swansea's historic docklands and reclaimed coastal land, there are significant geotechnical and environmental considerations that must be addressed before construction can proceed. The nearby Meridian Tower development provides useful reference information regarding likely ground conditions within the local area.

Historical Background and Preliminary Desktop Investigation

The proposed development site is located within Swansea's Maritime Quarter, an area that has undergone substantial transformation since the nineteenth century. Historical records indicate that prior to redevelopment the area formed part of the South Dock complex, which was constructed during Swansea's rapid industrial expansion in the mid-1800s. The South Dock officially opened in 1859 and was developed to support Swansea's growing copper, coal and maritime industries (History Points, 2024).

During the nineteenth century Swansea became internationally recognised for copper smelting and coal exportation. According to Swansea Council archive information, the docklands surrounding the proposed site contained extensive industrial infrastructure including railway sidings, warehouses, storage yards, engineering works and shipping facilities (City and County of Swansea, 2024). Historical mapping from the late nineteenth century demonstrates that the site itself was originally occupied by dockside operational land associated with maritime activity. These industrial processes would likely have generated contamination associated with heavy metals, fuel storage and industrial waste deposits (British Standards Institution, 2015).

By the early twentieth century the South Dock had become a densely developed industrial and maritime environment. Historical aerial photography from the 1920s shows extensive dockside activity throughout the surrounding area (History Points, 2024). Industrial operations during this period included fuel handling, warehousing, ship maintenance and metal processing. Such activities significantly increase the likelihood that made ground and contamination are present beneath the site (Health and Safety Executive, 2024).

The decline of Swansea's dock industry during the mid-twentieth century resulted in the gradual closure of maritime operations. South Dock officially closed in 1969 and large areas subsequently became derelict (City and County of Swansea, 2024). During redevelopment works in the 1970s and 1980s, extensive land reclamation and regrading were undertaken to support the regeneration of Swansea Marina and the Maritime Quarter. It is therefore highly likely that the existing ground profile consists of variable made ground overlying weaker alluvial and marine deposits (British Standards Institution, 2015).

The redevelopment of Swansea Marina commenced during the late 1970s and was completed in phases throughout the 1980s (Swansea Marina, 2024). The surrounding area now contains hotels, residential developments, restaurants and leisure facilities. However, despite this modern

redevelopment, the underlying ground conditions are still heavily influenced by the area's industrial and reclaimed-land history.

The nearby Meridian Tower development is particularly relevant to this study because previous borehole investigations undertaken in that area identified substantial depths of made ground and weak superficial deposits requiring piled foundations. Given the close proximity of the proposed development site, similar ground conditions are likely to exist beneath the proposed building footprint.

The coastal location also introduces further environmental concerns. The site is positioned adjacent to Swansea Bay and is therefore likely to experience high groundwater levels and tidal influence. These conditions may increase risks associated with settlement, flooding and aggressive ground chemistry affecting buried concrete structures (BRE, 2005)

Recommendations for the Detailed Site Investigation

Given the historical development of the site and the anticipated ground conditions, a comprehensive intrusive ground investigation will be required before detailed design work can commence. The investigation should be undertaken by a specialist geotechnical contractor in accordance with British Standard BS 5930: Code of Practice for Ground Investigations (British Standards Institution, 2015).

The most significant concern associated with the site is the likelihood of deep and variable made ground resulting from historic dockland reclamation and redevelopment. Borehole investigations should therefore be undertaken across the site to establish the depth and composition of made ground deposits, identify the presence of weak alluvial strata and determine the depth to competent bearing material suitable for foundation design. Eurocode 7 states that adequate geotechnical investigation is essential to ensure safe and economical foundation design (British Standards Institution, 2004).

The boreholes should extend sufficiently deep to provide accurate geotechnical data for foundation analysis. Groundwater monitoring installations should also be incorporated within the boreholes to establish groundwater levels and assess tidal influence on subsurface conditions. Due to the site's coastal position, groundwater levels may fluctuate significantly and could impact both construction activities and long-term structural performance (BRE, 2005).

