

Building Evaluation

CONSTRUCTION TECHNOLOGY 2

By Aaron Griffiths (2223674) | ACBA5019 | 12/01/26

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Report Summary

This report evaluates the design and construction options for the proposed medium-to-high rise hotel in Swansea. Which will address structural frame and foundation systems, building envelope choices, considerations for structural strength, environmental impact, sustainability and stability. In which the recommendations are made to tailor Swansea's coastal climate and ground conditions.

Site Context

Location:

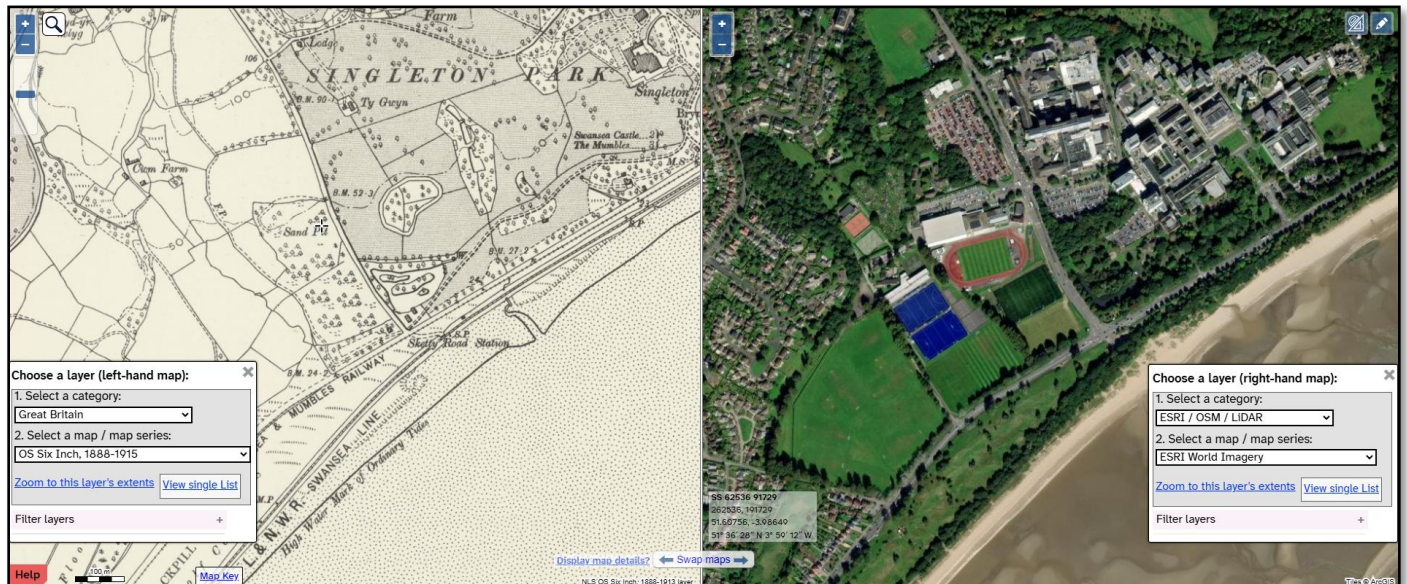


Figure 1: Maps.nls.uk. (2021). Side by side georeferenced maps viewer - Map images - National Library of Scotland. [online] Available at: <https://maps.nls.uk/explore/side-by-side/#zoom=5.0&lat=56.00000&lon=-4.00000&layers=6&right=ESRIWorld>

The above figure 1 shows the proposed land on which the client is proposing to build. This presents a modern map compared with a map from 1888-1915 of historical changes to the land. Points made such as sand pits, railway lines, athletics track, and housing being built. In comparison to the historic map. Due to being in a dune/wet land habitat, may be designated under - [online] Available at: https://www.go-roavr.co.uk/get-bng-help/?utm_source=microsoft&utm_medium=cpc&utm_campaign=BNG&msclkid=c57bea38b51c15ac7ff38379f51ca27b&utm_term=bio%20diversity%20report&utm_content=BNG. Which proposed development will have to comply with the Environment Act 2021 Biodiversity Net Gain (BNG) with a minimum 10% net gain in biodiversity value.

Figure 2 below shows a historical map dated between 1920 and 1940, illustrating key site features including environmental planning. The map identifies a former railway line constructed during this period, located adjacent to the proposed development field. The old railway line may introduce contaminated soil. Such as storage of fuel, maintenance chemicals, and solvents. A detailed site investigation under the UK Standards "BS 10175" - <https://knowledge.bsigroup.com/products/investigation-of-potentially-contaminated-sites-code-of-practice-code-of-practice>. Also, Networks Rails guidance on contaminated

land, which can be existing and historic. “A recent rail-related project that SOCOTEC’s Contaminated Land Consultancy has been involved in was the management of a contamination risk caused by historical waste disposal on the site of a major infrastructure project.” - [online] Available at: <https://www.socotec.co.uk/media/blog/contaminated-land-on-railway-sites>.



Figure 2 - <https://maps.nls.uk/explore/side-by-side/#zoom=5.0&lat=56.00000&lon=-4.00000&layers=6&right=ESRIWorld>

