

PHASE 1 PRELIMINARY STUDY REPORT

Project: Proposed Five-Storey Hotel, Bar, Restaurant, and Conference Centre

Location: Former Tesco Supermarket and Car Park, Swansea

Executive summary

This Phase 1 preliminary study examines the new development by Jarvis Hotels to determine its suitability for a new 5 storey hotel. The study analysed environmental, geological, and infrastructural factors and compliance with local regulations. Findings indicate favourable soil conditions, existing infrastructure constraints, environmental sensitivity. Recommendations include further soil testing, borehole logs and stakeholder consultations.

Introduction

This report was commissioned by Jarvis Hotels to evaluate the suitability of the Tesco supermarket and carpark for the new 5 storey hotel development. This study considers factors such as existing infrastructure, environmental conditions, and regulatory compliance. Limitations include the exclusion of intrusive testing and seasonal variations.

This phase 1 report outlines the background of this site with its previous uses. The report also proposes a framework for a detailed site investigation and offers the recommendations for the most suitable foundation type for the build. The findings are based on research from archivable material, Geotechnical assumptions derived from the site's context, and adherence to relevant building regs and codes of practice. Social and environmental considerations are also integrated to ensure compliance with sustainable and considerate construction plans.

Site Description

The site, currently home to the supermarket giants Tesco and its oversized car park, sits at the heart of Swansea city centre, directly opposite the LC2 leisure centre along with Swansea's latest development Swansea arena. It's a great location, full of potential and surrounded by many retail shops, homes, and entertainment venues. This area is booming with activity and now with the Swansea Arena it's the perfect opportunity for a new hotel to be built in the city.

Redeveloping this site offers an exciting opportunity to contribute to Swansea's ongoing transformation. With the Quadrant shopping centre and the waterfront just a stone's throw away, this redevelopment could seamlessly weave into the city's broader regeneration efforts, adding new energy and purpose to an already thriving urban landscape.

Historical Use of the Site

The Tesco Superstore in Swansea Marina is situated on a site with a rich industrial heritage. Historically, this location was home to the Swansea Gas Works, a facility integral to the city's energy production in the 19th and early 20th centuries. The gas works, located on Oystermouth Road, produced town gas from coal, which was then stored in large gas holders, or gasometers, before distribution. These prominent structures were key features of Swansea's industrial heritage.

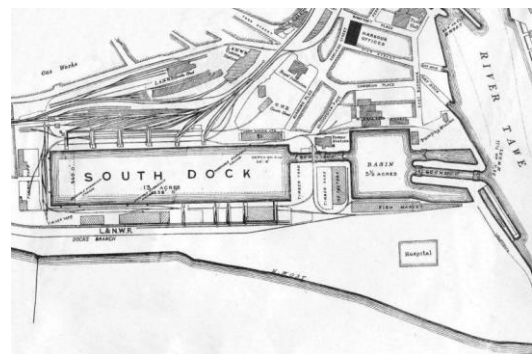
As the demand for town gas declined and natural gas became the standard, the gas works were decommissioned, and the site underwent significant redevelopment. The transformation of this industrial area into the modern Swansea Marina, including the construction of the Tesco Superstore, reflects the city's shift from its industrial roots to a focus on residential and commercial development, aiming to revitalise the urban landscape and economy.

Environmental impacts from previous uses, such as potential contamination from fuel storage or industrial activities.



Gasometers where Tesco is now - in 1989

Image from Wales Online



Map of the South Dock 1908

[Swansea Docks-Maps](#)

Methodology

Visual Inspection: This involved a basic walkthrough of the site and its surroundings to observe its current condition, the state of the building, the landscape, and any visible signs of ageing or damage. It allowed the inspection team to identify what needs to be repaired or preserved, as well as to assess the safety, accessibility, and potential hazards of the site. The walkthrough also provided a first glance at how the site interacts with its environment, particularly in terms of its relationship with adjacent properties and infrastructure.

Historical Research: Historical research was particularly useful in investigating the site's history. By collecting archival materials such as historical maps, property records, and aerial photographs, the team was able to create a timeline of the site's development. This investigation revealed previous land uses and construction changes that may have influenced the site's current configuration. Knowledge of the site's past was valuable in predicting potential problems related to preservation or compliance with zoning regulations. It also provided insights into environmental factors and how the site has evolved over decades or even centuries.

Stakeholder Engagement: Additionally, stakeholder engagement provided valuable qualitative data. Interviews were held with current property users, neighbouring businesses, and local authorities. These conversations offered information about the site and its significance within the community, its operations, and the concerns and priorities of those affected by the build.

Recommendations for Detailed Site Investigation

Given the site's historical and environmental context, a comprehensive site investigation is critical to address the potential risks and uncertainties of what could lay beneath the surface. The investigation should include environmental, hydrological, geotechnical and archaeological surveys. Below I have written out a detailed framework for the investigation.