In addition to boreholes, trial pits should be excavated to investigate shallow ground conditions and identify possible buried obstructions associated with historic dock infrastructure. Previous dockland developments frequently contain buried foundations, redundant services, concrete structures and demolition materials that may present difficulties during construction (Health and Safety Executive, 2024).

Contamination risk is considered particularly significant due to the industrial history of the site. Historical activities associated with copper processing, fuel storage and maritime engineering may have resulted in contamination by hydrocarbons, heavy metals, asbestos-containing materials and industrial by-products (City and County of Swansea, 2024). A geo-environmental assessment should therefore form a major component of the investigation.

Soil and groundwater samples should be obtained and tested for contaminants including lead, arsenic, hydrocarbons, sulphates and polycyclic aromatic hydrocarbons. Gas monitoring should also be undertaken because made ground can generate hazardous ground gases such as methane and carbon dioxide. CIRIA guidance notes that gas protection measures may be required where buildings are proposed on reclaimed or contaminated land (CIRIA, 2007).

The site investigation should also examine the potential for aggressive ground conditions that could affect buried concrete and steel structures. Chemical testing should therefore assess sulphate concentrations and pH values in accordance with BRE Special Digest 1 guidance (BRE, 2005).

Flood risk assessment is another important aspect of the investigation due to the site's proximity to Swansea Bay. Consultation with Natural Resources Wales will be necessary to determine tidal flood risk, future climate change allowances and drainage requirements. Surface water drainage strategies must also be carefully considered due to the likelihood of elevated groundwater levels (Natural Resources Wales, 2024).

A detailed utility survey should additionally be undertaken to identify existing underground services and possible redundant dock infrastructure. Ground penetrating radar surveys may assist in locating buried obstructions prior to excavation works.

Overall, the greatest risks associated with the site are considered to be variable made ground, contamination, high groundwater conditions and settlement potential. These issues should therefore form the primary focus of the detailed site investigation.

Relevant Regulations, Standards and Local Authority Involvement

The recommendations contained within this report are derived from current UK Building Regulations, British Standards and geotechnical engineering guidance.

The primary legislation governing structural safety is the Building Regulations 2010, particularly Approved Document A relating to structural stability and Approved Document C relating to site preparation and resistance to contaminants and moisture (UK Government, 2010). These documents establish the legal requirements for safe foundation design and contaminated land assessment.

Ground investigation procedures should comply with British Standard BS 5930: Code of Practice for Ground Investigations and Eurocode 7: Geotechnical Design (British Standards Institution, 2015). Laboratory testing of soil samples should be undertaken in accordance with BS 1377 standards.

Construction activities associated with the project must also comply with the Construction (Design and Management) Regulations 2015, which place duties upon clients, designers and contractors to manage health and safety risks throughout the project lifecycle (Health and Safety Executive, 2024).

Natural Resources Wales will play an important role during the planning and environmental approval stages due to the coastal nature of the site and the potential implications for flood risk and groundwater protection (Natural Resources Wales, 2024). Swansea Council Planning Department and Building Control will also require consultation regarding planning permission, drainage approval and compliance with Building Regulations.

Foundation Recommendations

Based upon the historical development of the site, the anticipated ground conditions and available geotechnical information from nearby developments, piled foundations are considered the most appropriate solution for the proposed building.

Traditional shallow foundations such as strip or pad foundations are unlikely to be suitable due to the anticipated variability of the made ground and the likelihood of soft underlying deposits. According to Tomlinson and Woodward (2014), shallow foundations are generally unsuitable where deep made ground or compressible soils are present because of the increased risk of differential settlement.