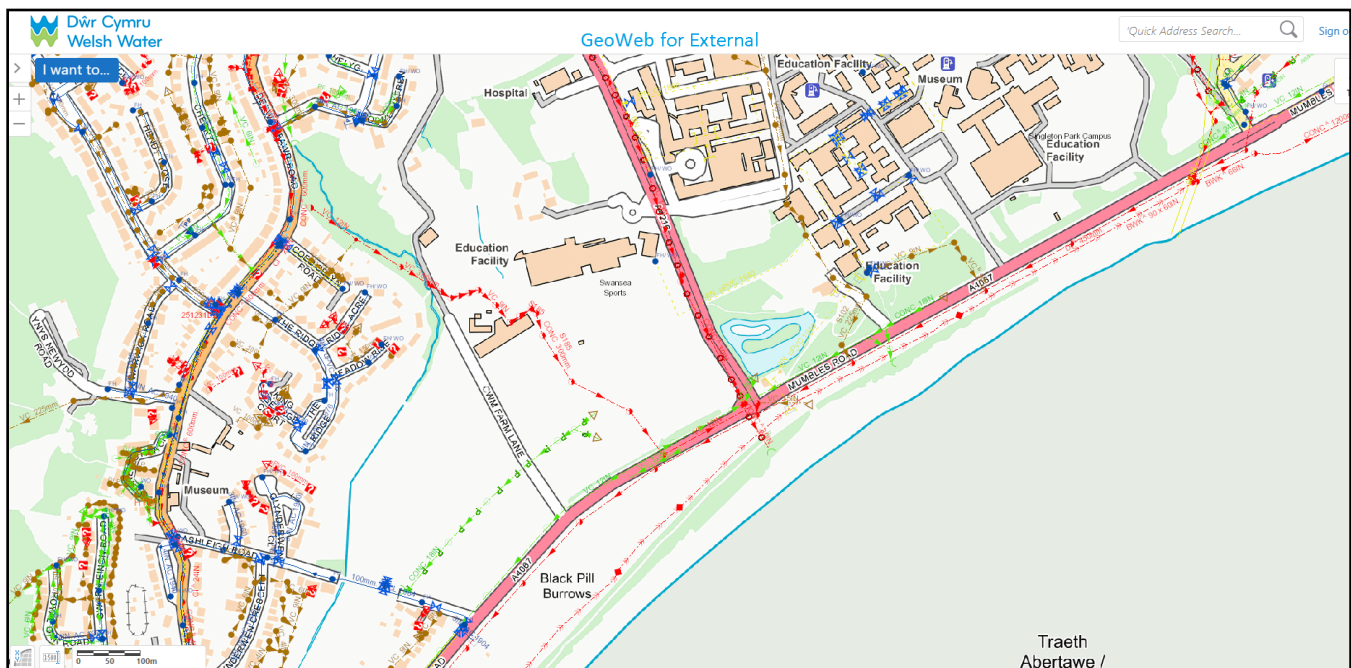


Figure 3 - [gisportal.dwrcymru.com](https://gisportal.dwrcymru.com/Html5Viewer/index.html?viewer=Web_External_Viewer#). (n.d.). Geocortex Viewer for HTML5. [online] Available at: https://gisportal.dwrcymru.com/Html5Viewer/index.html?viewer=Web_External_Viewer#.

Figure 3 illustrates a utility map sourced from Dŵr Cymru Welsh Water's GeoWeb system, showing critical underground infrastructure within the proposed construction area. The map identifies red lines representing foul drainage networks and green lines indicating surface water or combined sewer systems.

Any proposed alterations or connections to these systems must be approved through Welsh Water Developer Services in accordance with statutory obligations under the Water Industry Act 1991. - Available at: <https://developers.dwrcymru.com/en/help-advice/guidance-notes>

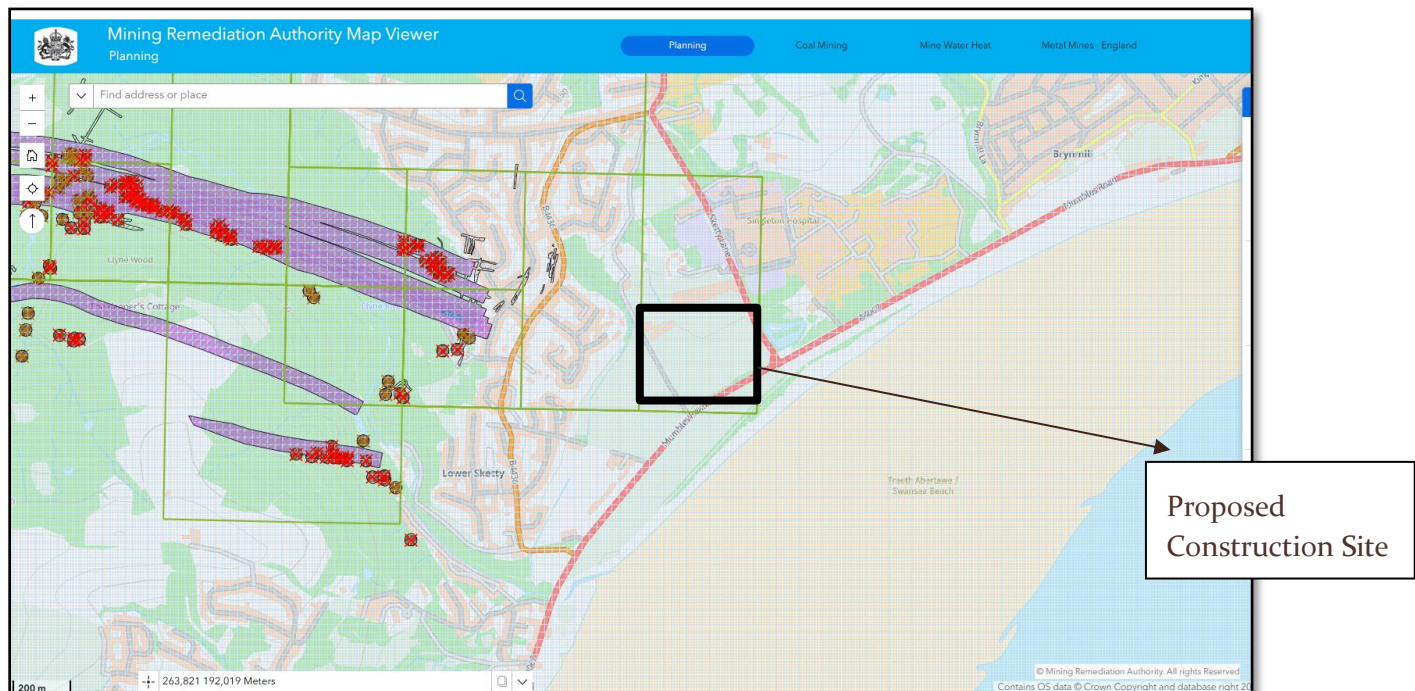


Figure 4 - Mining Remediation Authority (2021). The Coal Authority Map Viewer. [online] Arcgis.com. Available at: <https://datamine-cauk.hub.arcgis.com/>.

The figure above shows a coal map of the surrounding area, indicating the locations of local mines and the tunnels that were excavated to access them. This does not affect this site, although they could potentially contribute to soil contamination.