Geotechnical Investigation:

- Conduct borehole drilling to assess soil strata, bearing capacity, and depth to bedrock. Borehole drilling will also provide data on groundwater levels, potential contamination, and geotechnical properties such as soil permeability and strength. This information is essential for evaluating the site's suitability for construction, determining foundation design parameters, and identifying potential challenges such as soft or unstable layers.
- Perform Standard Penetration Tests (SPTs) and Cone Penetration Tests (CPTs) to evaluate subsoil properties.
- Analyse soil sampled for grain size distribution, compressibility and Atterberg limits.
- Assess the load bearing capacity and the settlement potential.

Contamination Assessment:

- Test for hydrocarbons, heavy metals, and asbestos due to previous commercial and industrial activities.
- Groundwater sampling and monitoring to identify potential contamination and flow patterns.
- Look at the risk of contamination to the workforce, future occupants, and nearby water bodies.

Hydrological survey

Surface water and ground water conditions will really impact the construction process. The survey should include

- Assess seasonal variations and flow patterns to understand how these encourage site conditions and potential risks over time.
- Install piezo-metres to measure the ground water levels and changes over time and potential impact from the site activities and seasonal changes.
- Consult flood maps and historical data to determine the likely hood of flooding.
- Look at the potential impact of floodwaters on site and surrounding buildings.

Buried Structures and Utilities:

Given Swansea's industrial roots, the site may contain buried artifacts or pieces of historical structures:

- Use Ground Penetrating Radar (GPR) to locate detect and map any buried structures such as old foundations, pipelines, or any underground services that may remain from the Tesco build or previous land uses.
- A desk-based assessment to review historical records to identify known archaeological sites.
- A field survey will conduct trial trenches and geophysical surveys to detect subsurface features.
- Contact utility providers for any maps of existing utilities e.g. National Grid, Wales and West Utilities and other utility providers.

Environmental Impact Assessment:

- Assess air quality levels to ensure construction activities do not exceed acceptable threshold for pollutants such as particle matter, nitrogen oxides and carbon monoxide.
- Make sure dust control measures such as water spraying, covering of materials, and speed limits for construction vehicles to reduce dust levels.
- Ensure all activities comply with the protection guidelines of Sites of Special Scientific Interest (SSSI), particularly focusing on the endangered species that inhabit the area.
- Monitor water quality to make sure construction run off does not contaminate nearby water sources, with particular attention to chemical pollutants, sedimentation and nutrient levels.
- Proximity to SSSI: Construction activities must avoid adverse effects on protected areas. Conduct environmental impacts assessments and monitor ecological health during construction.
- Keep in touch with the local community with updates and feedback sessions to address concerns and ensure transparency.
- Access and Traffic: Develop a traffic management plan to maintain accessibility for neighbouring businesses and residences. Include measures for pedestrian safety, clear signage, and scheduling of deliveries to minimise peak traffic interference.
- Waste Management: Implement a sustainable waste management plan to reduce landfill contributions, Prioritise recycling, reuse of materials when possible and proper disposal of hazardous substances.
- Endangered Species in Swansea: Given the presence of an endangered species, the project must take careful steps to protect this species throughout all construction phases. Surveys will need to be carried out to determine the presence, range and habitat requirements of endangered species. Work with wildlife experts or local conservation organisations to ensure compliance with legal protections and safeguard biodiversity.
- Carbon Footprint: Reduce the projects carbon footprint by using energy-efficient construction practices. Encourage use of low-emission vehicles and machinery to help reduce greenhouse gas emissions during construction.

Building Regulations and Codes of Practice

- **BS 5930:2015:** Code of practice for ground investigations.
- **BS 10175:2011+A2:2017:** Guidelines for contamination risk assessments.
- **Building Regulations (Part C):** Address site preparation, contamination resistance, and moisture management.

Considerate Constructors Scheme: Implement measures to minimize disruption to local businesses and residents

Foundation Options

Based on the proposed five-storey structure and anticipated site conditions:

1. **Pile Foundations:** A pile foundation is a deep foundation system used to transfer the load of a structure to deeper, more stable layers of soil or rock. Piles are long, slender columns that are typically made from materials such as concrete, steel, or timber.
2. **Raft Foundations:** A **raft foundation** is a type of shallow foundation that consists of a large, reinforced concrete slab that covers the entire area of a building's footprint. A raft foundation can be used if the upper strata is in good condition.

Recommended Foundation Type

Bored Piles: From the strata record on the borehole log I believe bored piles would be the most suitable foundation because they are used for sites with variable ground conditions or weaker soils. The borehole log indicates that the upper strata consists of compacted stones, ash, bricks, grey sand and peat. Which are not suitable for strip foundations or raft foundations. Additionally, the deeper layers consist of clay bound cobbles, gravel and boulders. Which require the right bearing capacity for transferring the load from the structure.