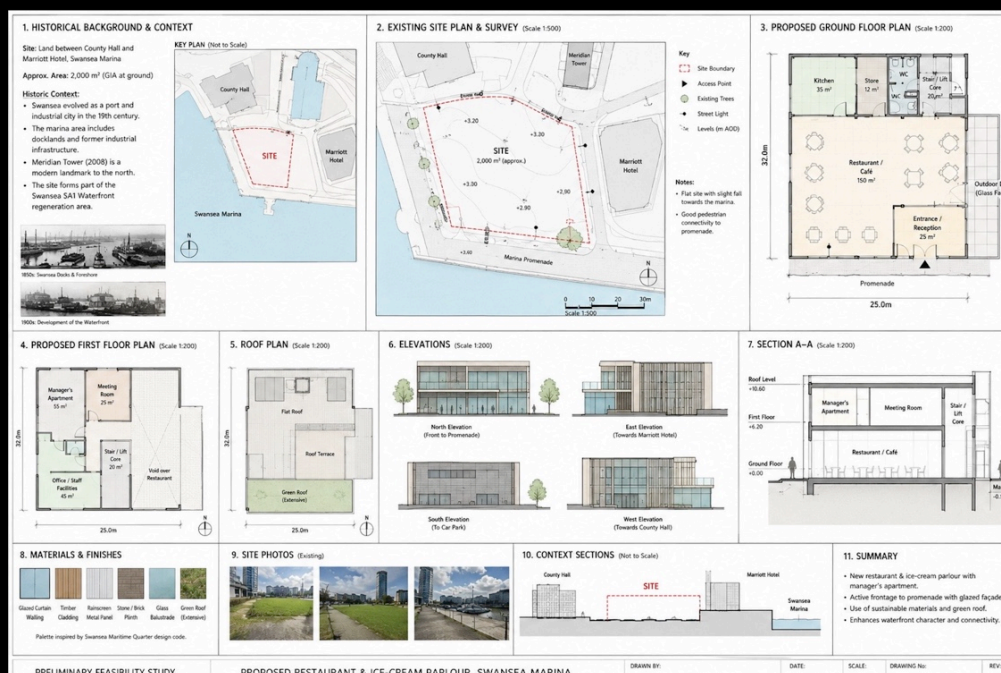
Continuous Flight Auger piles are considered particularly suitable for this development because they can transfer structural loads through weak superficial deposits into deeper competent strata

while minimising vibration and disturbance to adjacent structures. This is important due to the proximity of County Hall, the Swansea Marriott Hotel and surrounding public infrastructure.

Continuous Flight Auger piling methods are also advantageous in urban environments because they generate lower noise levels than driven piling systems and reduce risks associated with vibration-induced damage (Tomlinson and Woodward, 2014).

The proposed building should also incorporate reinforced ground beams and a suspended ground floor slab to minimise the effects of potential ground movement and groundwater ingress. Given the coastal location, all buried concrete should be designed to resist aggressive ground conditions and potential sulphate attack in accordance with BRE Special Digest 1 guidance (BRE, 2005).

The proposed foundation solution is therefore considered appropriate due to the combination of reclaimed ground conditions, expected contamination risks, high groundwater levels and the structural loading associated with the proposed commercial development.



Conclusion

The proposed Swansea Foreshore development site possesses a complex historical and geotechnical background resulting from its former use as part of Swansea's historic dockland infrastructure. Historical evidence suggests that the site has experienced extensive industrial activity, reclamation and redevelopment since the nineteenth century, creating significant risks associated with contamination, made ground and groundwater conditions (History Points, 2024).

A comprehensive intrusive site investigation is therefore essential before detailed design and construction activities commence. Particular attention should be given to contamination assessment, groundwater monitoring and foundation design due to the site's coastal location and industrial history.

Based upon the available evidence and nearby geotechnical data, Continuous Flight Auger piled foundations supporting a suspended ground floor slab are considered the most suitable solution for the proposed development. This approach would reduce settlement risks, improve structural stability and provide a practical solution for the anticipated ground conditions.

References

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