Geotechnical Investigation and Testing

Boreholes:

BS EN ISO 22476-9:2020

The document BS EN ISO 22476-9:2020 is a British standard document to guide on how geographical investigation is carried out. The document specifies how to execute, required equipment, and reporting on the field vane tests (FVT). It is a requirement to carry these tests out due to determine the undrained shear strength of the ground. In which to identify the sensitive saturated, fine-grained soils such as soft clays. Which being located near the coast which impacts the ground conditions.



Geotechnical investigation and testing — Field testing

Part 9: Field vane test (FVT and FVT-F)

*Figure 5 - BSI Standards Publication
Geotechnical investigation and testing -Field
testing. (n.d.).*

From the proposed location plan of the development a bore hole assessment was carried out on Sketty Lane for the development sport center. This assessment was carried out in accordance with BS 8004:2015+A1: 2020. The document provides practical guidance for the safe design, construction, testing, and maintenance of all foundation types. It outlines the principles of ground investigation, bearing capacity assessment, settlement analysis, and load transfer, while also covering shallow and deep foundations, underpinning, helical piles, and construction quality requirements. The standard emphasizes understanding soil and rock behavior, managing groundwater, and ensuring appropriate testing and monitoring. In which the foundations perform reliably throughout their service of life.

For the investigation to the near neighboring site of Sketty Lane, sports center. Bore holes were necessary, are drilled to obtain essential information about the subsurface, including soil and rock layers, groundwater levels, and geotechnical properties needed for foundation design. They allow for sampling, in-situ testing such as SPTs, and the installation of monitoring equipment. Borehole positions and depths should be planned to capture variations in ground conditions, and all logs should record strata, groundwater observations, and test results to support reliable geotechnical assessment.

Referenced from (BS 8004:2015+A1: 2020)

The results for the Sketty Lane under the British Geological survey are as shown below for the sports center:



British
Geological
Survey

BGS ID: 370610 : BGS Reference: SS69SW118
British National Grid (27700) : 262380,191740

Contract : SKETTY LANE POOL
Client : SWANSEA CITY COUNCIL

SS69SW 118

Borehole N.
BH 1A

Dates : 12/04/99 - 13/04/99

Job Number : A90763

Ground Level : m A.O.D.

Location :

Engineer : B. V. Williams
Partnership

Coordinates: E
N

Samples & Tests				STRATA			
Depth	Type No	Test Result, N. Blow Counts () SPT, () U100	Depth (Thick- ness)	DESCRIPTION	Red. Level	Legend	Water Insta Back
			(0.50)	MADE GROUND... Topsoil and building rubble (Drillers description)			
			0.50	Grey brown occasionally mottled orange sandy silty CLAY with some fine to coarse subangular to subrounded gravel of varying lithologies			
1	1.20 - 2.00	B1	(1.50)				
2	2.00 - 2.45	C	2.00	Stiff brown sandy CLAY with much fine to coarse subangular to subrounded gravel and some cobbles of varying lithologies			
	2.45 - 3.00	B3					
3	3.00 - 3.45	C	(3.10)				
	3.45 - 4.00	B5					
4	4.00 - 4.45	C					
	4.45 - 5.10	B7					
5	5.00 - 5.10	C	5.10	End of Borehole			

Boring Progress and Water Observations						Groundwater		Chiselling		
Date	Time	Depth	Casing	Cas. Dia.	Water	Struck	Behaviour	Scaled	From	To
12/04/99	EOD	2.00	2.00	150 mm			None encountered during boring		2.40	2.60
13/04/99	EOB	5.10	5.00	150 mm					2.70	3.00
									3.30	3.70
									3.70	4.00
									4.10	4.50
									4.70	4.90

Remarks: Pilon wayfarer cable percussion drilling rig, using 150 mm diameter casing and boring tools.



THYSSEN
GEOTECHNICAL

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Carmarthenshire, SA14 9SU
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A. Broom