Bored piles have the advantage in this context as they can be extended through the weaker strata to reach the competent layers, ensuring stability and load distribution. Also bored piles cause minimal vibration and noise, which is particularly important in this area as it is in the heart of Swansea where there is a lot of pedestrian traffic and nature in the area. This method also allows for inspection of the borehole to confirm

the ground conditions and pile base cleaning, ensuring quality control during construction

Advantages of Recommended Option

- Piles transfer loads to deeper levels to stronger strata and can also support heavy superstructures such as bridges, High rise buildings and industrial facilities.
- Suitable for urban environments with space constraints. Piles can also be installed in waterlogged areas or where ground water is present, with the use of casing or drilling fluids to stabilise the borehole.
- Reduces risk of disturbing contaminants in shallow soil layers. Also, by using piles it can reduce the excavation volume, lowering the environmental footprint.
- Pile foundations transfer loads from the superstructure to deeper and more suitable rock layers, bypassing the weaker strata.
- Provide support for heavy structures and are commonly used for multi-story buildings, ensuring significant horizontal and vertical loads.
- Effective in areas with loose sand, soft clay, silt and or industrial fill, where strip foundations may not be usable.
- Piles perform well in sites with high groundwater levels, reducing the risk of uplift or instability compared to raft or strip foundations.
- Pile foundations provide a uniform support, reducing the risk of uneven settlement that could potentially damage the structure.
- The deeper penetration ensures better structural performance, even under changing environmental conditions.
- Bored pile installation techniques minimize vibration and noise, which is very important in busy settings

Conclusion

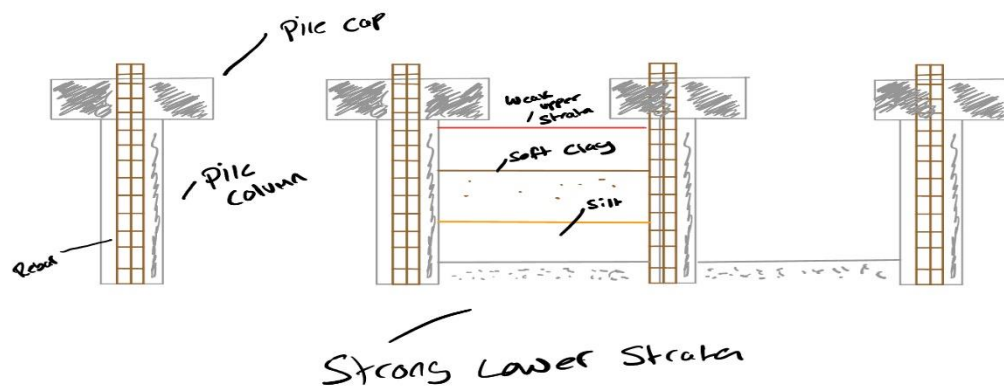
Transforming the old Tesco site into a hotel and conference centre is a momentous opportunity for urban regeneration in Swansea. This new project is expected to infuse the local economy through visitors and jobs and contribute to the revitalization of the whole area. Indeed, all developments should be considered critically on the present site conditions before a trail is taken into construction. A well-documented Phase 1 study indicates the targets for much-needed geotechnical and environmental evaluations to ensure that the foundation and general design of the building are suitable for the site.

The findings in the phase 1 study indicate that now site conditions be assessed for soil and possible contaminations. This has been a result of the historical land use now being expected to have great lasting impacts on the site. Therefore, a thorough geotechnical investigation would include soil sampling, groundwater testing, and analysing potential contaminants these would be given considering proximity of the site to areas of sensitive environment and present infrastructure. These would determine the viability if different foundation types.

Regarding foundation design, driven or bored pile foundations are proposed to meet structural stability requirements, given the very possibly weak, or highly variable soil layers. Such pile foundations will provide a deep and therefore stable foundation solution, and those hotel and conference centre would not be expected to fail under them for many years to come. In addition, they mitigate the risks of any differential settlement being significant and, therefore, for this size of building and number of stories, particularly crucial.

It is also integral to the successful execution of the project, incorporating various environmental and social considerations. The Phase 1 study recommends engaging stakeholders: local dwellers, businesses, and authorities in an interface process, with the purpose of proactively addressing construction impacts relative to traffic disruption and noise. This holistic approach will also ensure the redevelopment makes positive contributions to growth in Swansea while protecting both environment and the local community.

Drawing of Pile Foundation



Here is a brief drawing of the chosen pile foundations.

References

Borehole log : <https://api.bgs.ac.uk/sobi-scans/v1/borehole/scans/items/370488>

General Geotechnical and Site Investigation Standards: British Standards Institution (BSI). [BS 10175:2011+A2:2017](#)

Swansea gas works <https://portal.ariadne-infrastructure.eu/resource/b5b9142bbb62cd279fd49deedcf85676afe8a21992511cd5588812bd6de5d96a>.

Image of the gas holder: Wales online

Image of the south docks: <http://swanseadocks.co.uk/oldsite/Maps.htm>

Foundation choice : Tomlinson, M., & Woodward, J. (2008). Pile Design and Construction Practice (5th ed.). CRC Press.
ISBN: 978-0415385824

Historical background of the south docks:
<https://historypoints.org/index.php?page=swansea-marina>

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Fundamentals of Construction Assignment Level 4