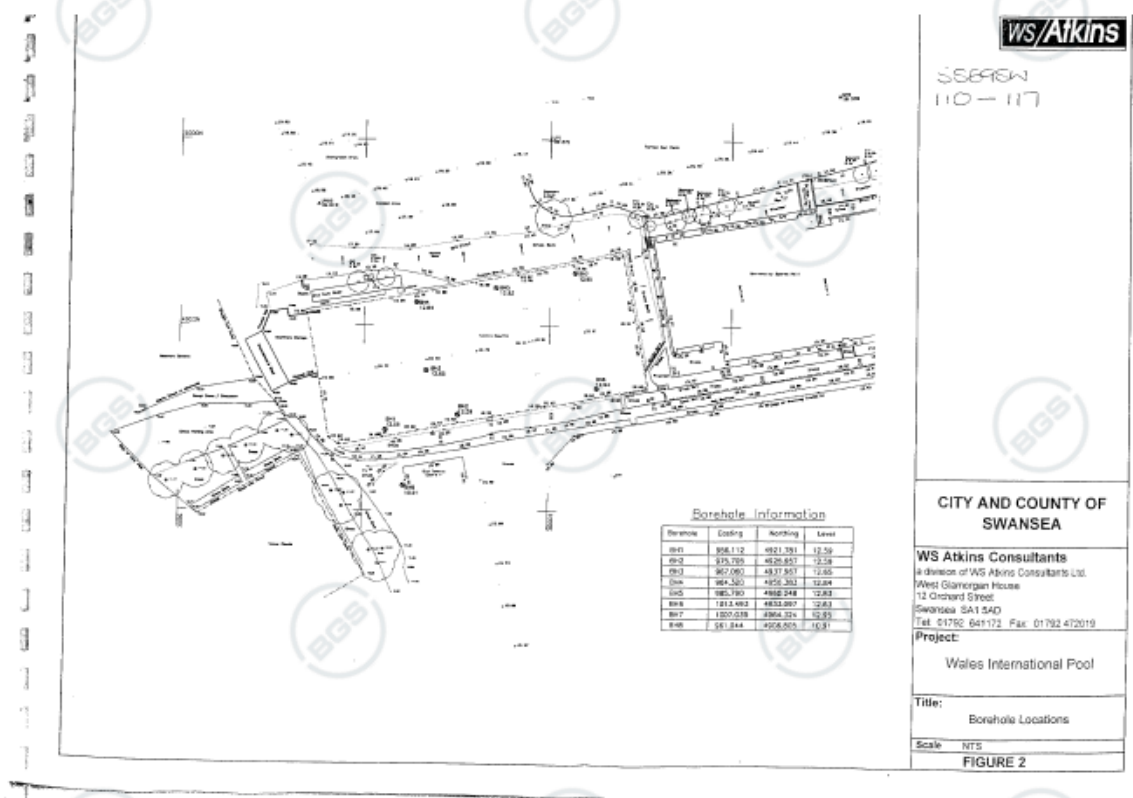
Sheet No.
1 Of 1

Scale:
1:60.98

All measurements in
metres unless
otherwise stated

Figure No.
2A

Contact BGS: ngdc@bgs.ac.uk





6236 9170 SS69SW 111

Contract :Wales International Pool										Borehole No.	
Client : City and County of Swansea										BH 2	
Dates : 3/11/99 - 4/11/99					Job Number : A90841			Ground Level : 12.59 m A.O.D.			
Location : Swansea University Sports Centre					Engineer : WS Atkins Consultants Limited			Coordinates: 975.74 E 4925.96 N			

Samples		Tests		STRATA		Red. Level	Legend	Water	Install/Backfill
Depth	Type No	Depth	Test Result, N. Blow Counts	Depth (Thickness)	DESCRIPTION				
				0.10	MADE GROUND - Concrete	12.49			
				(0.60)	MADE GROUND - Subbase				
0.70 - 1.00	B1			0.70	MADE GROUND... Very loose pale grey to dark grey black slightly clayey silty very sandy (fine to coarse) angular to subrounded fine to coarse gravel with some cobbles glass and brick fragments.	11.89			
1.00 - 1.45	B2	1.00 - 1.45	(C) 1 (2, 2, 1, 0, 0, 0)						
1.45 - 2.00	B3								
2.00 - 2.45	B4	2.00 - 2.45	(C) 2 (1, 0, 0, 0, 1, 1)						
2.45 - 3.00	B5			(3.50)					
3.00 - 3.45	B6	3.00 - 3.45	(C) 1 (1, 0, 0, 0, 0, 1)						
3.45 - 4.00	B7								
4.00 - 4.45	B8	4.00 - 4.45	(C) 8 (1, 0, 2, 2, 2, 3)	4.20	Firm to stiff grey to dark grey slightly sandy (fine to coarse) silty CLAY with some gravel	8.30			
4.45 - 5.00	B9			4.45	Dense pale brown to brown occasionally grey clayey silty sandy (fine to coarse) angular GRAVEL with occasional cobbles	8.14			
5.00 - 5.45	B10	5.00 - 5.45	(C) 41 (4, 8, 13, 8, 11, 3)	(1.15)					
5.45 - 6.00	B11								
6.00 - 6.45	B12	6.00 - 6.45	(C) 62 (11, 12, 10, 14, 19, 13)	5.60	Very dense grey to dark grey occasionally red brown to brown slightly silty sandy fine to medium rounded to subrounded occasionally angular GRAVEL with some to much cobbles and possible boulders	6.09			
6.45 - 7.00	B13								
7.00 - 7.45	B14	7.00 - 7.45	(C) 53 (8, 10, 12, 12, 16, 13)	(2.86)					
7.45 - 8.00	B15								
8.00 - 8.45	B16	8.00 - 8.45	(C) 63 (6, 8, 11, 13, 17, 13)	8.45	End of Borehole	4.14			

Boring Progress and Water Observations					Groundwater			Chiselling			
Date	Time	Depth	Casing	Cas. Dia.	Water	Struck	Behaviour	Sealed	From	To	Hours
03/11/99	EOD	4.45	4.00	200 mm	-		None encountered during boring.		4.70	4.90	1
04/11/99	EOB	8.45	8.30	200 mm	-				5.60	5.80	1
									5.80	6.00	1
									6.30	6.60	1
									6.70	6.90	1
									7.50	7.80	1

Remarks: Pilon Wayfare cable percussive drilling rig using 200 mm diameter casing and boring tools. Borehole terminated at 8.45m and backfilled with compacted arisings.

	THYSSEN GEOTECHNICAL	Bynes, Llanelli Central Business SA14 9SU Tel: 01354 772244 Tel: 01354 776190 email: j.poon@thyssen.co.uk	Operator:	Logged By:	Sheet No.	Scale:	All measurements in metres unless otherwise stated	Figure No.
			B. Hawkins	K. Hughes	1 Of 1	1:60.98		

Library File: J:\KIN\THYSSEN\GLB Form Name: SAISP1 Version: 2.0 08/01/99

The results for the borehole investigations within the proposed site of construction:

Depth: 0–1.2 m - Topsoil & Made Ground

- Turf and rootzone materials
- Imported fill from historic pitch and sports centre construction
- Occasional sand or gravel layers from earlier drainage systems

Depth: 1.2–6 m - Glacial Till

- Firm to stiff sandy clay
- Interbedded silt lenses
- Occasional gravel pockets
- Moderate moisture content
- Variable stiffness affecting drainage performance

This aligns with the widespread Devensian glacial till mapped across Swansea's coastal plain.

Depth: 6–10 m - Glaciofluvial Sands & Gravels

- Higher-permeability zones
- Potential for perched groundwater
- Suitable for soakaway design if encountered

These deposits are mapped locally beneath Sketty and Swansea Bay.

Depth >10 m - Bedrock (Coal Measures)

- Deeper than 12–15 m in this area

The Swansea district has Pennant Sandstone and Coal Measures, but these are buried beneath thick deposits.

Referenced from: webapps.bgs.ac.uk. (n.d.). *Geology of the Swansea district: a brief explanation. Sheet 247*. [online] Available at:

<https://webapps.bgs.ac.uk/memoirs/docs/Bo6123.html>.

Ground Water Conditions:

The ground water conditions of the land around the proposed construction area is strongly influenced by its coastal setting, the nature of the superficial deposits, and the historical use of the land as sports fields. Together, these factors create a groundwater regime that is both shallow and seasonally variable.

The site lies only a short distance inland from Swansea Bay, on low-lying ground formed by glacial and post-glacial deposits. As a result, groundwater is commonly encountered between 1.5 m and 3.5 m below ground level, depending on the season and recent rainfall.

Reference - Sketty Lane Playing Fields Outfield Drainage Improvements | Stotles. (2025). *Sketty Lane Playing Fields Outfield Drainage Improvements* | Stotles. [online]

Foundation types

The results of the geotechnical surveys will determine the most appropriate foundation type for the project's ground conditions.

Analyzing foundation types:

Strip foundations provide a simple and efficient solution for supporting continuous loads such as walls or closely spaced steel columns, performing best where the underlying soil is uniform and stable. They require less concrete than raft foundations and are straightforward to construct, making them a cost-effective option in suitable ground conditions. However, they become less reliable on soft, variable, or water-affected soils, where long trenches may become unstable and differential settlement can occur. Their performance is also limited in areas with high groundwater, which can soften the bearing surface or cause trench collapse.

Reference - BRE Group. (2016). *BRE Bookshop*. [online] Available at: <https://bregroup.com/store/bookshop>.

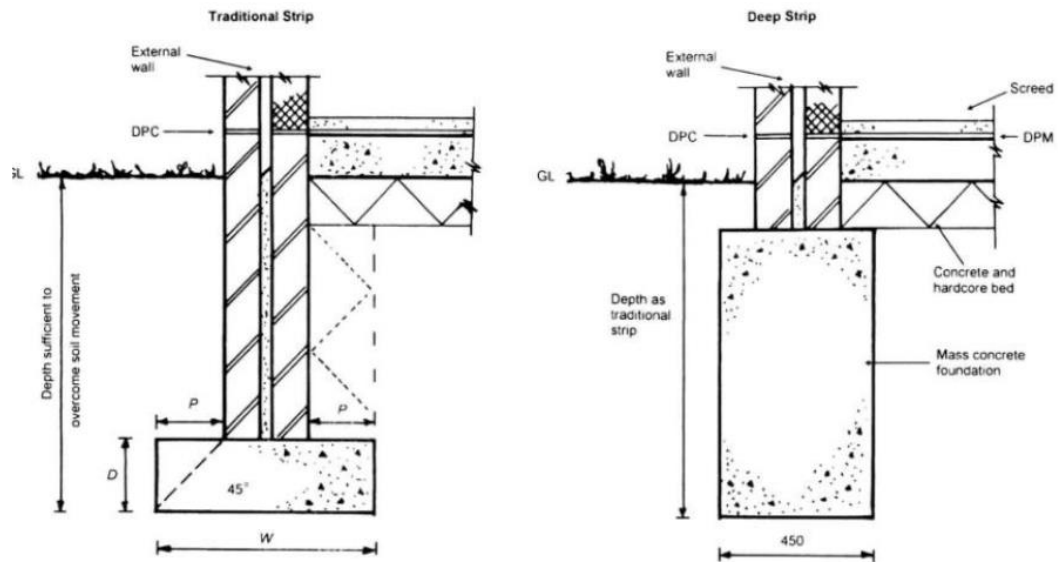


Figure 6 - Designing Buildings (2022). Strip foundation. [online] www.designingbuildings.co.uk. Available at: https://www.designingbuildings.co.uk/Strip_foundation.

Pad foundations are simple, isolated concrete footings designed to support individual columns, making them a cost-effective choice where the soil has a good, uniform bearing capacity. They are quick to construct, require relatively small excavations, and work well for steel-framed buildings arranged on a regular grid. However, they are less suitable on weak, highly variable, or waterlogged ground, where differential settlement can occur and additional ground beams or deeper foundations may be needed.

Referenced: Test book. (2024). *Pad Foundation: Types, Factors, and Advantages and Disadvantages*. [online]



Figure 7 www.iss.lv. (n.d.). pad foundation construction. [online]

However, the choice which I have made to propose for a foundation type is a screw pile foundation. The Screw-pile foundation is well suited for a high-rise construction due to the area's shoreline contains soft, saturated, and low-bearing-capacity soils. In which conditions where traditional concrete foundations would settle and fail. Helical piles perform reliably in these environments because they can provide strong compression and anchor deeply into competent strata. In which avoids the need for excavation or curing delays. The installation produces minimal vibration and noise, which is essential in Swansea's developed waterfront where existing buildings and sensitive infrastructure could be affected by driven piles. They also offer rapid installation with immediate load capacity, a major advantage in coastal projects where construction windows are limited by weather and tidal cycles. Moreover, screw piles minimise environmental disturbance by generating almost no spoil and reducing carbon emissions compared with concrete foundations, making them suitable for ecologically sensitive coastal zones. They can be proven stability in weak, saturated, or flood-prone soils. In which further supports why they are to be used in coastal cities like Swansea, where erosion and high groundwater levels are common challenges.

References: Fli.co.uk. (2025). *Screw Pile Foundations & Steel Grillage Solutions* | *FLI Structures*. [online]

Aarsleff Ground Engineering. (2025). *Screw Piling - Aarsleff Ground Engineering*. [online]

"Screw pile foundations offer advantages like fast, clean installation (no concrete curing, minimal excavation/mess), eco-friendliness (less waste, reusable, preserves trees), versatility in many soil types (including wet ground), and suitability for difficult access, while disadvantages include potential higher initial cost, difficulty in very rocky soils, reliance on specialized installers, and limitations for extremely heavy loads compared to deep concrete piers, though they often prove cost-effective overall due to time and labor savings" - Frédéric Cliche-Carrière (2024). *Screw Piles: Advantages, Disadvantages, and Comparisons with Other Foundations*. [online] Postech Screw Piles.



Figure 8 - Fli.co.uk. (2025). *Screw Pile Foundations & Steel Grillage Solutions* | *FLI Structures*. [online]

Basement Construction

The basement construction within the proposed location requires a carefully engineered approach because the area sits on soft reclaimed soils with high groundwater levels and tidal influence, making ground conditions challenging and unstable.

The process typically begins with a detailed geotechnical investigation and a Basement Impact Assessment to understand groundwater behavior, soil strength, and potential effects on nearby buildings. In this case the water table is high due to the location. Therefore, deep foundation such as screw foundations are driven into the ground to bedrock, which will provide a secure base. Temporary works such as sheet piles or secant pile walls are used to retain the saturated ground, while continuous dewatering is needed throughout excavation to control groundwater inflow. Excavation proceeds in stages with bracing added as a required. Once the final depth is reached, a heavily reinforced concrete slab is constructed to resist uplift pressure from groundwater. Basement walls are then formed often using secant piles or reinforced concrete and protected with robust waterproofing systems that combine membranes, waterproof concrete, and internal drainage in accordance with BS 8102:2022. After waterproofing and structural works are complete, the basement is backfilled and the superstructure can be built above. This method ensures long-term stability and water resistance in Swansea's demanding coastal environment

Referenced: BS 8102:2022 - European Standards (2022). *BS 8102:2022 Protection of below ground structures against water ingress. Code of practice.* [online]

Basement waterproofing solutions:

Depending on the results from the geographical survey a analysis will take place to choose the correct system for the waterproofing which the options are as below:

“A basement waterproofing specification involves selecting a system (Type A barrier, Type B integral, or Type C drained) based on required dryness (Grades 1-3) as per BS 8102:2022, considering soil type and water table, and integrating products like cementitious coatings, cavity membranes, or structural admixtures to create a continuous barrier or manage water flow, often combining methods (e.g., Type A+C) for robust protection”. - Safeguard Europe. (2022). *Basement and Cellar Waterproofing (Tanking) solutions.* [online]

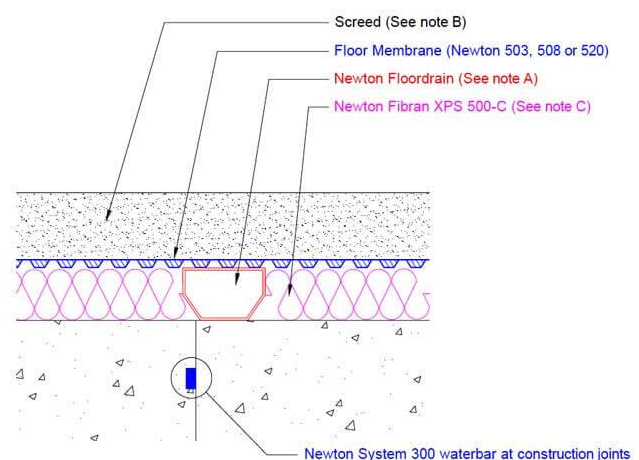


Figure 9 - Muschialli, W. (2019). *Waterproofing Existing Basements.* [online]

Structural Body & Frame

For the structural frame of the high-rise building, I will evaluate and compare several alternative construction proposals to determine the most appropriate system for the project.

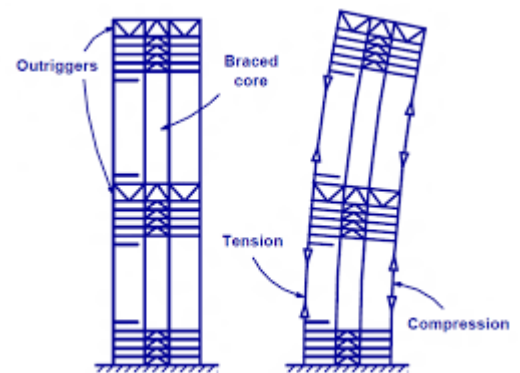
Outrigger system:

In which an outrigger system uses rigid horizontal structures (like trusses or walls) to connect a building's central columns to its perimeter columns. This dramatically increases stiffness and strength against wind/earthquakes. The loads by engaging the outer structure to resist overturning, effectively acting like the outrigger floats on a canoe for stability, preventing excessive sway and improving performance in tall buildings.

Referenced; Choi, H., Ho, G., Joseph, L. and Mathias, N. (n.d.). *Outrigger Design for High-Rise Buildings 2nd Edition An output of the CTBUH Outrigger Working Group*. [online]

Advantages:

- Enhanced stiffness of the structure
- The load distribution is shared more equally
- Can reduce the cost of the foundation price to construct
- The most efficient way to build a high-rise structure, due to materials used as other methods would fall short to this.



Disadvantages:

- Increase complexity to the structure to build
- Can slow down the construction due to how complex it is to build
- Creates stiff floors which could crack in the longevity of the building
- Advanced performance design required to cope with wind
- Outrigger elements can experience large gravity forces. Due to differential shortening, requiring robust design.

Figure 10 - 1: Outrigger structural system
(Source -Google slideshare by Akshay... |
Download Scientific Diagram

Braced frame:

A braced frame structure relies on diagonal members integrated into a beam-and-column framework to resist lateral forces such as wind and earthquakes. By assuming simple pinned connections for gravity loads, the system achieves high stiffness and stability at a lower cost than rigid frames, with beams and columns carrying vertical loads while the braces manage horizontal actions. Braced frames are widely used in steel and timber construction due to their efficiency and economy, though the presence of bracing can

restrict architectural freedom. Even so, contemporary designs often turn these structural elements.

Referenced Designing Buildings
(2016). *Braced frame structures* -
Designing Buildings Wiki.

Advantages:

- The structure has a high lateral resistance
- Cost effective solution
- Stiffness and strength within the structure due to the bracing.
- Effective design solution
- Minimizes lateral sway

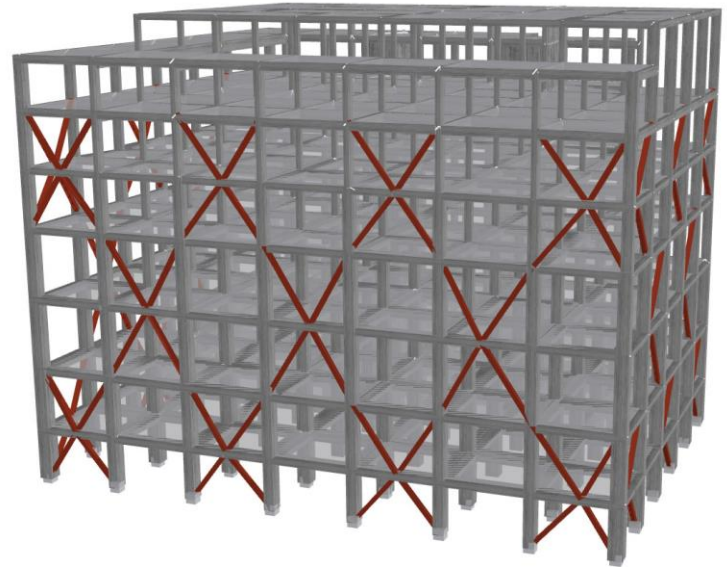


Figure 11 - Antoniou, S. (2022). *Steel Bracing*. [online] Seismosoft

Disadvantages:

- Obstructs space for doors, windows etc.
- Can be complex to make the connections for the bracing
- The bracing element involves creating bespoke materials.

Building Envelope

A local company/manufacturer based in Port Talbot, Tata Steel supplies SIP panel systems that would contribute effectively and perform well within this proposed design Tata steel sips panels.

“The Trisomet[®] is a steel insulated panel for both roof and wall cladding with a wide spaced trapezoidal external steel skin providing optimum performance for water drainage, strength and walkability. Available with factory applied side lap sealant (FASS) for improved weather performance and faster installation speeds “- Tata Steel UK. (2025). *Insulated roof panels and systems*. [online] Figure 12 is a document on how the insulation of the product is required to be fitted to guarantee the warranty of the product one built.



Trisomet[®]
External roof and wall panel system

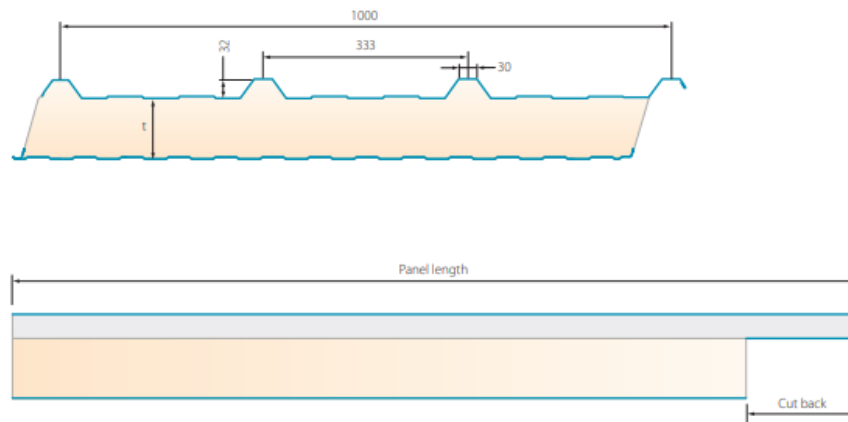


Figure 12 - Tata Steel UK.
(2025). *Insulated roof panels and systems*. [online]

Trisomet®

System performance data

Trisomet®



General panel information

Thickness, t (mm)	40, 60, 80, 100, 120 and 135
Maximum length (mm)*	20000
Minimum length (mm)	300
Cutback (mm)**	
Minimum	25
Maximum	250***
Weight (based on thickness mm) (kg/m ²)	
40	9.23
60	10.01
80	10.40
100	11.22
120	12.03
135	12.76

* The panel length is measured by the length of the external sheet, as shown above. Lengths over 14000 mm will be subject to additional delivery charges.

** Panels will always have one flush end and one cutback end; therefore, they will be handed and should be ordered according to the direction of lay required.

*** Recommended end laps are 50 mm for horizontal, 100 mm for vertical and 150 mm for roof applications.

Panel manufacturing tolerance

Cover width (mm)	±2
Thickness (mm)	±2
Squareness (mm)	<6
Cutback (mm)	-2 +5
Length (mm) < 3 m	±5
Length (mm) > 3 m	±10

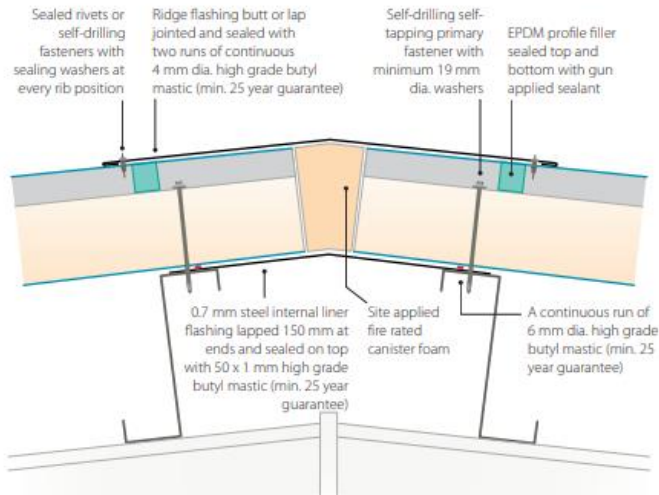
Tolerance is in accordance with BS EN 14509.

General reference

All measurements throughout this brochure are referenced in mm unless stated otherwise. Technical illustrations are not to scale.

Figure 13 –Roof/wall System insulation and performance - Tata Steel UK. (2025). Insulated roof panels and systems.

Ridge



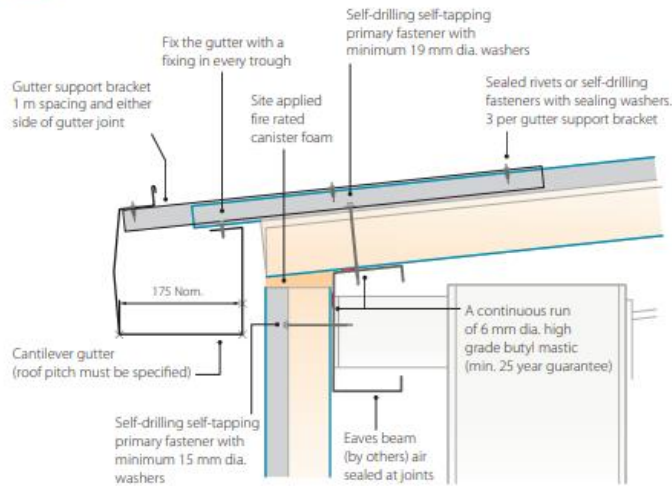
Ridge

Fillers should be positioned back from the edge of the ridge flashing by approximately 80 mm to avoid the risk of bird attack.

Psi value (W/mK)	f factor
0.009	0.975

Stated calculation results are dependant on components being as shown. Computer modelled in accordance with EN ISO 10211.

Eaves



Eaves

The Cantilever Gutter System is manufactured to suit the pitch of the roof and downpipes can be positioned as required.

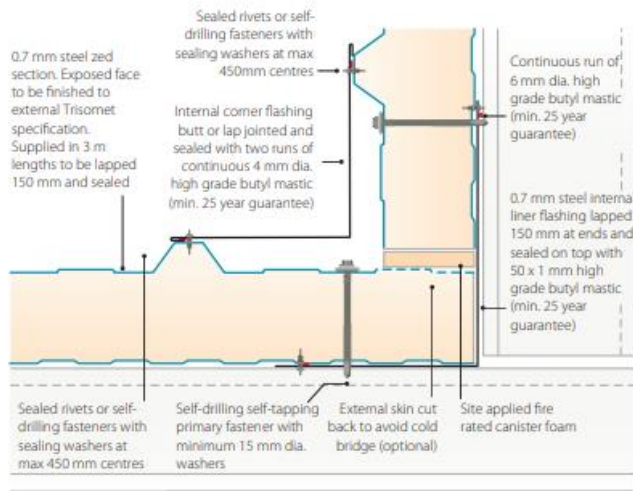
For further information on the Cantilever Gutter System and assistance with rainflow calculations please contact the Technical Department:
T: +44 (0) 1244 892199.

Psi value (W/mK)	f factor
0.222	0.903

Stated calculation results are dependant on components being as shown. Computer modelled in accordance with EN ISO 10211.

Figure 14 – Roof application details - Tata Steel UK. (2025). Insulated roof panels and systems.

Internal corner



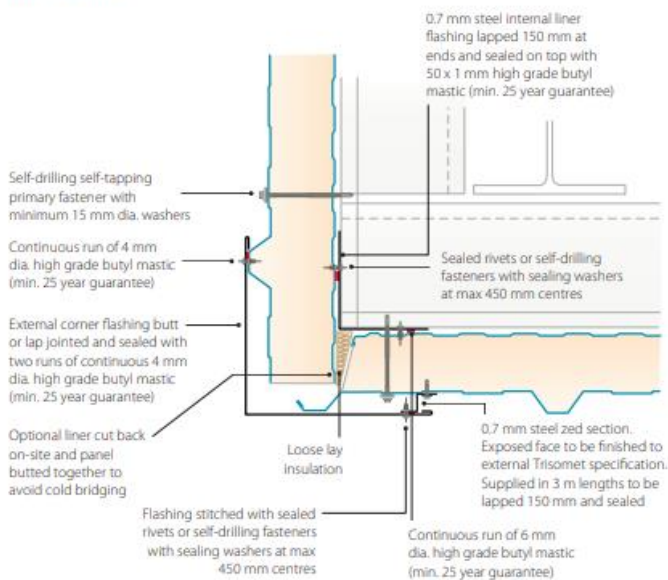
Internal corner

Thermal performance can be enhanced by the on-site removal of the panel outer skin, within the corner junction, therefore reducing the risk of cold bridging. The outer skin can be easily removed by running a circular saw through the steel approximately 100 mm from the panel edge and then peeling the cut strip away.

Psi value (W/mK)	f factor
With liner cut back	
0.041	0.957
Without liner cut back	
0.092	0.939

Stated calculation results are dependent on components being as shown. Computer modelled in accordance with EN ISO 10211.

External corner



External corner

Thermal performance can be enhanced by the on-site removal of the panel liner, within the corner junction, therefore reducing the risk of cold bridging. The liner can be easily removed by running a circular saw through the steel approximately 100mm from the panel edge and then peeling the cut strip away.

Psi value (W/mK)	f factor
With liner cut back	
0.019	0.940
Without liner cut back	
0.092	0.939

Stated calculation results are dependent on components being as shown. Computer modelled in accordance with EN ISO 10211.

Figure 15 – Internal walls make up and external building wall envelope - Tata Steel UK. (2025). Insulated roof panels and systems.

The Trisomet® system is a high-performance insulated panel solution suitable for both roof and wall cladding. The factory engineer and design which delivers reliable thermal efficiency and airtightness while enabling fast installation on site. The panels use a wide-spaced trapezoidal steel outer sheet, enhancing water drainage, structural strength, and safe walkability. Trisomet® is produced in accordance with BS EN ISO 9001:2015, BS EN ISO 14001:2015, and BS EN ISO 45001:2018, demonstrating strong quality,

environmental, and health and safety management. The system is backed by a Platinum® Plus 25-year building envelope guarantee. - Tata Steel UK. (2025). Insulated roof panels and systems. [online] Available at:

<https://www.tatasteeluk.com/construction/products/roof/insulated-roof-panels>

This type of system would be perfect for the harsh Swansea environment and protect the building from the elements.

On Site or Off-Site Construction

On site construction is when the materials are transported to site and constructed. The advantages of this method are:

- It has a flexible design. If changes need to be made on site
- Can make complex designs. Where prefabrication won't suite.
- Lower transportation costs/requirements
- Traditional workforce available on site. Many construction trades are trained to work for onsite methods

Disadvantages:

- Weather dependent on work on site
- Longer construction time for the construction to be completed.
- Higher levels of waste
- More disruption on site
- Quality control is harder to keep track of

Off-site construction, also known as modular construction, is when the building materials for the structure are prefabricated off site and transported to site for assembly. The advantages to this method are:

- Faster project delivery
- Quality control improvement over onsite
- Reduced waste
- Less site disruption between stages of construction
- Controlled work therefore health and safety are improved
- More predictable final sum due to costs

Summary

To summarize a screw pile foundation, offer a reliable solution because they perform well in softer soils, minimizing vibration during installation, and provides a strong load-bearing capacity despite the variable ground. The outrigger system adds crucial lateral resistance against coastal winds, while Tata Steel's off-site prefabrication approach reduces time spent on site and limits disruption from unpredictable weather. In which, these methods form a, efficient, resilient, and well-suited construction strategy for the proposed site location.

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